Test 0.7.6. PACS Chopper synchronous operation with detectors (photometer)

Objectives

The main goal of this test is to check if the bolometer read-out is synchronous with the chopper movement. The bolometer read-out frequency is 40 Hz (every 25 ms) for raw data and 10 Hz for on-board averaged data. Doing rectangular chopping, we will perform the test in the calibration window where the chopper transition lasts 30 ms. Thus, the last two read-outs (in a chopper plateau) of raw data will be disturbed by the chopper transition. We will investigate how these read-outs are disturbed and if this disturbance is reproducible or jitters.

Priority

A

When performed / frequency

PFM-ILT
PFM-IST

Inputs, prerequisites

PTD 0.7.5 Verification of Chopper Functionalities;
PTD 2.3.2 Chopper PID optimization and performance test;
Photometer functional tests;

Interconnections

A. Fulfilled By

B. Fulfilling

OGSE Setup, astr. sources, OBSW Compr./Red.

OGSE BBs are not needed;
CSs will be used for illuminating the detectors, use the default temperature values which are set-up in PACS photometry default mode;
Loss-less compression mode to get the full time resolution of detector signals;

Test Implementation Procedure (TIP)

We will have 20+1 photometer read-outs per chopper plateau.

Step #	Test Implementation Procedure	OGSE Setup	Products Online Analysis	Pass/Fail & Remarks
	FM ILT TIP for req. 0.7.6.phot PACS Chopper synchronous operation with detectors (photometer)			
	Setup the instrument for this PTD			
0.01	Switch on PACS (if not already done).			
0.02	Setup photometry mode			CSs have to be stabilized at default temperatures;
0.03	Set diagnostic HK for chopper measures at readout frequency. synchronize on blue spectrometer readout Chopper: 209 DMC_CHOP_CTRL_ST - Chopper Control Status 244 DMC_CHOP_CUR_POS - Chopper: Actual position from readout by HK 245 DMC_CHOP_SETPOIN - Chopper: Position servo setpoint 246 DMC_CHOP_TARGET - Chopper: Final position for move			
0.04	Setup the SPU compression / reduction: Bolometer loss-less compression mode having raw data for 14 pixels in the blue and red array.			
0.05	Select detector selection table select appropriate detector selection tables (DXS7602) for the loss-less compression mode with 14 in the blue and red array having raw data.			
	Step 1: Square wave modulation with different RIs			
1.01	Chop with 1 Hz with OBCP 10 Loop repeat 50 (OBCP 10) End loop OBCP 10		Check OBCP status;	
	Step 2: End of Test			

2.01	Set PACS in default starting mode. stop diagnostic housekeeping set PACS back to its default starting mode	

Estimated time needed

One OBCP sequence lasts XX sec and will be 50 times repeated. Taking into account OBCP overheads, we will need a total time of ... for this test procedure.

Success criteria, required accuracy

Synchronization is successful if timing is consistent and chopper movement is recognizable and reproducible triggered by the photometer signal.

Test Analysis Procedure (TAP)

Step #	Test Analysis Procedure (Offline)	Online Analysis Input	Output, Products	Requirements on IA
	FM ILT TAP for req. 0.7.6.phot PACS Chopper synchronous operation with detectors (photometer)			
1.01	plot signals of one pixel in a time line; overplot chopper position and labels; demonstrate effect of chopper transition on signals;			
1.02	calculate mean time difference of label change and start of flat plateau; calculate mean time difference of label change and end of flat plateau; calculate mean time difference between start of chopper plateau and start of next signal; calculate mean time difference between label change and start of next signal;			
1.03	calculate the signals by linearly fitting the ramp slopes; plot signals and overplot labels and chopper positions on signal time steps; demonstrate effect of chopper transitions on signals;			
1.04	average signals on chopper plateaux excluding the first signal and subtract the first; signal → plot these signal difference for all chopper phases;			
1.05	check if disturbance of last ramp is reproducible or jitters.			

Output, products

Coding Strategy

Version number

$Revision$: 1.1