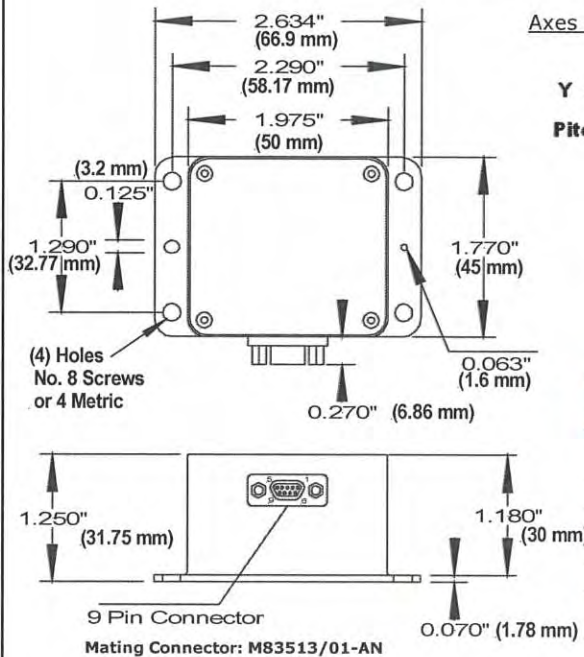
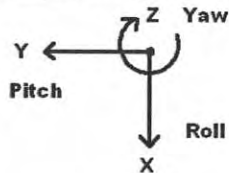


LandMark™ 20 AHRS



Axes (Top View) Right Hand Rule



LandMark™ 20 AHRS

LMRK20AHRS-075-02-300 or -10
LMRK20AHRS-150-02-300 or -10
LMRK20AHRS-300-02-300 or -10

Specification

PARAMETER	RATE AXES			ACCEL AXES	
Range	±75°/sec	±150°/sec	±300°/sec	±2 g's	±10 g's
Bias (Over Temp.)	<0.05°/sec 1 σ			< 1.0mg 1 σ	< 1.5mg 1 σ
Bias (In Run Stability)	15°/hour 1 σ			0.02mg 1 σ	0.1mg 1 σ
Scale Factor Error %	±0.1% (over temperature) 1 σ				
Sensor Resolution	0.005°/sec			0.025mg	0.08mg
Angle Random Walk	0.01° /sec/√Hz 1 σ			0.05mg /√Hz 1 σ	0.16mg /√Hz 1 σ
Alignment	1mrad 1 σ				
G-Sensitivity	<0.02°/sec/g 1 σ				
Self Test On	Δ 50 ± 25°/sec			Δ 1.5 ±0.5g	Δ 0.3 ±0.2g
Temp Range	Logic 1 = 3V to 5V at Pin 9 (open = off)				
	Operating: -40°C to +85°C Non-Operating: -55°C to +85°C				
Heading	± 0.5° stationary				
Pitch & Roll	± 0.25° stationary				
Altitude	± 3m 1 σ				
Update Rate	100 Hz or 10 Hz (user selectable)				
Temp Sensors	Internal Temperature Sensors				
Start-up Time	< 0.65 sec AHRS 200 Hz Spec Mode				
Input Power	+3.1V to 5.5V Max. Input (single sided)				
Power Consumption	600 mW at 3.3V typical 750 mW at 3.3V maximum				
Size	U.S.:	1.97 x 1.77 x 1.25 = 4.4 in ³			
	Metric:	5 x 4.5 x 3.2 = 72 cm ³			
Weight	110 grams				
Mounting	4ea No.8 or M4 Screws				
Shock	500g's ½ sine 30 msec powered				
Vibration	6gRMS (20Hz to 2KHz ~ 10g accelerometers)				
MTBF	31,428 hrs (per MIL-STD-217F, Notice 2 based on AIC environment with ambient temperature at 40 °C)				

Pin No.	Assignment
1	RS-485 A (+)
2	RS-485 B (-)
3	Power Ground
4	Analog/Digital Input (0V to 5V)
5	+3.1V to +5.5V Input Power
6	External Sync Input (1kHz or 1pps)
7	+5V Regulator Out
8	Signal Ground
9	Self Test

Outputs	Serial Sequence at 100Hz
1, 2, 3	Gyros: Roll (X), Pitch (Y), Yaw (Z)
4, 5, 6	Accelerometers: (X), (Y), (Z)
7	IMU Temperature
8, 9, 10	Magnetometers: (X), (Y), (Z)
11	Pressure
12, 13, 14	Angles: Roll, Pitch, Yaw
15, 16, 17	AC Velocities: (X), (Y) & Vertical Velocity: (Z)
18, 19, 20	Altitude, Temp, Forward Velocity

Specification subject to change without notice



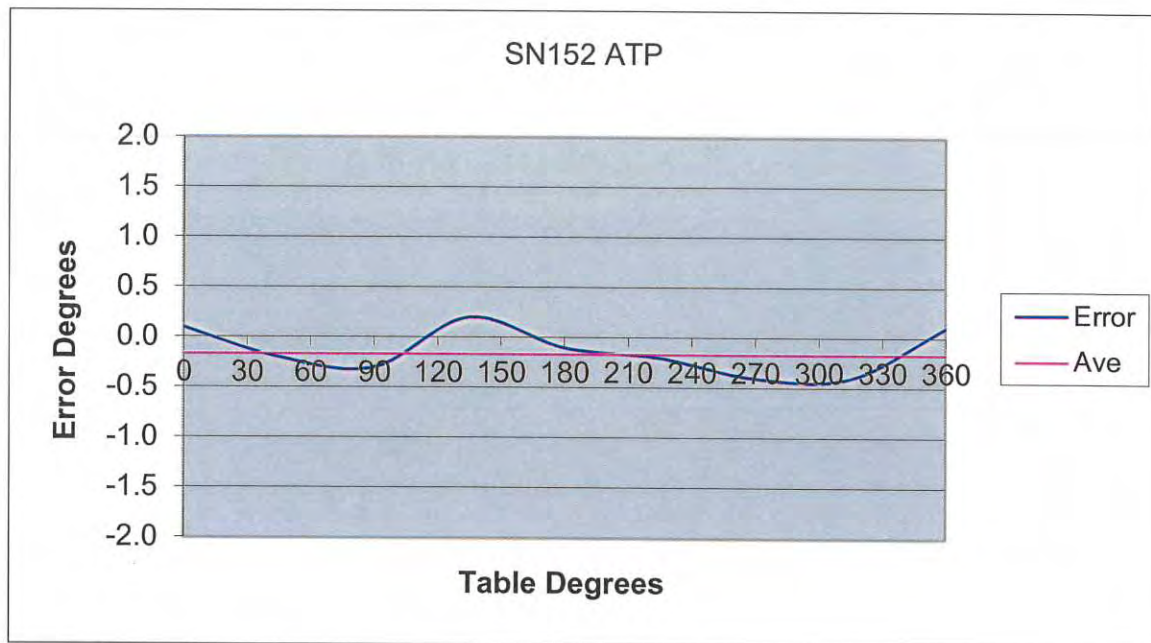
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Rev. Jan1312
SN: 150

