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Three letters specify the details for each analog multiplex input

The first specifies the unit.

A - milliamps
 C - counts (raw a/d counts)
 G - GHz (x band tune monitor)
 K - temperature in kelvin
 M - microamps (SIS junction current)
 P - pressure in psi
 S - millivolts (SIS junction voltage)
 T - temperature in celsius
 V - volts

The second specifies the number by which to MULTIPLY the raw a/d volts to get the true voltage (voltage at a/d multiplex input)

A - 1.0000 — 1.5 4.32 (0-5 V)
 B - 1.3472 — 8.06 4.75 (0-10 or 0-11 V)
 C - 2.6968 — 12.1 4.64 (0-15 V)
 D - 3.6078 —

E 2.7368 82.5K 97.5K

The third specifies the conversion formula to convert the voltage at the a/d input (post scaling) to the units indicated by the first letter.

A - input * (-200)
 C - input * 32768/4.516129
 D - input/1.5
 E - input - 5.00
 F - (flowmeter)
 G - input * 4.5/10 + 8.0
 H - input * 5.0
 I - input * 1.43 (power on a scale of 0-10)
 K - Lakeshore cryogenic diode formula
 M - input * 50.0
 N - input
 O - input * 1.0077 (to account for 1K o/p impedance of osc.)
 P - input * 30.0
 S - input * 5.0
 T - YSI thermistor formula
 V - (vacuum gauge)

Notes:

YSI thermistor formula is:

$R_{th} = R_0 / ((4.516129/V_{in}) - 1);$
 $1/T = a + b * \ln(R_{th}) + c * (\ln(R_{th}))^3$
 with $a = 0.0011303$, $b = 0.0002339$ and $c = 8.863e-08$

The Lakeshore cryogenic diode formula is given on the attached sheet.

Telemetry Address Allocations

each address contains 1 byte = 8 bits

bits are numbered 0-7; bit 7 is MSB, bit 0 is LSB

for octal address settings, lowest switch on telemetry card is MSB

Dec	Hex	Oct	
0	00	000	PST Clock MSB
1	01	001	PST Clock
2	02	002	PST Clock
3	03	003	PST Clock LSB
4	04	004	
5	05	005	
6	06	006	
7	07	007	
8	08	010	V/F 0 MSB
9	09	011	LSB
10	0A	012	V/F 1
11	0B	013	
12	0C	014	V/F 2 (ANA)
13	0D	015	
14	0E	016	V/F 3 MSB
15	0F	017	LSB

-----motor driver card 0x10 to 0x1F-----

16	10	020	12-bit DAC 0 = modulator C (MSB)
17	11	021	(000-7ff = -350 to +350 mA)
18	12	022	unused
19	13	023	.
20	14	024	.
21	15	025	.
22	16	026	.
23	17	027	.
24	18	030	(w) lock code (0x91 to enable tuning)
			(r) card status
24.7	18.7	030.7	--
24.6	18.6	030.6	0=motor driver overtemp
24.5	18.5	030.5	--
24.4	18.4	030.4	1=tuning enabled
24.3	18.3	030.3	--
24.2	18.2	030.2	1=lock code OK
24.1	18.1	030.1	0=pwr on reset active
24.0	18.0	030.0	0=start enabled
25	19	031	toggle byte (unused)
26	1A	032	direction byte (unused)
27	1B	033	.
28	1C	034	.
29	1D	035	.
30	1E	036	.
31	1F	037	.
32	20	040	Resolver 1 High Byte Azimuth
33	21	041	Resolver 1 Low Byte

