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International Space Station Ground Handbook Specific

ISS-3A

Mission Operations Directorate
Operations Division

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National Aeronautics and Space Administration

Lyndon B. Johnson Space Center
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United Space Alliance

INTERNATIONAL SPACE STATION GROUND HANDBOOK - SPECIFIC ISS-3A

FINAL
June 13, 2000

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This document is under the configuration control of the Systems Operations Data File Control Board (SODFCB).

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INTERNATIONAL SPACE STATION
GROUND HANDBOOK - SPECIFIC

LIST OF EFFECTIVE PAGES

FINAL 13 JUN 00

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CONTENTS

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C&DH PROCEDURES

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NOTE

1. This procedure is used to reconfigure the Node 1 MDMs after an Auto Retry Condition has occurred where the Auto Retry function reconfigures the MDMs back to the nominal states of N1-2 Primary and N1-1 Secondary.

2. N1-2 recovered: perform steps 1, 2, and 3.3
   N1-1 recovered: perform steps 1 and 3

1. VERIFYING MDM STATES

PCS2 Node 1: C&DH: MDM N1-2
Primary NCS MDM Node 1

Verify Frame Count – <incrementing>
Verify MDM ID – N1-2
Verify MDM State – Primary

Node 1: C&DH: MDM N1-1
Secondary NCS MDM Node 1

Verify Frame Count – <incrementing>
Verify MDM ID – N1-1
Verify MDM State – Secondary

Verifying RS State
If NCS interface is SM Central Computer
sel SMCC Control

Primary NCS SMCC Control

Verify SMCC Frame Count – <incrementing>

If NCS interface is FGB
FGB: C&DH: FGB MDM 2(1)
FGB MDM

Verify FGB Frame Count – <incrementing>

2. RECONFIGURING THE NODE 1-2 MDM

2.1 Clearing MDM BST Error Latch

PCS Node 1: C&DH: MDM N1-2
Primary NCS MDM Node 1
'Software Control'

sel MDM Utilities

'Clear Latched Data in BST A'

cmd Clear **Execute**

<Cmd Inv: Prim_NCS_Clr_Lat_Data – (M1DD95SM1027K)>

Primary NCS MDM Node 1

sel MDM BIT States

√BST Errors – blank
(errors cleared)

2.2 Configuring MDM Heaters Controlled by the N1-2 MDM

PCS2 Node 1: C&DH: MDM N1-2
Primary NCS MDM Node 1
'RPCM N1RS2 C'

√RPC 4 Position – Cl

If Open
sel RPC 4

RPCM_N1RS2_C_RPC_4

cmd Close

<Cmd Inv: RPCM_N1RS2_C_RPC_4_N1_1_MDM_SDO_1B_Cl – (M1PR95SM1598K)>

√RPC 4 Position – Cl

'N1-1 Heaters'

√Sur – Ena BKUP

If Sur – Ena Opr
sel N1-2 Heater Sur

N1_2_MDM_Survival_Heaters
'Command Status'

cmd Ena_BKUP

<Cmd Inv: MDM_N1_1_Ena_Bu_Srv_Htr – (M1TH96IM0273K)>

√Availbty – Ena BKUP

√Opr – Ena Opr

2.3 Reconfiguring N1-2 MDM EPS Remote Terminals

CRT SM 200 APCU

√APCU1 OUT VOLTS RES LOW ≥ 121

If APCU1 OUT VOLTS RES LOW ≥ 121

PCS2 Node 1: C&DH: MDM N1-2
Primary NCS MDM Node1

sel LB Sys Lab – 2
sel RT Status

LB_SYS_LAB_RT_Status

cmd 18_RPCM_N13B_C RT Status – Enable **Execute**
cmd 19_RPCM_N13B_B RT Status – Enable **Execute**
cmd 20_RPCM_N13B_A RT Status – Enable **Execute**

<Cmd Inv: N1_2_MDM_Ena_RPCM_N13B_C – (M1DD95SM1179K)>

<Cmd Inv: N1_2_MDM_Ena_RPCM_N13B_B – (M1DD95SM1180K)>

<Cmd Inv: N1_2_MDM_Ena_RPCM_N13B_A – (M1DD95SM1181K)>

LB_SYS_LAB_RT_Status

√RT Status 18, 19, 20 – ENA

cmd 18_RPCM_N13B_C RT FDIR Status – Enable FDIR **Execute**
cmd 19_RPCM_N13B_B RT FDIR Status – Enable FDIR **Execute**
cmd 20_RPCM_N13B_A RT FDIR Status – Enable FDIR **Execute**

<Cmd Inv: N1_2_MDM_Ena_FDIR_RPCM_N13B_C – (M1DD95SM1342K)>

<Cmd Inv: N1_2_MDM_Ena_FDIR_RPCM_N13B_B – (M1DD95SM1343K)>

<Cmd Inv: N1_2_MDM_Ena_FDIR_RPCM_N13B_A – (M1DD95SM1344K)>

LB_SYS_LAB_RT_Status

√RT FDIR Status 18, 19, 20 – ENA

2.4 Resetting NCS Auto Retry Counter
On MCC-H GO

PCS2 Node 1: C&DH: MDM N1-1
Secondary NCS MDM Node 1

sel MDM Utilities

If Auto Retry Counter - 1
cmd Reset **Execute**

<Cmd Inv: Sec_NCS_Rset_NCS_Retry_Cntr – (M1SDD95SM2619K)>

√Auto Retry Counter – 0

2.5 Subsystem Reconfiguration
As required, reactivate the following MDM N1-2 equipment.

√**MCC-H** for the proper configuration

EQUIPMENT	PROCEDURE REFERENCE	COMMENTS
Node 1 Smoke Detector 2	NODE 1 SMOKE DETECTOR ACTIVATION/DEACTIVATION (SODF: ISS OPS: ECLSS)	Activate Node 1 Smoke Detector 2.
Node 1 Port Fwd IMV Fan	NODE 1 IMV FAN ACTIVATION/ DEACTIVATION (SODF: ISS OPS: ECLSS)	Activate Node 1 Port Fwd IMV Fan only.
Node 1 Stbd Aft IMV Fan	NODE 1 IMV FAN ACTIVATION/ DEACTIVATION (SODF: ISS OPS: ECLSS)	Activate Node 1 Stbd Aft IMV Fan only.
Node 1 Fwd Port IMV Valve	NODE 1 IMV VALVE RECONFIGURATION (SODF: ISS OPS: ECLSS)	Activate Node 1 Fwd Port IMV Valve only.
Node 1 Fwd Stbd IMV Valve	NODE 1 IMV VALVE RECONFIGURATION (SODF: ISS OPS: ECLSS)	Activate Node 1 Fwd Stbd IMV Valve only.

