



Space Shuttle Mission 2007



Designed By: Michael Swannick

Mission Checklist

STS-27

Crew Members

Commander - Robert L. Gibson | Pilot - Guy S. Gardner

Mission Specialist

Richard M. Mullane | Jerry L. Ross | William M. Shepherd

Mission Highlights

Carried out by Atlantis on December 2, 1988. The Space Shuttle Atlantis, at the time the youngest in NASA's fleet, made its third flight in a classified mission for the Department of Defense (DOD). It deployed a single satellite, USA-34, which is widely believed to be the first of the Lacrosse radar imaging satellites. The Shuttle's Thermal Protection System tiles sustained more than normal damage during the flight. A review panel investigating the damage found the most probable cause was ablative insulating material from the right-hand solid rocket booster nose cap hitting the shuttle about 85 seconds into the flight. Upon landing, over 700 damaged tiles were noted, and one tile was missing. Also, one of the main engines turbo pumps was found to be cracked after the flight.

Payload

Lacrosse 1 satellite. A side looking radar, all weather surveillance satellite for the US National Reconnaissance Office and the CIA. Manufactured by Lockheed Martin Aeronautics, Denver.

Lacrosse uses Synthetic Aperture Radar as its prime imaging instrument. It is able to see through cloud cover and also has some ability to penetrate soil, though there have been more powerful instruments deployed in space for this specific purpose.

Flight Summary

Launchpad: Kennedy Space Center (KSC) 39B | Orbit: 255NM | Inclination: 57 | Orbits: 68

Duration: 4 Days, 09 Hours, 05 Minutes, 37 Seconds | Landing: Edwards Air Force Base



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PRE-LAUNCH CHECKLIST

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COMM	MET	PANEL SECTION	PANEL	PROCEDURE	PANEL AREA & NOTES
1	T-00:01:50:00				Astronauts Enter The Shuttle
2	T-00:01:40:00	Overhead Left Panel	O5	* Set Left Audio XMIT/ICOM MODE To VOX/VOX * Set Left Audio A/G (1 & 2) To T/R * Set Left Audio A/A To T/R * Set Left Audio ICOM (A & B) To T/R * Set Left Audio (AUD) Power Switch To AUD/TONE	Activates Commander Communications
3	T-00:01:35:00	Overhead Right Panel	O9	* Set Right Audio XMIT/ICOM MODE To VOX/VOX * Set Right Audio A/G (1 & 2) To T/R * Set Right Audio A/A To T/R * Set Right Audio ICOM (A & B) To T/R * Set Right Audio (AUD) Power Switch To AUD/TONE	Activates Pilot Communications
5	T-00:01:20:00	Front Left Panel	F6	* Check ABORT Light (DIM/BRIGHT/DIM) For 8 Seconds	Abort Advisory Check
6	T-00:01:10:00				Flight Control Confirms With Commander That The Side Hatch Is Closed & Locked
7	T-00:01:05:10	Left Panel Front Left Panel	L2 F2	* Set CABIN VENT ISOL To CLOSE * Set CABIN VENT To CLOSE * Press MASTER ALARM	Cabin Leak Check Cancel Master Alarm Sound
8	T-00:00:51:00				Pilot Confirms IMU Alignment
9	T-00:00:50:00	Right Panel	R2	* Check BOILER PWR (1/2/3) Are ON * Check BOILER CNTLR/HTR (1/2/3) Are On - A * Set BOILER N2 Supply (1/2/3) To ON	Confirm Boiler Power On
10	T-00:00:45:00	Left Panel	L2	* Set CABIN VENT/VENT To OPEN	Open Cabin Vent
11	T-00:00:42:00	Center Panel	C3 C2	* Set BFC CRT DISPLAY To ON * Confirm BFC CRT SELECT Is At (3+1) * Enter ITEM 25 EXEC (Use Left Keypad)	Enable Backup Flight System (BFS) And Execute Computer Data Transfer To BFS Copy Primary Avionics SW To BFS
