Status Report of the Telescope

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Subaru Users' Meeting FY2015

Summary

- Telescope has been maintained **acceptable condition**.
- **M1 recoating** is scheduled in 2016 with 2 months downtime.
- Telescope Engineering Division (TelDiv) is continuing to maintain and upgrade the telescope and its sub systems.
- Teldiv is making effort to reduce downtime continuously.
- **Budget and human resource shortage** might affect the telescope condition.
- Subaru Telescope is now 17 years old. Maintenance for 8-m class telescope is not trivia job, but really challenging activity.

Schedule in 2016

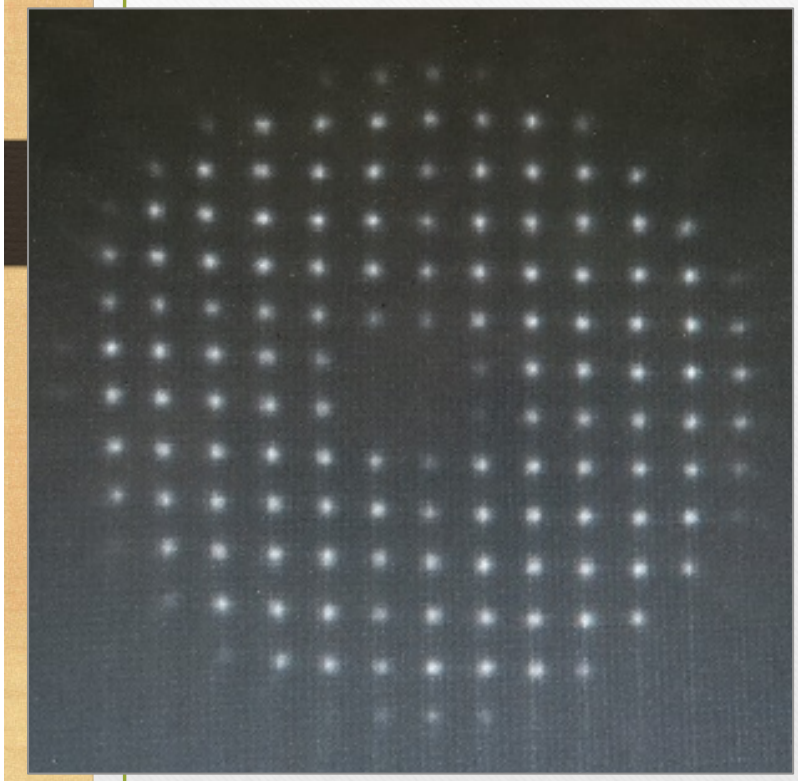
- Upgrade the control software TWS (January-March)
- Annual mechanical maintenance (March)
- M1 recoating facility maintenance (March)
- **Primary mirror recoating / Mechanical Maintenance (August-September)**

  Two month downtime is scheduled
- Upgrade the telescope control subsystem (October-November)
- Upgrade the top unit exchanger TUE (December)

Current Restrictions

- Cannot open/close M1 lower cover
  - This may affects the seeing quality
  - Will be repaired in August 2016
- Sometimes fail changing to AG mode
  - Will be repaired in March 2016
- Cannot use AG and **SH** at NsIR
- Cannot use **SH** at POpt (for Suprime Cam)

Mirror Analysis after M1 Recoating



Shack-Hultmann image on NsOpt focus

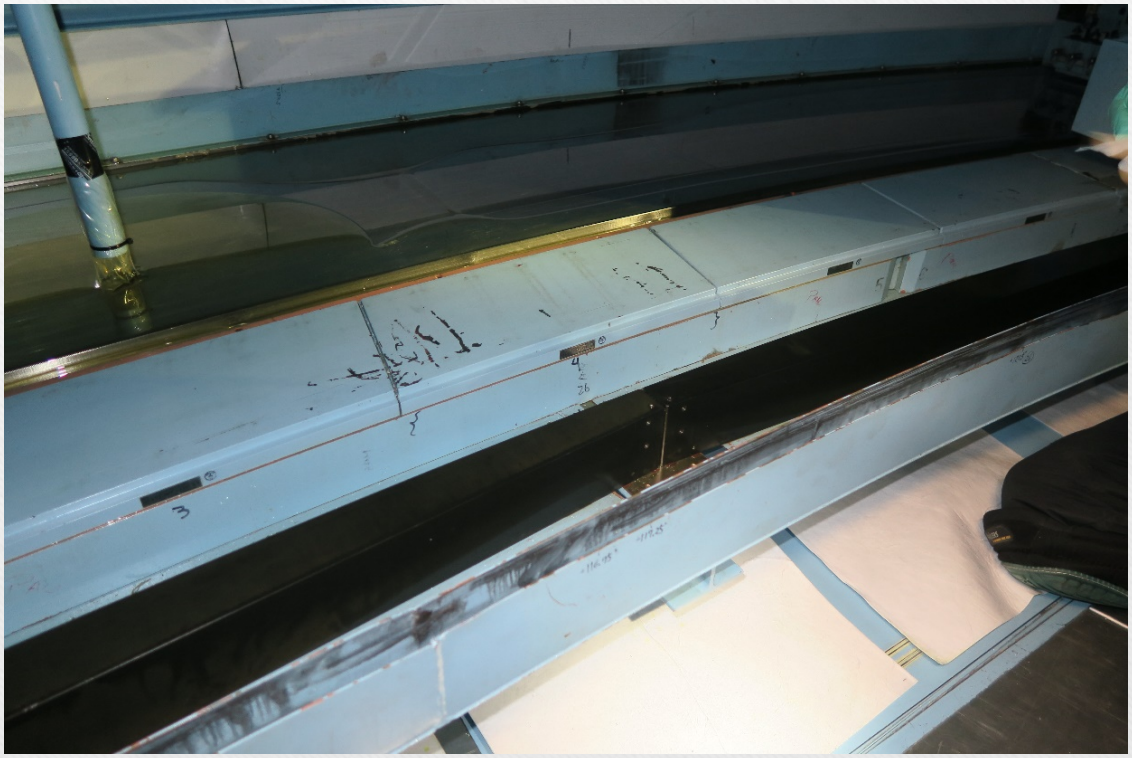
- We cannot execute the mirror analysis on NsIR and POpt foci due to hardware malfunctions.
- Mirror analysis is the procedure to measure, calculate, and correct the shape of the primary mirror.
- AO188 can correct the error on NsIR.
- Unfortunately, as a view of engineering, we **cannot guarantee the star image on POpt focus** (Suprime Cam)