34	22	042	Resolver 2 High Byte	Elevation
35	23	043	Resolver 2 Low Byte	
36	24	044	Resolver 3 High Byte	
37	25	045	Resolver 3 Low Byte	
38	26	046	Resolver 4 High Byte	
39	27	047	Resolver 4 Low Byte	
40	28	050	Resolver 5 High Byte	
41	29	051	Resolver 5 Low Byte	
42	2A	052	Resolver 6 High Byte	
43	2B	053	Resolver 6 Low Byte	
44	2C	054	Digital Velocity Filter Azimuth High Byte	
45	2D	055	Digital Velocity Filter Azimuth Low Byte	
46	2E	056	Digital Velocity Filter Elevation High Byte	
47	2F	057	Digital Velocity Filter Elevation Low Byte	
48	30	060	Azimuth Cosine High Byte	
49	31	061	Azimuth Cosine Low Byte	
50	32	062	Azimuth Sine High Byte	
51	33	063	Azimuth Sine Low Byte	
52	34	064	Elevation Cosine High Byte	
53	35	065	Elevation Cosine Low Byte	
54	36	066	Elevation Sine High Byte	
55	37	067	Elevation Sine Low Byte	
56	38	070	Encoder Control	
57	39	071	Encoder Status	
58	3A	072	Set Phase	
59	3B	073	Analog Status	←

----- offset generator 0x3C to 0x48 -----

60	3C	074	Offset Control	
60.7	3C.7	074.7	1=phase reset next Walsh epoch	
60.6	3C.6	074.6	1=card reset while high	
60.1	3C.1	074.1	1= -78.125 Hz; 0= +78.125 Hz	
60.0	3C.0	074.0	1= no 78 Hz; 0= 78 Hz on	
61	3D	075	Offset Frequency 0 High byte	
62	3E	076	Offset Frequency 0 Center byte	
63	3F	077	Offset Frequency 0 Low byte	
64	40	100	Walsh 0	
65	41	101	Offset Frequency 1 High byte	
66	42	102	Offset Frequency 1 Center byte	
67	43	103	Offset Frequency 1 Low byte	
68	44	104	Walsh 1	
69	45	105	Offset Phase 0 High byte	
70	46	106	Offset Phase 0 Low byte (12 bits left justified)	
71	47	107	Offset Phase 1 High byte	
72	48	110	Offset Phase 1 Low byte (12 bits left justified)	
73	49	111		
74	4A	112		
75	4B	113		
76	4C	114		
77	4D	115		
78	4E	116		
79	4F	117		

-----motor driver card 0x50 to 0x5F -----

80	50	120	12 bit DAC 0 - modulator B (MSB)
81	51	121	(000 - 7ff = -350 to +350 mA)
82	52	122	12 bit DAC 1 - YIG tune (MSB)
83	53	123	(000 - 7ff = 8.0 to 12.5 GHz)
84	54	124	12 bit DAC 2 - heater (MSB)
85	55	125	(000 - 7ff = 0 to 12 V)
86	56	126	12 bit DAC 3 - Vmixer (MSB)
87	57	127	(000 - 7ff = 0 to 20 mV/200 uA)
88	58	130	(w) lock code (0x95 to enable tuning)
			(r) card status
88.7	58.7	130.7	--
88.6	58.6	130.6	0=motor driver overtemp
88.5	58.5	130.5	--
88.4	58.4	130.4	1=tuning enabled
88.3	58.3	130.3	--
88.2	58.2	130.2	1=lock code OK
88.1	58.1	130.1	0=pwr on reset active
88.0	58.0	130.0	0=start enabled
89	59	131	toggle byte (bit pattern same as 5A)
90	5A	132	direction byte (1 = incr. pot counts)
90.7	5A.7	132.7	subreflector (special supply voltage)
90.6	5A.6	132.6	atten B
90.5	5A.5	132.5	mmosc B
90.4	5A.4	132.4	mmback B
90.3	5A.3	132.3	--
90.2	5A.2	132.2	mmback C
90.1	5A.1	132.1	atten C
90.0	5A.1	132.1	mmosc C = mxrback B
91	5B	133	bits out to antenna (none used)
92	5C	134	bits out to antenna
92.2	5C.2	134.2	1=voltage loop; 0=current loop
92.1	5C.1	134.1	band select A1 (11=D;10=C;01=B;00=A)
92.0	5C.0	134.0	band select A0
93	5D	135	(w) 8 bit DAC 1 (unused)
			(no readback)
94	5E	136	(w) 8 bit DAC 2 (unused)
			(r) bits in from antenna (none used)
95	5F	137	(w) 8 bit DAC 3 (unused)
			(r) bits in from antenna
95.2	5F.2	137.2	1=L band locked
95.1	5F.1	137.1	1=X band locked