12	T-00:00:36:40	Left Panel Overhead Low Panel	L2 O1	* Set CABIN VENT To CLOSE * Set CABIN VENT ISOL To OPEN * Check CABIN dP/dT Gauge For Possible Depressurization	Cabin Leak Check - Continued
13	T-00:00:33:20	Left Panel	L2	* Set CABIN VENT ISOL To Close * Check CABIN VENT Is CLOSED	Cabin Pressurization Check Complete
14	T-00:00:30:00	Center Panel	C2	* Enter OPS 101 PRO (Use Right Keypad) * Enter SPEC 99 PRO (Use Right Keypad) * Press RESUME (Use Right Keypad)	Load OPS 1 - Planned 10 Minute Hold Load First Stage SW Into Primary Avionics System
15	T-00:00:29:00	Center Panel	C2	* Enter OPS 101 PRO (Use Left Keypad)	Load OPS 1 Into The BFS
16	T-00:00:26:00	Right Panel	R2	* Set He ISOLATION A (LEFT/CRT/RIGHT) To Open * Set He ISOLATION B (LEFT/CRT/RIGHT) To Open * Set PNEUMATICS He ISOL To Open * Set 6 ENGINE POWER Switches (LEFT/CTR/RIGHT) To ON	Begin The Main Propulsion System (MPS) Helium (He) Pressurization
17	T-00:00:15:00	Front Left Panel Center Panel	F6 C3	* Check ABORT Light ON/OFF For 8 Seconds * Set CAUTION/WARNING MEMORY To CLEAR	Final Test Of The ABORT System Clear C/W Memory
18	T-00:00:09:00	Right Panel Center Panel Front Center Panel	R1 C3 F7	* Set ESS BUS SOURCE (MN B/C, MN C/A, MN A/B) To ON * Set Timer Thumbwheels To 0900 * Set TIMER Switch To SET * Check EVENT TIMER MODE Is DOWN * Set EVENT TIMER CONTROL To START * Confirm EVENT TIMER Display Continues The Countdown	Enable Fuel Cells, Enable Countdown From Nine (9) Minutes, Start The Countdown
19	T-00:00:08:00	Right Panel	R2	* Check APU FUEL TK VLV (1/2/3) Are CLOSED * Check APU AUTO SHUT DOWN (1/2/3) Are Enable * Check HYD MAIN PUMP PRESS (1/2/3) Are LOW * Check APU SPEED SELECT (1/2/3) Are NORM * Check HYD CIRC PUMP (1/2/3) Set To GPC * Set APU CNTLR PWR (1/2/3) To ON	The Crew Access Arm Is Retracting APU Prestart Check Is Underway
20	T-00:00:05:10	Right Panel Front Center Panel Right Panel Front Center Panel Front Left Panel Right Panel	R2 F7 R2 F7 F2 R2	* Set APU FUEL TK VLV (1/2/3) To Open * Check APU/HYD READY TO START (1/2/3) Repeaters-(White) * Set APU OPERATE (1/2/3) To START/RUN * Check HYDRAULIC (APU) Pressure 900psi (Use MFD #2) * Set HYD MAIN PUMP PRESS (1/2/3) To NORM * Check HYDRAULIC (APU) Pressure 3000psi (Use MFD #2) * Press MASTER ALARM (If Required) * Set HYD CIRC PUMP (1/2/3) Set To OFF	APU Start The Master Alarm May Sound Until APU Pressure Reaches 3000 PSI. (Silence Alarm)
21	T-00:00:04:30 T-00:00:04:10	Left Panel	L2	* Set FLASH EVAP FEEDLINE HTR A & B SUPPLY To OFF	The Shuttle Is On Internal Power. Turn Off Flash Evaporator Feed Line & Heater Supply APU Check Complete
22	T-00:00:03:45 T-00:00:03:05				Start Hydraulic Check, Aero Surfaces Are Moved, A Gimbal Check Is Performed Hydraulic Check Complete
23	T-00:00:02:55				External Tank Liquid Oxygen (LOX) Vents Are Closing & The External Tank Begins To Pressurize. External Tank Cap Is Retracted.
24	T-00:00:02:00	Right Panel Center Panel	R2 R1 C3	* Set APU AUTO SHUT DOWN (1/2/3) To INHIBIT * Set AC BUS SNSR (1/2/3) To MONITOR * Set CAUTION/WARNING MEMORY To CLEAR	APU Power - Inhibit
25	T-00:00:01:40 T-00:00:01:20				Liquid Hydrogen External Tanks Close. Go For Launch Announcement.



