XMM-Newton
Instrument Operations &
Data Systems

UGM #18
ESAC, 11 May 2017
J. Ramón Muñoz + Instrument Engineers & SWS Team,
SCI-OOX

- ➢ **Instrument Operations**
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  - Instrument Operations
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- ➢ **Data Generation and Distribution**
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  - Status of data production
  - SOC Migration

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Instrument status (1)

➢ **Instruments status:**

- **General:** All instruments healthy and working fine, now on rev 3189.

➢ **Recent anomalies** (since last UGM – 07/06/2016):

- **Major Instrument anomalies:**
  - No new NCR raised
  - All NCRs closed.

- **Minor Instrument anomalies:**

➢ **RGS**

- **No changes in configuration:**
  - RGS1 in dual node readout mode from beginning of mission. RGS2 in single node readout mode from Aug 2007.
  - New hot stuff tables produced at SOC. Release cycle to be started after DB 7.0 release.
- Operations: Fully smooth

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➢ **OM**

- **No changes in configuration** since 15/12/2010.

- No major events since last OICM.

- 40 occurrences of on board RAM corruption. 42 exposures lost (170 ks)

- 3 cases of DPU/RBI crash. 6 exposures lost (13.3 ks)

- 1 case of data corruption on board without any symptom. Cured by full memory upload. 12 exposures lost (7.8 ks)

➢ **EPICs**

- **No changes in configuration**

- PN Bad Pixel Tables updated: Operational since revolution 3061 (25th Aug 2016), now at version 5

- False current limiter activations (NCR#133) on 21-May-2016 and 14-Dec-2016.

- PN crash in NCR#138 style (PN currents low-low) on 9th June 2016.

- SEUs

  – MOS 2 lost the sync reading the central CCD on 21st Oct 2016. Solved by itself at the beginning of the next observation.

  – PN HK TLM corrupted on 27th Oct 2016, solved. by the next eclipse switch OFF/ON

Instrument status (3)

- PN quadrant 1 auto-reboot on 1st Feb 2017. It was the third time in the full mission that the dedicated recovery procedure needed to be used.
- A possible micrometeorite flash on 23rd March 2017 was seen by MOS 2 only. No damage found on the CCDs.

➢ **Other events (spacecraft)**

- On 16 March 2017 the spacecraft entered into ESAM (Emergency Sun Acquisition Mode) about 8 hours before eclipse. The suspected cause is that a Latching Current Limiter (LCL) of the Reaction Wheel Drive Electronics (RWDE) tripped as a result of a Single Event Upset (SEU). As the instruments were set in Safe-Standby, the pre-eclipse thermal control operations were started earlier. The eclipse itself was softer than others, as the unusual pointing reduced the heating- up of the radiators. The S/C and Instruments were already operating less than 24 h after the event.

Routine Operations

➢ Routine maintenance

- RBI clocks re-sync on 7th May and 18th November. All nominal wrap-around.

  – The next normal wrap around is predicted for 2017-05-31.

- ODB update to version 6.29. Mostly for PN bad pixel table.

  – Operational since revolution 3061 (25th Aug 2016)

➢ Main activities since last UGM have been:

- Preparation of changes in operations due to "merge with Gaia"

- New ODB 7.0

- MOIS automation

➢ STATS packet problem: Still present and the cause of very frequent reboots. Even to ensure specific observations are performed correctly. Should be solved in the next SW release from the MOC (expected by early June).

Routine Operations

➤ **SPACON Merge**

- All documentation agreed and approved (URD, TNs, ...)

- SOC working on simplification of all SPACON Procedures (maintained in parallel with the Full Procedures).

- SOC has generated the cross-reference list of Critical alarms.

- SOC has generated the "negative" list (do nothing) of alarms.

- Preparation of Instrument operations to recover the "next observation" when events affect one observation and no SPACON reaction is expected.

- ToO will be treated as a critical alarm but reaction time will most likely increase as it requires attendance by Analyst/Engineers.

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Routine Operations - Eclipses

- ➤ Eclipses since the last meeting:

    - 22 eclipses after perigee on 2016 Spring

    - 2 lunar eclipses in 4th June and 4th July

    - 28 eclipses before perigee on 2016 Autumn

    - 27 eclipses after perigee in 2017 Winter/Spring

- ➤ No changes in operations

    - MOC have automated most of the previously manual operations for eclipse, without change in the operations

    - A slightly reduction of the electronic boxes pre-eclipse boost heating is in the queue for the next season...

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Routine Operations

- ➤ **Radiation**
  - No big Solar Flares in the period.
  - Impact of radiation on science very low.

