Avionics Reference Document

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1 Introduction

- 1.1 Purpose
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- 1.3 Definitions and Acronyms



2 Hardware

2.1 Pressure Transducers

Model Number	MLH05KPSB01G
Serial Number	F8CEA38AA5
Datasheet Link	Link
Sensing Units	PSIG
Pressure Port Type	1/4-18 NPT (ANSI B1.20.1)
Accuracy	$\pm 0.25\%$
Pressure Range	0PSIG to 5000PSIG
Data Frequency	50Hz
Output Voltage Range	1.0 to 5.0 Volts
Input Voltage Range	8.0 to 30.0 Volts
Temperature Range	-40°to +125°Celcius

Model Number	ASUHGP1K55A1AA1A20000
Serial Number	E5C0ADEA35
Datasheet Link	Link
Sensing Units	PSIG
Pressure Port Type	3/8 Inch 24 UNF Dash 3 (SAE J514)
Accuracy	$\pm 0.25\%$
Pressure Range	0PSIG to 1500PSIG
Data Frequency	50Hz
Output Voltage Range	0.5 to 4.5 Volts
Input Voltage Range	8.0 to 16.0 Volts
Temperature Range	-40°to +150°Celcius

2.2 Thermocouples

Model Number	240-080
Serial Number	BB510C3CE3
Datasheet Link	Link
Type	K
Sensing Units	Celcius
Data Frequency	10Hz
Temperature Range	-73°to +150°Celcius

2.3 RTDs

Model Number	1PT100K2515
Serial Number	8105874731
Datasheet Link	Link
Type	PT100
Sensing Units	Celcius
Data Frequency	10Hz
Temperature Range	-200°to +150°Celcius



2.4 Hall Effect Sensors

Model Number	TCS40DPR
Serial Number	6D65BA9367
Datasheet Link	Link
Sensing Units	mT
Output Type	Push-Pull
Trip	$\pm 4.4 \mathrm{mT}$
Release	$\pm 0.9 \mathrm{mT}$
Input Voltage Range	8.0 to 16.0 Volts
Data Frequency	10Hz
Temperature Range	-40° to +150° Celcius



3 EEPROM Layouts

3.1 Layout Version IDs

VersionID	Version Name
1	Sensor Board Layout Rev 1
2	Power Distro Board Layout Rev 1



3.2 Sensor Board Layout Rev 1

	Sensor Board Layout Rev 1 Page #0						
Byte #	Usage	Byte #	Usage	Byte #	Usage		
0		48		96			
1	Layout Rev Number	49	PT0 Calibration	97	PT1 Data CanID		
2	Edyout Itev Ivamber	50	Polyfit p1	98	I II Bata Camb		
3		51		99			
4		52		100			
5	EEPROM Layout	53	PT0 Calibration	101	PT1 Current CanID		
6	Compile Time	54	Polyfit p2	102	1 11 Current Camb		
7		55		103			
8		56		104			
9	Board Status	57	PT0 Calibration	105	PT1 Data Frequency		
10	Board Status	58	Polyfit p3	106	1 11 Data Frequency		
11	59		107				
12		60		108			
13	Board VIN Voltage	61	PT0 Calibration	109	PT1 Max Output		
14	CanID	62	Polyfit p4	110	Voltage		
15		63		111			
16		64		112			
17	Board current CanID	65	PT0 Calibration	113	PT1 Min Output		
18	Board current Canib	66	Polyfit p5	114	Voltage		
19		67		115			
20		68		116			
21	DEC D . G ID	69	PT0 Calibration	117	DELA D		
22	PT0 Data CanID	70	Polyfit p6	118	PT1 Max Pressure		
23		71		119			
24		72		120			
25	DEED G + G ID	73	PT0 Calibration	121	DEL M. D		
26	PT0 Current CanID	74 Polyfit p7 122	PT1 Min Pressure				
27		75	_	123			
28		76		124			
29	DEC D . D	77	PT0 Biguad Filter	125	PT1 Calibration		
30	PT0 Data Frequency	78	b0	126	Polyfit p1		
31		79		127			
32		80					
33	DEED M. M. II	81	PT0 Biquad Filter				
34	PT0 Max Voltage	82	b1				
35		83					
36		84					
37	DTO Min Voltage	85	PT0 Biquad Filter				
38	PT0 Min Voltage	86	b2				
39		87					
40		88		1			
41	PT0 Max Pressure	89	PT0 Biquad Filter				
42	FIU Max Pressure	90	a1				
43		91					
44		92					
45	DEC M: D	93	PT0 Biquad Filter				
46	PT0 Min Pressure	94	a2				
		95	·	1.1	1		