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COMM	MET	PANEL SECTION	PANEL	PROCEDURE	PANEL AREA & NOTES
25	T-00:00:01:00 T-00:00:00:30				One Minute Countdown Announcement Thirty Seconds Countdown Announcement
26	T-00:00:00:15				Begin Countdown To Liftoff The Shuttles Main Engines Will Ignite At T-00:00:00:05. A Staggered Start Of The Main Engines Will Commence In 120 millisecond Intervals. The Two SRB's Will Ignite At T-00:00:00:00, Followed By An Almost Instantaneous Liftoff. Once The Shuttle Clears The Tower, It Will Complete A Roll Maneuver.
26	T-00:00:00:00				Shuttle Liftoff

Commence Ascent Checklist



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COMM	MET	PANEL SECTION	PANEL	PROCEDURE	NOTES
27	T+00:00:00:30 T+00:00:01:05				Main Engines Throttle Down To 65% Main Engines Throttle Up To 104%
28	T+00:00:02:00 T+00:00:02:05	Front Center Panel	F7	* Check Pressure Pc<50 (MFD / CRT 1)	Standby For SRB Separation SRB Separation
602	T+00:00:03:00	Overhead Low Panel	O1	* Check FREON - EVAP OUT TEMP Gauge Shows Below 60 Degrees	Check Flash Evaporator Is Operational
29	T+00:00:04:20				Negative Return
30	T+00:00:06:56				Single Engine Press To MECO
31	Mission Dep.	Front Center Panel	F7	* Check MAIN ENGINE STATUS Lights (Left/CTR/Right) Are Red	Engines Throttle Down In Preparation For Main Engine Cutoff (MECO) MECO Confirm Main Engine Shutdown External Tank Separation
33	Mission Dep.	Center Panel Overhead Aft Panel Center Panel	C2 O14 O16 C3 C2	* Enter ITEM 22 EXEC (Use Right Keypad) * Enter ITEM 27 EXEC (Use Right Keypad) * Enter ITEM 23 EXEC (Use Right Keypad) * Set L OMS ENG VLV To ON * Set R OMS ENG VLV To ON * Set OMS ENG LEFT & RIGHT To ARM/PRESS * Press EXEC - Confirms ready for OMS burn (Use Right Keypad)	Prepare For OMS Burn Load Burn Targets, Start Attitude Adjustments, Start Countdown Timer Confirm OMS Burn
34	Mission Dep.	Left Panel Center Panel Right Panel Front Left Panel Front Right Panel Center Panel	L1 L2 C3 R1 F6 F8 C3	* Set FLASH EVAP CONTROLLER PRI A & PRI B To ON * Set FLASH EVAP FEEDLINE HTR A SUPPLY & B SUPPLY To 1 * Set BFC CRT DISPLAY To OFF * Set AC BUS SNSR (1/2/3) To AUTO TRIP * Set O2 TK 1 (B) & O2 TK 2 (B) HEATERS To AUTO * Set H2 TK 1 (B) & H2 TK 2 (B) HEATERS To AUTO * Check FLT CNTLR POWER Is OFF * Check FLT CNTLR POWER Is OFF * Check ORBIRAL DAP - CONTROL Is Set To AUTO	Remaining MPS Propellants Are Dumped Automatically. Main Engines Are Gimballed Down During The Dump
35	Mission Dep.	Center Panel	C3	* Enter OPS 105 PRO (Use Left Keypad)	Prepare To Circularize Orbit
36	Mission Dep.	Center Panel Overhead Aft Panel Center Panel	C3 C2 O14 O16 C3	* Check ORBIRAL DAP - CONTROL Is Set To AUTO * Enter ITEM 22 EXEC (Use Right Keypad) * Enter ITEM 27 EXEC (Use Right Keypad) * Enter ITEM 23 EXEC (Use Right Keypad) * Confirm L OMS ENG VLV Is ON * Confirm R OMS ENG VLV Is ON * Confirm OMS ENG (LEFT & RIGHT) Are Set To ARM/PRESS	Circularize Orbit
37	Mission Dep.	Right Panel	R2 R4	* Set 6 ENGINE POWER Switches (LEFT/CTR/RIGHT) To OFF * Set He ISOL A (LEFT/CTR/RIGHT) To GPC * Set He ISOL B (LEFT/CTR/RIGHT) To GPC * Set PNEUMATICS He ISOL To GPC * Set H2 PRESS LINE VENT To OPEN	Propellant Dump Complete
38	Mission Dep.	Right Panel	R2 R4	* Set ET UMBILICAL DOOR - MODE GPC To GPC/MAN * Set CENTERLINE LATCH To STOW * Set LEFT & RIGHT Door To CLOSE * Check Talkback Shows CLOSE * Set LEFT & RIGHT LATCH To LATCH * Check Talkback Shows CLOSED & LATCHED * Set LEFT & RIGHT DOOR To OFF * Set LEFT & RIGHT LATCH To OFF * Set HYD MAIN PUMP PRESS (1/2/3) To LOW * Set APU OPERATE - START/RUN (1/2/3) To OFF * Set APU FUEL TK VLV (1/2/3) To CLOSE * Set APU CNTLR PWR (1/2/3) To OFF * Set BOILER PWR (1/2/3) To OFF * Set BOILER N2 SUPPLY (1/2/3) To OFF * Set HYD CIRC PUMP (1/2/3) To GPC * Set H2 PRESS LINE VENT To GND	Close & Latch The ET Umbilical Doors. APU Shutdown
39	Mission Dep.	Center Panel	C2	* Press EXEC - Confirms ready for OMS burn (Use Right Keypad)	Confirm OMS Burn
40	Mission Dep.	Right Panel Center Panel	R4 C3	* Set PROPELLANT FILL/DRAIN LH 2 OUTBD & INBD To OPEN * Set OMS ENG LEFT & RIGHT To OFF	Liquid He Manual Dump
41	Mission Dep.	Overhead Aft Panel Right Panel	O17 R4	* Set ATVC (1/2/3/4) To OFF * Set Engine Interface Units - EIU (L-C / C-R / R-L) To OFF * Set MEC (1 & 2) To OFF * Set MPS/TVC ISOL VLV - (SYS 1, SYS 2, SYS 3) To CLOSE	Turn Off Main Engine Controllers
42	Mission Dep.	Right Panel Center Panel Front Left Panel	R4 C3 F6	* Set PROPELLANT FILL/DRAIN - LH2 OUTBD To GND * Check PROPELLANT FILL/DRAIN - LH2 INBD To OPEN * ORBITAL DAP/MANUAL MODE - ROTATION YAW, VERN=ON * Set FLIGHT CNTLR POWER To ON * Rotate The Shuttle To Zero Attitude (Pitch/Roll) (Joystick - RHC)	Set Liquid H2 Outboard Fill And Drain Valve To Ground Control. Enable Manual Control Of The RCS Align All ADI Needles
43	Mission Dep.	Right Panel Aft Left Panel	R4 A12	* Set HYDRAULICS - BRAKE HEATERS (A/B/C) To AUTO * Set APU HEATER - GAS GEN/FUEL PUMPS (1/2/3) To A AUTO * Set APU HEATER - LUBE OIL LINES (1/2/3) To A AUTO * Set TANK/FUEL LINE/H2O (SYS 1A, SYS 2A, SYS 3A) To AUTO * Set HYDRAULIC HEATER - RUDDER SPD BRK To A AUTO * Set HYDRAULIC HEATER - BODY FLAP To A AUTO	Thermal Condition The Shuttle



