

Command Action Procedure

CAP #	1545	Originator:	Ken Gage/Dan Patnaude
Date:	09/04/2020	Commands Checked By:	HRC Ops
Participants	OC		
Required for Execution:	CC, HRC	Time of CAP execution:	(OC to write in)

Title:
HRC PMT#2 controlled power on

Description/Rationale:

Following successful completion of CAP 1543, the HRC is currently in standby. As part of a plan to resume nominal HRC operations, the HRC anti-coincidence shields (PMTs) must be powered on and their performance evaluated. This CAP performs a controlled ramp up of the high voltage for PMT#2. Additionally, the CAP loads commands to perform RADMON disable and re-enable for the radzone passage which begins on DOY 251.

Restrictions/Warnings/Notes

- The HRC team will be monitoring the expected PMT#2 rates during the execution of this CAP. If the PMT#2 rates greatly exceed the expected value of ~ 5000 c/s, the PMT#2 will be powered down and the CAP will be halted. In this event, SCS 132 will be terminated and cleared.

Yes ☐ No ☒ CAP requires enabling of a disabled command? If yes, provide a list of Disabled Commands

CARD Items:

Schedule Requirements/Load Interaction:

- Yes ☒ No ☐ Daily load commands exist during execution window of CAP
- Yes ☒ No ☐ CAP requires specific DSN comm. or timing requirements
- Yes ☐ No ☒ CAP will be run concurrently with another CAP
- Yes ☐ No ☒ CAP requires commanding in the load to be executed to ensure success
- Yes ☐ No ☒ Daily load requires the CAP to be completed to ensure success
- Yes ☒ No ☐ CAP uses SCS slots. If yes, performs SCS cleanup

Comments:

- The CAP is to be executed during the DSS-26 comm pass on 2020:249:00:15:00.
- The HRC team estimates that the CAP can be completed and the PMT#2 performance can be evaluated within the scheduled 4 hour comm window
- Commands exist in the daily loads for transmitter turn-on at 249:02:10 UT
- Commands exist in the daily load for transmitter turn-off and a command to NORM subformat at 2020:249:03:40 UT
- The CAP loads commands into SCS 132. The SCS is to be enabled and activated prior to manually raising the PMT#2 high voltage

Initial Conditions/Spacecraft Configuration:

- The CAP expects the HRC power supplies to be on at nominal voltages.
- The CAP expects PMT#2 to be connected to the side B preamps.
- The CAP expects the flight software has been patched to use side B HRC shield and MCP rates for RadMon handling

CAP depends upon or changes the state of:

<input type="checkbox"/> Telemetry Format	<input type="checkbox"/> SIM Table Position
<input checked="" type="checkbox"/> Safing Monitor En\Dis State (inc. RadMon)	<input type="checkbox"/> Grating Positions
<input type="checkbox"/> OBSID	<input type="checkbox"/> SI Mode
<input type="checkbox"/> Momentum State	<input type="checkbox"/> ACIS Parameter Blocks
<input type="checkbox"/> Attitude	<input checked="" type="checkbox"/> HRC Configuration
<input type="checkbox"/> PCAD Mode	<input checked="" type="checkbox"/> SCS States or Contents
<input type="checkbox"/> S/C Unit Configuration (H/W or S/W)	<input type="checkbox"/> Dither State
<input type="checkbox"/> Ground System Configuration/Settings	<input type="checkbox"/> FSW Element
<input type="checkbox"/> S/C Clock (VCDU)	

Comments:

- The CAP changes the state of the HRC. It raises the high voltage of PMT#2 to operational levels
- The CAP enables SCS 107 and sends commands to enable RADMON
- The CAP depends upon command loads 2A_RAD_20251_132.CLD being activated and enabled in SCS 132. The load contain commands to turn off the HV for PMT#2 as a part of RADMON disabling at 2020:250:22:06:30.450 (EEF1000 – 10ks) and then ramp the HV back up upon RADMON enable at 2020:251:11:57:50.450 (XEF1000 + 10ks).

Risk/Comm. Loss/Worst Case Scenario:**What happens if comm. is lost during CAP execution?**

Loads are enabled and activated prior to the PMT#2 power up sequence. This ensures that the PMT#2 will be powered down before entering the radiation belt. If comm is lost during CAP execution, the PMT#2 may be left with off nominal HV. It will be safed prior to radiation belt entry.