Human Resource Shortage

- The division chief was retired in January 2015
- A chief research engineer was retired in March 2015
- Two engineers came to our division in April 2015
- A chief engineer was transferred to NRO in January 2016
- **5 experienced personals, 4 newcomers today**
- Two other engineers will be retired/transferred
- One engineers will be newly employed.
- **3 experienced, 5 less-experienced after this summer**

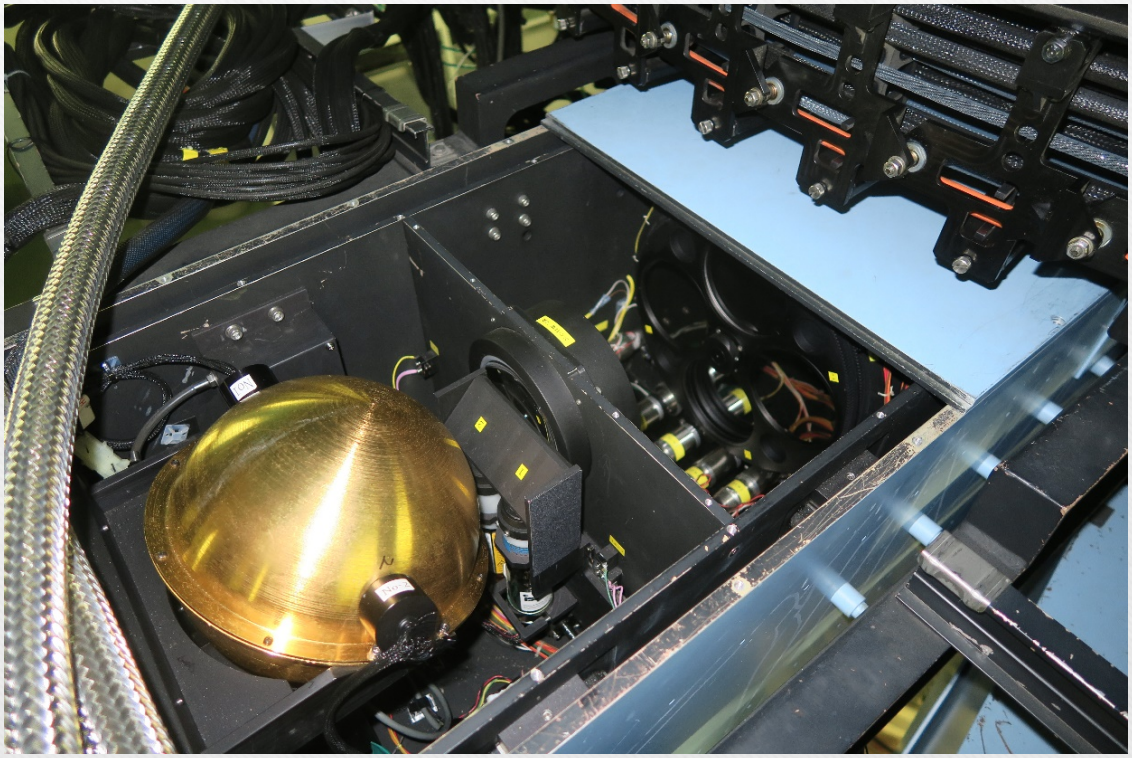
Maintenance

Hydrostatic bearing

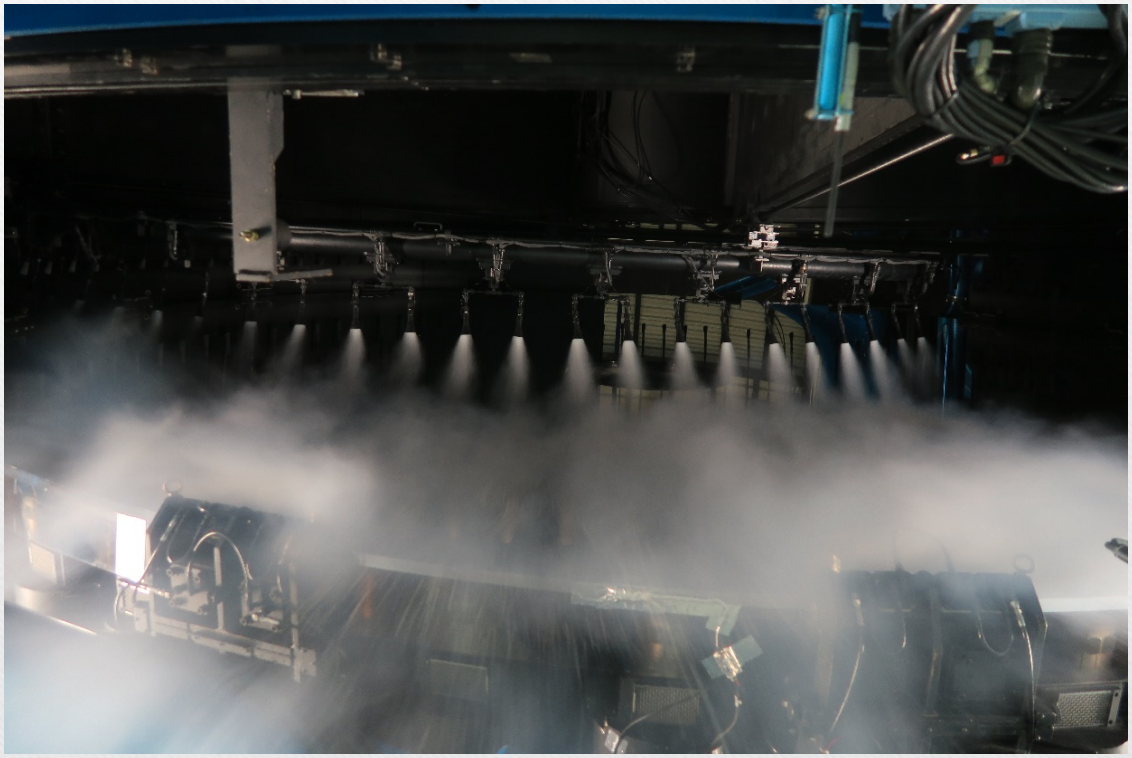


Man-Basket

Hollow Cathode Lamp



CO2 Cleaning



Snow Removal

M1 handling Facility

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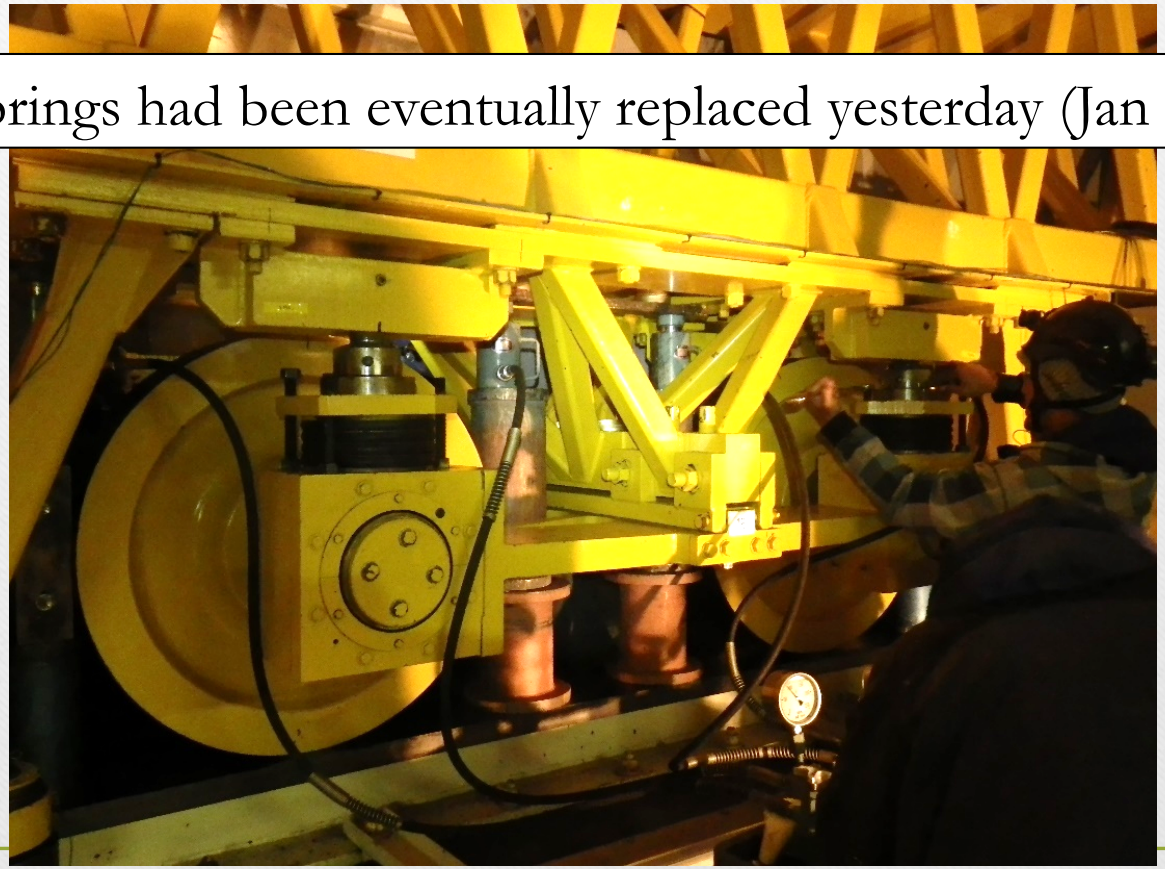
Bogie Rubber Spring

All 96 springs had been eventually replaced yesterday (Jan 19, 2016)