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43	Mission Dep.	Aft Right Panel	A12	* Set HYDRAULIC HEATER - ELEVON To A AUTO * Set HYDRAULIC HEATER - AFT FUSELAGE To A AUTO	Thermal Condition The Shuttle
44		Aft Right Panel Left Panel	A14 A8L L1	*Set RCS/OMS HEATERS - FWD RCS To A AUTO * Set RCS/OMS HEATERS - LEFT POD To A AUTO * Set RCS/OMS HEATERS - RIGHT POD To A AUTO * Set RCS/OMS HEATERS - FWD RCS JET (1/2/3/4/5) To AUTO * Set RCS/OMS HEATERS - AFT RCS JET (1/2/3/4/5) To AUTO * Set RCS/OMS HEATERS - OMS CRSFD LINES To A AUTO * Set PORT RMS HEATER To AUTO A * Set TOPPING EVAP HEATER - NOZZLE (L & R) To A AUTO * Set TOPPING EVAP HEATER - DUCT Selector To A/B * Set HI LOAD EVAP - HI LOAD DUCT HTR Selector To A/B	
45	Mission Dep.	Left Panel Overhead Aft Panel	L2 L1 O14 O15 O16 O15	* Set O2 SYS 2 SUPPLY To CLOSE * Set N2 SYS 2 SUPPLY To CLOSE * Set N2 SYS 2 REG INLET To CLOSE * Set H2O LOOP 2 BYPASS - MODE To AUTO * Set H2O PUMP - LOOP 1 To OFF H2O PUMP - LOOP 2 To GPC * Set RGA 1 To OFF * Set RGA 2 & 4 To OFF * Set RGA 3 To OFF * Set ACCEL 3 To OFF * Set ACCEL 4 To OFF	
46	Mission Dep.	Overhead Left Panel Right Aft Panel Overhead Left Panel	O6 R11L O6	* Set GENERAL PURPOSE COMPUTER - MODE 5 To HALT * Check MAJ FUNC Set To GNC * Enter OPS 201 PRO (AFT Keypad) * Set MAJ FUNC To SM * Press GPC/CRT (AFT Keypad) * Enter 4 EXEC (AFT Keypad) * Enter OPS 201 PRO (AFT Keypad) * Set GENERAL PURPOSE COMPUTER - MODE 3 To HALT	Configure Computers For Orbit Switch To On-Orbit SW Mode Load GPC 1/2/3 With GNC SW GPC 3 Preserves Independent Source Data GPC 4 Contains System Management Data GPC 5 Retains The Backup Flight System
47	Mission Dep.	Left Panel	L1 L2	* Set RAD CONTROLLER - (LOOP 1 & LOOP 2) To AUTO A * Set RAD CONTROLLER - BYPASS MODE (1 & 2) To AUTO * Set FREON LOOP ISOLATION - MODE To AUTO	Activate Radiator Cooling
48	Mission Dep.	Right Aft Panel	R11L R13L	* Confirm MAJOR FUNC Is Set To SM * Enter OPS 202 PRO (AFT Keypad) * Enter ITEM 3 EXEC * Enter ITEM 1 EXEC * Set PL BAY DOOR (SYS 1 & SYS 2) To ENABLE * Set PL BAY DOOR To OPEN * Confirm PL BAY DOOR Talkbacks Show DEP	Open Payload Doors PL BAY DOOR SPEC Display Enable Auto Mode Enable AC Power Opening Both PL Doors Takes 3 Minutes Indicating Both PL Doors Are Open
49	Mission Dep.	Right Aft Panel	R13L	* Set PL BAY MECH PWR (SYS 1 & SYS 2) To ON * Set RADIATOR LATCH (SYS A & SYS B) To RELEASE * Check RADIATOR LATCH SYS Talkbacks Indicate REL * Set RADIATOR CONTROL (SYS A & SYS B) To DEPLOY * Check RADIATOR CONTROL SYS Talkbacks Indicate DEP	Deploy Radiators Indicating That The Radiators Are Ready For DEP. Deploying Both Radiators Takes 30 Seconds. Indicating Both Radiators Are Deployed.
50	Mission Dep.	Right Aft Panel	R13L R11L	* Set RADIATOR LATCH (SYS A & SYS B) To OFF * Set RADIATOR CONTROL (SYS A & SYS B) To OFF * Set PL BAY DOOR To STOP * Set PL BAY MECH PWR (SYS 1 & SYS 2) To OFF * Set PL BAY DOOR (SYS 1 & SYS 2) To DISABLE * Enter ITEM 2 EXEC (AFT Keypad)	Disable All Power To PL Doors And Radiators. Disable AC Power To The Doors
51	Mission Dep.	Right Aft Panel	R11U	* Set FUEL CELL - PURGE HEATER To GPC * Set H2O LINE HTR & H2O RELIEF HTR To A AUTO * Confirm PURGE VALVES (1/2/3) Are On GPC * Confirm STARTUP HEATER (1/2/3) Are Set To ENABLE * Set GPC PURGE SEQ To START - Press START For 3 Seconds * Confirm GPC PURGE SEQ START Talkback Is WHITE	Initiate Fuel Cell Purge
52	Mission Dep.	Right Aft Panel Left Panel	R11L L1	* Confirm MAJOR FUNC Is Set To SM * Enter SPEC 69 PRO (AFT Keypad) * Enter SPEC 88 PRO (AFT Keypad) * Set FLASH EVAP CONTROLLER (PRI A & PRI B) To OFF * Set FLASH EVAP CONTROLLER - SEC To OFF * Set HILOAD EVAP To OFF	Check Purge Process On The SPEC Display Check Coolant Loops Secure The Flash Evaporator
53	Mission Dep.	Overhead Left Panel Right Aft Panel	O6 R11L	* Set STAR TRACKER POWER (-Y & -Z) To ON * Set DOOR CONTROL (SYS 1 & SYS 2) To OPEN * Check DOOR CONTROL (SYS 1 & SYS 2) Talkbacks Are OP * Set DOOR CONTROL (SYS 1 & SYS 2) To OFF * Set MAJ FUNC To GNC * Enter SPEC 22 PRO (AFT Keypad) * Enter ITEM 3 EXEC (AFT Keypad) * Enter ITEM 4 EXEC (AFT Keypad)	Deploy & Activate The Star Trackers Indicating The ST Doors Are Open
54	Mission Dep.	Right Aft Panel	R11L	* Check MAJ FUNC To GNC * Enter SPEC 21 PRO (AFT Keypad) * Enter ITEM 16 EXEC (AFT Keypad)	Initiate IMU Alignment
55	Mission Dep.	Overhead Center Panel	O7	* Set GPS 1 POWER To ON * Set GPS 1 PRE AMPL UPPER To ON	Activate Global Positioning System (GPS) Activate GPS 1



