1 General Comments

Activities scheduled for this week are those planned for the 28th calendar week of 2016:

11 JUL 2016 to 18 JUL 2016 (DoYs 193 to 200).

The following routine activities were planned this week (see Gantt chart on next page and CRF 587):

- One Warm NIR Calibration on 13 JUL 2016 (DoY 195) with ETO 02:40:45z (orbit 35182) and with the following expected calibration values:

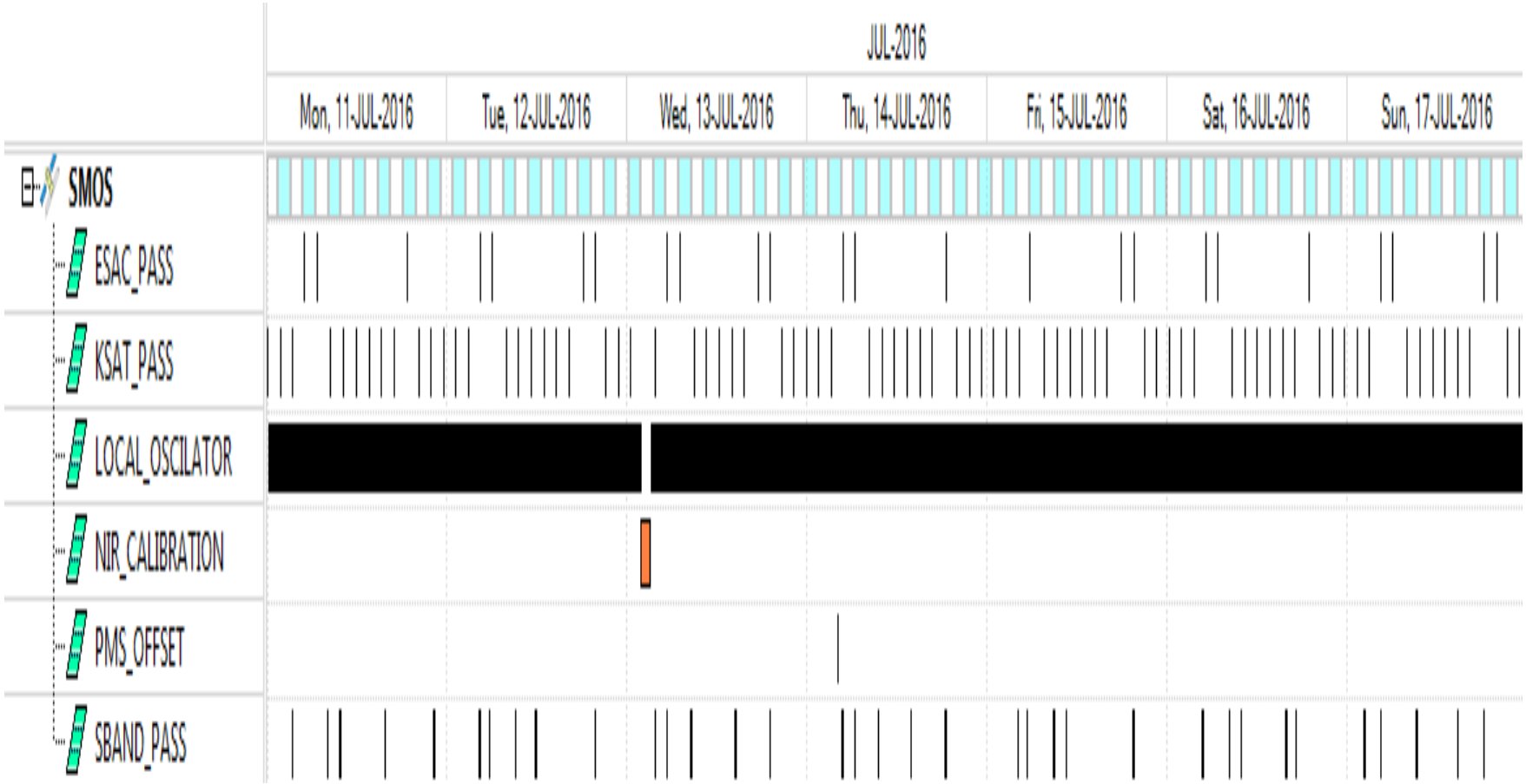
  B.T. = 3,6017º
  R.M.S. = 0,1879
  Sun Elevation = 07,5640º
  Moon elevation = 51,5789º
  R.A. = 205,85º
  DEC. = 028,73º
- One PMS Offset on 14 JUL 2016 (DoY 196), including three Short Calibrations at 04:14:00,0z, 04:14:34,8z, and 04:15:09,6z (orbit 35197).
- Local Oscillator Calibrations every 10 minutes.
- *X* band Passes over ESAC and Svalbard.