Table Position degrees from N	Heading AHRS °	Error degrees	Average degrees
0	0.1	0.1	-0.2
45	44.8	-0.2	-0.2
90	89.7	-0.3	-0.2
135	135.2	0.2	-0.2
180	179.9	-0.1	-0.2
225	224.8	-0.2	-0.2
270	269.6	-0.4	-0.2
315	314.6	-0.4	-0.2
360		0.1	-0.2
ave err =		-0.2	





LMRK20AHRS-150-10-300

AHRS eXT

Rate Spin Test

Test	gyroX	gyroY	gyroZ	accelX	accelY	accelZ	temp X
PX	7197.401	1.235	0.074	-0.263	-0.416	-4.341	2560.482
NX	-7203.51	-10.504	0.932	-0.3105	-0.8665	-4.8505	2560.642
Diff/2	7200.457	5.8695	-0.429	0.02375	0.22525	0.25475	-0.08
Ave	-3.056	-4.6345	0.503	-0.28675	-0.64125	-4.59575	2560.562
PY	0.361	7197.856	-0.418	-0.6255	0.348	-4.366	2556.134
NY	-7.858	-7200.97	0.052	-0.303	0.4855	-4.93	2556.257
Diff/2	4.1095	7199.411	-0.235	-0.16125	-0.06875	0.282	-0.0615
Ave	-3.7485	-1.5545	-0.183	-0.46425	0.41675	-4.648	2556.196
PZ	-3.309	-2.511	7196.412	-0.4225	-0.519	0.7025	2543.642
NZ	-3.811	-2.902	-7202.02	-0.8155	-0.8915	0.621	2544.102
Diff/2	0.251	0.1955	7199.218	0.1965	0.18625	0.04075	-0.23
Ave	-3.56	-2.7065	-2.8055	-0.619	-0.70525	0.66175	2543.872
RSF Norm	1.000063	0.999918	0.999891				Temp °C 25.54

Gyro Mis-Align deg/sec				Input Rate
x		0.04	0.00	x
y	0.06		0.00	y
z	0.00	0.00		z

Gyro Mis-align mrad				Input Rate
x		0.57	0.03	x
y	0.82		0.03	y
z	-0.06	-0.03		z

Accepted by:



Ray Fritch



LMRK20AHRs-150-10-300
AHRs eXT
Accelerometer Tumble Test

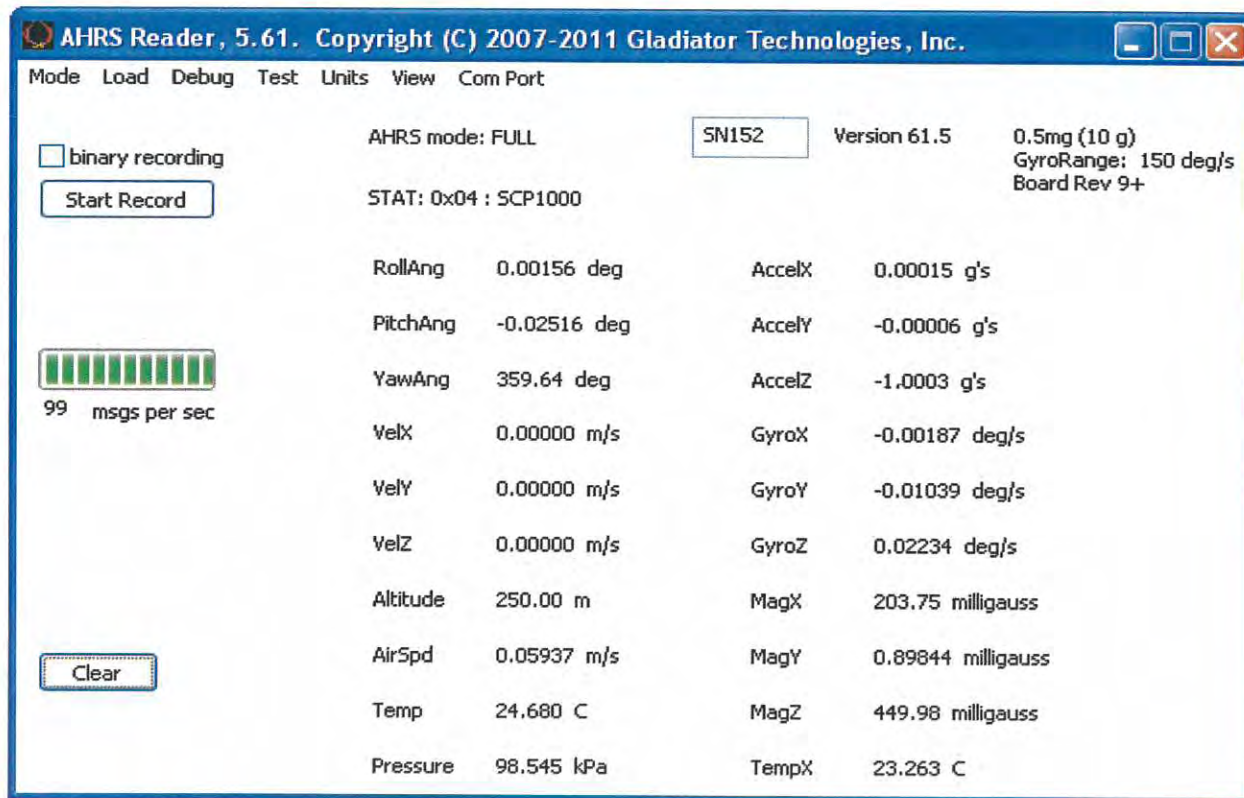
Test	gyroX	gyroY	gyroZ	accelX	accelY	accelZ	temp X
PX	-1.55	-1.485	-0.692	998.9615	-0.026	-0.428	2555.536
NX	-0.833	-1.175	-0.711	-1001.24	1.0815	0.598	2554.227
Diff/2	-0.3585	-0.155	0.0095	1000.102	-0.55375	-0.513	0.6545
Ave	-1.1915	-1.33	-0.7015	-1.14	0.52775	0.085	2554.882
PY	-1.399	-1.052	-0.593	-0.6125	998.818	0.09	2558.409
NY	-1.61	-2.797	-1.175	0.4925	-1001.27	0.1685	2559.647
Diff/2	0.1055	0.8725	0.291	-0.5525	1000.045	-0.03925	-0.619
Ave	-1.5045	-1.9245	-0.884	-0.06	-1.227	0.12925	2559.028
PZ	-1.455	-1.582	-1.417	0.2155	0.2745	999.892	2558.94
NZ	-1.715	-1.533	-1.002	-0.0245	-0.3095	-1000.05	2558.884
Diff/2	0.13	-0.0245	-0.2075	0.12	0.292	999.9695	0.028
Ave	-1.585	-1.5575	-1.2095	0.0955	-0.0175	-0.0775	2558.912
Bias %s,mg	-0.01	-0.02	-0.01	0.02	0.26	0.11	25.58
ASF Norm				1.0001	1.0000	1.0000	Temp °C

Gyro °/s /g	Input g =			Accel In g's
x	-0.004	0.001	0.001	x
y	-0.002	0.009	0.000	y
z	0.000	0.003	-0.002	z