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COMM	MET	PANEL SECTION	PANEL	PROCEDURE	NOTES
55	Mission Dep.	Overhead Center Panel	07	<ul style="list-style-type: none"> * Set GPS 1 PRE AMPL LOWER To ON * Set GPS 2 POWER To ON * Set GPS 2 PRE AMPL UPPER To ON * Set GPS 2 PRE AMPL LOWER To ON * Set GPS 3 POWER To ON * Set GPS 3 PRE AMPL UPPER To ON * Set GPS 3 PRE AMPL LOWER To ON * Set DUMP ISOL VLV To OPEN 	<ul style="list-style-type: none"> Activate GPS 2 Activate GPS 3
59	Mission Dep.	Right Aft Panel Right Aft Panel Aft Right Panel Right Aft Panel	R11L R11L R13L AIU R11L	<ul style="list-style-type: none"> * Check MAJ FUNC To GNC * Enter SPEC 25 PRO (AFT Keypad) * Set KU ANTENNA To DEPLOY * Check KU ANTENNA Talkback For DEP * Set KU ANTENNA To GND * Set KU BAND POWER To STBY * Check MAJ FUNC To GNC * Enter SPEC 33 PRO (AFT Keypad) * Enter ITEM 2 EXEC (AFT Keypad) 	<ul style="list-style-type: none"> Deploy KU Antenna Indicates Status For All THC/RHC (Joysticks). KU Antenna Deployment Takes 15 Seconds Indicates KU Antenna Is Deployed Enable KU Antenna
60	Mission Dep.				Shuttle Is Configured & Ready For Mission

Commence On-Orbit Mission



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STS-27 MISSION CHECKLIST

COMM	MET	PANEL SECTION	PANEL	PROCEDURE	PANEL AREA & NOTES
1100	Mission Dep.				RMS Needs To Be Powered Up: Next Event
1101	Mission Dep.	Aft Left Panel	A8L	<ul style="list-style-type: none"> * Set RMS POWER To PRIMARY * Set RMS SELECT To PORT * Set The PORT RMS DEPLOY To DEPLOY 	Power Up & Deploy The RMS
1102	Mission Dep.	Aft Left Panel	A8L	<ul style="list-style-type: none"> * Set The PORT RMS DEPLOY To OFF * Set The PORT RMS Latch To RELEASE * Set The PORT RMS Latch To OFF * Hold The RMS SHOULDER BRACE RELEASE Toward PORT 	RMS Is Deployed Confirm Talkbacks Indicate REL Hold Until The Talkback Turns White
1103	Mission Dep.	Right Aft Panel Aft Left Panel	R11L A8U	<ul style="list-style-type: none"> * Set MAJ FUNC To SM * Enter SPEC 94 PRO (Aft Keypad) * Set MODE Rotary Switch To SINGLE * Press ENTER Just Below The MODE Rotary Switch * Set BRAKES To OFF 	RMS Preparation
1104	Mission Dep.	Aft Left Panel	A8U	<ul style="list-style-type: none"> * Set The PARAMETER Rotary Switch To JOINT ANGLE * Set The JOINT Rotary Switch To SHOULDER/PITCH * Press & Hold The SINGLE DIRECT DRIVE In The + Position * Set The JOINT Rotary Switch To ELBOW * Press & Hold The SINGLE DIRECT DRIVE In The - Position * Set The MODE Rotary Switch To MANUAL ORB UNL * Press ENTER Just Below The MODE Rotary Switch 	Move RMS Out Of Reach Limit Confirm Digital Readout Indicates +3 Degrees Confirm Digital Readout Indicates -3 Degrees
1105	Mission Dep.	Aft Right Panel	A6U	* Set FLT CNTLR POWER To ON	Assign RHC/THC Control To The RMS
1106	Mission Dep.	Aft Left Panel Front Left Panel	A8L A8U F6	<ul style="list-style-type: none"> * Set RMS POWER To OFF * Set RMS BRAKES To ON * Set FLT CNTLR POWER To ON 	Turn Off RMS Power For Later Use
1107	Mission Dep.				RMS Powered Up & Checked: Next Event
1110	Mission Dep.	Center Panel Overhead Aft Panel Center Panel	C2 C3 O14 O16 C2	<ul style="list-style-type: none"> * Set CRT 2 MAJ FUNC Switch To GNC * Enter OPS 202 PRO (Right Keypad) - If Necessary * Enter ITEM 22 EXEC (Right Keypad) * Enter ITEM 27 EXEC (Right Keypad) * Enter ITEM 23 EXEC (Right Keypad) * Set OMS ENG (Left & Right) To ARM/PRESS * Confirm L OMS ENG VLV Is ON * Confirm R OMS ENG VLV Is ON * Press EXEC - (Right Keypad) Confirms ready for OMS burn 	First Orbit Correction Burn
1111	Mission Dep.	Center Panel	C3	* Set OMS ENG (Left & Right) To OFF	Burn Complete, Disable OMS Next Event
1115	Mission Dep.	Center Panel Overhead Aft Panel Center Panel	C2 C3 O14 O16 C2	<ul style="list-style-type: none"> * Set CRT 2 MAJ FUNC Switch To GNC * Enter OPS 202 PRO (Right Keypad) - If Necessary * Enter ITEM 22 EXEC (Right Keypad) * Enter ITEM 27 EXEC (Right Keypad) * Enter ITEM 23 EXEC (Right Keypad) * Set OMS ENG (Left & Right) To ARM/PRESS * Confirm L OMS ENG VLV Is ON * Confirm R OMS ENG VLV Is ON * Press EXEC - (Right Keypad) Confirms ready for OMS burn 	Second Orbit Correction Burn
1116	Mission Dep.	Center Panel	C3	* Set OMS ENG (Left & Right) To OFF	Burn Complete, Disable OMS Next Event
1120	Mission Dep.	Aft Left Panel Aft Right Panel	A8L A6U	<ul style="list-style-type: none"> * Set RMS POWER To PRIMARY * Set The FLT CNTLR POWER To ON 	Power Up The RMS
1121	Mission Dep.	Aft Left Panel	A8L A8U	<ul style="list-style-type: none"> * Set END EFFECTOR MODE To Switch To AUTO * Set RMS BRAKES Switch To OFF * Grapple The Lacrosse Satellite 	Deploy The RMS When The RMS Is In Position Press Enter <u>POSITION - P Y R</u> P: -090.0 Y: 000.0 R: 000.0 <u>POSITION - X Y Z</u> X: 851 Y: -005 Z: 525 <u>JOINT ANGLE</u> YAW: -17.8 SHOULDER: 66.9 ELBOW: -99.0 WRIST PITCH: -57.8 WRIST YAW: 000.0 WRIST ROLL: 17.9
					
