MONITOR

Description: This tool/Pipeline performs basic monitoring functions for all time indexed engineering-like elements. This includes all Level 0 engineering as well as EPHIN, HRC and ACIS housekeeping and Level one non-SI data.

Open Items:

- I haven't thought hard about trending dynmical limimts. The right thing to do is to build a history of the systems "when on" and "when off" and trend the two separately. One could do this using pseudo MSIDs.

Inputs:

- Level 0 or Level 1 fits binary file single extention

Outputs:

- Fits file containing selected colunms (see algorithm).
- html file with graphics. (see algorithm)
- binned MSIDS for database

Control Parameters:

- stack of input data files

Analysis Reference Data:

- List of MSIDS (or other column names).
- Grouping information.
- List of limits.

Algorithm:

1. Load in list of MSIDS or other column names to monitor from ARD

2. Load in MSID grouping information from ARD
3. Load in lists of limits (or if appropriate time index limits - see MTA_FIND_STATES) from ARD (separate ICF)
4. Map MSIDs to appropriate files.
5. For each pass:
   - open each file of interest.
   - examine columns of interest
   - Write out to MTA_Status file by group indicating time of each sample and status.
   - FOR MSIDS WITH A NUMERICAL VALUE -
     (stored in LX_Process_list) compare the value with the four limits in the limits data base (limits.db or var_limits.db) any of the 10 codes below may apply.

     ```
     0=Green
     1=unchecked
     2=operational yellow low
     3=operational yellow high
     4=survival yellow low
     5=survival yellow high
     6=operational red low
     7=operational red high
     8=survival red low
     9=survival red high
     ```

   - FOR MSIDS WITH A STRING VALUE -
     These are listed in a file call /stage/ascds_extra/swolk/IPCL/ODB_v6.8/tes.db along with the expected state. Groups are indicate in this file by an instrument code: (ACIS, HRC, SIM, HRMA, GRAT, PCAD, SUB, EPH) followed by the word "DISCREET" If the MSID = expected_state then status is green. If the MSID = does not have an expected state listed the status is unchecked. If the MSID NE expected_state then status is red. IF the status is Red the send the following alert:

```
Subsystem (from above)
errorcode 3X  (X determined by subsystem)
Priority 4A

Discreet violation:
(MSID)  was found in the unexpected state (UNEXPECTED STATE)
for (2656) secs starting at (12/31/1993 02:44:00 -- 9.840003673791885E+0
see
http://asc.harvard.edu/mta/indata/eph00059304_l0.fits
```

As usual all alerts are concatinated untill the end of processing.
Note: tes.db has 5 columns MSID -self explanitory,
STATE CODE - this is a statement of the current state of the spacecraft,and thus which set of state code to use. first implimentation is to only use STATE CODE =1, IF an MSID has both, check neither.
EXPECTED STATE - the expected state for this state code.
Total number of violation before user notification.
Whether or not to check each occurance - A = yes check ALL.

- In the case of unevenly sampled data within the same group write out data at the sample rate of the most often occuring element. For rows without data at the sample time repeat the last available sample, but use the quality bit to note the stale data as “bad” (i.e. 1)
- HTML output:
  A main page listing the days of the mission for which data is avaiable.

```
                Available MTA Daily Reports

1999-244
1999-245
1999-246
```

```
1999-247
1999-248
...
1999-303

Trend reports

Older Reports

August_1999
July_1999
June_1999
May_1999
April_1999

Previous years
1998
```

- The link page lists available catagories:

```
                   MTA Reports

                  Day 1999 102


Please select one of the following reports:

     ACIS
         ACIS Thermal Control
         ACIS Electronics
         ACIS Mechanism Controller
         ACIS Source Counting Rates
         ACIS Background Counting Rates

     EPH
         EPHIN Housekeeping
         EPHIN Temperatures and Voltages
         EPHIN Rates
```

GRAD

HRMA CAP thermister gradients
HRMA FAP thermister gradients
HRMA Hyp. Shell 1 thermister gradients
HRMA Hyp. Shell 3 thermister gradients
HRMA Hyp. Shell 4 thermister gradients
HRMA Hyp. Shell 6 thermister gradients
HRMA Par. Shell 1 thermister gradients
HRMA Par. Shell 3 thermister gradients
HRMA Par. Shell 4 thermister gradients
HRMA Par. Shell 6 thermister gradients

