

# Payload Powerdown

## STS-129

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**Mission Operations Directorate  
Operations Division**

**Final  
October 22, 2009**

National Aeronautics and  
Space Administration

**Lyndon B. Johnson Space Center**  
Houston, Texas



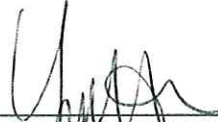


MISSION OPERATIONS DIRECTORATE

**PAYLOAD POWERDOWN  
STS-129**

FINAL  
October 22, 2009

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NOTES

1. Section 1 of this book is inserted at the back of the Ascent Pocket Checklist.
2. Sections 2 and 3 of this book are inserted at the back of the Orbit Pocket Checklist.
3. Section 4 of this book is inserted at the back of the Entry Pocket Checklist.

PAYLOAD POWERDOWN  
STS-129

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\* – Omit from flight book

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**PL PWRDN  
ASC**

**PL PWRDN MATRIX**

**PL PWRDN  
ASC**

PROCEDURE	ACTION
PWRDN FOR LOSS OF:	
2 CAB FANS	A
CAB PRESS	
(MINOR PWRDN; from step 4)	A
(MAJOR PWRDN; from step 5)	A
AV BAY COOLING/AV BAY FIRE	B
2 H2O LOOPS	
[PLT PWRDN, SYS AOA,	
<u>2 H2O LOOPS (AOA);</u>	
(CDR/PLT PWRDNS)]	A
(POST OMS-2)	A
1 FREON LOOP	N/A
2 FREON LOOPS	
[PLT PWRDN, SYS AOA,	
<u>2 FREON LOOPS (AOA);</u>	
(CDR/PLT PWRDNS)]	A
(POST OMS-2)	A
HI LOAD EVAP	N/A
FES /1 FC	N/A
2nd FC	A
MN BUS UNDERVOLTS/FC VOLTS	
(from step 6; permanent loss of PL PRI)	N/A
(from step 14; temporary loss of PL PRI)	N/A

**ACTION**

A	PWRDN	PWRUP
	<u>MIDDECK PAYLOADS</u>	N/A
	<u>NOTE</u> When orbiter power removed, science degradation or loss will occur to ABRS (30 min), CGBA (30 min)	

A (Cont)	PWRDN	PWRUP
MF28E ML85E	<u>ABRS</u> 1. cb POWER – op 2. DC 10 AMP MNB S4 – OFF cb DC 10 AMP MNB CB4 – op	

B	PWRDN	PWRUP
	<u>MIDDECK REAR-BREATHER PAYLOADS</u>  <u>NOTE</u> When orbiter power removed, science degradation or loss will occur to ABRS (30 min)  IF AV BAY 1: <u>ABRS</u> MF28E 1. cb POWER – op ML85E 2. DC 10 AMP MNB S4 – OFF cb DC 10 AMP MNB CB4 – op	N/A

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PL PWRDN  
ORB

**PL PWRDN MATRIX**

**PL PWRDN  
ORB**

PROCEDURE	ACTION
PWRDN FOR LOSS OF:	
HI LOAD EVAP	N/A
1 FREON LOOP	PP3A*,PP3B** (on MCC call) as required
AV BAY COOLING (from MAL GPC FRP-7)	C
1 FC	PP3A*, PP3B** (on MCC call) as required until ORB kW < 17
FES (ON ORBIT)	PP3A*,PP3B** (on MCC call) as required
(DEORBIT PREP)	A
MN BUS UNDERVOLTS/FC VOLTS (from step 6; permanent loss of PL PRI)	B
(from step 17; temporary loss of PL PRI)	B
AV BAY FIRE	C
PRIORITY PWRDN GROUP 3	PP3A*,PP3B** (on MCC call) as required

\*PRIORITY PWRDN 3A (PP3A) contains recoverable Payload Operations Powerdown steps

\*\*PRIORITY PWRDN 3B (PP3B) is a total Payload Powerdown that may cause Payload Operations to be nonrecoverable

**ACTION**

PP3A	PRIORITY PWRDN (Recoverable) (On MCC call only)	PWRUP
<u>PCS</u>  1. Exit programs, power off PCS L12(PDIP 1) <u>OIU</u> L12U (SSP1)	2. DC PWR 1 – OFF  3. OIU PWR – OFF (tb-bp)  If additional powerdown required: 4. Go to PRIORITY PWRDN 3B (PP3B)	√MCC