1125	Mission Dep.	Center Panel Aft Right Panel	C3 A6U	<ul style="list-style-type: none"> * PAYLOAD SAFING Switches (1-2-3-4-5) To NORM * PAYLOAD RETENTION LOGIC POWER (SYS 1) To ON * PAYLOAD SELECT Rotary Switch To 1 * PAYLOAD RETENSION LATCHES (1-2-3-4-5) To RELEASE * PAYLOAD RETENSION LATCHES (1-2-3-4-5) To OFF * PAYLOAD RETENTION LOGIC POWER (SYS 1) To OFF 	Unlatch The Satellite From The Cargo Bay



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COMM	MET	PANEL SECTION	PANEL	PROCEDURE	PANEL AREA & NOTES
1126	Mission Dep.	Aft Left Panel	A8L	* Use RMS Controls To Remove The Satellite From The Cargo Bay <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>To Grapple - Press Enter On Your Keyboard</p>  <p>Grapple Failed - Press Backspace On Your Keyboard</p> </div>	Move The Satellite To A High Hover. Rotate The RMS So That The Grapple Faces Down Toward The Shuttle Bay. Satellite Engines Should Face Aft. The Longitudal Axis Should Be Parallel To The Shuttle. <u>POSITION - P Y R</u> P: 090.0 Y: 000.0 R: -179.9 <u>POSITION - X Y Z</u> X: 535 Y: -0107 Z: 1051 <u>JOINT ANGLE</u> YAW: 000.0 SHOULDER: 090.0 ELBOW: 000.0 WRIST PITCH: 000.0 WRIST YAW: 000.0 WRIST ROLL: -180.0
1128	Mission Dep.	Aft Left Panel	A8L	* Once The Satellite Is In The Release Position - Press Backspace	Release Lacrosse Satellite
1129	Mission Dep.	Aft Left Panel	A8L	* Use RMS Controls To Stow The RMS	Stow The RMS
1130	Mission Dep.	Aft Left Panel Front Left Panel	A8L F6	* Set RMS POWER To OFF * Set FLT CNTLR POWER To ON	Gain RCS Control
1131	Mission Dep.	Front Left Panel	F6	* Use RCS Bursts To Move Away From The Satellite	Move The Shuttle Away From The Satellite By Translating Backwards Using Short Backward Bursts.
1135	Mission Dep.	Front Left Panel Aft Left Panel Aft Right Panel	F6 A8L A6U	* Use RCS Bursts To Rendezvous With The Lacrosse Satellite * Set RMS Power To PRIMARY * Set FLT CNTLR POWER To ON	There's A Problem With The Lacrosse Satellite And It Needs To Be Retrieved. Move The Shuttle Towards The Satellite By Translating Forward Using Short Forward Bursts. (Capture The Lacrosse Satellite)
1136	Mission Dep.	Front Left Panel Aft Left Panel	F6 A8L	* Set FLT CNTLR POWER To OFF * Set RMS POWER To PRIMARY	Return The Lacrosse Satellite To The Shuttle Bay. Use COMM 1121 Coordinates.
1137	Mission Dep.			* Commence EV-1 Operations	Move Toward Lacrosse's Main Power Box
1138	Mission Dep.			* Repair The Lacrosse Satellite	Open The Main Power Box And Reset Lacrosse's Power Switch
1139	Mission Dep.			* Move EV-1 Back To The Airlock	Ground Control Confirms Power On
1140	Mission Dep.	Aft Left Panel	A8L	* Use RMS Controls To Remove The Satellite From The Cargo Bay (Use COMM 1126 Coordinates To Position The Satellite)	Remove The Satellite From The Cargo Bay Move The Satellite To A High Hover. Rotate The RMS So The Grapple Faces Down Toward The Shuttle Bay. The Satellite Engines Should Face Aft. The Longitudal Axis Should Be Parallel To The Shuttle.
1141	Mission Dep.	Aft Left Panel	A8L	* Once The Satellite Is In The Release Position - Press Backspace	Release Lacrosse Satellite
1142	Mission Dep.	Aft Left Panel	A8L	* Use RMS Controls To Stow The RMS	Stow The RMS
1143	Mission Dep.	Aft Left Panel Front Left Panel	A8L F6	* Set RMS POWER To OFF * Set FLT CNTLR POWER To ON	Gain RCS Control
1144	Mission Dep.	Front Left Panel	F6	* Use RCS Bursts To Move Away From The Satellite	Move The Shuttle Away From The Satellite By Translating Backwards Using Short Backward Bursts.
1145	Mission Dep.				Lacrosse Deploys Communications Antenna, Main Radar Dish And Solar Panels.
1146	Mission Dep.	Front Left Panel	F6	* Use RCS Bursts To Increase Distance From Lacrosse Satellite	Increase Distance Between The Shuttle And The Lacrosse Satellite.
1147	Mission Dep.				Mission Complete - Next Event