- ➤ **Ground Stations:**
  - Yatharagga is now operational (main GS replacing Perth).
  - Santiago became formally Kourou backup on Feb 2016.
  - GS in Argentina under evaluation.
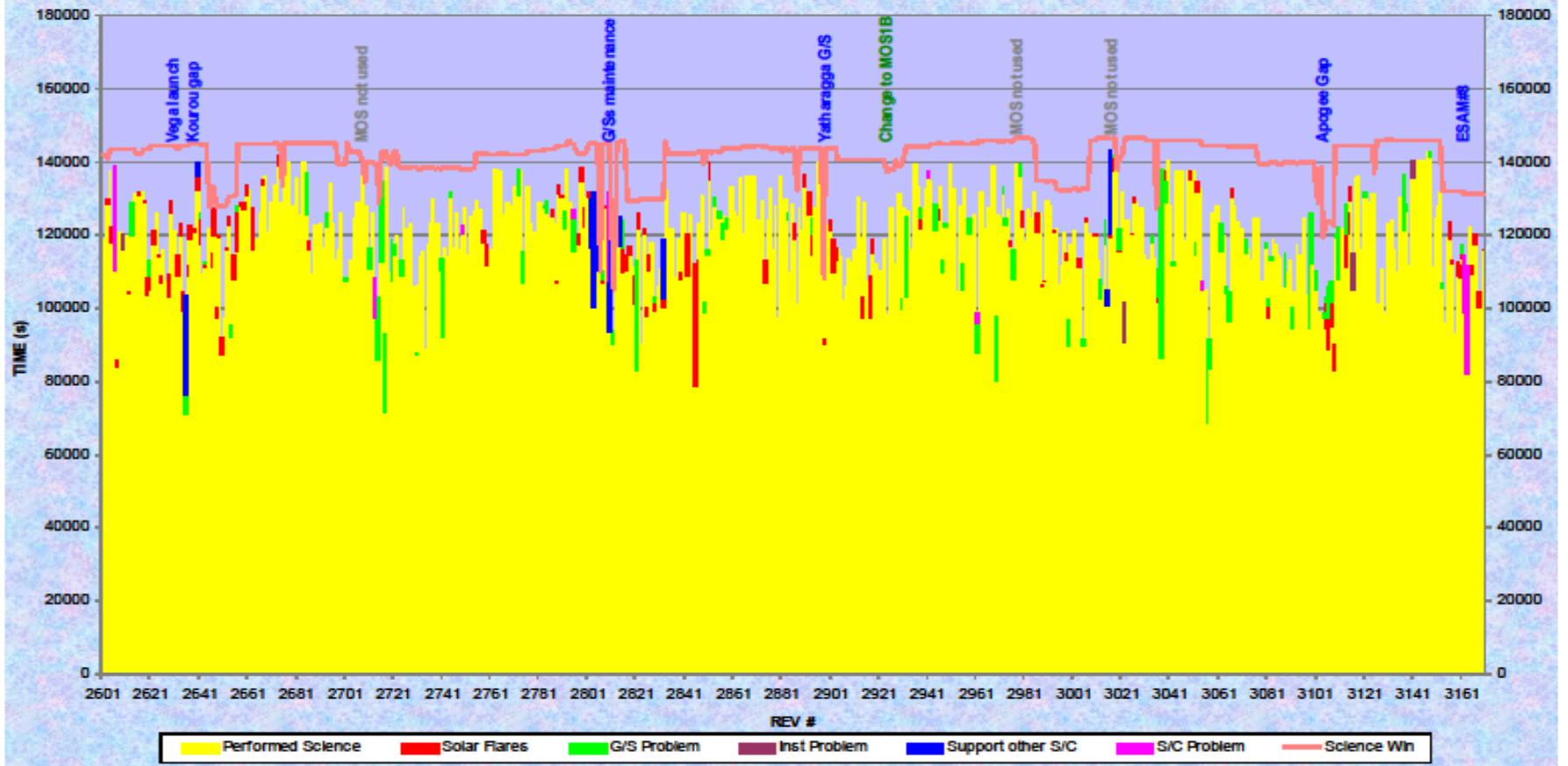
- ➤ **Automation:**
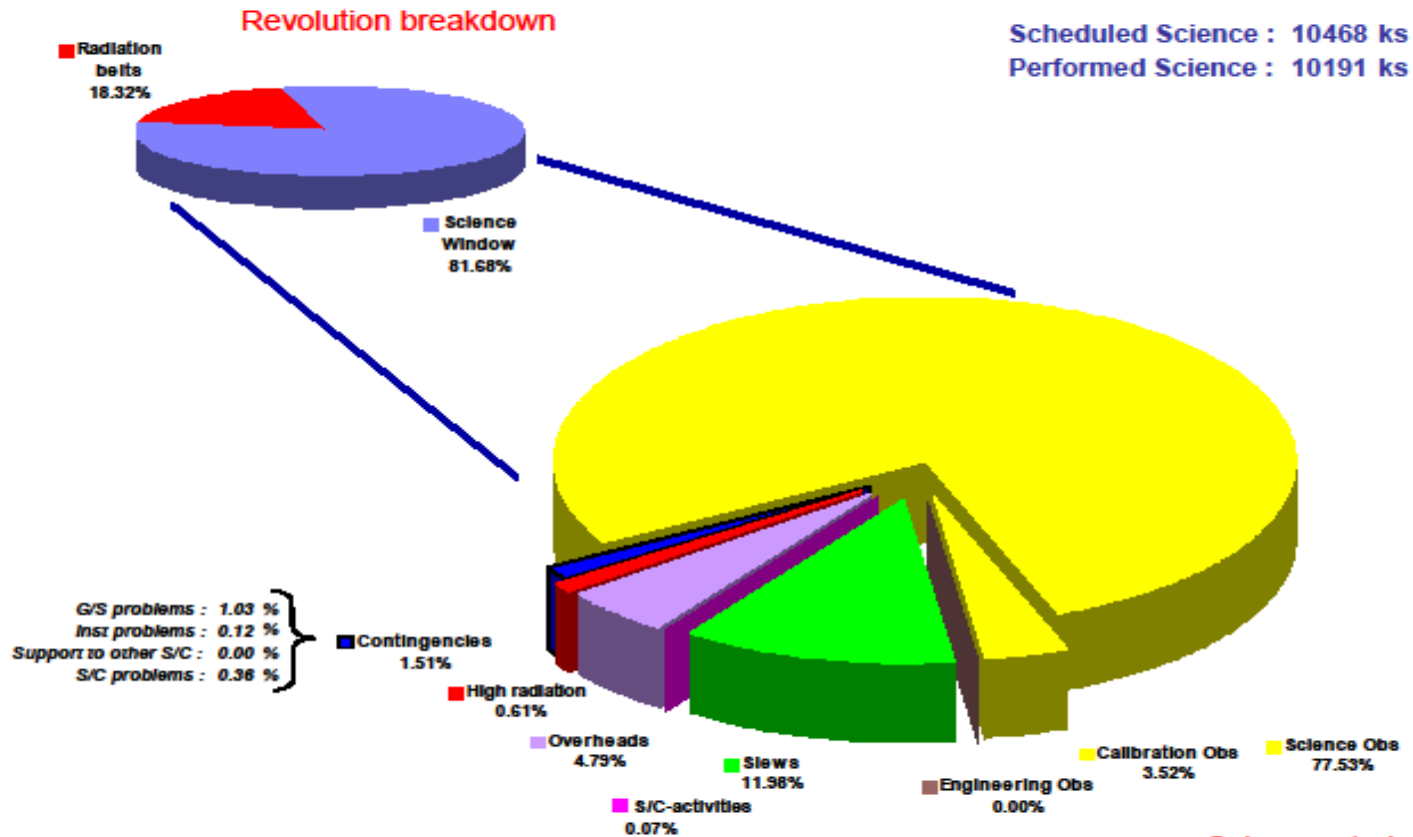 - Several automatic Procedures already implemented. SOC & MOC working on the implementation of the most frequent ones.

