MGF data-block format rev: 3 j r bennest 2005 12 06 2016/12/08

122 rows of 8 bytes each ---> 976 bytes = 7808 bits per block in three bursts of 8 * (40 + 39 + 43) bytes per packet: 320 312 344

need 3 rows for each subblock ---> 24 bytes organized as 16 x 12-bit words header + samp 1 - 52 samp 53 - 104 samp 104 - 160 + trailer

tx

column:	1	2	3	4	5	6	7	8	code execution timing example
row:									each row ~ 1ms
1	DLE	STX	PID	MSB length	LSB length	Board ID	MSB_OFFSET	Idmeas'ment	
2	aux 1	- 0 -	x-dac 1	y-dac 1	z-dac 1	x-AD 1	triple AD		*** this is sample number 1 in the new block
3	y-AD 1	z-AD 1	x-AD 2	y-AD 2	z-AD 2	x-AD 2	buffer update		
4	3	y-AD 3	z-AD 3	x-AD 4	y-AD 4	z-AD 4	dac update		
5	aux 2	- 0 -	x-dac 2	y-dac 2	z-dac 2	x-AD 5	CRC update		
6	y-AD 5	z-AD 5	x-AD 6	y-AD 6	z-AD 6	x-AD 6	set up for tx		
7	7	y-AD 7	z-AD 7	x-AD 8	y-AD 8	z-AD 8	wait		
8	aux 3	- 0 -	x-dac 3	y-dac 3	z-dac 3	x-AD 9	triple AD		*** this is sample number 2 in the new block
9	y-AD 9	z-AD 9	x-AD 10	y-AD 10	z-AD 10	x-AD 10	buffer update		
10	11	y-AD 11	z-AD 11	x-AD 12	y-AD 12	z-AD 12	tx		MAG_A (master) transmits
11	aux 4	- 0 -	x-dac 4	y-dac 4	z-dac 4	x-AD 13	tx		320 bytes in first burst
12	y-AD 13	z-AD 13	x-AD 14	y-AD 14	z-AD 14	x-AD 14	tx		
13	15	y-AD 15	z-AD 15	x-AD 16	y-AD 16	z-AD 16	tx		
14	aux 5	- 0 -	x-dac 5	y-dac 5	z-dac 5	x-AD 17	triple AD		*** this is sample number 3 in the new block
15	y-AD 17	z-AD 17	x-AD 18	y-AD 18	z-AD 18	x-AD 18	buffer update		
16	19	y-AD 19	z-AD 19	x-AD 20	y-AD 20	z-AD 20	tx		
17	aux 6	- 0 -	x-dac 6	y-dac 6	z-dac 6	x-AD 21	tx		312 bytes in second burst
18	y-AD 21	z-AD 21	x-AD 22	y-AD 22	z-AD 22	x-AD 22	tx		
19	23	y-AD 23	z-AD 23	x-AD 24	y-AD 24	z-AD 24	tx		
20	aux 7	- 0 -	x-dac 7	y-dac 7	z-dac 7	x-AD 25	triple AD		*** this is sample number 4 in the new block
21	y-AD 25	z-AD 25	x-AD 26	y-AD 26	z-AD 26	x-AD 26	buffer update		
22	27	y-AD 27	z-AD 27	x-AD 28	y-AD 28	z-AD 28	tx		
23	aux 8	- 0 -	x-dac 8	y-dac 8	z-dac 8	x-AD 29	tx		344 bytes in third burst
24	y-AD 29	z-AD 29	x-AD 30	y-AD 30	z-AD 30	x-AD 30	tx		
25	31	y-AD 31	z-AD 31	x-AD 32	y-AD 32	z-AD 32	tx		
26	aux 9	- 0 -	x-dac 9	y-dac 9	z-dac 9	x-AD 33	triple AD		*** this is sample number 5 in the new block
27	y-AD 33	z-AD 33	x-AD 34	y-AD 34	z-AD 34	x-AD 34	buffer update		
28	35	y-AD 35	z-AD 35	x-AD 36	y-AD 36	z-AD 36	dac update		
29	aux 10	- 0 -	x-dac 10	y-dac 10	z-dac 10	x-AD 37	CRC update		
30	y-AD 37	z-AD 37	x-AD 38	y-AD 38	z-AD 38	x-AD 38	wait		
31	39	y-AD 39	z-AD 39	x-AD 40	y-AD 40	z-AD 40	wait		
32	aux 11	- 0 -	x-dac 11	y-dac 11	z-dac 11	x-AD 41	triple AD		*** this is sample number 6 in the new block
33	y-AD 41	z-AD 41	x-AD 42	y-AD 42	z-AD 42	x-AD 42	buffer update		
34	43	y-AD 43	z-AD 43	x-AD 44	y-AD 44	z-AD 44	wait		
35	aux 12	- 0 -	x-dac 12	y-dac 12	z-dac 12	x-AD 45	wait		
36	y-AD 45	z-AD 45	x-AD 46	y-AD 46	z-AD 46	x-AD 46	wait		
37	47	y-AD 47	z-AD 47	x-AD 48	y-AD 48	z-AD 48	wait		
38	aux 13	- 0 -	x-dac 13	y-dac 13	z-dac 13	x-AD 49	triple AD		*** this is sample number 7 in the new block
39	y-AD 49	z-AD 49	x-AD 50	y-AD 50	z-AD 50	x-AD 50	buffer update		
40	51	y-AD 51	z-AD 51	x-AD 52	y-AD 52	z-AD 52	wait		
41	aux 14	- 0 -	x-dac 14	y-dac 14	z-dac 14	x-AD 53	wait		
42	y-AD 53	z-AD 53	x-AD 54	y-AD 54	z-AD 54	x-AD 54	wait		
43	55	y-AD 55	z-AD 55	x-AD 56	y-AD 56	z-AD 56	wait		
44	aux 15	- 0 -	x-dac 15	y-dac 15	z-dac 15	x-AD 57	triple AD		*** this is sample number 8 in the new block
45	y-AD 57	z-AD 57	x-AD 58	y-AD 58	z-AD 58	x-AD 58	buffer update		
46	59	y-AD 59	z-AD 59	x-AD 60	y-AD 60	z-AD 60	wait		
47	aux 16	- 0 -	x-dac 16	y-dac 16	z-dac 16	x-AD 61	wait		
48	y-AD 61	z-AD 61	x-AD 62	y-AD 62	z-AD 62	x-AD 62	wait		
49	63	y-AD 63	z-AD 63	x-AD 64	y-AD 64	z-AD 64	wait		
50	aux 17	- 0 -	x-dac 17	y-dac 17	z-dac 17	x-AD 65	triple AD		*** this is sample number 9 in the new block
51	y-AD 65	z-AD 65	x-AD 66	y-AD 66	z-AD 66	x-AD 66	buffer update		