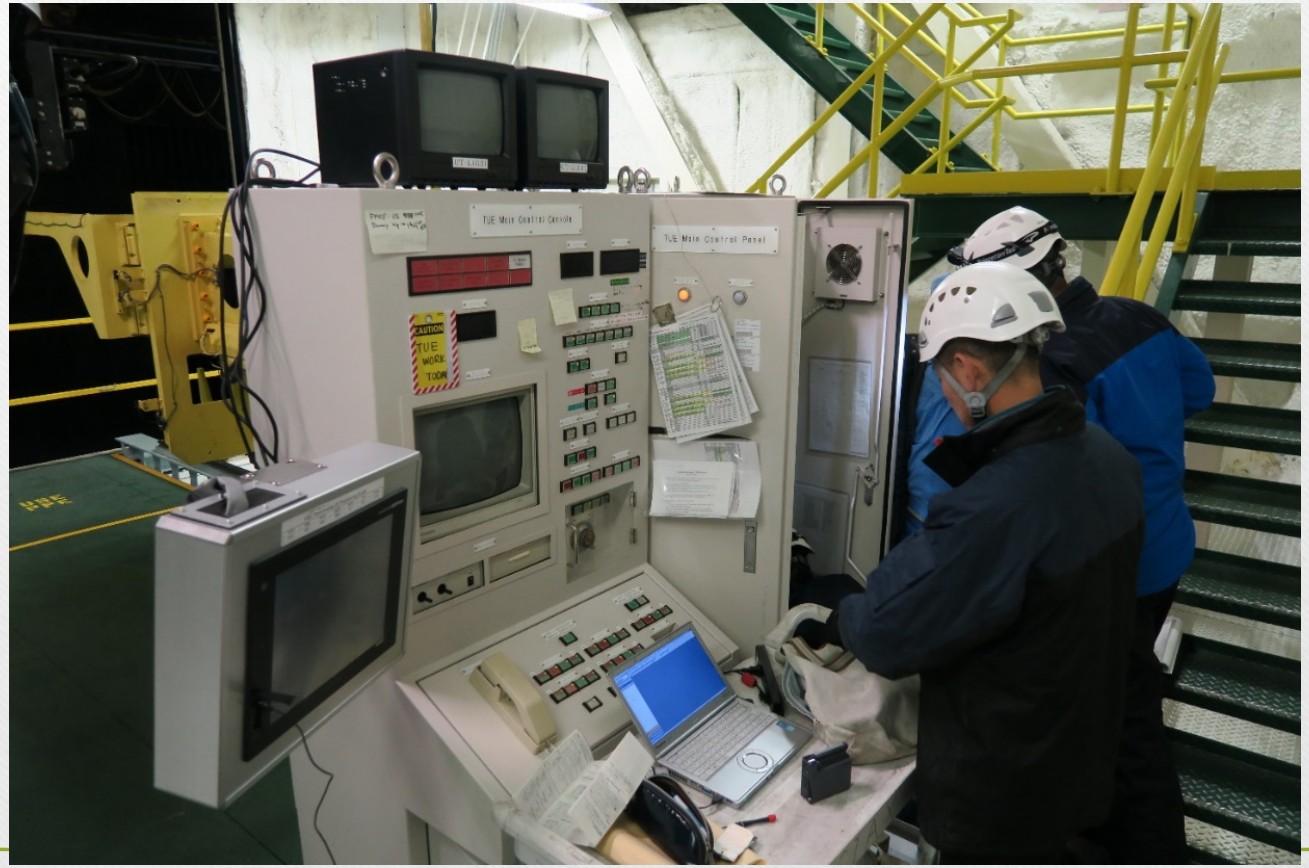
Upgrade & Improvement

DCU/DRPU

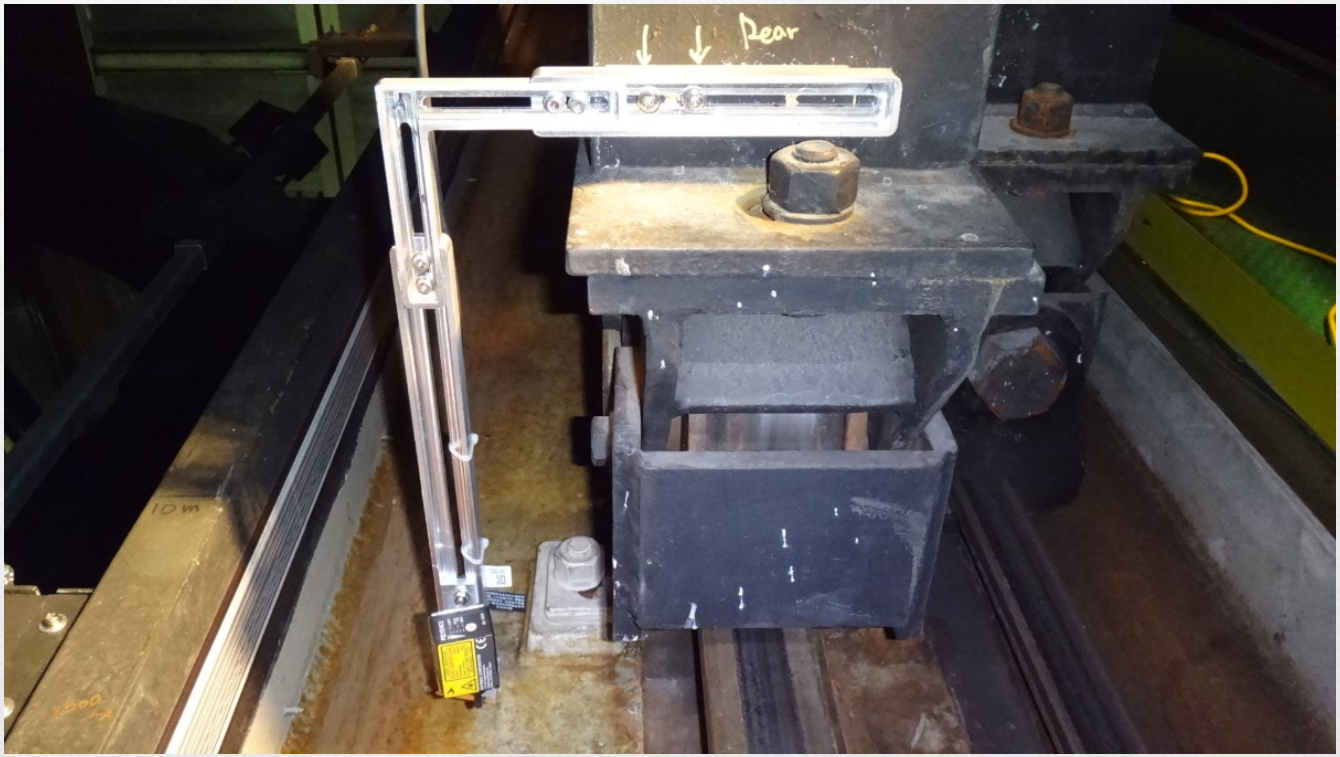
Dome Control Unit / Dome Rotation Processor Unit