2.6 Resetting ACS Moding
If during Docked Ops, go to ACS PRE-DEPARTURE MODING for N1-2, all (SODF: ISS OPS: MCS).

3. RECONFIGURING THE NODE 1-1 MDM
3.1 Clearing MDM BST Error Latch
Perform NCS MDM BST CLEAR LATCHED DATA, for the Secondary N1-1 MDM, (SODF: GND: C&DH).

3.2 Configuring MDM Heaters Controlled by the N1-1 MDM

PCS2 Node 1: C&DH: MDM N1-1
Secondary NCS MDM Node 1
'RPCM N1RS1 A'

√RPC 5 Position – Cl

If Open
sel RPC 5

RPCM_N1RS1_A_RPC_5

cmd Close

<Cmd Inv: RPCM_N1RS1_A_RPC_5_SDO_1A_N1_1_Cl – (M1PR95SM1329K)>

√RPC 5 Position – Cl

'N1-1 Heaters'

√Opr – ENA OPR

'N1-2 Heaters'

√Sur – Ena BKUP

If Sur – Ena BKUP
sel N1-1 Heaters, Sur

N1_1_Survival Heater

cmd Enable BKUP

<Cmd Inv: N1_2_Srv_Htr_Ena_BU – (M1TH96IM0271K)>

√Availbty – Ena BKUP

3.3 Reconfiguring N1-1 MDM EPS Remote Terminals

CRT SM 200 APCU

√APCU2 OUT VOLTS RES LOW ≥ 121

If APCU2 OUT VOLTS RES LOW ≥ 121

PCS2 Node 1: C&DH: MDM N1-1
Secondary NCS MDM Node1

sel LB Sys Lab – 1
sel RT Status

LB_SYS_LAB_RT_Status

cmd 18_RPCM_N14B_C RT Status – Enable **Execute**
cmd 19_RPCM_N14B_B RT Status – Enable **Execute**
cmd 20_RPCM_N14B_A RT Status – Enable **Execute**

<Cmd Inv: N1_1_MDM_Ena_RPCM_N14B_C – (M1DD95SM1138K)>

<Cmd Inv: N1_1_MDM_Ena_RPCM_N14B_B – (M1DD95SM1139K)>

<Cmd Inv: N1_1_MDM_Ena_RPCM_N14B_A – (M1DD95SM1140K)>

LB_SYS_LAB_RT_Status

√RT Inhibited 18, 19, 20 – ENA

cmd 18_RPCM_N14B_C RT FDIR Status – Enable FDIR **Execute**
cmd 19_RPCM_N14B_B RT FDIR Status – Enable FDIR **Execute**
cmd 20_RPCM_N14B_A RT FDIR Status – Enable FDIR **Execute**

<Cmd Inv: N1_1_MDM_Ena_FDIR_RPCM_N14B_C – (M1DD95SM1300K)>

<Cmd Inv: N1_1_MDM_Ena_FDIR_RPCM_N14B_B – (M1DD95SM1301K)>

<Cmd Inv: N1_1_MDM_Ena_FDIR_RPCM_N14B_A – (M1DD95SM1302K)>

LB_SYS_LAB_RT_Status

√RT FDIR Status 18, 19, 20 – ENA

3.4 Resetting NCS Auto Retry Counter
On MCC-H GO

PCS2 Node 1: C&DH: MDM N1-2
Primary NCS MDM Node 1

sel MDM Utilities

If Auto Retry Counter – 1
cmd Reset **Execute**

<Cmd Inv: Prim_NCS_Rset_NCS_Retry_Cntr – (M1DD95SM2500K)>

√Auto Retry Counter – 0

3.5 Subsystem Reconfiguration
As required, reactivate the following MDM N1-1 equipment.

√**MCC-H** for proper configuration

EQUIPMENT	PROCEDURE REFERENCE	COMMENTS
Node 1 Cabin Fan	NODE 1 CABIN FAN ACTIVATION, (SODF: ISS OPS: ECLSS)	This procedure will start up the Cabin Fan and both Node 1 Smoke Detectors.
Node 1 Smoke Detector 1	NODE 1 SMOKE DETECTOR ACTIVATION (SODF: ISS OPS: ECLSS)	Execute only if Node 1 Cabin Fan Activation not performed.
Node 1 Smoke Detector 2	NODE 1 SMOKE DETECTOR ACTIVATION (SODF:ISS OPS: ECLSS)	Execute only if Node 1 Cabin Fan Activation not performed.
Node 1 Aft Port IMV Fan	NODE 1 IMV FAN ACTIVATION/ DEACTIVATION (SODF: ISS OPS: ECLSS)	Activate Node 1 Aft Port IMV Fan only.
Node 1 Aft Port IMV Valve	NODE 1 IMV VALVE RECONFIGURATION (SODF: ISS OPS: ECLSS)	Activate Node 1 Aft Port IMV Valve only.
Node 1 Aft Stbd IMV Valve	NODE 1 IMV VALVE RECONFIGURATION (SODF: ISS OPS: ECLSS)	Activate Node 1 Aft Stbd IMV Valve only.