Statistics / Efficiency

PN efficiency in the routine phase: Revs 2601 to 3170

MOS1 efficiency breakdown over the last 6 months (revs 3081 to 3170)

Revolution breakdown

Radiation belts
18.38%

Science Window
81.62%

Scheduled Science : 10931 ks
Performed Science : 10572 ks

G/S problems : 0.88 %
Inst problems : 0.00 %
Support to other S/C : 0.00 %
S/C problems : 0.38 %

Contingencies
1.25%

High radiation
1.52%

Overheads
1.09%

S/C-activities
0.11%

Slews
11.98%

Engineering Obs
0.00%

Calibration Obs
3.75%

Science Obs
80.31%

Science window breakdown
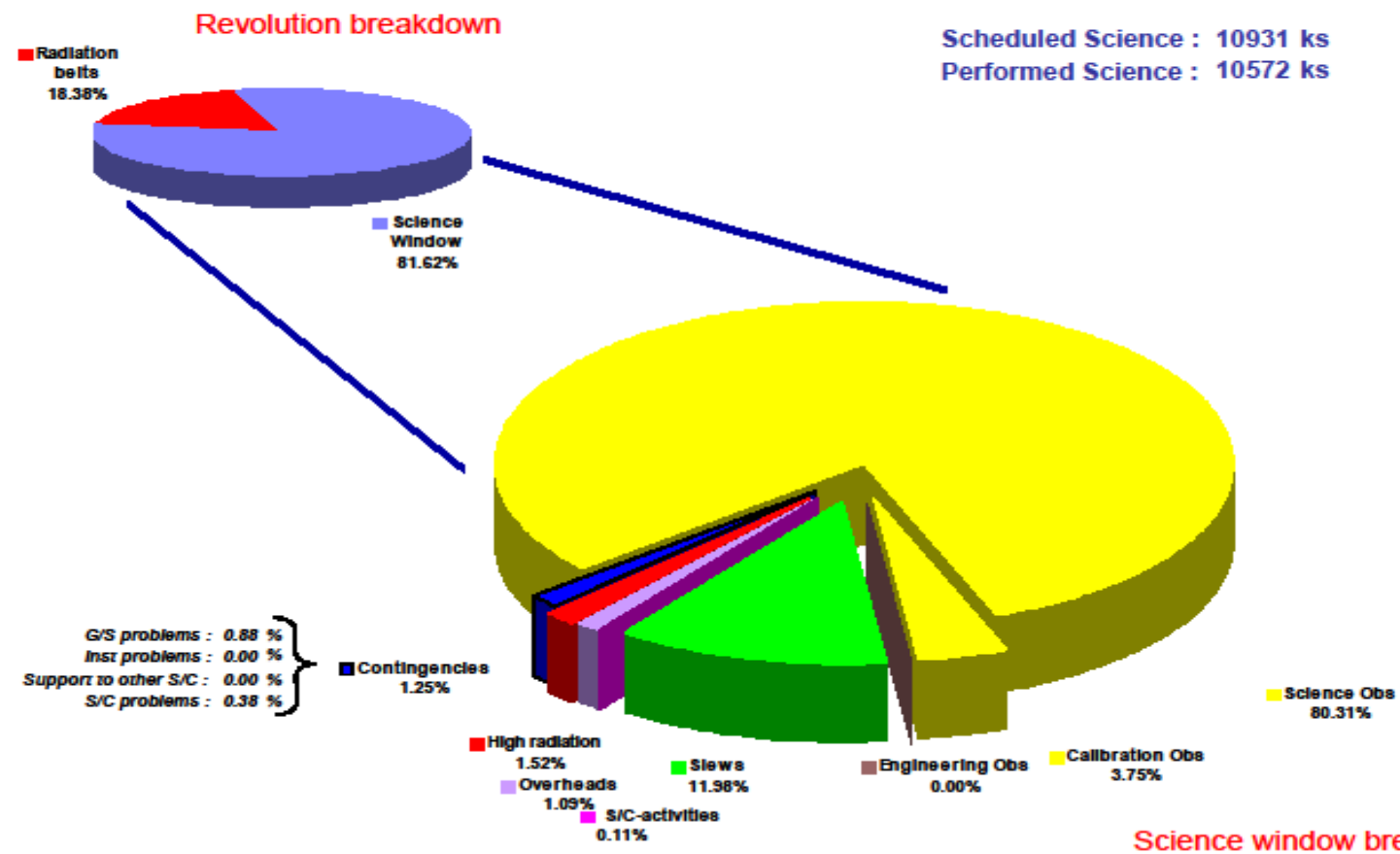
RGS1 efficiency breakdown over the last 6 months (revs 3081 to 3170)
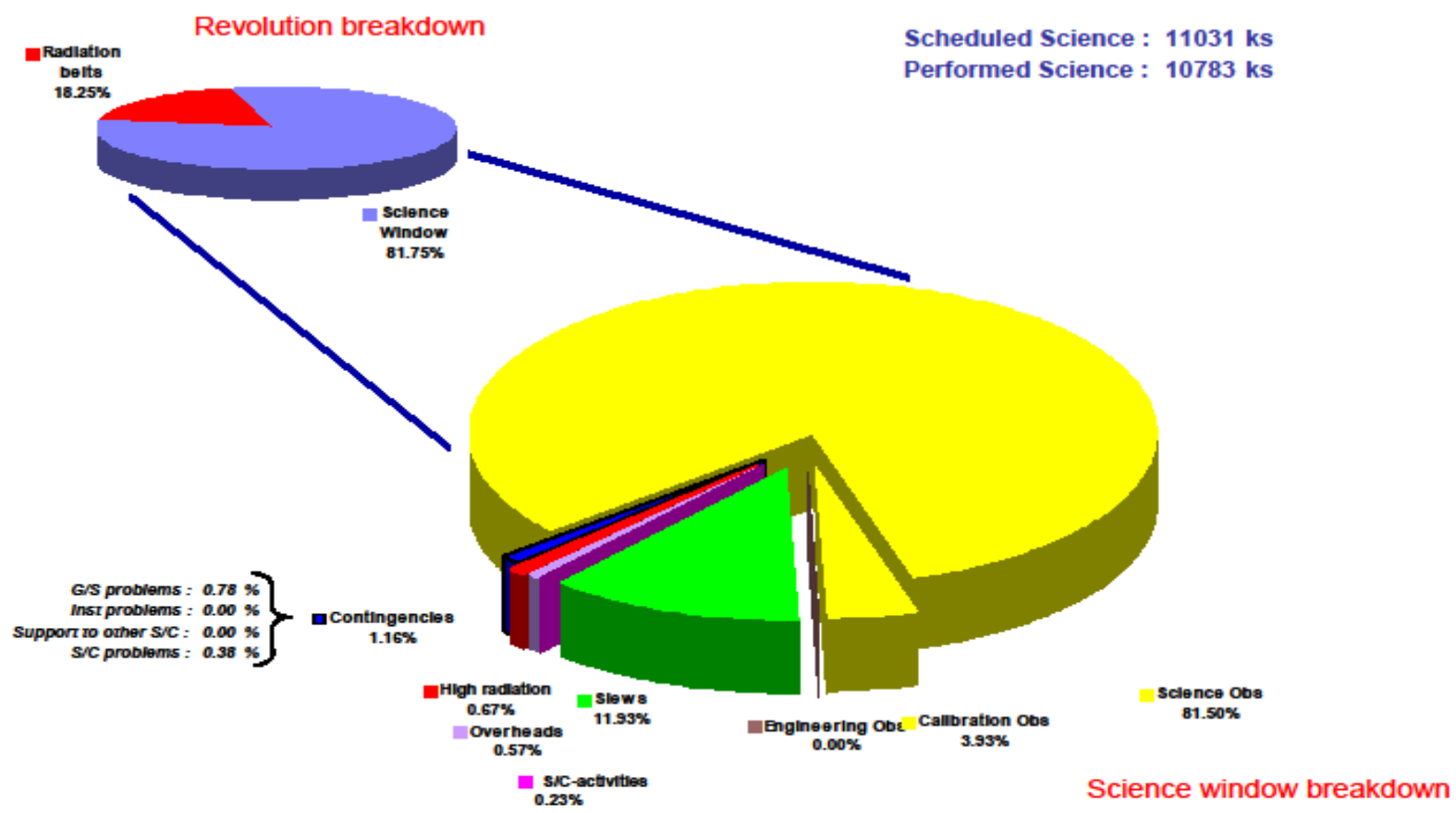
Routine Phase Statistics (revs 0103 – 3188 [7th – May - 2017])