PP3B	PRIORITY PWRDN (Non-Recoverable) (On MCC call only)	PWRUP
<u>MIDDECK PAYLOADS</u>		N/A
<p style="text-align: center;"><u>NOTE</u> When orbiter power removed, science degradation or loss will occur to ABRS (30 min), GLACIER (120 min @ -95C), MDS (15 min), CGBA (30 min)</p>		
<p style="text-align: center;"><u>ABRS</u> (if powered)</p>		
MF28E	1. cb POWER – op	
ML85E	2. DC 10 AMP MNB S4 – OFF	
	3. cb DC 10 AMP MNB CB4 – op	
<p style="text-align: center;"><u>CGBA</u></p>		
MF71E	4. pb MENU → Press	
	5. pb 7 Shutdown → Press	
	6. pb ENTER → Press	
	7. pb 1 Shutdown System → Press	
	8. pb ENTER → Press	
	9. √Display	
	OK TO POWERDOWN	
	10. cb MAIN POWER – op	
MO63P	11. 10A J4 – OFF	
	12. cb CB4/J4 – op	
<p style="text-align: center;"><u>GLACIER</u> (if powered)</p>		
MA16F/G	13. pb Left (MENU) → Press (one time)	
	QUICK STATUS 1/5	
	14. pb Left (NEXT) → Press (four time)	
	SHUTDOWN 5/5	
	15. pb Center (SELECT) → Press (one time)	
	SHUTDOWN 1/2	
	16. pb Center (SELECT) → Press (one time)	
	Confirm Shutdown	
	17. pb Left (APPLY) → Press (one time)	
	Shutting Down	
	Please Wait	
	18. √Display	
	Shutdown Complete	
	TURN POWER OFF	
	19. √BATTERY – ON (It on)	
	20. cb POWER – op (It off)	
ML86B:E	21. cb MNB MAR 1 – op	



PP3B (Cont)	PRIORITY PWRDN (Non-Recoverable) (On MCC call only)	PWRUP
	<u>MDS</u> (if powered)	
MF28E/G	22. cb POWER cb – OPEN (all lts off)	
ML85E	23. DC 10 AMP MNB S4 – OFF	
	24. cb DC 10 AMP MNB CB4 – op	
	<u>OBSS</u>	
	25. LCC DEACT (Cue Card, <u>LCS</u> )	
	26. LCH DEACT (Cue Card, <u>LCS</u> )	
	27. LDRI/ITVC DEACT (Cue Card, <u>LDRI/ITVC</u> )	
	<u>SASA</u>	
R1	28. PL AFT MNC – OFF	
	<u>ELC1 &amp; 2</u>	
R1	29. PL PRI MNC – OFF (tb-OFF)	
	<u>PL BUS DEACT</u>	
R1	30. PL CAB – OFF	
	31. AUX – OFF	

A	PWRDN (to reduce internal cabin heat loads)	PWRUP
<u>ORBITER</u> Exit software programs, power down all non-essential PGSCs and orbiter equipment (OCAC, Ergometer, Battery Chargers, etc)		√MCC
B	PWRDN (PL PRI permanently or temporarily lost)	PWRUP
L12 (SSP1)	√APCU 1,2 CONV (two) – OFF √OUTPUT RLY (two) – OP	√MCC