TUE

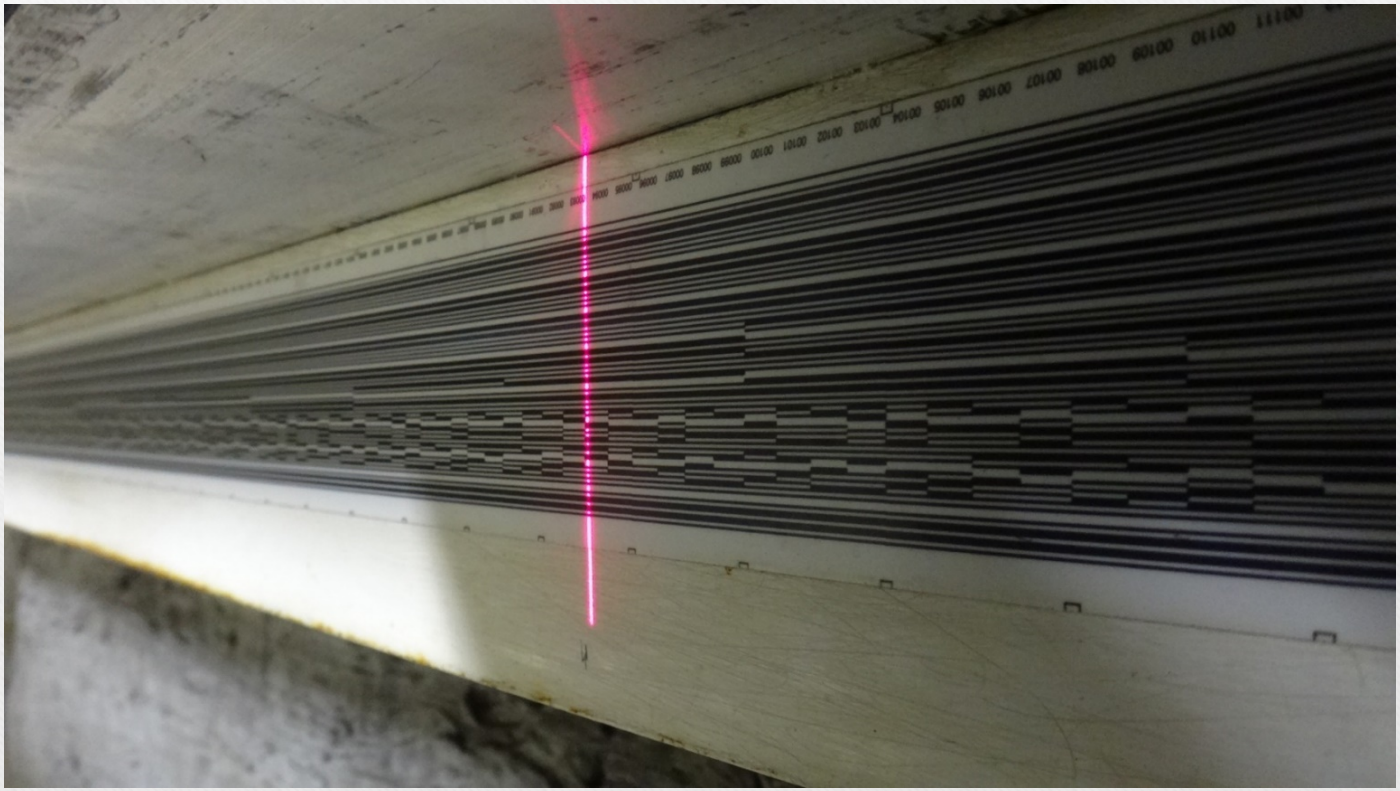
Top Unit Exchanger



Top Screen Barcode



Dome Azimuth Barcode

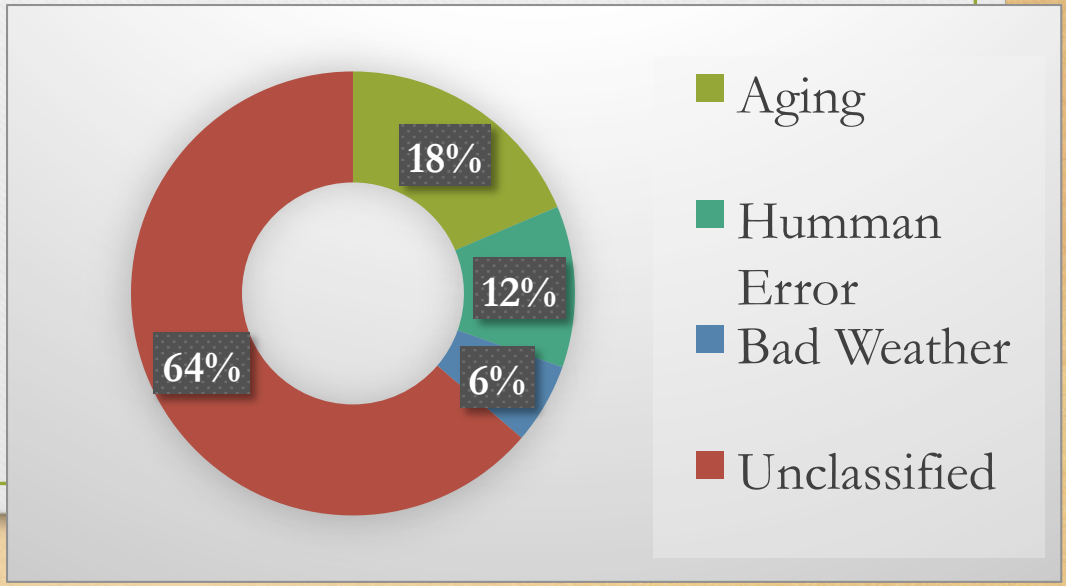


Troubleshoot

Trouble Statistic

- **204 reported troubles** were occurred in 2015
- 50 of 204 (25%) troubles were severe accident
- Lost **6 nights** (12 nights effectively)
- Lost **4653 minutes**
- **Aging** were 18 %