52	67	y-AD 67	z-AD 67	x-AD 68	y-AD 68	z-AD 68	dac update		
53	aux 18	- 0 -	x-dac 18	y-dac 18	z-dac 18	x-AD 69	CRC update		
54	y-AD 69	z-AD 69	x-AD 70	y-AD 70	z-AD 70	x-AD 70	wait		
55	71	y-AD 71	z-AD 71	x-AD 72	y-AD 72	z-AD 72	wait		
56	aux 19	- 0 -	x-dac 19	y-dac 19	z-dac 19	x-AD 73	triple AD		*** this is sample number 10 in the new block
57	y-AD 73	z-AD 73	x-AD 74	y-AD 74	z-AD 74	x-AD 74	buffer update		
58	75	y-AD 75	z-AD 75	x-AD 76	y-AD 76	z-AD 76	tx		MAG_B(slave) transmits
59	aux 20	- 0 -	x-dac 20	y-dac 20	z-dac 20	x-AD 77	tx		320 bytes in first burst
60	y-AD 77	z-AD 77	x-AD 78	y-AD 78	z-AD 78	x-AD 78	tx		
61	79	y-AD 79	z-AD 79	x-AD 80	y-AD 80	z-AD 80	tx		
62	aux 21	- 0 -	x-dac 21	y-dac 21	z-dac 21	x-AD 81	triple AD		*** this is sample number 11 in the new block
63	y-AD 81	z-AD 81	x-AD 82	y-AD 82	z-AD 82	x-AD 82	buffer update		
64	83	y-AD 83	z-AD 83	x-AD 84	y-AD 84	z-AD 84	tx		
65	aux 22	- 0 -	x-dac 22	y-dac 22	z-dac 22	x-AD 85	tx		312 bytes in second burst
66	y-AD 85	z-AD 85	x-AD 86	y-AD 86	z-AD 86	x-AD 86	tx		
67	87	y-AD 87	z-AD 87	x-AD 88	y-AD 88	z-AD 88	tx		
68	aux 23	- 0 -	x-dac 23	y-dac 23	z-dac 23	x-AD 89	triple AD		*** this is sample number 12 in the new block
69	y-AD 89	z-AD 89	x-AD 90	y-AD 90	z-AD 90	x-AD 90	buffer update		
70	91	y-AD 91	z-AD 91	x-AD 92	y-AD 92	z-AD 92	tx		
71	aux 24	- 0 -	x-dac 24	y-dac 24	z-dac 24	x-AD 93	tx		344 bytes in third burst
72	y-AD 93	z-AD 93	x-AD 94	y-AD 94	z-AD 94	x-AD 94	tx		
73	95	y-AD 95	z-AD 95	x-AD 96	y-AD 96	z-AD 96	tx		
74	aux 25	- 0 -	x-dac 25	y-dac 25	z-dac 25	x-AD 97	triple AD		*** this is sample number 13 in the new block
75	y-AD 97	z-AD 97	x-AD 98	y-AD 98	z-AD 98	x-AD 98	buffer update		
76	99	y-AD 99	z-AD 99	x-AD 100	y-AD 100	z-AD 100	dac update		
77	aux 26	- 0 -	x-dac 26	y-dac 26	z-dac 26	x-AD 101	CRC update		
78	y-AD 101	z-AD 101	x-AD 102	y-AD 102	z-AD 102	x-AD 102	wait		
79	103	y-AD 103	z-AD 103	x-AD 104	y-AD 104	z-AD 104	wait		
80	aux 27	- 0 -	x-dac 27	y-dac 27	z-dac 27	x-AD 105	triple AD		*** this is sample number 14 in the new block
81	y-AD 105	z-AD 105	x-AD 106	y-AD 106	z-AD 106	x-AD 106	buffer update		
82	107	y-AD 107	z-AD 107	x-AD 108	y-AD 108	z-AD 108	wait		
83	aux 28	- 0 -	x-dac 28	y-dac 28	z-dac 28	x-AD 109	wait		
84	y-AD 109	z-AD 109	x-AD 110	y-AD 110	z-AD 110	x-AD 110	wait		
85	111	y-AD 111	z-AD 111	x-AD 112	y-AD 112	z-AD 112	wait		
86	aux 29	- 0 -	x-dac 29	y-dac 29	z-dac 29	x-AD 113	triple AD		
87	y-AD 113	z-AD 113	x-AD 114	y-AD 114	z-AD 114	x-AD 114	buffer update		
88	115	y-AD 115	z-AD 115	x-AD 116	y-AD 116	z-AD 116	wait		
89	aux 30	- 0 -	x-dac 30	y-dac 30	z-dac 30	x-AD 117	wait		
90	y-AD 117	z-AD 117	x-AD 118	y-AD 118	z-AD 118	x-AD 118	wait		
91	119	y-AD 119	z-AD 119	x-AD 120	y-AD 120	z-AD 120	wait		
92	aux 31	- 0 -	x-dac 31	y-dac 31	z-dac 31	x-AD 121	triple AD		
93	y-AD 121	z-AD 121	x-AD 122	y-AD 122	z-AD 122	x-AD 122	buffer update		
94	123	y-AD 123	z-AD 123	x-AD 124	y-AD 124	z-AD 124	wait		
95	aux 32	- 0 -	x-dac 32	y-dac 32	z-dac 32	x-AD 125	wait		
96	y-AD 125	z-AD 125	x-AD 126	y-AD 126	z-AD 126	x-AD 126	wait		
97	127	y-AD 127	z-AD 127	x-AD 128	y-AD 128	z-AD 128	wait		
98	aux 33	- 0 -	x-dac 33	y-dac 33	z-dac 33	x-AD 129	triple AD		
99	y-AD 129	z-AD 129	x-AD 130	y-AD 130	z-AD 130	x-AD 130	buffer update		
100	131	y-AD 131	z-AD 131	x-AD 132	y-AD 132	z-AD 132	dac update		
101	aux 34	- 0 -	x-dac 34	y-dac 34	z-dac 34	x-AD 133	CRC update		
102	y-AD 133	z-AD 133	x-AD 134	y-AD 134	z-AD 134	x-AD 134	wait		
103	135	y-AD 135	z-AD 135	x-AD 136	y-AD 136	z-AD 136	wait		
104	aux 35	- 0 -	x-dac 35	y-dac 35	z-dac 35	x-AD 137	triple AD		
105	y-AD 137	z-AD 137	x-AD 138	y-AD 138	z-AD 138	x-AD 138	buffer update		
106	139	y-AD 139	z-AD 139	x-AD 140	y-AD 140	z-AD 140	wait		
107	aux 36	- 0 -	x-dac 36	y-dac 36	z-dac 36	x-AD 141	wait		
108	y-AD 141	z-AD 141	x-AD 142	y-AD 142	z-AD 142	x-AD 142	wait		

