

# Calibration Notes for FAST Fields and ElectroStatic Analyzer (ESA) Data

## Fields

The FAST fields raw data is calibrated by a large collection of ASCII calibration files, which are included with every release of the FAST data analysis. In any given release, these files (of which there are 220) are in the directory:

**FASTLIB/fast\_fields\_cals**

where FASTLIB, for Solaris, is the sub-directory:

**release\_directory/SunOS.5.8/lib/fast\_fields\_cals**

For the LINUX release, this sub-directory would be:

**release\_directory/Linux.2.6/lib/fast\_fields\_cals**

The calibration file names are of the form:

**<MeasurementType>.cal**

where <MeasurementType> is one of 220 different types of fields measurements. Some examples are:

**MagDC.cal**  
**V2-V4\_16k.cal**

and so on.

## ESA

There are three ESA detectors on FAST:

- **Stepped ESA (SESA)**
- **Ion ESA (IESA)**
- **Electron ESA (EESA)**

All three of these instruments can produce data at a low data rate, called "Survey" mode, or at a high data rate (but for a limited timespan) called "Burst" mode.

The data for all of these detectors is calibrated from within the software. The most important calibration factors are the 8-to-14, and 8-to-16 bit tables which decompress the 8-bit raw telemetry data into actual counts. Note that the 8-to-14 table is used for the ESA "Burst" data and the 8-to-16 table is used for the "Survey" data. Here are the two tables (each maps an 8-bit unsigned integer to a larger count):

**"byteTo14" Table:**

[ 0]:	0	1	2	3	4	5	6	7	8	9
[ 10]:	10	11	12	13	14	15	16	18	20	22
[ 20]:	24	26	28	30	32	36	40	44	48	52
[ 30]:	56	60	64	68	72	76	80	84	88	92
[ 40]:	96	100	104	108	112	116	120	124	128	136
[ 50]:	144	152	160	168	176	184	192	200	208	216
[ 60]:	224	232	240	248	256	272	288	304	320	336
[ 70]:	352	368	384	400	416	432	448	464	480	496
[ 80]:	512	544	576	608	640	672	704	736	768	800
[ 90]:	832	864	896	928	960	992	1024	1056	1088	1120
[100]:	1152	1184	1216	1248	1280	1312	1344	1376	1408	1440
[110]:	1472	1504	1536	1568	1600	1632	1664	1696	1728	1760
[120]:	1792	1824	1856	1888	1920	1952	1984	2016	2048	2112
[130]:	2176	2240	2304	2368	2432	2496	2560	2624	2688	2752
[140]:	2816	2880	2944	3008	3072	3136	3200	3264	3328	3392
[150]:	3456	3520	3584	3648	3712	3776	3840	3904	3968	4032
[160]:	4096	4224	4352	4480	4608	4736	4864	4992	5120	5248
[170]:	5376	5504	5632	5760	5888	6016	6144	6272	6400	6528
[180]:	6656	6784	6912	7040	7168	7296	7424	7552	7680	7808
[190]:	7936	8064	8192	8320	8448	8576	8704	8832	8960	9088
[200]:	9216	9344	9472	9600	9728	9856	9984	10112	10240	10368
[210]:	10496	10624	10752	10880	11008	11136	11264	11392	11520	11648
[220]:	11776	11904	12032	12160	12288	12416	12544	12672	12800	12928
[230]:	13056	13184	13312	13440	13568	13696	13824	13952	14080	14208
[240]:	14336	14464	14592	14720	14848	14976	15104	15232	15360	15488
[250]:	15616	15744	15872	16000	16128	16256				

**"byteTo16" Table:**

[ 0]:	0	1	2	3	4	5	6	7	8	9
[ 10]:	10	11	12	13	14	15	16	18	20	22
[ 20]:	24	26	28	30	32	36	40	44	48	52
[ 30]:	56	60	64	68	72	76	80	84	88	92
[ 40]:	96	100	104	108	112	116	120	124	128	136
[ 50]:	144	152	160	168	176	184	192	200	208	216
[ 60]:	224	232	240	248	256	272	288	304	320	336
[ 70]:	352	368	384	400	416	432	448	464	480	496
[ 80]:	512	544	576	608	640	672	704	736	768	800
[ 90]:	832	864	896	928	960	992	1024	1088	1152	1216
[100]:	1280	1344	1408	1472	1536	1600	1664	1728	1792	1856
[110]:	1920	1984	2048	2176	2304	2432	2560	2688	2816	2944
[120]:	3072	3200	3328	3456	3584	3712	3840	3968	4096	4224
[130]:	4352	4480	4608	4736	4864	4992	5120	5248	5376	5504
[140]:	5632	5760	5888	6016	6144	6272	6400	6528	6656	6784
[150]:	6912	7040	7168	7296	7424	7552	7680	7808	7936	8064
[160]:	8192	8448	8704	8960	9216	9472	9728	9984	10240	10496
[170]:	10752	11008	11264	11520	11776	12032	12288	12544	12800	13056
[180]:	13312	13568	13824	14080	14336	14592	14848	15104	15360	15616
[190]:	15872	16128	16384	16896	17408	17920	18432	18944	19456	19968
[200]:	20480	20992	21504	22016	22528	23040	23552	24064	24576	25088
[210]:	25600	26112	26624	27136	27648	28160	28672	29184	29696	30208
[220]:	30720	31232	31744	32256	32768	33792	34816	35840	36864	37888
[230]:	38912	39936	40960	41984	43008	44032	45056	46080	47104	48128
[240]:	49152	50176	51200	52224	53248	54272	55296	56320	57344	58368
[250]:	59392	60416	61440	62464	63488	64512				