C	PWRDN	PWRUP
	<p data-bbox="363 296 873 327"><u>MIDDECK REAR-BREATHING PAYLOADS</u></p> <p data-bbox="760 354 841 386" style="text-align: center;"><u>NOTE</u></p> <p data-bbox="509 386 1084 478" style="text-align: center;">When orbiter power removed, science degradation or loss will occur to ABRS (30 min), MDS (15 min), GLACIER (120 min @ -95C)</p> <p data-bbox="363 506 521 537">IF AV BAY 1:</p> <p data-bbox="509 537 732 569" style="text-align: center;"><u>ABRS</u> (if powered)</p> <p data-bbox="363 569 927 661"> MF28E    1.    cb POWER – op  ML85E    2.    DC 10 AMP MNB S4 – OFF            3.    cb DC 10 AMP MNB CB4 – op </p> <p data-bbox="509 688 716 720" style="text-align: center;"><u>MDS</u> (if powered)</p> <p data-bbox="363 720 964 812"> MF28E/G 4.    cb POWER cb – OPEN (all lts off)  ML85E    5.    DC 10 AMP MNB S4 – OFF            6.    cb DC 10 AMP MNB CB4 – op </p> <p data-bbox="363 840 521 871">IF AV BAY 3:</p> <p data-bbox="509 871 776 903" style="text-align: center;"><u>GLACIER</u> (if powered)</p> <p data-bbox="363 903 834 995"> MA16F/G 7.    √BATTERY – ON (lt on)            8.    cb POWER – op (lt off)  ML86B:E 9.    cb MNB MAR 1 – op </p>	<p data-bbox="1110 296 1187 327">√MCC</p>
	<p data-bbox="678 1010 781 1041" style="text-align: center;">PWRUP</p> <p data-bbox="363 1062 526 1094">On MCC GO:</p> <p data-bbox="363 1094 521 1125">IF AV BAY 1:</p> <p data-bbox="509 1125 857 1157" style="text-align: center;"><u>ABRS</u> (if previously powered)</p> <p data-bbox="363 1157 922 1278"> MF28E    1.    √sw POWER – ON            2.    cb POWER – cl  ML85E    3.    cb DC 10 AMP MNB CB4 – cl            4.    sw DC 10 AMP MNB S4 – ON </p> <p data-bbox="509 1306 846 1337" style="text-align: center;"><u>MDS</u> (if previously powered)</p> <p data-bbox="363 1337 922 1528"> ML85E    5.    cb DC 10 AMP MNB CB4 – cl            6.    DC 10 AMP MNB S4 – ON  MF28E/G 7.    cb POWER cb – CLOSED            √MDS POWER LED – On            √PRIMARY POWER LED – On            √MODE &amp; STATUS LED – Off </p>	

C (Cont)	PWRUP
IF AV BAY 3:	
	<u>GLACIER</u> (if previously powered)
ML86B:E	8.   cb MNB MAR 1 – cl
MA16F/G	9.   cb POWER – cl (lt on)
	10. √BATTERY – ON (lt on)

PL SAFING – ORBIT

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PAYLOAD BUSES.....	PL 3-4

PL SAFING  
ORB

**PL SAFING MATRIX**

PROCEDURE	ACTION
9.101 JOINT EXPEDITED UNDOCKING AND SEPARATION, from step 18b (SODF: JOINT OPS, <u>EMERGENCY RESPONSE</u> ; JEUS)	PL SAFING
PWRDN FOR LOSS OF:	
2 CAB FANS	PL SAFING
2 H2O LOOPS	PL SAFING
CAB PRESS	PL SAFING
2nd FC (TIG < 4 hr) (from step 5)	PL SAFING
(TIG > 4 hr) (from step 15)	PL SAFING
2 FREON LOOPS	PL SAFING

**PL SAFING  
ORB**

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PL 3-2

PL PWR/129/O/FIN

## ACTION

PL SAFING	
<u>MIDDECK TRANSFER (IF NOT ALREADY PERFORMED)</u>	
	If transfer hardware in ODS: 1. Complete transfer to ISS Else: 2. Stow in Middeck
<u>MIDDECK PAYLOADS</u>	
	<u>ABRS/MDS</u> (if powered)
ML85E	3. DC 10 AMP MNB S4 – OFF 4. cb DC 10 AMP MNB CB4 – op
	<u>GLACIER</u> (if powered)
ML86B:E	5. cb MNB MAR 1 – op
MA16F/G MF28K	If Glacier Door Captive Locks (two) are unlocked perform: 6. Unstow Tools 3/16" Hex Head, 3/8" Drive 1/4" to 3/8" Adapter 4" Ext, 1/4" Drive (40-200 in-lbs) Trq Wrench, 1/4" Drive
MA16F/G	7. √Door Latch – Locked (Finger latches fully spread apart and locking flap positioned between finger latches)
	8. Fasten Glacier Door Captive Locks (two), torque to 75 in-lbs using to Trq Wrench
MF28K	9. Stow tools
	<u>CGBA</u>
MO63P	10. 10A J4 – OFF 11. cb CB4/J4 – op
<u>OIU</u>	
L12U (SSP1)	12. OIU PWR – OFF (tb-bp)
<u>APCU</u>	
L12U (SSP1)	13. √APCU 1,2 CONV (two) – OFF (tb-bp) √OUTPUT RLY (two) – OP (tb-bp)