3.6 Resetting ACS Moding
If during Docked Ops, perform ACS PRE-DEPARTURE MODING for N1-1, all (SODF: ISS OPS: MCS).

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MCS PROCEDURES

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ACS PRE-ARRIVAL MODING

(GND/3A/BAS A) Page 1 of 3 pages

Identification Section:

Procedure Name:	ACS Pre-Arrival Moding - Ground
Applicability:	Arrival of Flights 2A.2, 3A, 4A, and 5A.
Frequency:	This procedure is performed before entering the Prox Ops timeline.
Objective:	To enable Arrival Response software and LEDs.
Description:	The Arrival Response software acts upon the APAS Capture Long sensors at orbiter contact and cues the RS GNC to mode to Indicator (Drift). The LED Control software operates the ACS Moding Indicator light assemblies on the PMA to provide the orbiter crew with a visual indication of the RS GNC mode.
Crew Required:	None
Power:	N/A
Data:	Required telemetry is given in the procedure.
Duration:	Concurrent with integrated and arrival Prox Ops timeline.
Location:	PMA2 for 2A.2 and 3A. PMA3 for 4A and 5A.
Parts:	APAS docking mechanisms; Node 1 MDMs; RS segment MDMs, and Propulsion system.
Materials:	N/A
Tools:	N/A
Constraints:	N/A
Assumptions:	The orbiter maintains attitude control over mated stack.
Reference Materials:	S684-10174 - 5/15/96; MDC 95H0250B 3/15/96 (Russian data), Pass2-100% 2A/3A Command and Telemetry file.

1. ACS MODING PRE-ARRIVAL CONFIGURATION AND STATUS

PCS MCS: ACS Moding
ACS Moding
'ACS Configuration'

Verify Moding Role Primary,Secondary NCS – Full

****
If Primary(Secondary) NCS Moding Role is not set to Full, then the following commands should be sent:

sel Moding Role
Moding Role

cmd N1-2(N1-1) – Arm
Verify Arm Status Primary(Secondary) NCS – Arm

cmd N1-2(N1-1) – Full
Verify Moding Role Primary(Secondary) NCS – Full
Verify Arm Status Primary(Secondary) NCS – Disarm
****

Verify RS Mode Primary,Secondary NCS – Cntl

'Arrival'

Verify PMA2(PMA3) Arrival Response software Primary,Secondary NCS – Inh

2. ACS MODING INDICATOR LIGHTS

NOTE
Each of the primary and secondary MDMs command one of the LED units (i.e., two units per PMA, four LEDs per unit). LED configurations: On - Active Attitude Control, Flash - Station in Free Drift, Off – LED Control Software is Inhibited or an MDM loss of comm situation has occurred.

PCS MCS: ACS Moding
ACS Moding
'ACS Configuration'

sel LED Control SW

LED Control SW
'Primary NCS'

cmd Enable
√LED Control SW – Ena
Verify PMA2,PMA3 LED State – On

'Secondary NCS'

cmd Enable
√LED Control SW – Ena
Verify PMA2,PMA3 LED State – On

3. ARRIVAL RESPONSE SOFTWARE FOR ACS MODING

ACS Moding
'Arrival'

sel PMA2(PMA3) Arrival Response SW

PMA2(PMA3) Arrival Response SW
'Primary NCS'

cmd Enable
Verify Arrival Response SW – Ena

'Secondary NCS'

cmd Enable
Verify Arrival Response SW – Ena

****
If Primary(Secondary) NCS Arrival Response SW needs to be inhibited (wave off, etc.), then the following commands should be sent:

sel PMA2(PMA3) Arrival Response SW

PMA2(PMA3) Arrival Response SW
'Primary NCS'('Secondary NCS')

cmd Arm
Verify Arm Status Primary(Secondary) NCS – Arm

cmd Inhibit
Verify Arrival Response SW Primary(Secondary) NCS – Inh
****

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ACS ARRIVAL MODING

(GND/3A/BAS A) Page 1 of 2 pages

Identification Section:

Procedure Name:	ACS Arrival Moding - Ground
Applicability:	Arrival of Flights 2A.2, 3A, 4A, and 5A.
Frequency:	This procedure is performed during the Prox Ops timeline.
Objective:	To monitor the ACS Moding function during orbiter arrival.
Description:	The ACS Moding software declares an Orbiter Arrival Event based on APAS Capture Long sensor signals. The Arrival Event cues the RS GNC to mode to Indicator (Drift). The ACS Moding indicator lights provide orbiter crew with a visual indication of the RS GNC mode.
Crew Required:	None
Power:	N/A
Data:	Required telemetry is given in the procedure.
Duration:	Concurrent with integrated and arrival Prox Ops timeline.
Location:	PMA2 for 2A.2 and 3A. PMA3 for 4A and 5A.
Parts:	APAS docking mechanisms; Node 1 MDMs; RS segment MDMs, and Propulsion system.
Materials:	N/A
Tools:	N/A
Constraints:	N/A
Assumptions:	The orbiter maintains attitude control over mated stack.
Reference Materials:	S684-10174 - 5/15/96; MDC 95H0250B 3/15/96 (Russian data), Pass2-100% 2A/3A Command and Telemetry file.

1. VERIFYING ACS MODING PRE-ARRIVAL CONFIGURATION AND STATUS

PCS MCS: ACS Moding
ACS Moding
'ACS Configuration'

Verify Moding Role Primary,Secondary NCS – Full
Verify RS Mode Primary,Secondary NCS – Cntl

√LED Control Software Primary,Secondary NCS – Ena
Verify PMA2,PMA3 LED State Primary,Secondary NCS – On

'Arrival'

√PMA2(PMA3) Arrival Response SW Primary,Secondary NCS – Ena

2. ACS MODING AT ORBITER DOCKING
Perform STATION-ORBITER DOCKING SCRIPT, all (SODF: GND: MCS), then proceed.

3. STATION ACS MODING POST-DOCKING CONFIGURATION

PCS MCS: ACS Moding
ACS Moding
'Arrival'

Verify PMA2(PMA3) Capture Long Primary,Secondary NCS – X
Verify Arrival Event Primary,Secondary NCS – X

'ACS Configuration'

Verify RS Mode Primary,Secondary NCS – Drift
Verify PMA2,PMA3 LED State Primary,Secondary NCS – Flash

NOTE
The following signals nominally may take up to 13 minutes to occur before hard mate is completed.