	Sensor Board Layout Rev 1 Page #1						
Byte #	Usage	Byte #	Usage	Byte #	Usage		
128 129 130 131	PT1 Calibration Polyfit p2	176 177 178 179	PT2 Current CanID	224 225 226 227	PT2 Calibration Polyfit p7		
132 133 134 135	PT1 Calibration Polyfit p3	180 181 182 183	PT2 Data Frequency	228 229 230 231	PT2 Biquad Filter b0		
136 137 138 139	PT1 Calibration Polyfit p4	184 185 186 187	PT2 Max Voltage	232 233 234 235	PT2 Biquad Filter b1		
140 141 142 143	PT1 Calibration Polyfit p5	188 189 190 191	PT2 Min Voltage	236 237 238 239	PT2 Biquad Filter b2		
144 145 146 147	PT1 Calibration Polyfit p6	192 193 194 195	PT2 Max Pressure	240 241 242 243	PT2 Biquad Filter a1		
148 149 150 151	PT1 Calibration Polyfit p7	196 197 198 199	PT2 Min Pressure	244 245 246 247	PT2 Biquad Filter a2		
152 153 154 155	PT1 Biquad Filter b0	200 201 202 203	PT2 Calibration Polyfit p1	248 249 250 251	Hall Effect 0 Data CanID		
156 157 158 159	PT1 Biquad Filter b1	204 205 206 207	PT2 Calibration Polyfit p2	252 253 254 255	Hall Effect 0 Current CanID		
160 161 162 163	PT1 Biquad Filter b2	208 209 210 211	PT2 Calibration Polyfit p3				
164 165 166 167	PT1 Biquad Filter a1	212 213 214 215	PT2 Calibration Polyfit p4				
168 169 170 171	PT1 Biquad Filter a2	216 217 218 219	PT2 Calibration Polyfit p5				
172 173 174 175	PT2 Data CanID	220 221 222 223	PT2 Calibration Polyfit p6				



Sensor Board Layout Rev 1 Page #2						
Byte #	Usage	Byte #	Usage	Byte #	Usage	
256		304		352		
257	Hall Effect 0 Data	305	TC0 Biquad Filter	353	RTD0 Biquad Filter	
258	Frequency	306	a1	354	b1	
259		307		355		
260		308		356		
261	Hall Effect 1 Data	309	TC0 Biquad Filter	357	RTD0 Biquad Filter	
262		310	a2	358	b2	
263	Camb	310	a2	359	02	
$\frac{263}{264}$		312		360		
	Hall Effect 1	11 -			DED O D: 1 F:14	
265		313	TC1 Data CanID	361	RTD0 Biquad Filter	
266	Current CanID	314		362	a1	
267		315		363		
268		316		364		
269	Hall Effect 1 Data	317	TC1 Data Frequency	365	RTD0 Biquad Filter	
270	Frequency	318	1C1 Data Frequency	366	a2	
271		319		367		
272		320		368		
273	Hall Effect 2 Data	321	TC1 Biquad Filter	369		
274		322			RTD1 Data CanID	
275		323		$\begin{vmatrix} 370 \\ 371 \end{vmatrix}$		
276		324		372		
277	Hall Effect 2	325	TC1 Biquad Filter	373	RTD1 Data	
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		b1	11	Frequency	
278	Current Canib			374	Frequency	
279		327		375		
280	H II DOT I O D	328		376		
281	Hall Effect 2 Data	329	TC1 Biquad Filter	377	RTD1 Biquad Filter	
282	Frequency	330	b2	378	b0	
283		331		379		
284		332		380		
285	TC0 Data CanID	333	TC1 Biquad Filter	381	RTD1 Biquad Filter	
286	1 Co Data Camib	334	a1	382	b1	
287		335		383		
288		336		1		
289		337	TC1 Biquad Filter			
290	TC0 Data Frequency	338	a2			
291		339	~~			
292	1	340		+		
292 293	TC0 Biquad Filter	341				
293 294	b0	341	RTD0 Data CanID			
	D0	11 -				
295		343		4		
296		344	D			
297	TC0 Biquad Filter	345	RTD0 Data			
298	b1	346	Frequency			
299		347				
300		348				
301	TC0 Biquad Filter	349	RTD0 Biquad Filter			
302	b2	350	b0			
303	1	351		- 11		