2 Mission Planning Deviations

Due to the CCU reset that happened on the 14th of July 2016, the following XBand passes were not acquired on ground:

Station	AOS	LOS	Duration
ESAC	2016-07-14T06:27:20z	2016-07-14T06:34:38z	437
SVAL	2016-07-14T08:19:54z	2016-07-14T08:25:55z	361
SVAL	2016-07-14T10:02:25z	2016-07-14T10:06:18z	233
SVAL	2016-07-14T11:44:06z	2016-07-14T11:47:55z	228
SVAL	2016-07-14T13:24:33z	2016-07-14T13:30:25z	351

In the case of the first failed pass over ESAC, the pass was not received due to the Autodownlink on-board failure reported in section 4 of this document.


JUL-2016
Mon, 11-JUL-2016
Tue, 12-JUL-2016
Wed, 13-JUL-2016
Thu, 14-JUL-2016
Fri, 15-JUL-2016
Sat, 16-JUL-2016
Sun, 17-JUL-2016
SMOS
ESAC_PASS
KSAT_PASS
LOCAL_OSCILATOR
NIR_CALIBRATION
PMS_OFFSET
SBAND_PASS

3 TC Failures

None.

4 Unforeseen Out of Limits (OOLs)

Several PLPC out of limits were received related with the different MIRAS anomalies that occurred during this reporting week. Further details of these OOLs can be seen in Appendix-A of this document.

5 On Board Anomalies

- A new CMN unlock happened on unit H1 on 13 of July at 21:11:41.516z. It was geolocated over Brazil at the following geographical coordinates:

  LAT =-7.506483
  LONG=310.967824

  Both parameters, output power SPM11167 and locking status SPM11162, went out of limits in the FOS PLPC system. The anomaly recovered by itself in 13 Epochs.
- A new MIRAS CCU happened on the 14 of July of 2016, at 04:53:50z. The event was notified by the CNES oncall team in a direct telephone call to the FOS oncall Engineer around 07:05z on that day. The onboard alarms caused by the reset were received during the first SBand morning pass of that day at 06:26z just after the XBand pass over ESAC where the CCU reset happened.

  The reset took place in the middle of the ESAC X Band GS pass commencing on 2016-07-14T04:50:25.312z. Said pass was scheduled for a duration of 376 seconds. The reset occurred 205 seconds after the station AoS and before the switch off of the X Band antenna, scheduled for 2016-07-14T04:55:35z. The last TM packet before the reset was received on 2016-07-14T04:53:17z.
  The replanning Telecommands were generated during the morning of the 14th of July and transferred to CNES for their further uplink to the spacecraft, during SBand pass KUX-22 at 09:35z. MIRAS nominal download activities were resumed on the same day, 14 of July, at 15:05:31z.