109		143		y-AD	143		z-AD	143		x-AD	144		y-AD	144		z-AD	144	wait
110		aux	37	- 0 -		x-dac	37		y-dac	37		z-dac	37		x-AD	145		triple AD
111		y-AD	145		z-AD	145		x-AD	146		y-AD	146		z-AD	146		x-AD	buffer update
112		147		y-AD	147		z-AD	147		x-AD	148		y-AD	148		z-AD	148	wait
113		aux	38	- 0 -		x-dac	38		y-dac	38		z-dac	38		x-AD	149		wait
114		y-AD	149		z-AD	149		x-AD	150		y-AD	150		z-AD	150		x-AD	wait
115		151		y-AD	151		z-AD	151		x-AD	152		y-AD	152		z-AD	152	wait
116		aux	39	- 0 -		x-dac	39		y-dac	39		z-dac	39		x-AD	153		triple AD
117		y-AD	153		z-AD	153		x-AD	154		y-AD	154		z-AD	154		x-AD	buffer update
118		155		y-AD	155		z-AD	155		x-AD	156		y-AD	156		z-AD	156	wait
119		aux	40	- 0 -		x-dac	40		y-dac	40		z-dac	40		x-AD	157		wait
120		y-AD	157		z-AD	157		x-AD	158		y-AD	158		z-AD	158		x-AD	wait
121		159		y-AD	159		z-AD	159		x-AD	160		y-AD	160		z-AD	160	wait
122		STARTUP			MID_OFFSET		LSB_OFFSET		MAJOR-VER		MINOR-VER		REVISION-VER	MSB-CRC		LSB-CRC		..etc..