-----motor driver card 0x60 to 0x6F-----

96	60	140	12 bit DAC 0 = modulator A (MSB)
97	61	141	(000 - 7ff = -350 to +350 mA)
98	62	142	12 bit DAC 1 (unused) (MSB) htr 2
99	63	143	.
100	64	144	12-bit DAC 2 = mm osc Vop (MSB)
101	65	145	(000 - 900 = 7.5 V to 10.0 V)
102	66	146	12-bit DAC 3 = mm loop gain (MSB)
103	67	147	(000=max gain; 7ff=min gain)
104	68	150	(w) lock code (0x96 enables tuning)
			(r) card status:
104.7	68.7	150.7	--
104.6	68.6	150.6	0=motor driver overtemp

1 for open loop
open/closed
open/closed loop
TV flap
HEMT, SIS bias

104.5	68.5	150.5	--
104.4	68.4	150.4	1=tuning enabled
104.3	68.3	150.3	--
104.2	68.2	150.2	1=lock code OK
104.1	68.1	150.1	0=pwr on reset active
104.0	68.0	150.0	0=start enabled
105	69	151	toggle byte (bit pattern same as 6A)
106	6A	152	direction byte (1 = incr. pot counts)
106.7	6A.7	152.7	--
106.6	6A.6	152.6	atten A
106.5	6A.5	152.5	mmosc A
106.4	6A.4	152.4	mmback A
106.3	6A.3	152.3	--
106.2	6A.2	152.2	polarizers
106.1	6A.1	152.1	atten D
106.0	6A.0	152.0	calibration wheel
107	6B	153	bits out to antenna (none used)
108	6C	154	bits out to antenna:
108.7	6C.7	154.7	1=mm sweep off
108.6	6C.6	154.6	1=mmosc on
108.5	6C.5	154.5	1=2nd IF on
108.4	6C.4	154.4	0=2nd IF 13 dB atten on (lower signal)
108.3	6C.3	154.3	phslck select 1 (11=D;10=C;01=B;00=A)
108.2	6C.2	154.2	phslck select 0
108.1	6C.1	154.1	band select 1 (11=D;10=C;01=B;00=A)
108.0	6C.0	154.0	band select 0
109	6D	155	(w) 8-bit DAC 1 = echo level
			(no readback) (00-7f = 0 to 10 V)
110	6E	156	(w) 8-bit DAC 2 = balance B
			(no readback) (00-7f = 0 to 10 V)
			(r) bits in from antenna:
110.2	6E.2	156.2	1=line length ref status OK
110.1	6E.1	156.1	1=mm lock ref status OK
110.0	6E.0	156.0	1=mmosc phaselocked
111	6F	157	(w) 8-bit DAC 3 = balance A
			(no readback) (00-7f = 0 to 10 V)
			(r) bits in from antenna (none used)

mm Vop + HP switch

IF switch

----- analog multiplex addresses (0x70 to 0x138) -----

112	70	160	mmosc A (MSB)	LO plate AD	CAC
113	71	161	(LSB)		
114	72	162	Imxr A	dewar control	MAM
115	73	163			
116	74	164	Vop A	LO plate AD	VCO
117	75	165			
118	76	166	spare 1	dewar control	
119	77	167			
120	78	170	atten C	LO plate BC	CAC
121	79	171			
122	7A	172	T3	therm fanout 1	TAT
123	7B	173			
124	7C	174	T harm gen	IF plate	TAT
125	7D	175			
126	7E	176	T9	therm fanout 1	TAT
127	7F	177			