  The sequence of events including alarm and event packets leading to the CCU reset was:

  2016.196.04.50.25.311 725 NORM XBand Powered On

2016.196.04.50.49.312	*695*	*NORM*	*MM Full Dump Start*
2016.196.04.53.16.923	*689*	*ALARM*	*MM_Error_Counters_Acquisition_Failure*
2016.196.04.53.16.943	*690*	*ALARM*	*MM_Scrub_Frequency_Acquisition_Failure*
2016.196.04.53.16.983	*684*	*ALARM*	*MM_Address_Acquistion_Failure*
2016.196.04.53.16.983	*682*	*NORM*	*MM Dump Ended*
2016.196.04.53.17.033	*692*	*ALARM*	*MM_Science_Write_Failure*
2016.196.04.53.17.133	*692*	*ALARM*	*MM_Science_Write_Failure*
2016.196.04.53.17.233	*692*	*ALARM*	*MM_Science_Write_Failure*
2016.196.04.53.51.122	*826*	*NORM*	*Mode Change To Full Polarisation*

The values of the READ and WRITE pointers at the time of the reset were:

Read = 176012 MM Partition P8
Write = 3941473 MM Partition P0

- After the CCU reset and as expected, MIRAS automatically went into autodownlink mode over ESAC until the upload of the instrument recovery and the replanning from CNES. After the reset on the 14th of July, there was an Xband pass over ESAC long enough, 437 seconds, to be considered suitable for this autodownlink mode. In fact the instrument correctly detected this event and then it switched on the onboard transmitter. Unfortunately the transmitter went off immediately issuing also a Mass Memory Dump failure Alarm packet. The summary of onboard events was as follows:

2016.196.06.28.33.237	*740*	*NORM*	*GS_Detection_Visible*
2016.196.06.28.34.207	*432*	*NORM*	*Event_Action_Released*
2016.196.06.28.34.447	*725*	*NORM*	*XBand Powered On*
2016.196.06.28.58.447	*695*	*NORM*	*MM Full Dump Start*
2016.196.06.28.58.447	*685*	*ALARM*	*MM_Dump_Failure*
2016.196.06.28.58.447	*682*	*NORM*	*MM Dump Ended*
2016.196.06.28.59.637	*724*	*NORM*	*XBand Powered Off*
2016.196.06.29.51.017	*33233*	*NORM*	*LO Cal NoUN FULL NoEXT OBOP 29 Started*
2016.196.06.29.54.658	*826*	*NORM*	*Mode Change To Full Polarisation*
2016.196.06.29.55.808	*33234*	*NORM*	*LO Cal NoUN FULL NoEXT OBOP 29 Completed*
2016.196.06.35.51.011	*33233*	*NORM*	*LO Cal NoUN FULL NoEXT OBOP 29 Started*
2016.196.06.35.54.661	*826*	*NORM*	*Mode Change To Full Polarisation*
2016.196.06.35.55.811	*33234*	*NORM*	*LO Cal NoUN FULL NoEXT OBOP 29 Completed*
2016.196.06.36.24.841	*741*	*NORM*	*GS_Detection_NOT_Visible*
2016.196.06.36.25.811	*432*	*NORM*	*Event_Action_Released*
2016.196.06.36.25.811	*697*	*WARN*	*MM No Dump Aborted*

As result of this failure no data was received on ground for the affected pass. During the first SBand pass after the reset, AOS=09:35z, and before the recovery of the instrument, it was checked that the instrument was nominally working with no any other alarm and with the onboard Write pointer nominally progressing. A visual inspection of the OBSW code showed that the problem could be a Low Level Software problem caused by a possible late response of the hardware or a direct RTEMS LLSW problem. The data from the XBAS antenna at ESAC also showed a short carrier peak at the start of the pass compatible with the low power peak seen at instrument level (see Figures from 1 to 3).