		Sensor Bo	ard Layout Rev 1 Pa	ge #3	
Byte #	Usage	Byte #	Usage	Byte #	Usage
384		432		480	
385	RTD1 Biquad Filter	433		481	
386	b2	434		482	
387		435		483	
388		436		484	
389	RTD1 Biquad Filter	437		485	
390	a1	438		486	
391		439	İ	487	
392		440		488	
393	RTD1 Biquad Filter	441		489	
394	a2	442		490	
395		443		491	
396		T 444		492	
397		445		493	
398		446		494	
399		447		495	
400		448		496	
401		449		497	
402		450		498	
403		451		499	
404		452		500	
405		453		501	
406		454		502	
407		455		503	
408		456		504	
409		457		505	
410		458		506	
411		459		507	
412		460		508	
413		461		509	
414		462		510	
415		463		511	
416		464		011	
417		465			
418		466			
419		467			
420		468			
421		469			
422		470			
423		471			
424		472			
425		473			
426		474			
427		475			
427		476			
428		477			
430		11			
430		478			
431		479	1	П	



${\bf 3.3} \quad {\bf Power~Distro~Board~Layout~Rev~1}$

		Power Distro	Board Layout Rev	v 1 Page #0	
Byte #	Usage	Byte #	Usage	Byte #	Usage
0		48		96	
1	Board Status	49		97	
2	Board Status	50		98	
3		51		99	
4		52		100	
5	Offboard Battery	53		101	
6	Voltage CANID	54		102	
7		55		103	
8		56		104	
9	Offboard Battery	57		105	
10	Current CANID	58		106	
11		59		107	
12		60		108	
13	Onboard Battery	61		109	
14	Voltage CANID	62		110	
15		63		111	
16		64		112	
17	Onboard Battery	65		113	
18	Current CANID	66		114	
19		67		115	
20		68		116	
21	Helix Loop CW	69		117	
22	Voltage CANID	70		118	
23		71		119	
24		72		120	
25	Helix Loop CW	73		121	
26	Current CANID	74		122	
27		75		123	
28		76		124	
29	Helix Loop CCW	77		125	
30	Voltage CANID	78		126	
31		79		127	
32		80			
33	Helix Loop CCW	81			
34	Current CANID	82			
35		83			
36		84			
37		85			
38		86			
39		87			
40		88			
41		89			
42		90			
43		91			
44		92			
45		93			
46		94			
47		95			



4 CAN IDs

4.1 ID 0 - Clock Sync

Frequency: 50Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False	0 to 4294967295	Milliseconds	UTC time

4.2 ID 1 - Emergency Signal

Frequency: 50Hz

I	Byte	Bit	Signed	Range	Units	Description
()		False			Status
		0-1				System Status

4.3 ID 100 - Helium Pressure

Frequency: 50Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		False		PSIG	Helium Pressure

4.4 ID 101 - Lox Pressure

Frequency: 50Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		False		PSIG	LOX Pressure

4.5 ID 102 - Methane Pressure

Frequency: 50Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		False		PSIG	Methane Pressure

4.6 ID 103 - Chamber Pressure

Frequency: 50Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		False		PSIG	Chamber Pressure

4.7 ID 200 - Helium Fill Valve

Frequency: 10Hz

	Byte	Bit	Signed	Range	Units	Description
	0-3		False		Milliseconds	UTC time
4	4		False		Open/Closed	Helium Fill Valve State

4.8 ID 201 - LOX Fill Valve

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4		False		Open/Closed	LOX Fill Valve State



4.9 ID 202 - Methane Fill Valve

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4		False		Open/Closed	Methane Fill Valve State

4.10 ID 300 - Helium Tank Temperature

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		True		Celcius	Helium Tank Temperature

4.11 ID 301 - LOX Tank Temperature

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		True		Celcius	LOX Tank Temperature

4.12 ID 302 - Methane Tank Temperature

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		True		Celcius	Methane Tank Temperature

4.13 ID 303 - Nozzle Temperature

Frequency: 10Hz

1	1··································						
Byte	Bit	Signed	Range	Units	Description		
0-3		False		Milliseconds	UTC time		
4-5		True		Celcius	Nozzle Temperature		

4.14 ID 304 - Upper Air Frame Temperature

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		True		Celcius	Upper Air Frame Temperature

4.15 ID 400 - Helium PT Current

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		True		milliamps	Helium PT Current

4.16 ID 401 - LOX PT Current

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		True		milliamps	LOX PT Current



4.17 ID 402 - Methane PT Current

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		True		milliamps	Methane PT Current

4.18 ID 403 - Chamber PT Current

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		True		milliamps	Chamber PT Current

4.19 ID 404 - Helium Fill Hall Effect Current

Frequency: 10Hz

1 1	- J				
Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		True		milliamps	Helium Fill Hall Effect Current

4.20 ID 405 - LOX Fill Hall Effect Current

Frequency: 10Hz

1							
Byte	Bit	Signed	Range	Units	Description		
0-3		False		Milliseconds	UTC time		
4-5		True		milliamps	LOX Fill Hall Effect Current		

4.21 ID 406 - Methane Fill Hall Effect Current

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		True		milliamps	Methane Fill Hall Effect Current