128	80	200	+15 mon	IF plate	VDN
129	81	201			
130	82	202	T15	therm fanout 2	TAT
131	83	203			
132	84	204	xband IF lev	rcvr mon panel	VCN
133	85	205			
134	86	206	T21	therm fanout 2	TAT
135	87	207			
136	88	210	T heat exch	He compressor	TAT
137	89	211			
138	8A	212	T amb	cal/pol	TAT
139	8B	213			
140	8C	214	T water in	water flometer	TAT
141	8D	215			
142	8E	216	tilt 1	tiltmeter 1	VAN
143	8F	217			
144	90	220	mmbock A	LO plate AD	CAC
145	91	221			
146	92	222	VmxrA	dewar control	SAH
147	93	223			
148	94	224	tripler	LO plate AD	VAN
149	95	225			
150	96	226	sensor 1	dewar control	KAK
151	97	227			
152	98	230	T bc	LO plate BC	TAT
153	99	231			
154	9A	232	T4	therm fanout 1	TAT
155	9B	233			
156	9C	234	T bp/bs	IF plate	TAT
157	9D	235			
158	9E	236	T10	therm fanout 1	TAT
159	9F	237			
160	A0	240	-15 mon	IF plate	VDN
161	A1	241			
162	A2	242	T16	therm fanout 2	TAT
163	A3	243			
164	A4	244	mm err V	rcvr mon panel	VCE
165	A5	245			
166	A6	246	T22	therm fanout 2	TAT
167	A7	247			
168	A8	250	T oil sump	He compressor	TAT
169	A9	251			
170	AA	252	T hot	cal/pol	TAT
171	AB	253			
172	AC	254	T water out	water flometer	TAT
173	AD	255			
174	AE	256	tilt 2	tiltmeter 2	VAN
175	AF	257			
176	B0	260	atten A	LO plate AD	CAC
177	B1	261			
178	B2	262	Iheater	dewar control	AAA
179	B3	263			
180	B4	264	mmosc B	LO plate BC	CAC
181	B5	265			
182	B6	266	sensor 2	dewar control	KAK
183	B7	267			

184	B8	270	Vop B	LO plate BC	VCO
185	B9	271			
186	BA	272	T5	therm fanout 1	TAT
187	BB	273			
188	BC	274	xband tune mon	IF plate	GCG
189	BD	275			
190	BE	276	T11	therm fanout 1	TAT
191	BF	277			
192	C0	300	+5 mon	IF plate	VCN
193	C1	301			
194	C2	302	T17	therm fanout 2	TAT
195	C3	303			
196	C4	304	mm IF lev	rcvr mon panel	VCN
197	C5	305			
198	C6	306	T23	therm fanout 2	TAT
199	C7	307			
200	C8	310	He supply	He manifold	PCP
201	C9	311			
202	CA	312	mod A Imon	VME chassis	AAA
203	CB	313			
204	CC	314	extra 1	P extra 1	
205	CD	315			
206	CE	316	extra 5	P extra 2	
207	CF	317			
208	D0	320	spare 1	LO plate AD	
209	D1	321			
210	D2	322	sensor 5	dewar control	KAK
211	D3	323			
212	D4	324	mmcbck B	LO plate BC	CAC
213	D5	325			
214	D6	326	sensor 3	dewar control	KAK
215	D7	327			
216	D8	330	Vop C	LO plate BC	VCO
217	D9	331			
218	DA	332	T6	therm fanout 1	TAT
219	DB	333			
220	DC	334	plate htr mon	IF plate	VCI
221	DD	335			
222	DE	336	T12	therm fanout 1	TAT
223	DF	337			
224	E0	340	Lband err V	rcvr mon panel	VCE
225	E1	341			
226	E2	342	T18	therm fanout 2	TAT
227	E3	343			
228	E4	344	totpwr	rcvr mon panel	VDN
229	E5	345			
230	E6	346	T24	therm fanout 2	TAT
231	E7	347			
232	E8	350	He return	He manifold	PCP
233	E9	351			
234	EA	352	mod B Imon	VME chassis	AAA
235	EB	353			
236	EC	354	extra 2	P extra 1	
237	ED	355			
238	EE	356	extra 6	P extra 2	
239	EF	357			

240	F0	360	spare 2	LO plate AD	
241	F1	361			
242	F2	362	sensor 6	dewar control	KAK
243	F3	363			
244	F4	364	atten B	LO plate BC	CAC
245	F5	365			
246	F6	366	sensor 4	dewar control	KAK
247	F7	367			
248	F8	370	T plate	IF plate	TAT
249	F9	371			
250	FA	372	T7	therm fanout 1	TAT
251	FB	373			
252	FC	374	mm lp gain mon	IF plate	VCN
253	FD	375			
254	FE	376	T13	therm fanout 2	TAT
255	FF	377			

