ACA_TRD

Description: This tool collects data from the ASPECT L1 pipes and trends the appropriate Colunms. This tool is directed against SE03 5.6.2.2.2.4- 5.6.2.2.2.5.

Open Issues:

1. CXC handeling of the monitor stars is not yet defined.
2. Fid light names are not uniquly defined.

Inputs:

- Data should be taken from MTA DB tables but are available in the following archival files: FIDPROPS, GSPROPS, ACACENT FILE

Outputs:

- summary plots (gifs) as given.
- MTA Summary page. Accessed from normal daily top level. (This means add the last 2 rows listed below to the "MTA TRENDS" page)

```
      PCAD
ACA Thermal                             Weekly Monthly Yearly Mission
IRU Configuration                       Weekly Monthly Yearly Mission
IRU Temperatures and Electronics        Weekly Monthly Yearly Mission
PCAD Gyro Rates                         Weekly Monthly Yearly Mission
PCAD Temperatures and Electronics       Weekly Monthly Yearly Mission
PCAD FID Light Magnitude                Weekly Monthly Yearly Mission
Aspect Quality Solution                 Weekly Monthly Yearly Mission
Drift rate updates to gyros             Weekly Monthly Yearly Mission
PCAD reaction wheel Rates               Weekly Monthly Yearly Mission
FTS temp & gradient                     Weekly Monthly Yearly Mission
Aspect Level 1 Centroids                Weekly Monthly Yearly Mission
ACA level 1 Fid lights                  Weekly Monthly Yearly Mission
ACA level 1 slots                       Weekly Monthly Yearly Mission
```

Parameters: Start time, stop time (for trend pages)

Aspect Level 1 Fids:

- Grab the following columns from the data base tables:

```
slot, ID_num,id_status, id_string
mag_i_avg, mag_i_min, mag_i_max
```

- Grab the following keywords:

```
Tstart, Tstop, OBS_ID
```

- Monitoring is done on a per L1 file basis so there is likely only one set of rows, these are displays via HTML as follows. In this example Fid lights 1,2,10 and 13 were used during the day. Three aspect intervals occured this day. Anywhere from 1 to three files were input. Notice that all 14 fid lights are always displayed whether or not they are used. The fid light ID_string (e.g. HRC-I-2) can be taken from the fidprops files as well or hard coded once science knows the names of the fid lights.

FID LIGHT TRENDS

FOR WEEKLY PERIOD 2000-062 to 2000-069 including 7 OBS IDs

		STATUS			avg	min	max
FID Light	Good	Marginal	Bad	Number	mag	mag	mag
1 HRC-I-1	100	0.0	0.0	30	10.2	10.3	10.1
2 HRC-I-2	100	0.0	0.0	30	10.1	10.2	10.0
...							
13 ACIS-S-3	66.7	33.3	0.0	30	10.0	10.0	10.0
14 ACIS-S-4	0.0	0.0	0.0	0	NAN	NAN	NAN

- The numbers in the "Good", "Marginal" and "Bad" columns are the fractional number of samples which had that value (i.e. row 13 is the result of having 30 values, 20 good and 10 marginal 0 bad.avg mag = the average of the mag_i_avgs, min mag = the minimum of the mag_i_min and max mag = the max of mag_i_max. Number is the number of samples.

- The Following trend plots should be linked from the appropriate columns (i.e click on the Fidlight number or name to display the plot).

  1. Mag(avg)vs time for each fid light.

  For each aspect interval, the FIDPROPS file Identifies a time range (see the FIDPROPS ICD) a fid light id (id_num/id_string) and a magnitude (mag_i_avg).

- A linear, least squares, fit shall be made to each of the above (14) plots extending 20% in time (2 days, 7 days or 60 days) past the existing data. If the fit line violates the limits, the time and degree of the violations shall be notes, at the end of the processing run Alerts shall be sent, Priority 3X (X is determined by notifier rules based on when the violation is projected to occur.), Problem ID: 225

  Additional text should read:

```
The average magnitude of FIDLIGHT #X (NAME:XXXXX)
will violate yellow limit of 11 on or about 2000-071TT20:00:00
The html page with this data is:
http://asc.harvard.edu/mta_trends/weekly/pcad/fids.html

or

The average magnitude of FIDLIGHT #X (NAME:XXXXX)
will violate yellow limit of 11 on or about 2000-071TT20:00:00
and
will violate red limit of 12 on or about 2000-091TT19:00:00
The html page with this data is:
http://asc.harvard.edu/mta_trends/monthly/pcad/fids.html
```

- Limits for mag_i_avg should be kept in the normal MTA limits data base. The nominal values should be initially set to:

red high =12
yellow high =11
yellow low =5
red low =4

Aspect Level 1 Centroids and Slots

- Pull angynea(1-8) and angznea(1-8) from the ACACENT file.
- This section uses the data grabbed for the previous page plus the following columns the MTA DB tables or GSPROPS

```
slot, agasc_id,type,id_status, ra_offset_obs, dec_offset_obs
mag_aca_avg, mag_aca_min, mag_aca_max, mag_aca
```

- Grab the following keywords:

```
Tstart, Tstop, OBS_ID
```

- For trending purposes the following data will be sent to the
- Cumulative data shall be stored as part of the trends pages, updated weekly.