'Departure'

Verify PMA2(PMA3) Interface Sealed Primary,Secondary NCS – X
Verify PMA2(PMA3) Separation Primary,Secondary NCS – blank

ACS DEPARTURE MODING
(GND/3A/FIN) Page 1 of 2 pages

1. VERIFYING ACS MODING SOFTWARE CONFIGURATION

PCS MCS:ACS Moding

ACS Moding

'Departure'

Verify PMA2(PMA3) Interface Sealed Primary, Secondary NCS – X
Verify PMA2(PMA3) Separation Primary, Secondary NCS – blank
Verify PMA2(PMA3) Departure Response SW Primary, Secondary NCS – Ena
Verify Back Off Time Primary, Secondary NCS: 250 (seconds)
Verify Time Since Separation Primary, Secondary NCS: 0
Verify Departure Event Primary, Secondary NCS – blank

2. MONITORING NCS SEPARATION SIGNALS AND VERFICATION OF ORBITER DEPARTURE AND POST SEPARATION LED MODE CHANGE

****
If the Primary(Secondary) Time Since Separation is observed to be incrementing any time prior to planned departure, IMMEDIATE ACTION IS REQUIRED.
sel Moding Role

Moding Role

cmd N1-2(N1-1) – Arm

Verify Arm Status Primary(Secondary) NCS – Arm

cmd N1-2(N1-1) – Off

Verify Moding Role Primary(Secondary) NCS – Off
Verify Arm Status Primary(Secondary) NCS – Disarm
****

NOTE

1. For flights prior to onboard crew, orbiter monitoring of Station telemetry is discontinued when orbiter OIU is disconnected.
2. The Time Since Separation counter is initiated when Separation is true (X) and Interface Sealed is false (blank).
3. The Departure Event is set when the Time Since Separation equals the set Back Off Time. When the SM receives the Departure Event request, it will resume active attitude control.

'Departure'

Monitor the following during vehicle separation.

Verify PMA2(PMA3) Interface Sealed Primary, Secondary NCS – blank
Verify PMA2(PMA3) Separation Primary,Secondary NCS – X
Verify Time Since Separation Primary,Secondary NCS – <Increasing>

When Time Since Separation equals Back Off Time:
Verify Departure Event Primary,Secondary NCS – X

3. VERIFICATION OF RUSSIAN SEGMENT ATTITUDE CONTROL AND LED STATUS

PCS MCS: ACS Moding
ACS Moding
'ACS Configuration'

Verify RS Mode Primary,Secondary NCS – Cntl
Verify PMA2,PMA3 LED State Primary,Secondary NCS – On

PCS SM MCS
SM MCS

Verify RS GNC Mode – Thrusters

ACS POST DEPARTURE MODING

(GND/3A/BAS A) Page 1 of 2 pages

Identification Section:

Procedure Name:	ACS Post Departure Moding - Ground
Applicability:	Departure of Flights 2A.2, 3A, and 4A.
Frequency:	This procedure is performed after the departure sequence.
Objective:	Inhibit the Station ACS Moding indicator lights and Departure Response software.
Description:	The ACS Moding indicator lights (LEDs) will be powered off. Then the Departure Response software, which monitors the APAS Interface Sealed and Undocking Complete sensors, will be inhibited.
Crew Required:	None
Power:	N/A
Data:	Required telemetry is given in the procedure.
Duration:	Concurrent with integrated and departure Prox Ops timeline.
Location:	PMA2 for 2A.2 and 3A. PMA3 for 4A.
Parts:	APAS docking mechanisms; Node 1 MDMs; RS segment MDMs, and Propulsion system.
Materials:	N/A
Tools:	N/A
Constraints:	None
Assumptions:	N/A
Reference Materials:	S684-10174 - 5/15/96; MDC 95H0250B 3/15/96 (Russian data), PAS2-100% 2A/3A, Engineering release cycle, and Standard out Command and Telemetry files. ACS Moding Display Revision 3A-1.

1. ACS MODING INDICATOR LIGHTS

PCS MCS: ACS Moding
ACS Moding
'ACS Configuration'

sel LED Control SW

LED Control SW
'Primary NCS'

cmd Inhibit
√LED Control SW – Inh
Verify PMA2,PMA3 LED State – Off

'Secondary NCS'

cmd Inhibit
√LED Control SW – Inh
Verify PMA2,PMA3 LED State – Off

2. DEPARTURE RESPONSE

ACS Moding
'Departure'

sel PMA2(PMA3) Departure Response SW

PMA2(PMA3) Departure Response SW
'Primary NCS'

cmd Inhibit
Verify Departure Response SW – Inh
Verify Arm Status – Disarm

'Secondary NCS'

cmd Inhibit
Verify Departure Response SW – Inh
Verify Arm Status – Disarm

ACS Moding
'Departure'

Verify Departure Event Primary,Secondary NCS – blank

S&M PROCEDURES

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OBJECTIVE:
Verify CBM full functionality after the reinstallation of CBM hardware or as a flight test.

LOCATION:
NOD1/**MCC-H**

DURATION:
1 hour 15 minutes

REFERENCED PROCEDURE(S):
None

NOTE
1. Forward CBM connectivity is as follows:
   CB GNC 1 A = CPA 1
   B = CPA 4
   CB GNC 2 A = CPA 2
   B = CPA 3

2. Where CDDT HTMLs are used to command, Command Inventory command ops names and CI PUIs are listed beneath each command in parentheses and italics.

1. VERIFYING POWER CONFIGURATION

N1_Fwd_CBM_Power_Data
'RPCM N13B C'

√Integ Counter – <incrementing>

'RPCM N14B A'

√Integ Counter – <incrementing>

'APCU-1'

√Volts Hi (Res) >122 volts

'APCU-2'

√Volts Hi (Res) >122 volts

2. VERIFYING MDM CONFIGURATION

N1_Fwd_CBM_Power_Data
'Primary MDM'

√MDM ID – N1-2
√Frame Count – <incrementing>

'Secondary MDM'

√MDM ID – N1-1
√Frame Count – <incrementing>

√CB GNC N1-1 Bus Channel

Record A or B _____

√CB GNC N1-2 Bus Channel

Record A or B _____

3. ENABLING PRIMARY RPCS

CBM_Cmds.msk

sel N1 Forward CBM Checkout

N1 Forward CBM Checkout

cmd RPCM N13B-C RPC [X] CPA [Y] Pri Close – Enable

where [X] = 03 04 05 06

[Y] = 1 2 3 4

<Cmd Inv: RPCM_N13B_C_RPC_[X]_CBM_N1_Fwd_Pri_[Y]_Cl-Enable – (M1PR95SM1147K, 1148K, 1149K, 1150K)>

N1_Fwd_CBM_Power_Data
'RPCM N13B C'