GRAT

Grating Voltages and Rotation Angles

HRC

HRC Temperatures
HRC Electronics
HRC Veto Counting Rates
HRC Source Counting Rates
HRC Background Counting Rates
HRC PSF
HRC Houskeeping

PCAD

ACA Thermal
IRU Configuration
IRU Temperatures and Electronics
PCAD Gyro Rates
PCAD Temperatures and Electronics
PCAD FID Light Magnitude
Aspect Quality Solution
Drift rate updates to gyros
PCAD reaction wheel Rates
FTS temp & gradient
Aspect Level 1 Centroids

```
        ACA level 1 Fid lights
        ACA level 1 slots


    SIM
        SIM Thermal
        SIM Electronics
        SIM Actuator Use

    SUB
        OBC State
        Spacecraft Temperatures
        Battery Usage

    TEL
        Telescope Thermistor Data
        HRMA Temperatures
```

- The individual HTML pages will display the following data for each MSID in the group:
  (a) Mnemonic – The MSID. This has a link to a strip plot of the values of that MSID during the given day.
  (b) Description – The Description from ODB file tmsrment.txt.
  (c) Red – The precentage of sample that day (GMT) which were outside red limits.
  (d) Yellow – The precentage of sample that day which were outside yellow limits.
  (e) Green – The precentage of sample that day which were within yellow limits.
  (f) Unchk – The precentage of sample that day which were not limit checked.
  (g) average – The average of all samples.
  (h) stddev – The standard deviation among the samples.
  (i) min – The minimum value of the samples.
  (j) max– The maximum value of the samples.

(k) count – The number of samples that day.