Accel	Mis-Align	mrads	Accel In
-0.55	-0.55	0.12	x
-0.51	-0.04	0.29	y
			z

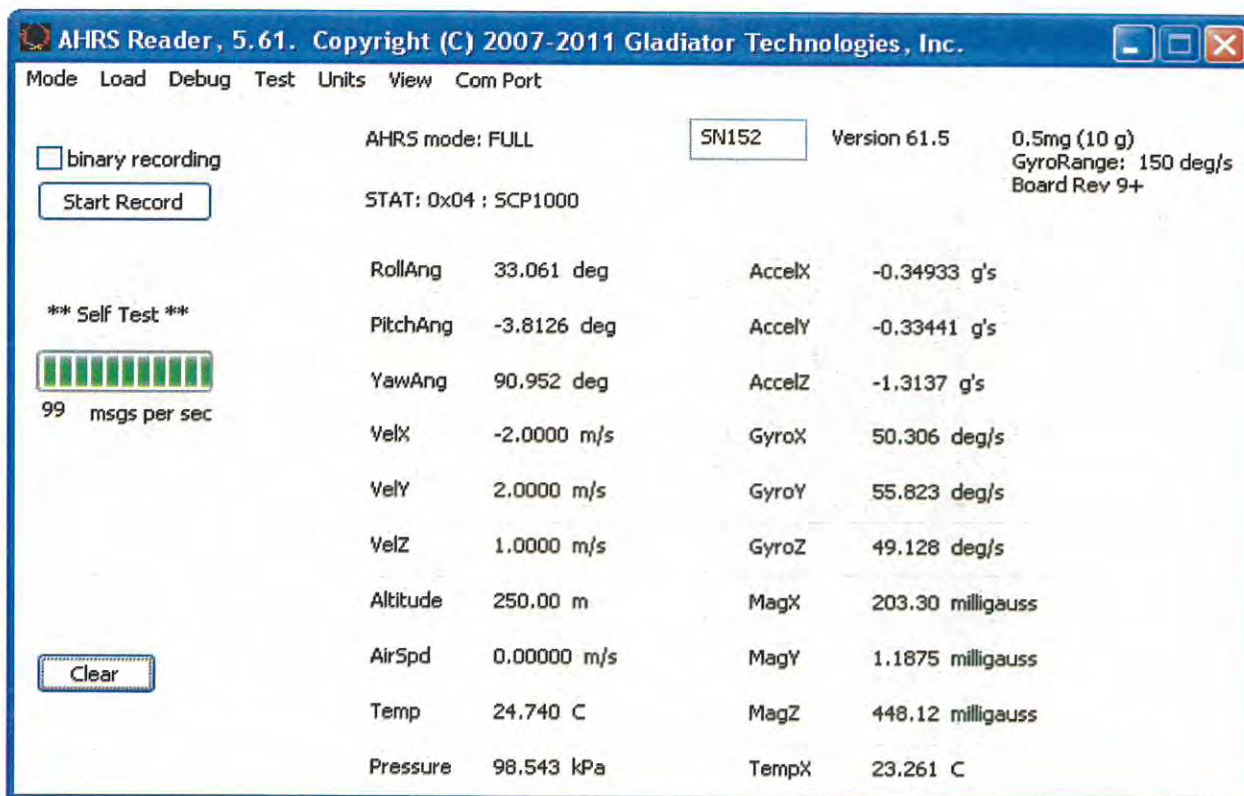
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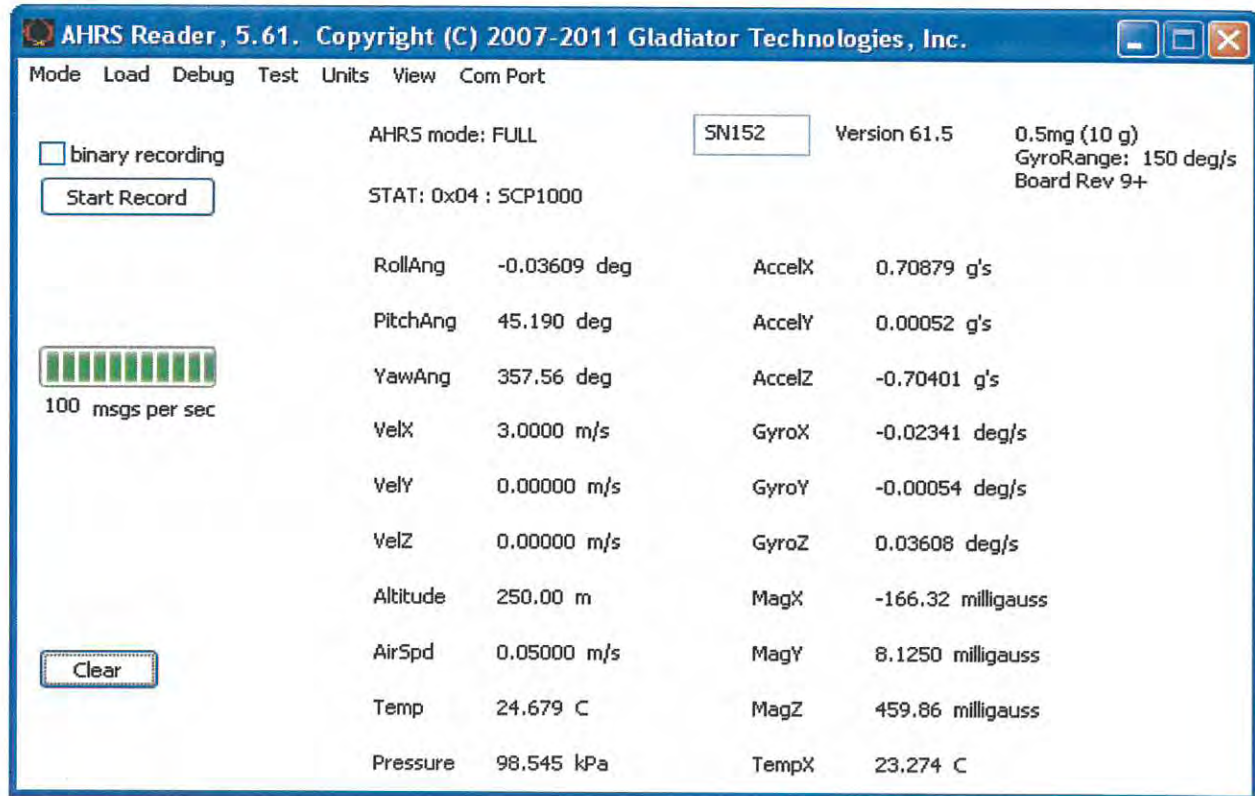




Initial Bench Readout (above)