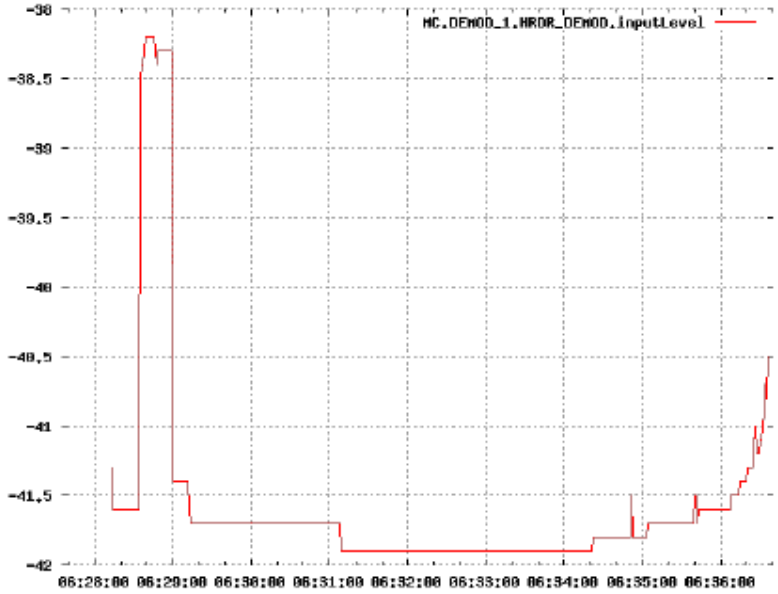


Figure 1 Demodulator input level

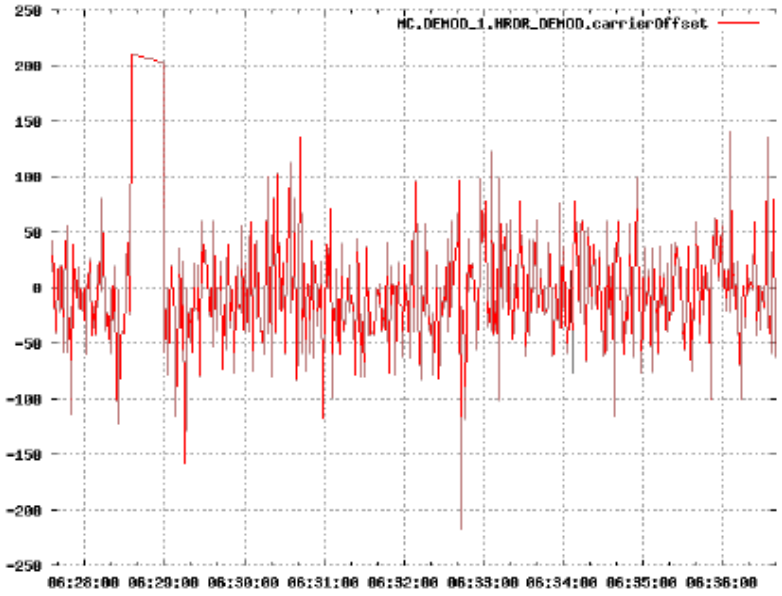


Figure 2 Demodulator carrier offset

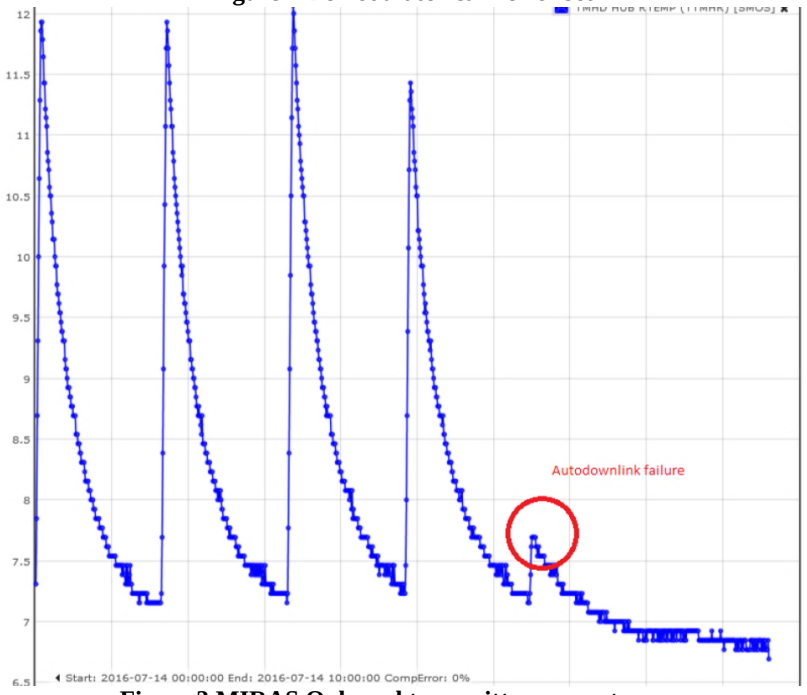


Figure 3 MIRAS Onboard transmitter current

During the second SBand pass of the day with AOS at 13:58z, a Mass memory Latch-up in partition P10 was detected and the Out of Limit triggered on PLPC system at 2016.196.09.37.11z. This time coincided when the first TM packet of SID 11 issued by the instrument after the execution of the CCU recovery procedure.

In nominal conditions a Mass Memory latch-up is always detected on ground by two different telemetry alarms:

-A first OOL alarm in parameter DMASME37 "SDD LU Detected" that detects the latch-up occurrence and

-A second alarm in other parameter that identifies the affected partition.

The first OOL alarm is just a sporadic alarm that immediately disappears from the PLPC system while the other one remains until the anomaly is fixed from ground.

For this particular case, the first alarm was never seen since the Telemetry packet where this parameter is located, SID 11, is not generated after a CCU reset. The second alarm was just seen when the first TM packet of SID 11 was generated immediately after the execution of the CCU recovery procedure. This clearly indicated that the Mass Memory latch-up happened sometime after the CCU reset and before the execution of the CCU recovery procedure.

Similar to this autodownlink anomaly, there was one on the 19th of October 2015 when a Mass Memory Latch up happened in the middle of an XBand pass. This caused the effect that the Read pointer was not updated at the end of the pass but also that not all the data was correctly downloaded. Due to that, there is a high suspicious that the Mass Memory Latch up on the 14th of July happened just at the start of the failed autodownlink pass and created such anomaly.