  of the troubles



Lost 1 night

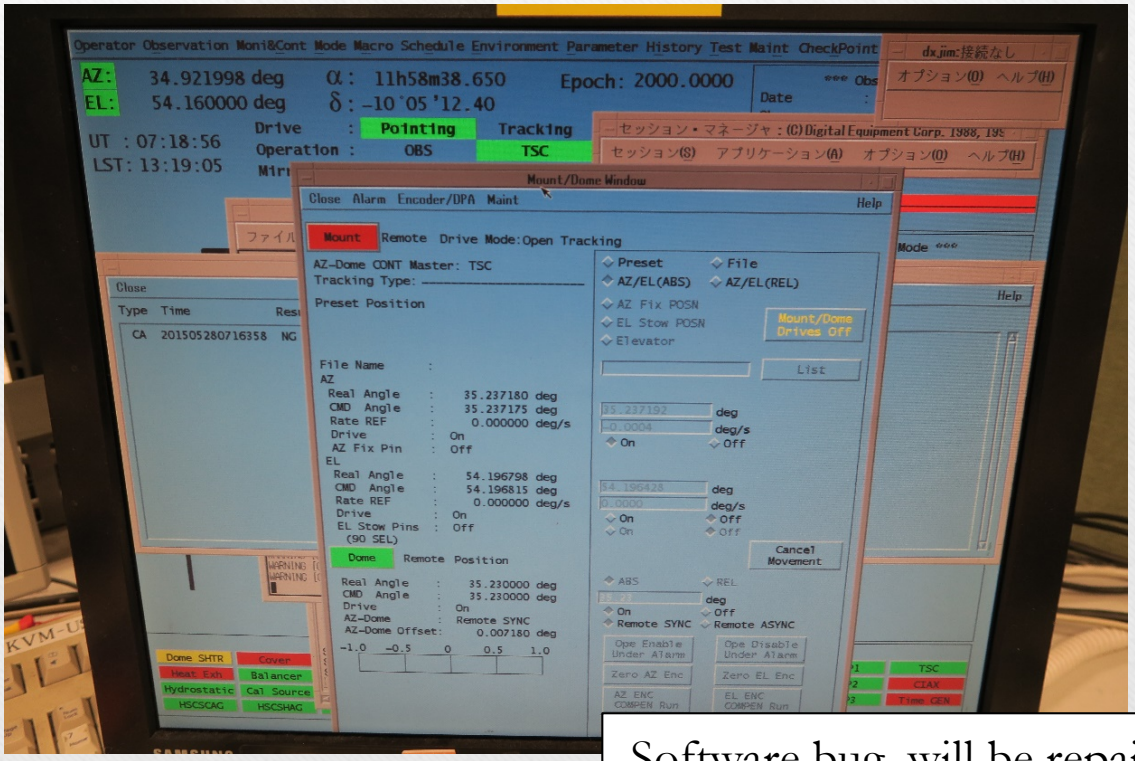
CsOpt Secondary Unit

January 5

Hardware aging and human operation error

AG not started

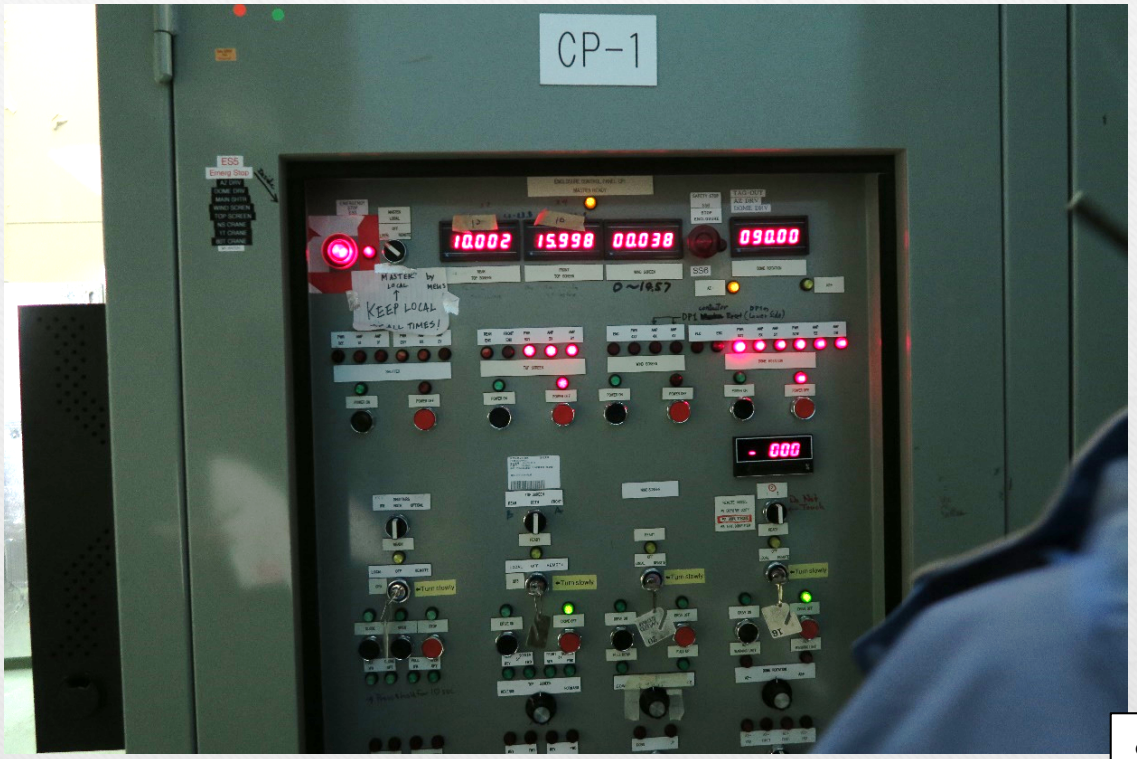
February 16



Software bug, will be repaired in March

MLP-CP1

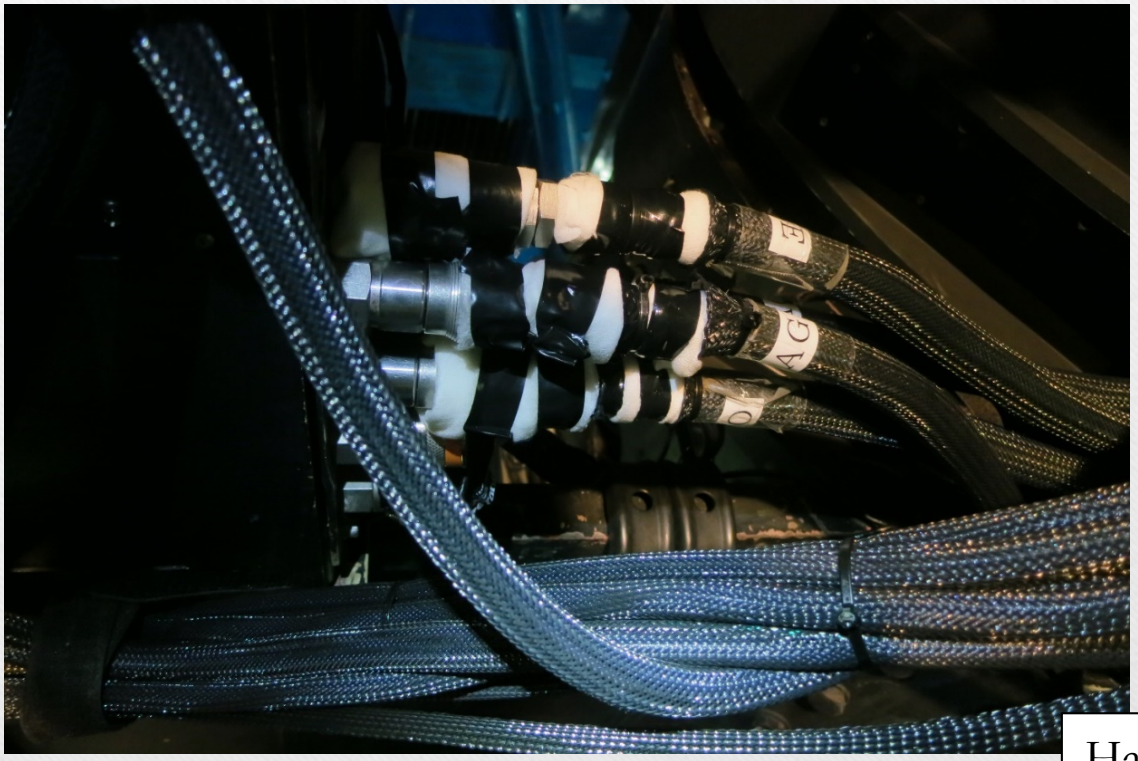
March 27



Software bug

Small Leakage of Glycol

April 14



Hardware aging

Wind Screen

April 16

Hardware aging and hardware design error

Lateral Guide Roller

May 16