√RPC [X] Cl – Ena

Repeat

4. ENABLING SECONDARY RPCS

CBM_Cmds.msk

sel N1 Forward CBM Checkout

N1 Forward CBM Checkout

cmd RPCM N14B-A RPC [X] CPA [Y] Sec Close – Enable

where [X] = 02 03 14 15

[Y] = 1 2 3 4

<Cmd Inv: RPCM_N14B_A_RPC_[X]_CBM_N1_Fwd_Sec_[Y]_Cl-Enable – (M1PR95SM1200K, 1201K, 1212K, 1213K)>

N1_Fwd_CBM_Power_Data
'RPCM N14B A'

√RPC [X] Cl – Ena

Repeat

5. CLOSING SECONDARY RPCS

CBM_Cmds.msk

sel N1 Forward CBM Checkout

N1 Forward CBM Checkout

cmd RPCM N14B-A RPC [X] CPA [Y] Sec Close

where [X] = 02 03 14 15

[Y] = 1 2 3 4

<Cmd Inv: RPCM_N14B_A_RPC_[X]_CBM_N1_Fwd_Sec_[Y]_Cl – (M1PR95SM1164K, 1165K, 1176K, 1177K)>

N1_Fwd_CBM_Power_Data
'RPCM N14B A'

√RPC [X] Posn – Cl

Repeat

6. ACTIVATING FORWARD CBM PRIMARY MASTER CONTROLLER

N1 Forward CBM Checkout

cmd Activate Primary Master **Execute**

<Cmd Inv: CBM_Activate_N1_Fwd_Pri_Master – (M1MC95SM1160K)>

Wait 20 seconds, then:

N1_Fwd_CBM_Power_Data
'CBM Status'

√Mode – Activated
√Master – Primary
√CPA – Record # _____
√Comm Error – blank

Node_1_CBM.msk

√Master Cmd Status – Complete
√Active BIT Error – blank
√Background BIT Error – blank
√Master Cmd Error – blank
√Slave Cmd Error – blank
√485 Timeout – blank
√Command Rejected – blank
√485 Channel (twenty) – B

7. INITIALIZING CONTROLLER POSITIONS ZERO

N1 Forward CBM Checkout

cmd Set All Zero Ch B **Execute**

<Cmd Inv: CBM_Set_All_Posns_To_Zero_Ch_B – (M1MC96IM0002K)>

Node_1_CBM.msk

√Master Cmd Status – Complete

8. VERIFYING RS-485 COMM STATUS

NOTE
CBM Active BIT may have to be commanded multiple times to clear MSBDs.

Node_1_CBM.msk

√Cmd Code (twenty) – RELD
√Cmd Stat (twenty) – CPLT

If any Cmd Stat - MSBD
****

N1 Forward CBM Checkout

cmd CBM Active BIT **Execute**

<Cmd Inv: CBM_Act_Built_In_Test – (M1MC95SM1027K)>

Node_1_CBM.msk

√Confirmation Request – Built-in Test

N1 Forward CBM Checkout

cmd CBM Active BIT **Execute**

<Cmd Inv: CBM_Act_Built_In_Test – (M1MC95SM1027K)>

Wait 15 seconds, then:

Node_1_CBM.msk

√Master Cmd Status – Complete
√Active BIT Error – blank
√Cmd Code (twenty) – BIT
√Cmd Stat (twenty) – CPLT
****

9. VERIFING CONTROLLER POSITIONS ZERO

Node_1_CBM.msk

√Position (twenty): 0 rev | deg

If any position ≠ 0 rev | deg
****

N1 Forward CBM Checkout

cmd Set All Zero Ch B **Execute**

<Cmd Inv: CBM_Set_All_Posns_To_Zero_Ch_B –
(M1MC96IM0002K)>

Node_1_CBM.msk

√Master Cmd Status – Complete
√Background BIT Error – blank
√Master Cmd Error – blank
√Slave Cmd Error – blank
√Cmd Code (twenty) – RELD
√Cmd Stat (twenty) – CPLT
√Position (twenty): 0 rev | deg
****

10. TESTING BOLT DRIVE

N1 Forward CBM Checkout

cmd DBBoltck Nominal **Execute**

<Cmd Inv: CBM_DBBoltck_Nominal – (M1MC95SM1331K)>

Node_1_CBM.msk

√Confirmation Request – DBBoltck

N1 Forward CBM Checkout

cmd Confirm Cmd **Execute**

<Cmd Inv: CBM_Confirm_Cmd – (M1MC95SM1470K)>

Wait 30 seconds, then:

Node_1_CBM.msk

√Master Cmd Status – Complete
√Bolt Cmd Code (sixteen) – DBCK
√Bolt Cmd Stat (sixteen) – CPLT
√Bolt Position (sixteen): 50 --- 51 rev

11. DEACTIVATING FORWARD CBM MASTER CONTROLLER

N1 Forward CBM Checkout

cmd Deactivate CBM **Execute**

<Cmd Inv: CBM_Deactivate_N1_Fwd – (M1MC95SM1006K)>

N1_Fwd_CBM_Power_Data
'CBM Status'

√Mode – Deactivated

12. OPENING SECONDARY RPCS

cmd RPCM N14B-A RPC [X] CPA [Y] Sec Open

where [X] = 02 03 14 15

[Y] = 1 2 3 4

<Cmd Inv: RPCM_N14B_A_RPC_[X]_CBM_N1_Fwd_Sec_[Y]_Op – (M1PR95SM1812K, 1813K, 18624K, 1825K)>

N1_Fwd_CBM_Power_Data
'RPCM N14B A'

√RPC [X] Posn – Op

Repeat

13. CLOSING PRIMARY RPCS

cmd RPCM N13B-C RPC [X] CPA [Y] Pri Close

where [X] = 03 04 05 06

[Y] = 1 2 3 4

<Cmd Inv: RPCM_N13B_C_RPC_[X]_CBM_N1_Fwd_Pri_[Y]_Cl – (M1PR95SM1111K, 1112K, 1113K, 1114K)>

N1_Fwd_CBM_Power_Data
'RPCM N13B C'

√RPC [X] Posn – Cl

Repeat

14. ACTIVATING FORWARD CBM SECONDARY MASTER CONTROLLER

N1 Forward CBM Checkout

cmd Activate Secondary Master **Execute**

<Cmd Inv: CBM_Activate_N1_Fwd_Sec_Master – (M1MC95SM1161K)>

Wait 20 seconds, then:

N1_Fwd_CBM_Power_Data
'CBM Status'

√Mode – Activated
√Master – Secondary
√CPA – Record # _____
√Comm Error – blank

Node_1_CBM.msk

√Master Cmd Status – Complete
√Active BIT Error – blank
√Background BIT Error – blank
√Master Cmd Error – blank
√Slave Cmd Error – blank
√485 Timeout – blank
√Command Rejected – blank
√485 Ch (twenty) – B

15. SWITCHING RS-485 BUS TO CHANNEL A

N1 Forward CBM Checkout

cmd Set Last State to Stop Ch A **Execute**

<Cmd Inv: CBM_Set_Last_State_To_Stop_Ch_A – (M1MC95SM1491K)>

Node_1_CBM.msk

√Master Cmd Status – Complete
√485 Ch (twenty) – A

16. SETTING CONTROLLER POSITIONS ZERO

N1 Forward CBM Checkout

cmd Set All Zero Ch A **Execute**

<Cmd Inv: CBM_Set_All_Posns_To_Zero_Ch_A – (M1MC96IM0004K)>

Node_1_CBM.msk

√Master Cmd Status – Complete
√485 Ch (twenty) – A

17. VERIFYING RS-485 COMM STATUS

NOTE
CBM active BIT may have to be commanded multiple times to clear MSBDs.

Node_1_CBM.msk

√Cmd Code (twenty) – RELD
√Cmd Stat (twenty) – CPLT

If any Cmd Stat - MSBD
****
N1 Forward CBM Checkout

cmd CBM Active BIT **Execute**

<Cmd Inv: CBM_Act_Built_In_Test – (M1MC95SM1027K)>

Node_1_CBM.msk

√Confirmation Request – Built-in Test

N1 Forward CBM Checkout

cmd CBM Active BIT **Execute**

<Cmd Inv: CBM_Act_Built_In_Test – (M1MC95SM1027K)>

Wait 15 seconds, then:

Node_1_CBM.msk

√Master Cmd Status – Complete
√Active BIT Error – blank
√Cmd Code (twenty) – BIT
√Cmd Stat (twenty) – CPLT
****

18. VERIFYING CONTROLLER POSITIONS ZERO

Node_1_CBM.msk

√Position (twenty): 0 rev | deg

If any position ? 0 rev | deg
****
N1 Forward CBM Checkout

cmd Set All Zero Ch A **Execute**

<Cmd Inv: CBM_Set_All_Posns_To_Zero_Ch_A –
(M1MC96IM0004K)>

Node_1_CBM.msk

√Master Cmd Status – Complete
√Background BIT Error – blank
√Master Cmd Error – blank
√Slave Cmd Error – blank
√Cmd Code (twenty) – RELD
√Cmd Stat (twenty) – CPLT
√Position (twenty): 0 rev | deg
****

19. DEPLOYING LATCH 1 TO 210

N1 Forward CBM Checkout

cmd Deploy Latch 1 to 210 **Execute**

<Cmd Inv: CBM_Deploy_Latch_1_to_210_Degrees – (M1MC96IM0027K)>

Node_1_CBM.msk

√Confirmation Request – Deploy

N1 Forward CBM Checkout

cmd Confirm Cmd **Execute**

<Cmd Inv: CBM_Confirm_Command – (M1MC95SM1470K)>

Wait 90 seconds, then:

Node_1_CBM.msk

√Master Cmd Status – Failed
√Latch 1 Cmd Code – DPLY
√Latch 1 Cmd Stat – BIND
√Latch 1 Position: 200 --- 210 deg
√Latch 1 Capture Switch Cl – X

20. DEPLOYING LATCH 2 TO 210

N1 Forward CBM Checkout

cmd Deploy Latch 2 to 210 **Execute**

<Cmd Inv: CBM_Deploy_Latch_2_to_210_Degrees – (M1MC96IM0028K)>

Node_1_CBM.msk

√Confirmation Request – Deploy

N1 Forward CBM Checkout

cmd Confirm Cmd **Execute**

<Cmd Inv: CBM_Confirm_Command – (M1MC95SM1470K)>

Wait 90 seconds, then:

Node_1_CBM.msk

√Master Cmd Status – Failed
√Latch 2 Cmd Code – DPLY
√Latch 2 Cmd Stat – CPLT
√Latch 2 Position: 200 --- 210 deg
√Latch 2 Capture Switch Cl – X

21. DEPLOYING LATCH 3 TO 210

N1 Forward CBM Checkout

cmd Deploy Latch 3 to 210 **Execute**

<Cmd Inv: CBM_Deploy_Latch_3_to_210_Degrees – (M1MC96IM0029K)>

Node_1_CBM.msk

√Confirmation Request – Deploy

N1 Forward CBM Checkout

cmd Confirm Cmd **Execute**

<Cmd Inv: CBM_Confirm_Command – (M1MC95SM1470K)>

Wait 90 seconds, then:

Node_1_CBM.msk

√Master Cmd Status – Failed
√Latch 3 Cmd Code – DPLY
√Latch 3 Cmd Stat – BIND
√Latch 3 Position: 200 --- 210 deg
√Latch 3 Capture Switch Cl – X

22. DEPLOYING LATCH 4 TO 210

N1 Forward CBM Checkout

cmd Deploy Latch 4 to 210 **Execute**

<Cmd Inv: CBM_Deploy_Latch_4_to_210_Degrees – (M1MC96IM0030K)>

Node_1_CBM.msk

√Confirmation Request – Deploy

N1 Forward CBM Checkout

cmd Confirm Cmd **Execute**

<Cmd Inv: CBM_Confirm_Command – (M1MC95SM1470K)>

Wait 90 seconds, then:

Node_1_CBM.msk

√Master Cmd Status – Failed
√Latch 4 Cmd Code – DPLY
√Latch 4 Cmd Stat – BIND
√Latch 4 Position: 200 --- 210 deg
√Latch 4 Capture Switch Cl – X

23. CLEARING LATCH BIND INDICATIONS

NOTE
Stop command may nominally need to be issued multiple times to clear binding indications.