Commence Deorbit & Landing



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1000	Mission Dep.	Left Panel	L1	<ul style="list-style-type: none"> * Set RAD CONTROLLER - OUT TEMP To HIGH * Set RAD CONTROLLER (LOOP 1 & LOOP 2) To OFF * Set RAD CONTROLLER - BYPASS MODE (1 & 2) To MAN * Confirm RAD FLOW BYPASS VALVE Talkbacks Display (BYP) * Confirm The HI LOAD EVAP ENABLE Is Set To OFF * Set FLASH EVAP CONTROLLER (PRI A & PRI B) To ON * Set FLASH EVAP CONTROLLER - SEC GPC To ON 	<p>Trap Cold Freon In The Bay Radiators</p> <p>If The Rad Bypass Valve Talkbacks Do Not Display (BYP), Set The Manual Rad Flow Bypass Switches 1 & 2 To Bypass.</p>
1001	Mission Dep.	Right Aft Panel Aft Right Panel Right Aft Panel	R11L A1U R13L R11L	<ul style="list-style-type: none"> * Set The MAJ FUNC Switch To GNC * Enter SPEC 33 PRO (AFT Keypad) * Enter ITEM 2 EXEC (AFT Keypad) * Enter ITEM 1 EXEC (AFT Keypad) * Set KU BAND POWER To OFF * Set KU Antenna To STOW * When KU Antenna Talkback Shows STO, Set KU Antenna To GND * Enter SPEC 22 PRO (Aft Keypad) * Enter ITEM 9 EXEC (Aft Keypad) * Enter ITEM 10 EXEC (Aft Keypad) 	<p>Deactivate & Stow The KU Antenna</p> <p>NOTE: Rendezvous Navigation Has Been Used It Must Be Disabled.</p> <p>Confirm On CRT 4 There Are No Asterisks Besides The Following Entries. RNDZ NAV ENA 1 KU ANT ENA 2 MEAS ENA 3</p>
1002	Mission Dep.	Right Aft Panel	R13L	<ul style="list-style-type: none"> * Set PL BAY MECH PWR (SYS 1 & SYS 2) To ON * Set RADIATOR CONTROL (SYS A & SYS B) To STOW * Set LATCH CONTROL (SYS A & SYS B) To LATCH * Set LATCH CONTROL (SYS A & SYS B) To OFF * Set RADIATOR CONTROL (SYS A & SYS B) To OFF * Set PL BAY MECH PWR (SYS 1 & SYS 2) To OFF 	<p>Stow The Radiators</p> <p>Wait Until The RADIATOR CONTROL Talkbacks Show STO Before Setting The LATCH CONTROLS SYS 1 & SYS 2 To LATCH. Wait Until Latch Control Talkbacks Show LAT Before Turning Off ALL Radiators.</p>
1003	Mission Dep.	Overhead Left Panel Center Panel Right Panel	O6 C3 R2	<ul style="list-style-type: none"> * Set GENERAL PURPOSE COMPUTER - MODE 5 To STBY * Set The BFC/CRT - Display To ON * Confirm The BFC/CRT SELECT Is Set To (3+1) * Confirm BOILER CNTLR/HTR Switches (1/2/3) Are ON * Set HYD CIRC PUMP Switches (1/2/3) To OFF 	<p>Activate Backup Flight System</p>
1004	Mission Dep.	Overhead Aft Panel Right Aft Panel	O14 O15 O16 O15 R11L	<ul style="list-style-type: none"> * Set RGA 1 To ON * Set RGA (2 & 4) To ON * Set RGA 3 To ON * Set ACCEL 3 To ON * Set ACCEL 4 To ON * Set SUPPLY H2O - Crossover Valve To OPEN 	<p>Gyro Assemblies & Accelerators</p>
1091	Mission Dep.	Aft Left Panel Aft Right Panel Aft Left Panel	A8L A6U A8U	<ul style="list-style-type: none"> * Set RMS POWER To PRIMARY * Set RMS SELECT To PORT * Set FLT CNTLR POWER To ON * Set RMS BRAKES To OFF * Set The MODE Rotary Selector To SINGLE * Press ENTER Just Below The MODE Rotary Selector * Set The PARAMETER Rotary Selector To JOINT ANGLE * Set The JOINT Rotary Selector As Required * Depress The SINGLE/DIRECT DRIVE (+-) Spring Switch 	<p>Stow The RMS</p> <p>Return All Joint Angles To Their Stowed Position.</p> <p>By Returning All Joint Angles To Zero, You Will Eventually Reach The RMS Latch Position.</p>
1092	Mission Dep.	Aft Left Panel Front Left Panel	A8L F6	<ul style="list-style-type: none"> * Port RMS Retention Latches Ready For Latch Talkbacks (White) * Set PORT RMS (RELEASE/OFF/LATCH) To LATCH * Set PORT RMS (RELEASE/OFF/LATCH) To OFF * Set PORT RMS (DEPLOY/OFF/STOW) To STOW * Set PORT RMS (DEPLOY/OFF/STOW) To OFF * Set RMS POWER To OFF * Set FLT CNTLR POWER To ON 	<p>Latch The RMS</p> <p>Wait Until Talkbacks Indicate (LAT)</p> <p>Wait Until Talkbacks Indicate (STO)</p>
1093	Mission Dep.	Aft Left Panel	A7U	<ul style="list-style-type: none"> * Check/Set All PAYLOAD BAY FLOOD Lights To OFF 	<p>Turn Off All Payload Bay Flood Lights</p>
1006	Mission Dep.	Right Aft Panel	R11L R13L R11L	<ul style="list-style-type: none"> * Set MAJ FUNC Switch To SM * If Required, Enter OPS 202 PRO (AFT Keypad) * Enter ITEM 1 EXEC (AFT Keypad) * If Not Already Enabled, Enter ITEM 3 EXEC (AFT Keypad) * Set PL BAY DOOR (SYS 1 & SYS 2) To ENABLE * Set PL BAY DOOR To CLOSE * Set PL BAY DOOR To STOP * Set PL BAY DOOR (SYS 1 & SYS 2) To DISABLE * Enter ITEM 2 EXEC (AFT Keypad) 	<p>Close Payload Bay Doors</p> <p>Wait Until The PL BAY DOOR Talkback Shows CL.</p>
1008	Mission Dep.	Right Aft Panel Overhead Left Panel Right Aft Panel	R11L O6 R11L	<ul style="list-style-type: none"> * Set MAJ FUNC To GNC * Press GPC/CRT (AFT Keypad) * Enter 4 EXEC (AFT Keypad) * Enter OPS 201 PRO (AFT Keypad) * Set GENERAL PURPOSE COMPUTER - MODE 3 To RUN * Enter OPS 301 PRO (AFT Keypad) 	<p>Reconfigure GNC's For Deorbit</p>
1009	Mission Dep.	Overhead Left Panel	O6	<ul style="list-style-type: none"> * STAR TRACKER DOOR CONTROL (SYS 1 & SYS 2) To CLOSE * STAR TRACKER DOOR CONTROL (SYS 1 & SYS 2) To OFF * Set The STAR TRACKER POWER Switches (-Y & -Z) To OFF 	<p>Close Star Tracker Doors Wait Until STAR TRACKER DOOR POSITION Talkback Shows CL.</p>
1010	Mission Dep.	Right Panel Overhead Aft Panel Center Panel	R4 O15 O14 O16 C3	<ul style="list-style-type: none"> * Check HYDRAULICS BRAKE HEATER (A/B/C) Set To AUTO * Set BRAKES MN B To ON * Set BRAKES MN A To ON * Set BRAKES MN C To ON * ORBITAL DAP / MANUAL MODE / ROTATION - ROLL To PRI 	<p>Final Switch Configuration Check</p>