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PL SAFING (Cont)

SPINAL ELONGATION

If Spinal Elongation ops in progress:

14. Remove Spinal Elongation hardware from CDR Seat
15. Re-install Head Rest and Seat Cushion to nominal config
16. Return Shoulder harness and lap belt to nominal config
17. Remove D2X Camera and Multi-use arm, stow

If ISS hatch still open:

18. Return Spinal Elongation hardware to ISS

Else:

19. Stow Spinal Elongation hardware on Shuttle

PAYLOAD BUSES

20. PL PRI MNC – OFF (tb-OFF)
21.     √MNB,FC3 (two) – ctr (tb-OFF)
22.     AUX – OFF
23.     CAB – OFF
24.     √AFT MNB – OFF
25.     MNC – OFF

Once PL SAFING completed, return to calling procedure, if required

Once calling procedure completed, stow all non-essential orbiter equipment (OCAC,Cycle Ergometer,Battery Chargers, etc)



PL PWRDN – ENTRY

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MDS .....	PL 4-3
GLACIER .....	PL 4-3

**PL PWRDN MATRIX**

PROCEDURE	ACTION
PWRDN FOR LOSS OF:	
2 CAB FANS	A
2 H2O LOOPS (ENTRY)	A
CAB PRESS	A
AV BAY COOLING (ENTRY)	B
1 FREON LOOP/HI LOAD EVAP (ENTRY)	N/A
FES	N/A
1 FC (ENTRY)	N/A
2 FREON LOOPS (ENTRY)	A
2nd FC (ENTRY)	A
MN BUS UNDERVOLTS/FC VOLTS	
(from step 6; permanent loss of PL PRI)	N/A
(from step 14; temporary loss of PL PRI)	N/A

**ACTION**

A	PWRDN	PWRUP
	<u>MIDDECK PAYLOADS</u>	N/A
	<u>NOTE</u> When orbiter power removed, science degradation or loss will occur to MDS (15 min), GLACIER (120 min @ -95 C), CGBA (30 min)	
	<u>MDS</u>	
MF28E/G	1. cb POWER cb – OPEN (all lts off)	
ML85E	2. DC 10 AMP MNB S4 – OFF	
	3. cb DC 10 AMP MNB CB4 – op	
	<u>GLACIER</u>	
MA16F/G	4. √BATTERY – ON (lt on)	
	5. cb POWER – op (lt off)	
ML86B:E	6. cb MNB MAR 1 – op	
	<u>CGBA</u>	
MF71E	7. cb MAIN POWER – op	
MO63P	8. 10A J4 – OFF	
	9. cb CB4/J4 – op	

PL PWRDN  
ENT

B	PWRDN	PWRUP
	<p data-bbox="357 296 873 327"><u>MIDDECK REAR-BREATHER PAYLOADS</u></p> <p data-bbox="776 344 857 371" style="text-align: center;"><u>NOTE</u></p> <p data-bbox="548 373 1075 464" style="text-align: center;">When orbiter power removed, science degradation or loss will occur to MDS (15 min), GLACIER (120 min @ -95 C)</p> <p data-bbox="357 495 522 527">IF AV BAY 1:</p> <p data-bbox="506 529 571 556" style="text-align: center;"><u>MDS</u></p> <p data-bbox="357 558 964 590">MF28E/G 1. cb POWER cb – OPEN (all lts off)</p> <p data-bbox="357 592 893 623">ML85E 2. DC 10 AMP MNB S4 – OFF</p> <p data-bbox="506 625 925 657">3. cb DC 10 AMP MNB CB4 – op</p> <p data-bbox="357 688 522 720">IF AV BAY 3:</p> <p data-bbox="506 722 630 749" style="text-align: center;"><u>GLACIER</u></p> <p data-bbox="357 751 834 783">MA16F/G 4. √BATTERY – ON (lt on)</p> <p data-bbox="506 785 834 816">5. cb POWER – op (lt off)</p> <p data-bbox="357 819 808 850">ML86B:E 6. cb MNB MAR 1 – op</p>	N/A

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PL 4-4

PL PWR/129/E/FIN

Space Shuttle Program  
FLIGHT DATA FILE

JSC-48097-129  
FINAL



**PAYLOAD  
POWERDOWN**

**STS  
129**

Flight Cover (trim bottom to expose tabs)