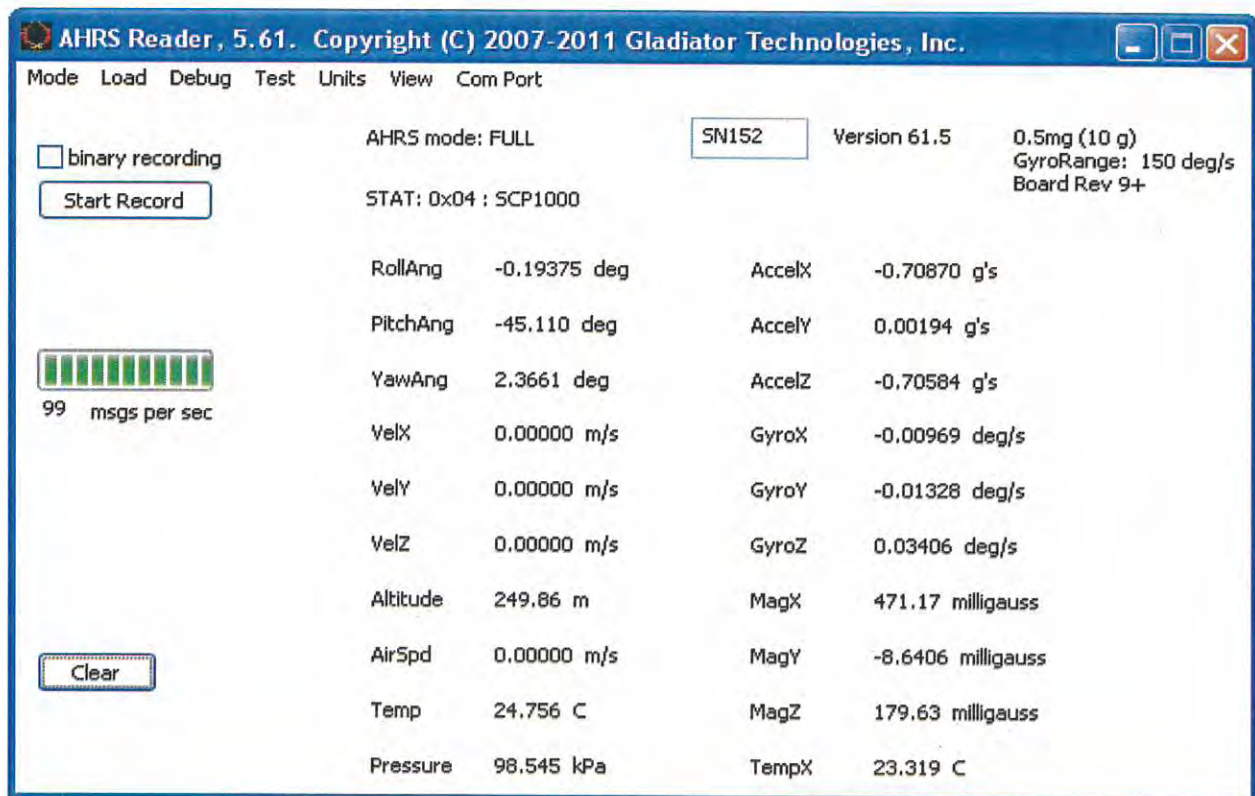
Self Test (below)

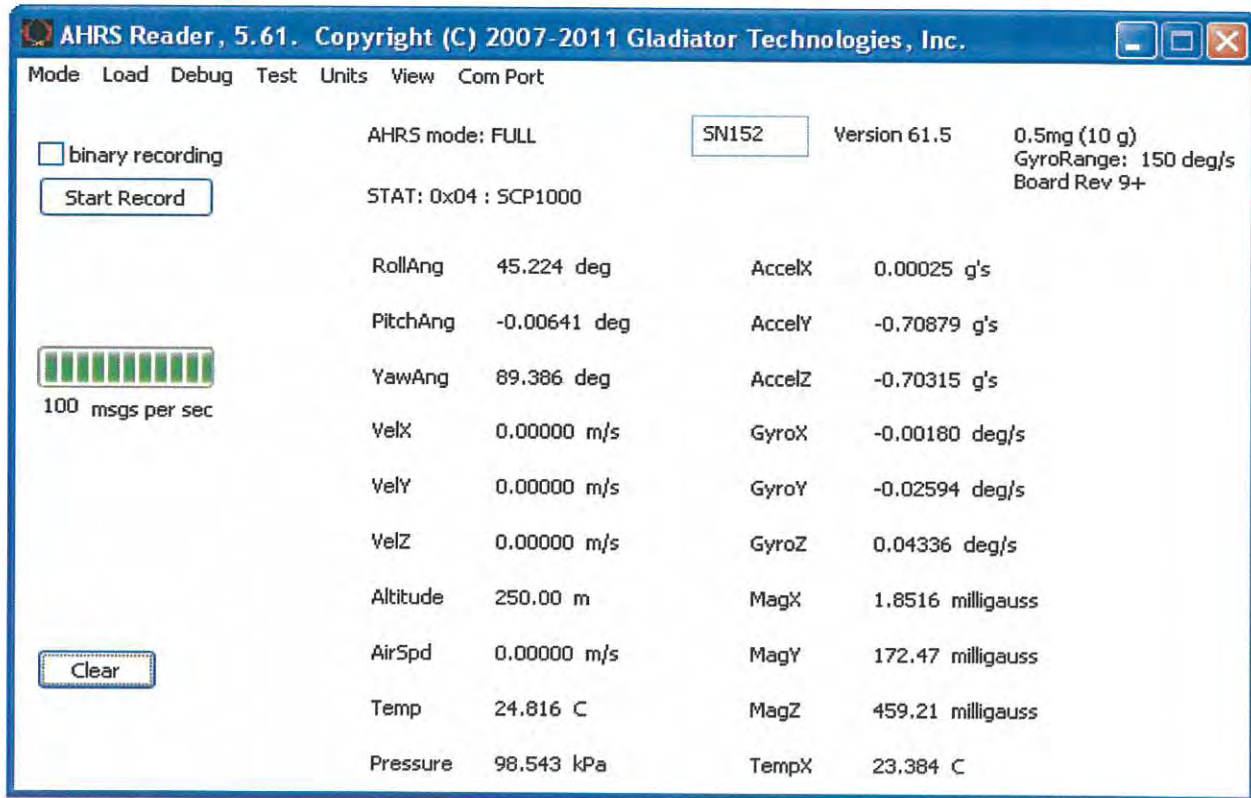




Pitch Up 45° (above)