N1 Forward CBM Checkout

cmd Stop **Execute**

<Cmd Inv: CBM_Stop_All_Controllers – (M1MC95SM1435K)>

Node_1_CBM.msk

√Master Cmd Status – Complete
√Latch Cmd Code (four) – STOP
√Latch Cmd Stat (four) – CPLT

24. SETTING BOLT/LATCH START POSITIONS

N1 Forward CBM Checkout

cmd Set Deberthing Start Posns Ch A **Execute**

<Cmd Inv: CBM_Set Deberthing_Start_Posns_Ch A – (M1MC96IM0024K)>

Node_1_CBM.msk

√Master Cmd Status – Complete
√Cmd Code (twenty) – RELD
√Cmd Stat (twenty) – CPLT
√Bolt Position (sixteen): 51 rev
√Latch Position (four): 202 deg

25. MOVING LATCHES TO CAPTURE POSITIONS

N1 Forward CBM Checkout

cmd Capture for Deberth **Execute**

<Cmd Inv: CBM_Capture_For_Deberth – (M1MC96IM0033K)>

Node_1_CBM.msk

√Confirmation Request – Capture

N1 Forward CBM Checkout

cmd Confirm Cmd **Execute**

<Cmd Inv: CBM_Confirm_Cmd – (M1MC95SM1470K)>

Wait 90 seconds, then:

√Master Cmd Status – Complete
√Latch Cmd Code (four) – DPLY
√Latch Cmd Stat (four) – CPLT
√Latch Position (four): 200 --- 210 deg
√Latch Capture Switch Cl (four) – X

26. CLOSING LATCHES

N1 Forward CBM Checkout

cmd Close Nominal **Execute**

<Cmd Inv: CBM_Close_Nominal – (M1MC96IM0036K)>

Node_1_CBM.msk

√Confirmation Request – Close

N1 Forward CBM Checkout

cmd Confirm Cmd **Execute**

<Cmd Inv: CBM_Confirm_Cmd – (M1MC95SM1470K)>

Wait 90 seconds, then:

Node_1_CBM.msk

√Master Cmd Status – Complete
√Latch Cmd Code (four) – CLOS
√Latch Cmd Stat (four) – CPLT
√Latch Position (four): 0 --- 1 deg

27. DEACTIVATING FORWARD CBM MASTER CONTROLLER

N1 Forward CBM Checkout

cmd Deactivate CBM **Execute**

<Cmd Inv: CBM_Deactivate_N1_Fwd – (M1MC95SM1006K)>

N1_Fwd_CBM_Power_Data
'CBM Status'

√Mode – Deactivated

28. PERFORMING CB-GNC N1-1 BUS CHANNEL SWITCH (C&DH)

NOTE
Steps 28 and 29 check out remaining CBM master controllers and 1553 channels.

√CB-GNC N1-1 Bus Channel

Record A or B _____

If Bus Channel recorded was A, then:
<Cmd Inv: N1_1_MDM_CB_GNC_1_Sel_Ch_B – (M1DD95SM1396K)>

√CB-GNC N1-1 Bus Channel – B

If Bus Channel recorded was B, then:
<Cmd Inv: N1_1_MDM_CB_GNC_1_Sel_Ch_A – (M1DD95SM1395K)>

√CB-GNC N1-1 Bus Channel – A

29. PERFORMING CB-GNC N1-2 BUS CHANNEL SWITCH (C&DH)

√CB-GNC N1-2 Bus Channel

Record A or B _____

If Bus Channel recorded was A, then:

<Cmd Inv: N1_2_MDM_CB_GNC_2_Sel_Ch_B – (M1DD95SM1402K)>

√CB-GNC N1-2 Bus Channel – B

If Bus Channel recorded was B, then:

<Cmd Inv: N1_2_MDM_CB_GNC_2_Sel_Ch_A – (M1DD95SM1401K)>

√CB-GNC N1-2 Bus Channel – A

30. CHECKING OUT CBM PRIMARY MASTER CONTROLLER, OPPOSITE CHANNEL

N1 Forward CBM Checkout

cmd Activate Primary Master **Execute**

<Cmd Inv: CBM_Activate_N1_Fwd_Pri_Master – (M1MC95SM1160K)>

Wait 20 seconds, then:

N1_Fwd_CBM_Power_Data
'CBM Status'

√Mode – Activated
√Master – Primary
√CPA – Record # _____
√Comm Error – blank

Node_1_CBM.msk

√Master Cmd Status – Complete
√Active BIT Error – blank
√Background BIT Error – blank
√Master Cmd Error – blank
√Slave Cmd Error – blank
√485 Timeout – blank
√Command Rejected – blank
√485 Ch (twenty) – B

31. CHECKING OUT CBM SECONDARY MASTER CONTROLLER, OPPOSITE CHANNEL

N1 Forward CBM Checkout

cmd Activate Secondary Master **Execute**

<Cmd Inv: CBM_Activate_N1_Fwd_Sec_Master – (M1MC95SM1161K)>

Wait 20 seconds, then:

N1_Fwd_CBM_Power_Data
'CBM Status'

√Mode – Activated
√Master – Secondary
√CPA – Record # _____
√Comm Error – blank

Node_1_CBM.msk

√Master Cmd Status – Complete
√Active BIT Error – blank
√Background BIT Error – blank
√Master Cmd Error – blank
√Slave Cmd Error – blank
√485 Timeout – blank
√Command Rejected – blank
√485 Ch (sixteen bolts, four latches) – B

32. DEACTIVATING FORWARD CBM MASTER CONTROLLER

N1 Forward CBM Checkout

cmd Deactivate CBM **Execute**

<Cmd Inv: CBM_Deactivate_N1_Fwd – (M1MC95SM1006K)>

N1_Fwd_CBM_Power_Data
'CBM Status'

√Mode – Deactivated

33. OPENING PRIMARY RPCs

N1 Forward CBM Checkout

cmd RPCM N13B-C RPC [X] CPA [Y] Pri Open

where [X] = 03 04 05 06

[Y] = 1 2 3 4

<Cmd Inv: RPCM_N13B_C_RPC_[X]_CBM_N1_Fwd_Pri_[Y]_Op – (M1PR95SM1759K, 1760K, 1761K, 1762K)>

N1_Fwd_CBM_Power_Data
'RPCM N13B C'