What is the worst case scenario for CAP execution? (Assuming the CAP is executed correctly)

The worst case scenario is that the PMT#2 does not come on as expected. If this happens, we will command the PMT#2 off, and terminate and clear SCS 132.

Required Products (Scripts, Displays, SOPs, etc.):

Product Name	Version	On-Conso
O_SCSCCTRL.ssc	3.4	<input type="checkbox"/>
HRC_SH2_ACT_SLOW.ssc		<input type="checkbox"/>
F_MAIN.dsp	3.10	<input type="checkbox"/>
I_HRC_SOH.dsp	3.10	<input type="checkbox"/>
F_HRC_ALL.dec	2.1	<input type="checkbox"/>
O_PROT_SCSCCTRL.ssc	3.2	<input type="checkbox"/>

Command Load Name	Checksum (if applicable)	In ODB
2A_RAD_20251_132.cld	8766EA4	<input type="checkbox"/>
		<input type="checkbox"/>
		<input type="checkbox"/>

Instructions:**CONTINGENCY STEPS**

If required at any point, and at the direction of the HRC team:

1. **(OPTIONAL)** send command **2S2HVOF**
HRC verify PMT #2 HV OFF: 2ST2ONST = OFF
2. **(OPTIONAL)** using script **O_SCSCCTRL**, terminate and clear **SCS 132**

Load and activate radiation zone handling ATS

3. Use script **O_PROT_SCSCCTRL** to enable **SCS 107**
 4. Uplink Command load 2A_RAD_20251_132.cld
44 Commands
- Checksum = 8766EA4

5. Using script **O_SCSCTRL**, Enable and Activate **SCS 132**
6. Uplink command **OORMPEN**
Verify RADMON Enabled: CORADMEN = ENAB

Power up PMT#2

7. Start Script **HRC_SH2_ACT_SLOW** and hold at the INITIAL WAIT
8. On HRC Go, **Resume** script
Script will buffer command
2S2STHV, 2S2STHV2=0 Set PMT #2 step to 0
9. On HRC Go, **Resume** to uplink command
HRC verify PMT #2 step level: 2S2HVST = 0

Script will buffer command
2S2HVON Turn on PMT #2 HVPS
10. On HRC Go, **Resume** to uplink command
HRC verify PMT #2 HV ON: 2S2ONST = ON

Script will buffer command
2S2STHV, 2S2STHV2=2 Set PMT #2 step to 2
11. On HRC Go, **Resume** to uplink command
HRC verify PMT #2 step level: 2S2HVST = 2

Script will buffer command
2S2STHV, 2S2STHV2=4 Set PMT #2 step to 4
12. On HRC Go, **Resume** to uplink command
HRC verify PMT #2 step level: 2S2HVST = 4

Script will buffer command
2S2STHV, 2S2STHV2=6 Set PMT #2 step to 6
13. On HRC Go, **Resume** to uplink command
HRC verify PMT #2 step level: 2S2HVST = 6

Script will buffer command
2S2STHV, 2S2STHV2=7 Set PMT #2 step to 7
14. On HRC Go, **Resume** to uplink command
HRC verify PMT #2 step level: 2S2HVST = 7

Script will buffer command
2S2STHV, 2S2STHV2=8

Set PMT #2 step to 8

15. On HRC Go, **Resume** to uplink command

HRC verify PMT #2 step level: 2S2HVST = 8

16. HRC determine if PMT#2 step level of 9 is desired

If Step level of 9 is not desired:

Stop and exit script **HRC_SH2_ACT_SLOW**

17. If Step level of 9 is desired: On HRC Go, **Resume** script

Script will buffer command

2S2STHV, 2S2STHV2=9

Set PMT #2 step to 9

18. On HRC Go, **Resume** to uplink command

HRC verify PMT #2 step level: 2S2HVST = 9

19. On HRC Go, **Resume** to end script **HRC_SH2_ACT_SLOW** and exit

SOT Manager/Lead: J. Vrtilek (Verbal)		Mission Planning Manager: J. Scott (Verbal)	
OC or Ops Manager: J. Wellington (Verbal)		FOM: S. Hurley (Verbal)	
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