- Scheduled observations   12150

- Performed: 11723

- ODFs produced: 11562

- PPS products: 11496

  - Not performed out of Scheduled due to Solar Flares, antennas, Technical issues, …
  - No ODFs out of performed due to empty (dummies) observations, technical problems (no link, system problems, …), manual execution, special calibrations.
  - No PPS Products out of ODFs produced due to (most below rev 1000) manual ops, TM problems (HK), …

- Production of data is nominal, delay in ODF/SDF completion respect to data acquisition is consistently 4-5 days.

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SOC Data Systems

➤ XSCS status

- No changes to XSCS.

- Real-Time (PMS-ODS) systems behaving very well with Real Time TM at the SOC.

- Overall very few ODFs needed to be generated (successfully) from Raw TM due to problems at SOC (lines, crashes).

- STATS packet problem: Too frequent reboots required.

- Team changes:

  - S. Fernandez replaced J.C. Vallejo who left ESAC by the end of 2016.

Virtualization & Migration

➢ **Virtualization and Migration to Sol 10:**

- Downlink is currently virtualized (under Sol 8) in one of the MD3000 systems.

- Operational for Reprocessing and Handler.

- Migration to Sol10 of PMS is in progress:

  - Migration plan issued.

  - Development system (Sol 10) transferred from MOC.

  - All needed elements (DBs, environment, ...) installed.

  - SCOS launcher was successfully installed and run.

  - Currently testing the playback functionality (re-processing).

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Questions/Comments

➢ **Thank you.**

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