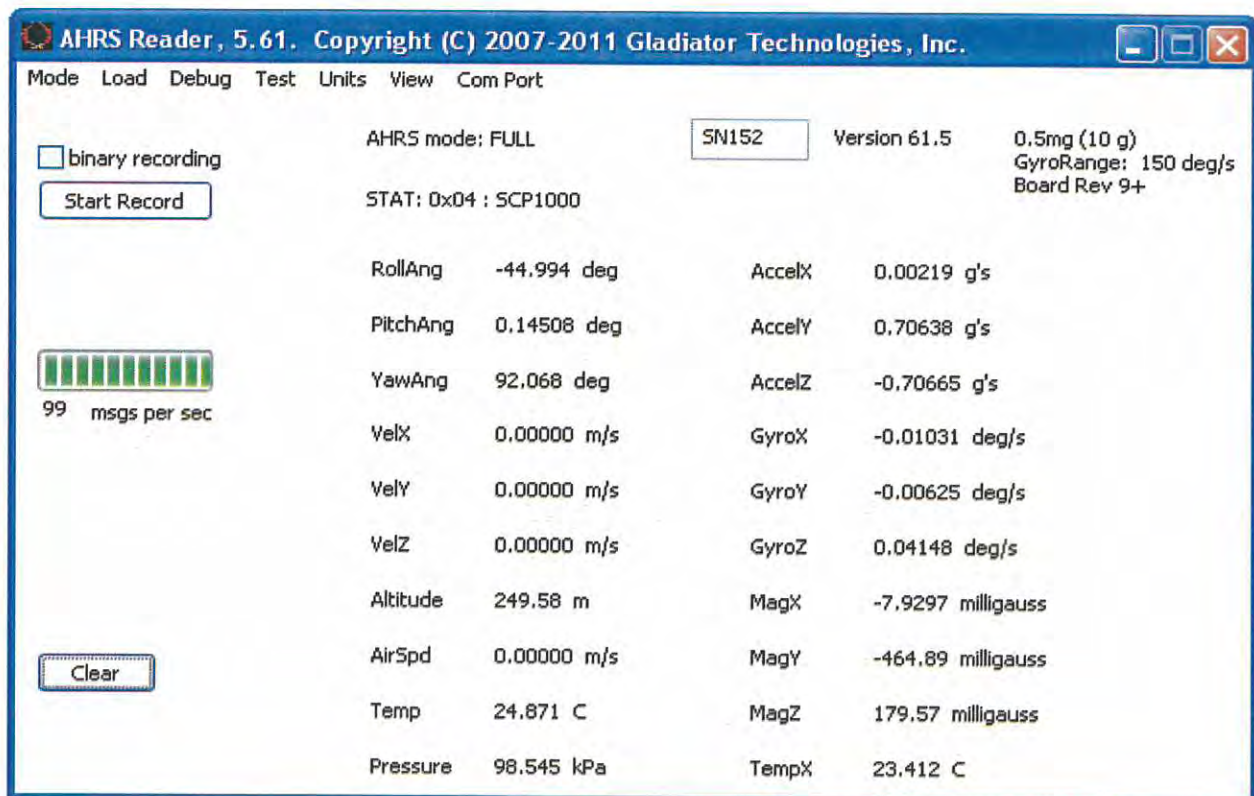
Pitch Down 45° (below)