Remain to be identified

Lower Mirror Cover

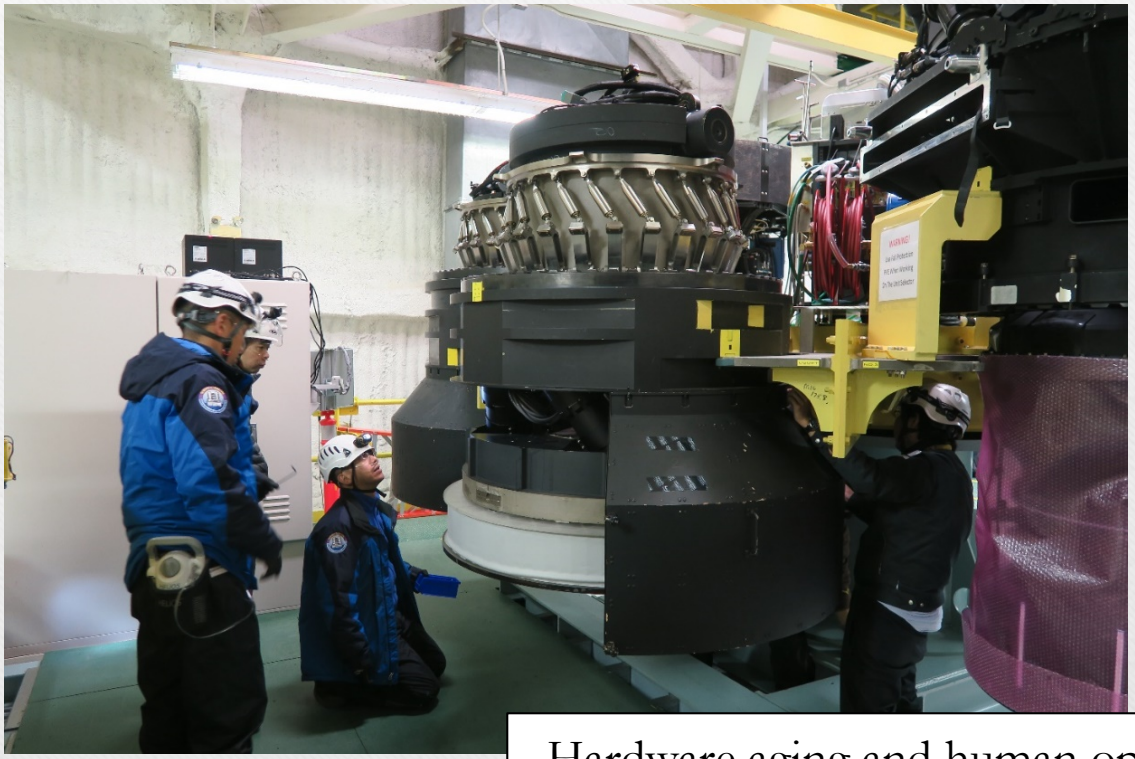
June 8

Hardware aging and hardware design error

Lost 1 night

CsOPT Secondary Unit

June 22



Hardware aging and human operation error

Dip on Bogie Rail

July 15, 2015

Hardware aging

Lost 1 night

Main Shutter

August 3

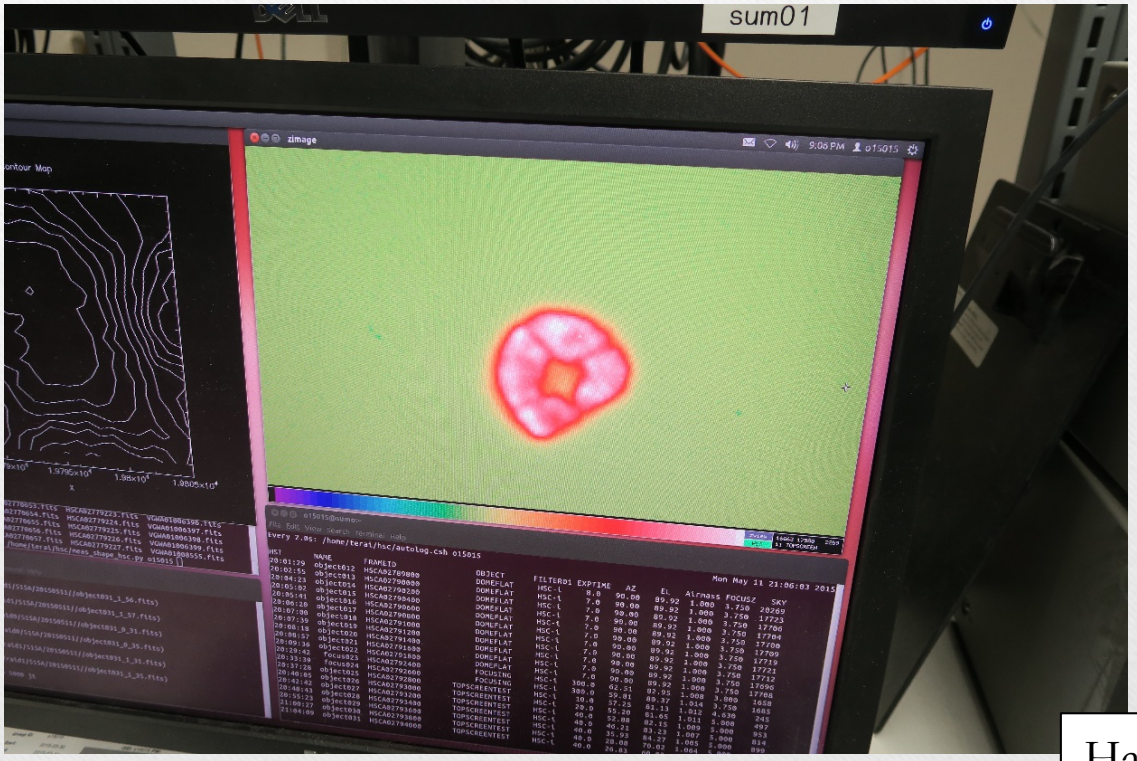
Bad weather

Observation was cancelled due to bud weather officially,
but this trouble potentially made the observation cancel.