The following addresses are read only

256	100	400	Lband IF lev	rcvr mon panel	VCN
257	101	401			
258	102	402	T19	therm fanout 2	TAT
259	103	403			
260	104	404	T inlet air	He compressor	TAT
261	105	405			
262	106	406	calib	cal/pol	CAC
263	107	407			
264	108	410	vac gauge	He manifold	VCV
265	109	411			
266	10A	412	mon C Imon	VME chassis	AAA
267	10B	413			
268	10C	414	extra 3	P extra 1	
269	10D	415			
270	10E	416	extra 7	P extra 2	
271	10F	417			
272	110	420	atten D	LO plate AD	CAC
273	111	421			
274	112	422	V schottky	dewar control	VAD
275	113	423			
276	114	424	mmosc C	LO plate BC	CAC
277	115	425			
278	116	426	T1	therm fanout 1	TAT
279	117	427			
280	118	430	T 2nd IF	IF plate	TAT
281	119	431			
282	11A	432	T8	therm fanout 1	TAT
283	11B	433			
284	11C	434	echo level mon	IF plate	VCN
285	11D	435			
286	11E	436	T14	therm fanout 2	TAT
287	11F	437			
288	120	440	xband err V	rcvr mon panel	VCE
289	121	441			
290	122	442	T20	therm fanout 2	TAT
291	123	443			
292	124	444	T gas disch	He compressor	TAT
293	125	445			
294	126	446	pol	cal/pol	CAC

295	127	447			
296	128	450	flowrate	water flometer	VAF
297	129	451			
298	12A	452	T VME	VME chassis	TAT
299	12B	453			
300	12C	454	extra 4	P extra 1	
301	12D	455			
302	12E	456	extra 8	P extra 2	
303	12F	457			
304	130	460	T ad	LO plate AD	TAT
305	131	461			
306	132	462	spare 2	dewar control	
307	133	463			
308	134	464	mmback C	LO plate BC	CAC
309	135	465			
310	136	466	T2 (MSB)	therm fanout 1	TAT
311	137	467	(LSB)		
312	138	470			
314	13A	472	control box status bits:		
314.7	13A.7	472.7	cabin power (0=OK; 1=power off)	1=OK 0=power off	
314.6	13A.6	472.6	camera flap (0=closed, 1=open)		
314.5	13A.5	472.5	priority pwr (0=normal, 1=manual override)		
314.4	13A.4	472.4	camera flap bypass (0=bypassed)		
314.3	13A.3	472.3	--		
314.2	13A.2	472.2	--		
314.1	13A.1	472.1	--		
314.0	13A.0	472.0	always 0		
315	13B	473	ant base control box status:		
315.7	13B.7	473.7	collision (0=OK, 1=collision occurred)		
315.6	13B.6	473.6	ant drive (0>manual, 1=computer)		
315.5	13B.5	473.5	spare 1 temperature (1=OK, 0=fault)		
315.4	13B.4	473.4	cabin temp (1=OK, 0=too high)		
315.3	13B.3	473.3	rcvr temp (1=OK, 0=too high)		
315.2	13B.2	473.2	elev drive temp (1=OK, 0=too hot)		
315.1	13B.1	473.1	camera safe (1=OK, 0=flap not safe)		
315.0	13B.0	473.0	azim drive temp (1=OK, 0=too hot)		
316	13C	474	ant base control box status bits:		
316.7	13C.7	474.7	ultimate elev limit (0=OK, 1=on limit)		
316.6	13C.6	474.6	azim limit (0=OK, 1=on limit)		
316.5	13C.5	474.5	collision protection (0=enabled)		
316.4	13C.4	474.4	water pressure (0=OK, 1=too low)		
316.3	13C.3	474.3	key (0=OK, 1=key off/ult lim/safety int)		
316.2	13C.2	474.2	ultimate limit azim (0=OK, 1=on limit)		
316.1	13C.1	474.1	service (0=normal; 1=5 minute grace period to service water pump)		
316.0	13C.0	474.0	elev limit (0=OK, 1=on limit)		
317	13D	475	Phase Status		
318	13E	476	Error Status - status reg of DP8343 rcvr chip		
319	13F	477	Error Address - telem addr of error		