After the CCU recovery the first XBand pass commanded from the MIRAS ITL was successfully executed at 15:05:31z which clearly indicated that the anomaly was fixed at that time.

• A new Mass Memory latch up in partition P10 happened sometime during ESAC Xband pass with AOS=2016-07-14T06:27:20z and LOS=2016-07-14T06:34:38z. The exact time of the anomaly cannot be established since the anomaly happened after a CCU reset and the TM packets containing the parameters related with the LU are not generated after resets. In fact only one parameter was possible to see on PLPC system at the time the first SID=11 packet was generated this was at 2016-07-14T09:37:11.426z. The other parameter that goes out of limit just at the time of the latch event, DMASME37, was not possible to see. This Mass Memory Latch up was the cause of the Autodownlink failure that happened the same day at 06:27:20z. The exact geolocation of the event cannot be established but it is assumed to happen just at the start of the XBand pass at 2016-07-

14T06:27:20. The anomaly was recovered on 2016-07-18T15:00:00 via CRF 590

6 On Board Events Telemetry

The following Alarm packets were received just immediately before the CCU reset on the 14th of July:

Event Description	Severity	Event Time	Parameters
MM_Error_Counters_Acquisition_Failure	ALARM	2016.196.04.53.16.923	No Response
MM_Scrub_Frequency_Acquisition_Failure	ALARM	2016.196.04.53.16.923	No Response
MM_Address_Acquistion_Failure	ALARM	2016.196.04.53.16.983	No Response
MM_Science_Write_Failure	ALARM	2016.196.04.53.17.033	Link Problem
MM_Science_Write_Failure	ALARM	2016.196.04.53.17.133	Link Problem
MM_Science_Write_Failure	ALARM	2016.196.04.53.17.233	Link Problem

The following Alarm packet was received at the time of the Autodownlink failure on the 14th of july.

Event Description	Severity	Event Time	Parameters
MM_Dump_Failure	ALARM	2016.196.06.28.58.447	Parameter Error

7 FOS Systems Status

After the installation of new redundant switches for FOS Switches 5 and 6, the connectivity with the redundant ones is successfully tested on the 12 of July.