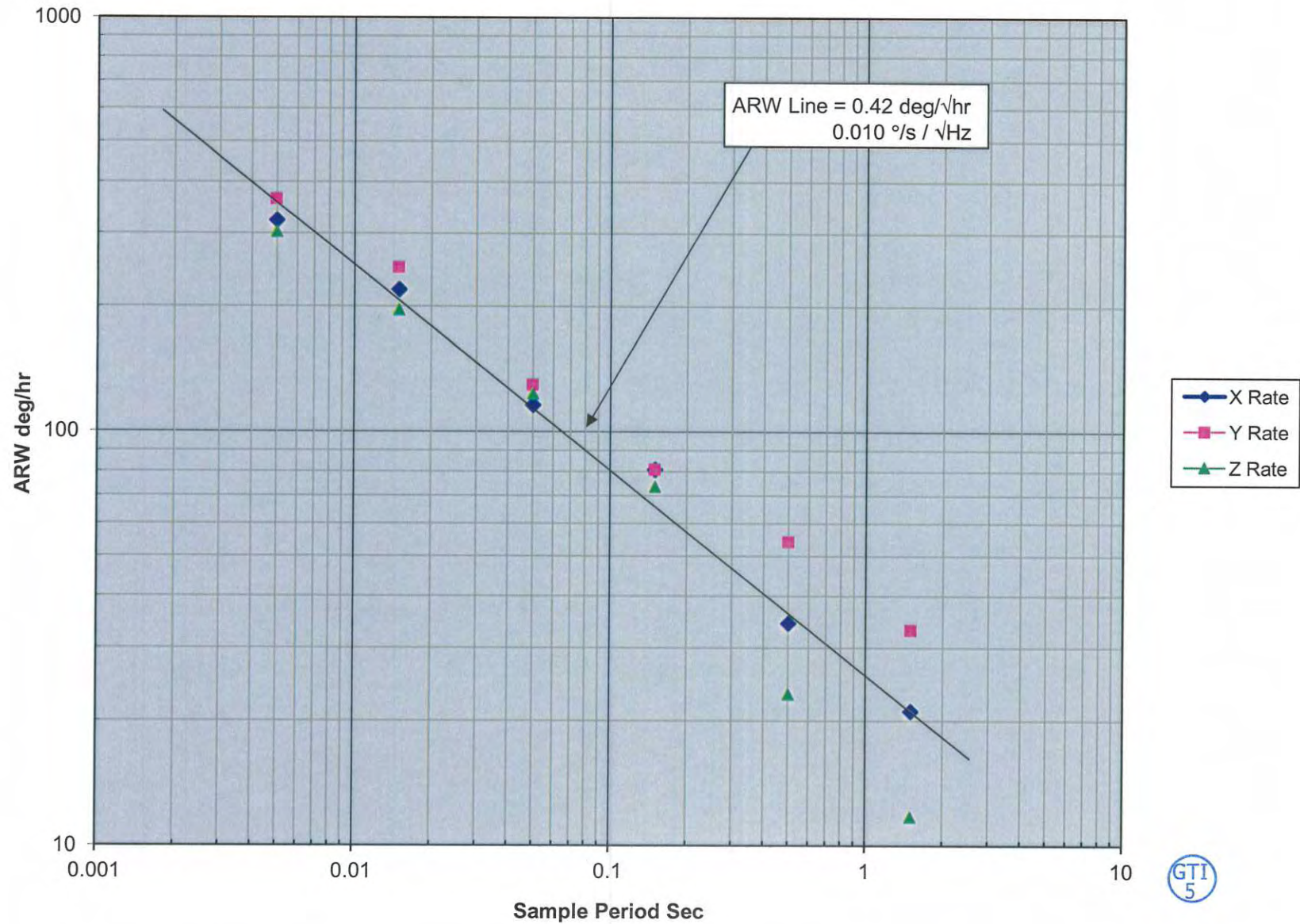


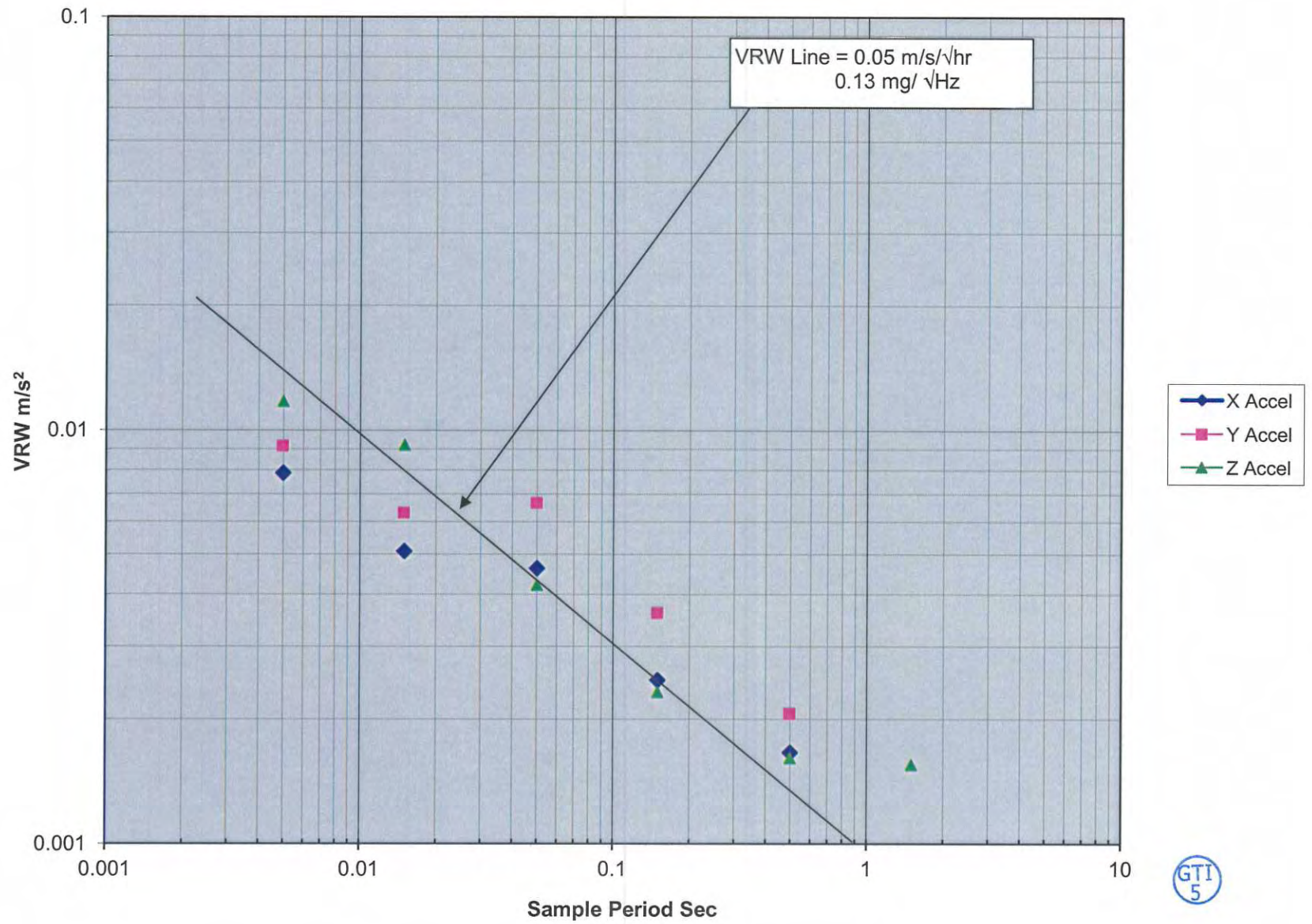


Roll 45° (above)

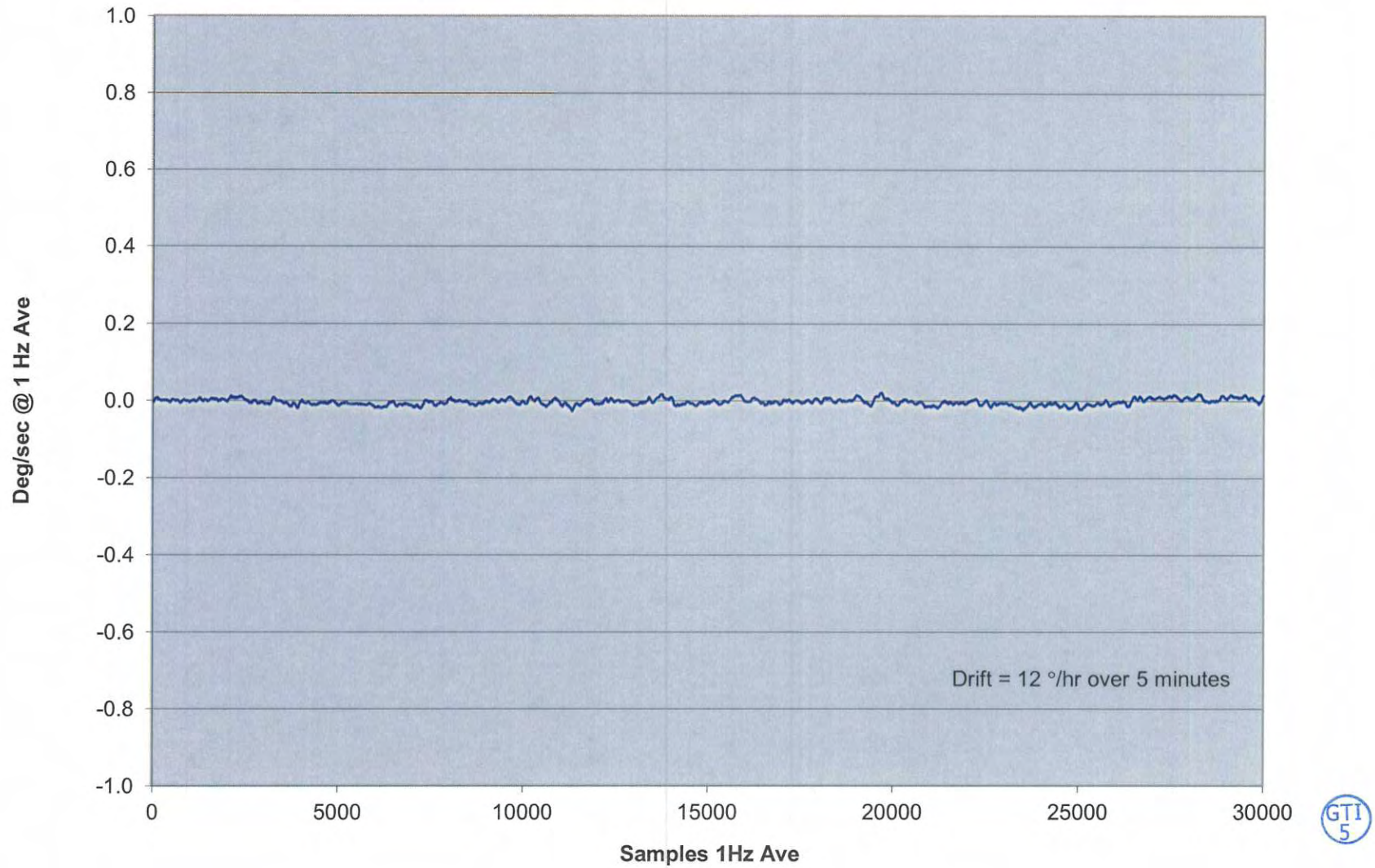
Roll -45° (below)