NOTES:

x, y, z-AD values are raw 12-bit numbers from each 12-bit AD converter
x, y, z-dac values : msb is sign bit, then most-significant 11 bits of dac value for each (lowest 5 bits of our 16-bit dac ALWAYS zero)

Assignment of Aux words - most are left-justified bytes, low nibble zero-filled

Vmon values are right-justified 10-bit data

Aux		Aux		Aux		Aux	
1	mag #	11	msbYd2a	21	mag #	31	msbYd2a
2	status_flags	12	lsbYd2a	22	status_flags	32	lsbYd2a
3	bitchk	13	msbZd2a	23	bitchk	33	msbZd2a
4	DEPRECIATED	14	lsbZd2a	24	DEPRECIATED	34	lsbZd2a
5	Vmon1	15	msbXa2d	25	Vmon1	35	msbXa2d
6	Vmon2	16	lsbXa2d	26	Vmon2	36	lsbXa2d
7	Tsensor	17	msbYa2d	27	Tsensor	37	msbYa2d
8	Tebox	18	lsbYa2d	28	Tebox	38	lsbYa2d
9	msbXd2a	19	msbZa2d	29	msbXd2a	39	msbZa2d
10	lsbXd2a	20	lsbZa2d	30	lsbXd2a	40	lsbZa2d

Aux 9 - 14 right-justified copies of DAC values as reported for sample # 1, high nibble of msbXd2a always zero

15 - 20 right-justified copies of AD values as reported for sample # 1, high nibble of msbXa2d always zero

Aux 21 - 40 duplicate of aux 1 - 20

aux 3 - bit checker=en422+2*p_sel+4*b_sel+8*b60hz+16*polx+32*poly+64*polz
1Hz Flag state counter value at IPPS arrival

.end of document