√RPC [X] Posn – Op

Repeat

34. INHIBITING PRIMARY RPCs

cmd RPCM_N13B_C_RPC_[X]_CBM_N1_Fwd_Pri_[Y]_Cl_Inhib_On

where [X] = 03 04 05 06

[Y] = 1 2 3 4

<Cmd Inv: RPCM_N13B_C_RPC_[X]_CBM_N1_Fwd_Pri_[Y]_Cl_Inhib_On – (M1PR95SM1129K, 1130K, 1131K, 1132K)>

N1_Fwd_CBM_Power_Data
'RPCM N13B C'

√RPC [X] Cl – Inh

Repeat

35. INHIBITING SECONDARY RPCS

cmd RPCM_N14B_A_RPC_[X]_CBM_N1_Fwd_Sec_[Y]_Cl_Inhib_On

where [X] = 02 | 03 | 04 | 05

[Y] = 1 | 2 | 3 | 4

<Cmd Inv: RPCM_N14B_A_RPC_[X]_CBM_N1_Fwd_Sec_[Y]_Cl_ Inhib_On – M1PR95SM1182K, 1183K, 1194K, 1195K)>

N1_Fwd_CBM_Power_Data
'RPCM N14B A'

√RPC [X] Cl – Inh

Repeat

TCS PROCEDURES

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PMA 3 HEATER CHECKOUT
(GND/3A/FIN) Page 1 of 4 pages

Identification Section:

Procedure Name:	PMA3 Heater Checkout
Applicability:	3A
Frequency:	Rare
Objective:	To verify the PMA 3 shell heater functionality.
Description:	This procedure verifies the PMA 3 shell heater functionality. VSS2 version 14.
Crew Required:	Ground
Power:	TBD
Data:	Cyclic Telemetry
Duration:	30 minutes
Location:	**MCC-H**
Parts:	None
Materials:	None
Tools:	None
Constraints:	None
Reference Materials:	Node Control Software SRS
Assumptions:	None
Definitions:	X = Heater Designator (i.e., 1B) Y = the RPC corresponding to the heater you are enabling (i.e., 2)

1. RECORDING AVAILABILITY OF HEATER TO BE CHECKED OUT

Prior to the execution of this procedure, the **MCC-H** will have built the appropriate commands from the Command Inventory interface using the following procedures:

PMA 3 HEATER INHIBIT TEMPLATE COMMAND BUILD: TCS CONSOLE HANDBOOK

PMA 3 HEATER ENABLE TEMPLATE COMMAND BUILD: TCS CONSOLE HANDBOOK

SHELL HEATER - UPDATE TEMPERATURE SENSOR SETPOINTS: GND HANDBOOK: TCS

All commands should be sent from the Command Inventory interface. CDDT/PCS should not be used for this procedure due to identified display problems.

Availability = _____

Failure Upper Limit, degC: _____
Upper Setpoint, degC: _____
Lower Setpoint, degC: _____
Failure Lower Limit, degC: _____
Cyclic Load Delta, degC: _____

2. INHIBITING HEATER TO BE CHECKED OUT

<Cmd Inv: PMA3 Htr[X] Inh Fixed>
where X = heater designator (i.e., 1B)
√Availability – Inh

3. UPDATING HEATER SETPOINTS

NOTE
The temperature of the heater to be checked out must be below the lower setpoint.

<Cmd Inv: Update PMA3 Htr[X] Temp_Snsr_Setpoints_[Descriptor] Uplink Crit 4>
where X = heater designator (i.e., 1B)

Verify new setpoints are received onboard.

4. ENABLING HEATER TO BE CHECKED OUT

PCS RPCM N1RS2 B RPC Y where Y - the RPC corresponding to the heater you are enabling (i.e., 2)

√Close Cmd – Ena

<Cmd Inv: PMA3 Htr[X] Ena Opr Uplink Crit 4>

where X = heater designator (i.e., 1B)

√Availability – Ena Opr

5. VERIFYING HEATER TURNED ON
   Verify PMA3 Htr[X] Cmd Stat – On
   Verify PMA3 Htr[X] RPC Posn – Closed
   where X = heater designator (i.e., 1B)

   Wait 30 minutes.

NOTE
Temperature and RPCM Current changes will be plotted to determine successful heater operation.

6. INHIBITING HEATER
   <Cmd Inv: PMA3 Htr[X] Inh Fixed>
   where X = heater designator (i.e., 1B)

   √Availability – Inh

7. RETURNING HEATER SETPOINTS TO ORIGINAL VALUES
   <Cmd Inv: Update PMA3 Htr[X] Temp Snsr Setpoints [Descriptor> Uplink Crit 4
   where X = heater designator (i.e., 1B)

   Verify new setpoints are received onboard.

8. RETURNING HEATER AVAILABILITY TO ORIGINAL VALUE
   <Cmd Inv: PMA3 Htr[X] Value in Step 1 Uplink Crit 4>
   where X = heater designator (i.e., 1B)

9. MODIFYING SETPOINTS FOR PMA 3 HEATERS 5A AND 5B
   Steps 9 and 10 should not be performed until all 10 PMA 3 heaters have been checked out per steps 1 through 8.

   Modify setpoints for PMA3 Htr 5A and PMA3 Htr 5B to the values listed below.

Specific values to be entered in the template command for both PMA3 Htr 5A and PMA3 Htr 5B are listed below. Values are provided for each of the five items in the template: Upper Setpoint, Failure Upper Limit, Lower Setpoint, Failure Lower Limit, and Cyclic Load Delta.

Failure Upper Limit, degC: 45
Upper Setpoint, degC: -28
Lower Setpoint, degC: -33
Failure Lower Limit, degC: -45
Cyclic Load Delta, degC: 2.24

<Cmd Inv: Update PMA3 Htr[x] Temp Snsr Setpoints [Descriptor]> Uplink Crit 4
where X = heater designator (i.e., 1B)

Verify setpoints are received onboard.

10. ENABLING TO OPERATE PMA3 HEATERS 5A AND 5B

PCS <Cmd Inv: PMA3 Htr5A Ena Opr> Uplink Crit 4

√Availability – Ena Opr

<Cmd Inv: PMA3 Htr5B Ena Opr> Uplink Crit 4

√Availability – Ena Opr