8 Data Reception from CNES

All the SBand passes of the week were succesfully acquired and processed by the FOS PLPC system.

9 *X* Band Data Reception in PXMF

Due to the SBand Ground station pass failure for pass HBX-3 (AOS=14:28:09z, LOS=14:39:25z) on day 2016-07-8 (Friday of the week before) the following MIRAS PUS Telemetry gap was filled using PXMF system:

Start gap= 2016-07-08T08:32:00z
End gap = 2016-07-08T14:31:00z

10 Exceptional Activities

None.

11 AOB

None.

APPENDIX A: OOLs

At the time of the CMN Unlock on H1 unit the following paraemters went Out of Limits on PLPC system

GS_TIME	OBTIME	PARAMETER	DESCRIPTION	OOL Value	Check Value
2016.196.05.24.03.031	2016.195.21.11.42.716	SPM11167	H1 LO_Locking	UNLOCK	LOCK
2016.196.05.24.02.953	2016.195.21.11.41.516	SPM11162	H1 LO_Out_Power	NOT-OK	OK

At CCU reset the following MIRAS parameters went Out of Limits;

GS_TIME	OBTIME	PARAMETER	DESCRIPTION	OOL Value	Check Value
2016.196.06.54.31.925	2016.196.04.53.50.852	XNIRCAST	NIR CA VALID ST	NOT-OK	OK
2016.196.06.54.31.925	2016.196.04.53.50.852	XNIRBCST	NIR BC VALID ST	NOT-OK	OK
2016.196.06.54.31.925	2016.196.04.53.50.852	XNIRABST	NIR AB VALID ST	NOT-OK	OK
2016.196.06.54.31.922	2016.196.04.53.50.852	SPC02106	Instrument_Mode	Inst Init	Any other
2016.196.06.54.31.921	2016.196.04.53.50.852	SPM14167	A1 LO_Locking	Unlock	Lock
2016.196.06.54.31.921	2016.196.04.53.50.852	SPM13167	H3 LO_Locking	Unlock	Lock
2016.196.06.54.31.921	2016.196.04.53.50.852	SPM12172	H2 LO_locking	Unlock	Lock
2016.196.06.54.31.921	2016.196.04.53.50.852	SPM11167	H1 LO_Locking	Unlock	Lock
2016.196.06.54.31.920	2016.196.04.53.50.852	SPM17167	B1 LO_Locking	Unlock	Lock
2016.196.06.54.31.920	2016.196.04.53.50.852	SPM16167	A3 LO_Locking	Unlock	Lock
2016.196.06.54.31.920	2016.196.04.53.50.852	SPM15167	A2 LO_Locking	Unlock	Lock
2016.196.06.54.31.919	2016.196.04.53.50.852	SPM20167	C1 LO_Locking	Unlock	Lock
2016.196.06.54.31.919	2016.196.04.53.50.852	SPM19167	B3 LO_Locking	Unlock	Lock

2016.196.06.54.31.919	2016.196.04.53.50.852	SPM18167	B2 LO_Locking	Unlock	Lock
2016.196.06.54.31.918	2016.196.04.53.50.852	SPM22167	C3 LO_Locking	Unlock	Lock
2016.196.06.54.31.918	2016.196.04.53.50.852	SPM21167	C2 LO_Locking	Unlock	Lock

During the execution of the CCU recovery procedure the onboard MIRAS ITL went nominally Out of Limits

GS_TIME	OBTIME	PARAMETER	DESCRIPTION	OOL Value	Check Value
2016.196.14.34.24.433	2016.196.09.37.11.426	NTLHK022	ITL Ena State	Disable	Enable

The Mass Memory Latch up in partition P10 produced the following Out of limit.

GS_TIME	OBTIME	PARAMETER	DESCRIPTION	OOL Value	Check Value
2016.196.14.34.24.435	2016.196.09.37.11.426	DMASME02	LU Switch P10	OFF	ON