6. The Trend report lists the same available catgories as the daily pages, but they link to trend HTML pages and thus view the most recent week, month (4 weeks), year, or the whole mission.

```
                    MTA Trend Reports
              Last weekly update Occured 1999-297

           Please select one of the following reports:

               ACIS
ACIS Thermal Control                      Weekly Monthly Yearly Mission
ACIS Electronics                          Weekly Monthly Yearly Mission
ACIS Mechanism Controller                 Weekly Monthly Yearly Mission
ACIS Source Counting Rates                Weekly Monthly Yearly Mission
ACIS Background Counting Rates            Weekly Monthly Yearly Mission

      EPH
EPHIN Housekeeping                        Weekly Monthly Yearly Mission
EPHIN Temperatures and Voltages           Weekly Monthly Yearly Mission
EPHIN Rates                               Weekly Monthly Yearly Mission

      GRAT
Grating Voltages and Rotation Angles      Weekly Monthly Yearly Mission

       HRC
HRC Temperatures                          Weekly Monthly Yearly Mission
HRC Electronics                           Weekly Monthly Yearly Mission
HRC Veto Counting Rates                   Weekly Monthly Yearly Mission
HRC Source Counting Rates                 Weekly Monthly Yearly Mission
HRC Background Counting Rates             Weekly Monthly Yearly Mission
HRC PSF                                   Weekly Monthly Yearly Mission
HRC Houskeeping                           Weekly Monthly Yearly Mission

        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
SIM				
SIM Thermal	Weekly	Monthly	Yearly	Mission
SIM Electronics	Weekly	Monthly	Yearly	Mission
SIM Actuator Use	Weekly	Monthly	Yearly	Mission
SUB				
OBC State	Weekly	Monthly	Yearly	Mission
Spacecraft Temperatures	Weekly	Monthly	Yearly	Mission
Battery Usage	Weekly	Monthly	Yearly	Mission
TEL				
Telescope Thermistor Data	Weekly	Monthly	Yearly	Mission
HRMA Temperatures	Weekly	Monthly	Yearly	Mission

Note- ACA L1 Fid lights and slots are discussed in ACA_MON.

- The individual HTML pages will display the the same data for each msid as was displayed in the daily monitoing task. (The count will be larger though).
- Each of the above pages is regenerated once/week, based on the last (weeks, 28 days, 365 days) worth of data or all the data as appropriate.

- The trend plots will include a linear extrapoltaion of the plotted data set extending for 1/4 of the plotted data set (i.e the weekly will include about 2 days, the monthly will include 7 days projection, the Annual will include 3 months projection. An acceptable form of the extrapolation would be to use a linear least-squares fit.
- Alerts will be sent when the projected trend violates limits. The message will include the expected time that violation will occur, this time will be used to calulate the "urgency" code, see the notifier spec for more details.
- The intention is that MTA trend reports are *not* generated from the original level 0 files but instead from the MTA database tables.

7. The proposed web directory structure is given at the end of this document.

Release: 4

Group: DSOPS

Analysis Domain: Spatial

DS Tool Class: 2

DS Tool Category: Monitoring

Spec Name: monitor.tex

Spec Category: New

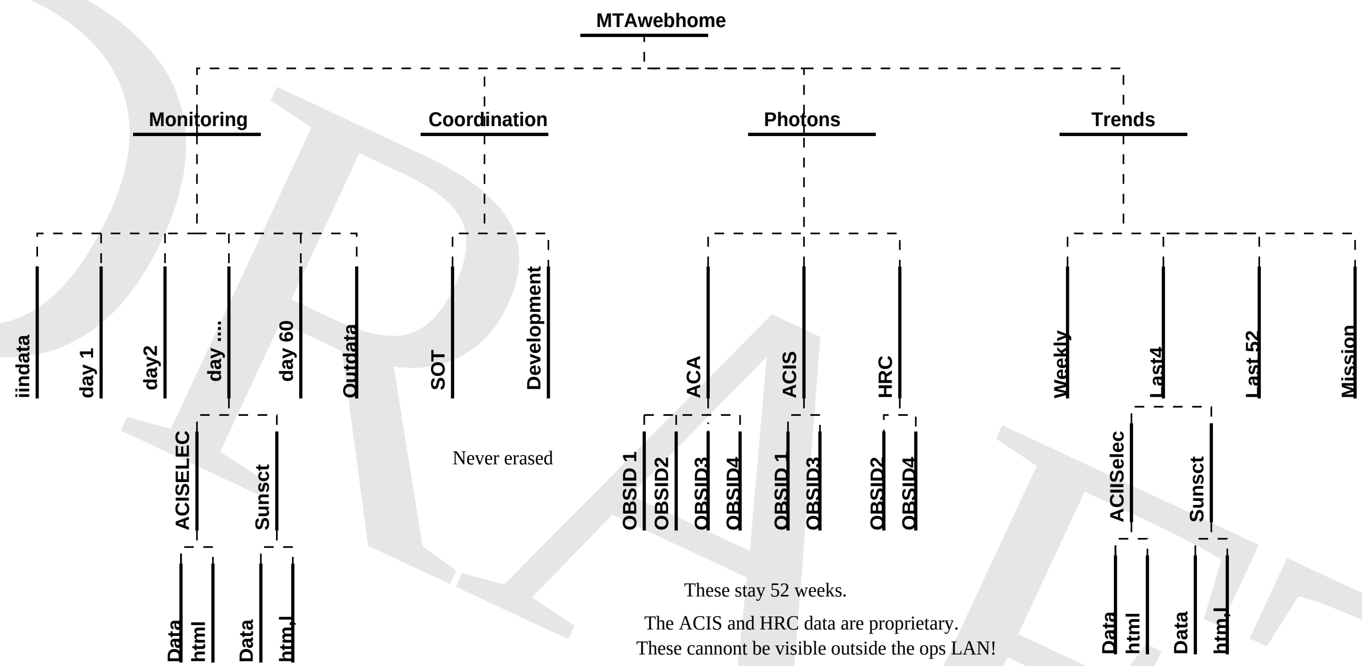
Code Type: ASCDS:w

Code Source: New

This Revison: 0.4 - by SJW

Change control: 0.1 to 0.4 - added detail on string handling and the web site directory structure.

Last Edit: March 12, 1999



Indata is erased at 3 days old (900 MB/day)
Outdata and Data are deleted at 7 days old (90 MB/day each)
html is deleted at 60 days old (30 MB/day.)

These files overwrite older files.

We currently have a web loaction at http:// asc.harvard.edu/mta_days.html, this should be moved to http://asc.harvard.edu/mta this location should be MTA home above.

DIRECTORY STRUCTURE OF THE MTA WEB SITE