Slot Trends

7 day period from 2000-062 to 2000-069 (7 OBS IDs)

Average performace of each slot when looking at a Guide Star

SLOT	STATUS GOOD	STATUS MARGINAL	STATUS BAD	RMS RA ERR	RMS DEC ERR	RMS Δmag	#	RMS nea Y	RMS nea Z	Number
1	98.1	1.2	0.7	.0334	.0023	.0213	125	.235	.328	12500
2	96.4	1.4	2.2	.0023	.0002	.2120	129	.235	.328	12900
...										
7	88.1	9.3	1.4	.0023	.0002	.2120	206	.235	.328	20600
8	92.3	1.3	6.4	.0023	.0002	.2120	67	.235	.328	6700
AVG	95.3	2.4	2.3	.0021	.0021	.4323	1432	.235	.328	143200

Average performace of each slot when looking at a Monitor Star

SLOT	STATUS GOOD	STATUS MARGINAL	STATUS BAD	RMS RA ERR	RMS DEC ERR	RMS Δmag	#	RMS nea Y	RMS nea Z	Number
1	98.1	1.2	0.7	.0334	.0023	.0213	12	.235	.328	1200
2	96.4	1.4	2.2	.0023	.0002	.2120	12	.235	.328	1200
..										
7	88.1	9.3	1.4	.0023	.0002	.2120	20	.235	.328	2000
8	92.3	1.3	6.4	.0023	.0002	.2120	6	.235	.328	600

Average performace of each slot when looking at a Fid light

SLOT	STATUS GOOD	STATUS MARGINAL	STATUS BAD	RMS Δmag	Number
1	98.1	1.2	0.7	.0213	222
2	96.4	1.4	2.2	.2120	212
...					
7	88.1	9.3	1.4	.2120	176
8	92.3	1.3	6.4	.2120	301
AVG	95.3	2.4	2.3	.4323	1432

- Notice that the number of enties from id_status, ra_offset_obs and dec_offset_obs is much smaller than angy(z)nea(1-8). Hence two seperate number columns.
- Ra_err and Dec_err come from ra_offset_obs and dec_offset_obs respectivly. They are the RMS average values of ra_offset_obs and dec_offset_obs for the times that the slot status is "good" *do not use marginal or bad values in this computation.* Other values are the same as the previous table
- RMS RA ERR = Root mean square of the "good" values of ra_offset_obs. RMS Dec ERR = Root mean square of the "good" values of dec_offset_obs.

RMS nea Y = Root mean square of all values of angynea().
RMS nea Z = Root mean square of all values of angznea().

- The Δ Magnitude (diff) is defined as diff = mag_aca_avg-mag_aca for all objects type=guide diff= mag_i_aca-8.34 for all objects type = fid (or all slots observed in a given fidprops file. (in this case 8.34 is a place holder, the actual value should be a parameter set for each fid light.)

- The Following trend plots should be linked from the appropriate columns.

  1. Plot pos_err vs time for each slot (including AVG). (Both mon and guide)
  2. diff (see previous bullet) vs time for each slot (including AVG).
  3. Plot angynea vs time for each slot (including AVG).
  4. Plot angznea vs time for each slot (including AVG).

- A linear, least squares, fit shall be made to each of the above plots extending 20% in time (2 days, 7 days or 60 days) past the existing data. If the fit line violates the limits, the time and degree of the violations shall be notes, at the end of the processing run Alerts shall be sent, Priority 3X (X is determined by notifier rules based on when the violation is projected to occur.), Problem ID: 226

  Additional text should read

```
The POS_ERR (or Delta Magnitude or nea y or nea z)
will exceed its yellow (red) high limit of 1.0
 on or about 2000-071TT20:00:00
The html page with this data is:
http://asc.harvard.edu/mta_trends/weekly/pcad/slots.html
```

- Limits for pos_err should be kept in the normal MTA limits data base. The nominal values should be initially set to:
  red high =1
  yellow high =.2
  there is no low limit

- Limits for Delta Magnitude should be kept in the normal MTA limits data base. The nominal values should be initially set to:
  red high =3
  yellow high =1
  there is no low limit

- Limits for nea_y and ang_z should be kept in the normal MTA limits data base. The nominal values should be initially set to:
  red high =2
  yellow high =1
  there is no low limit

Inputs to Database Tables:
The following are the appropriate entries for the database table.

- No input to MTA DB table by this code.
- There is NO MTA status file generated by this code.

Enhancement requests:
The following are the appropriate entries for the database table.

- 10/25/00 add units in the header rows.
- 10/25/00 Delta mag is currently abs(predicted - observed), change this to (predicted - observed), (no absolute value).
- 10/25/00 pos_err should exist within the gsprops file, use this instead of $(RA\_ERR^2 + DEC\_ERR^2)^{0.5})$
- 10/25/00 add a close button to the javascript "TV screens"

Release: 4

Group: DSOPS

Analysis Domain:

DS Tool Class: 2

DS Tool Category: Trending

Spec Name: ACA_TRD.tex
Spec Category: New
Code Type: ASCDS
Code Source: New
Specification Version: 1.1
Change Control: 0.2 changes based on 3/3/99 meeting.
Change Control: 1.1 changes based on 10/25/00 preliminary run.
Last Edit: October 25, 2000