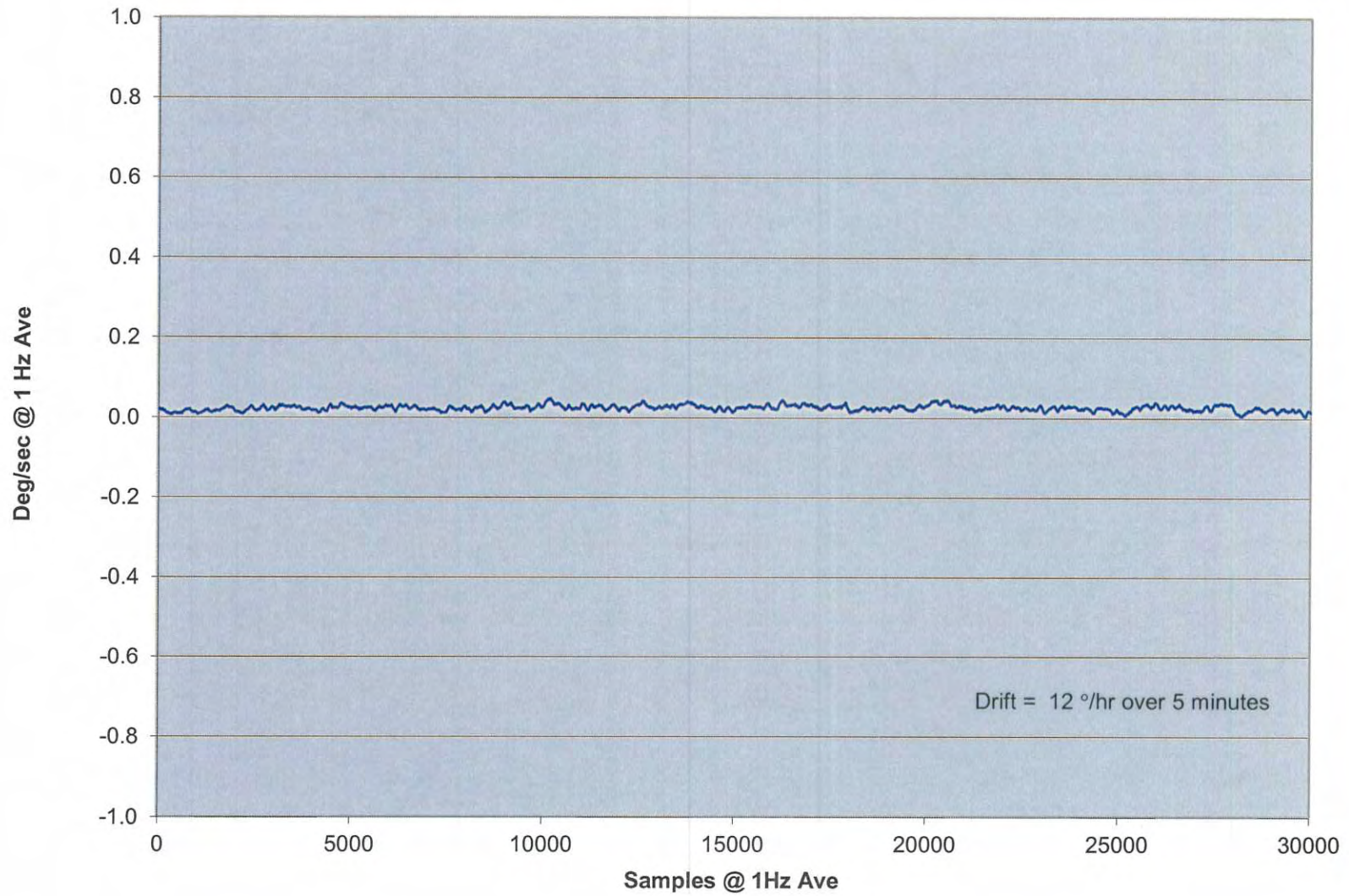




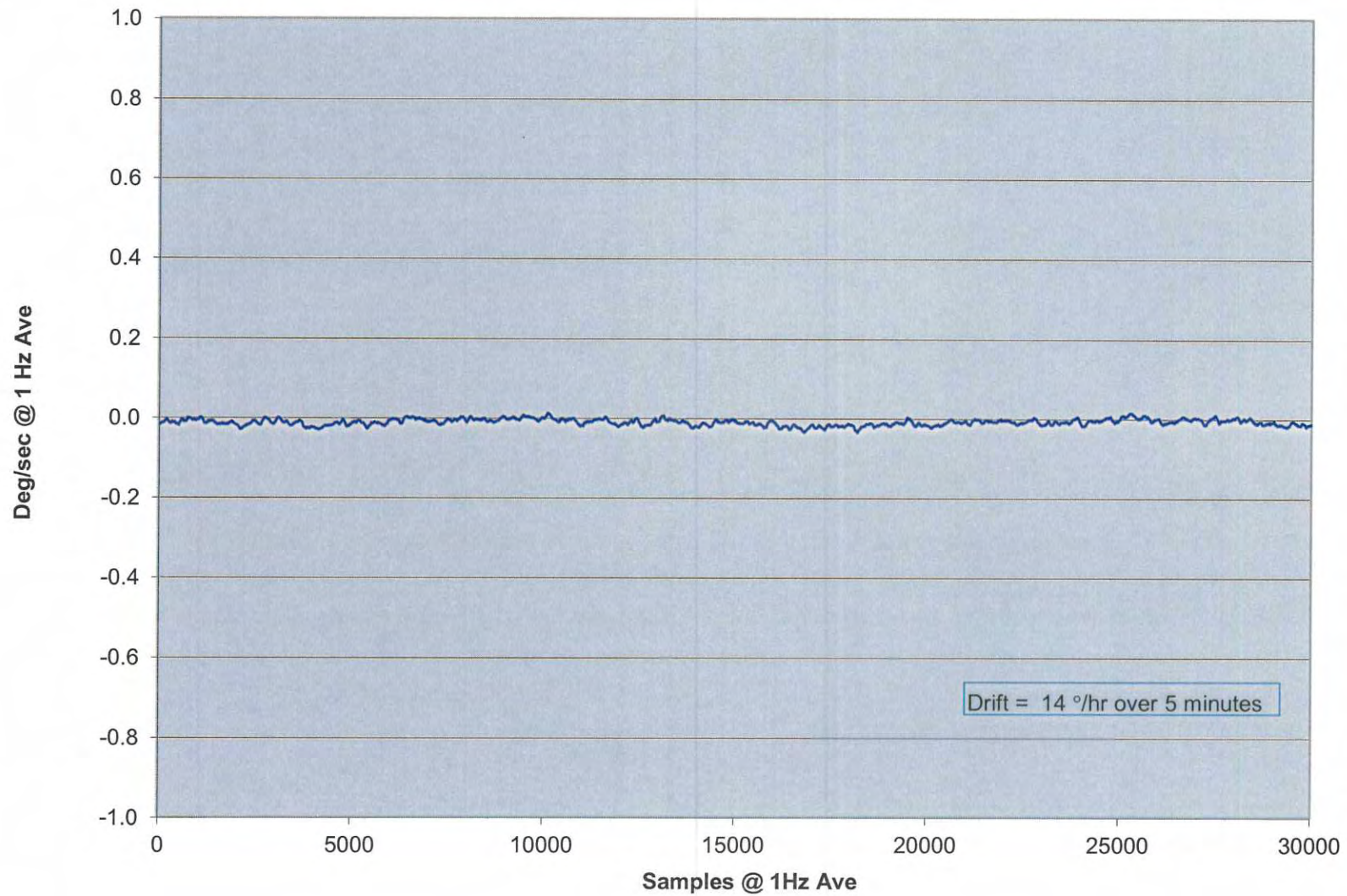
X Gyro In-Run Bias



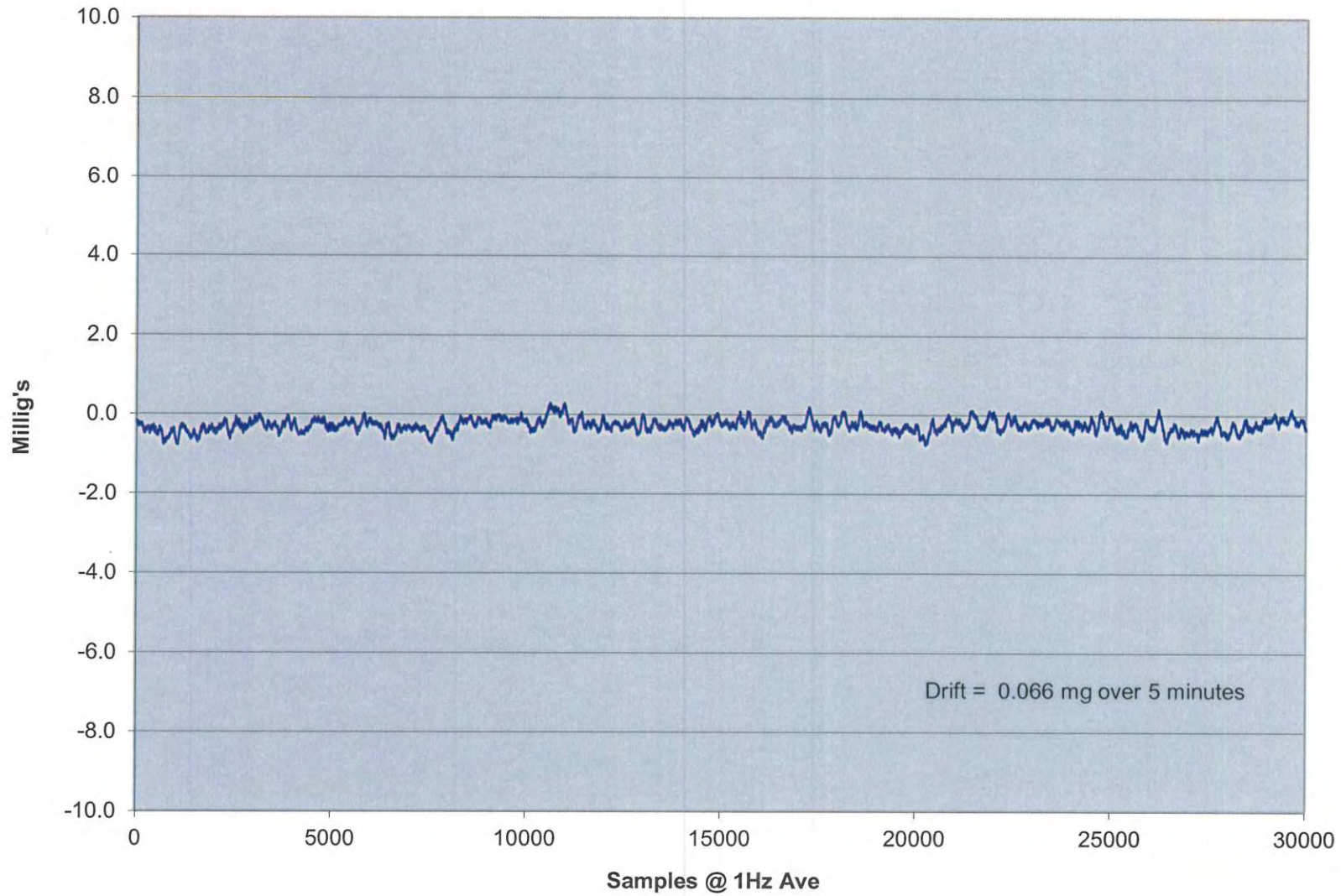