Lost 1 night

Top Screen

August 25

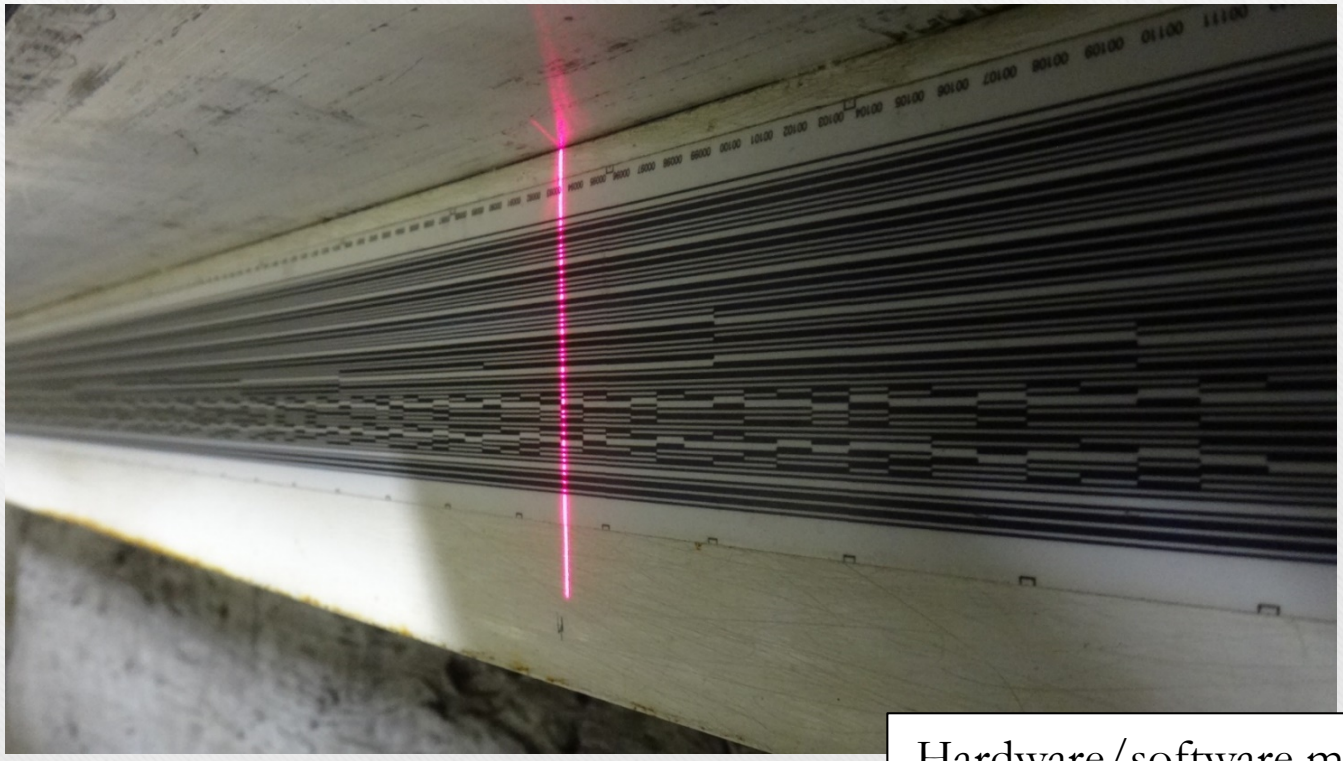


Hardware aging

Lost 1 night

Dome AZ Barcode

September 4



Hardware/software mismatch

Lost 1 night

Main Shutter

September 9

Safety interlock malfunction

Lost 1 night

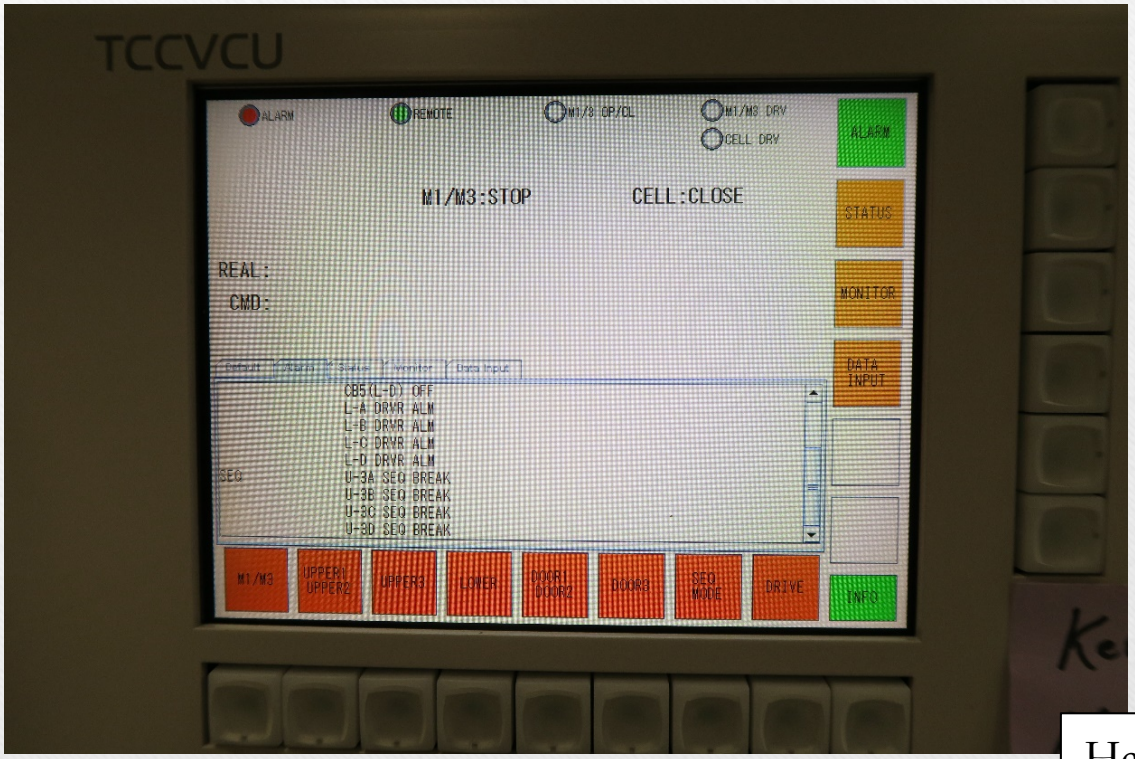
Elevation Incremental Encoders

November 19

Bad weather

Mirror Upper Cover

November 28



Hardware aging

We lost 1 night in officially but we could not exchange the top unit and 2 nights of original observation were cancelled. Teldiv think this trouble made total 3 nights loss, effectively.

Lost 3 night

80t Crane/TUE

December 11

Human error and software bug

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- Subaru Telescope is now 17 years old. Maintenance for 8-m class telescope is not trivia job, but really challenging activity.

Backup

Mission

- Telescope Engineering Division defines their missions.
- The mission is consistent with the breakdown of the Subaru Telescope Projects in NAOJ.
- The Missions:
  - Maintain the telescope healthy
  - Troubleshoot the telescope within minimum downtime
  - Update the telescope functions
  - Improve the telescope performance
  - Account capability study for future operation

Priority

- Telescope Engineering Division defined the priority of their tasks
- This priority is reasonable with finite budget/human/time resources
- The Priority:
  1. Telescope trouble which makes observation cancel and affects other instrument / human safety
  2. Telescope trouble which makes observation cancel but no other concern
  3. Telescope trouble which losses the telescope function / performance
  4. Telescope trouble which losses comfortability and conveniency of the observation
  5. Other scheduled/urgent tasks (maintenance, upgrade, improvement, capability study, etc.)