Y Gyro In-Run Bias



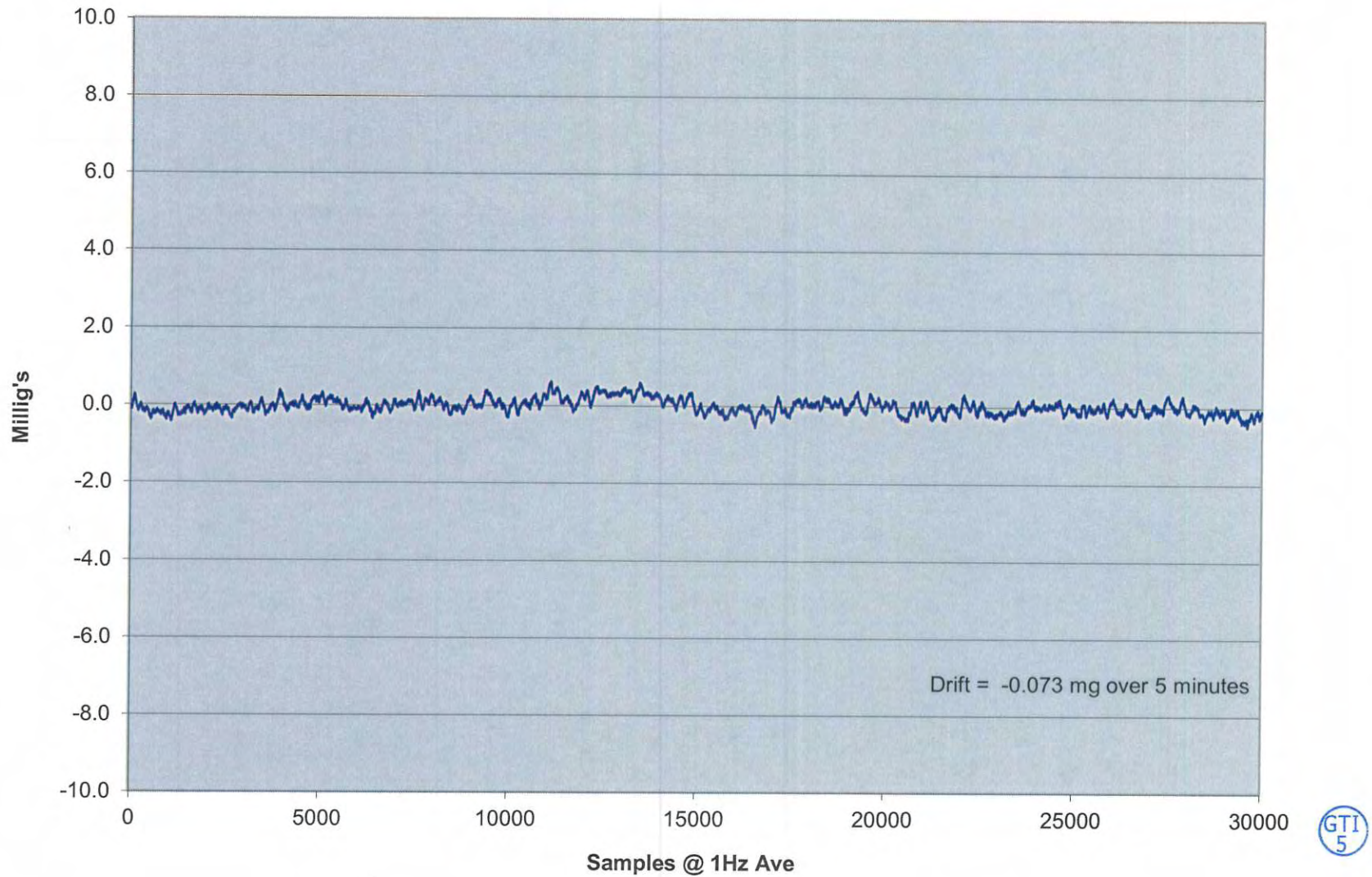
Z Gyro In-Run Bias



X Accel In-Run



Y Accel In-Run



Z Accel In-Run