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1026	Mission Dep.				The Shuttle Will Perform Roll Reversals
1027	Mission Dep.	Left Panel	L1	* Set RAD CONTROLLER - OUT TEMP To NORM * Set RAD CONTROLLER (LOOP 1 & LOOP 2) To AUTO A * Set RAD CONTROLLER - BYPASS MODE (1 & 2) To AUTO	
1080	Mission Dep.	Right Panel Left Panel	R4 L1	* Set MPS/TVC/ISOL/VLV (SYS1, SYS2, SYS3) To OPEN * Set NH3 BOILER - NH3 CONTROLLER (A & B) To PRI/GPC	Hydraulics / Brake Heater
1028	Mission Dep.	Center Panel Front Left Panel Front Right Panel Overhead Right Panel	C3 F6 F8 O8	* Set AIR DATA PROBE (Left & Right) To DEPLOY HEAT * Set AIR DATA To LEFT * Set AIR DATA To RIGHT * Set RADAR ALTIMETERS (1 & 2) To ON	Deploy Air Data Probes
1029	Mission Dep.	Front Left Panel Front Right Panel Front Left Panel	F3 F3 F2	* Set HUD POWER To ON (Commander) * Set HUD POWER To ON (Pilot) * Set PITCH & ROLL/YAW To CSS (Commander)	Commander & Pilot HUD Power
1031	Mission Dep.	Overhead Right Panel	O8	* Set MLS (1/2/3) Switches To ON * Set MLS Thumbwheel To (111)	Auto Software Transition To OPS 305 Microwave Scan Beam Landing System
1033	Mission Dep.	HUD Display Window		* Press LANDING GEAR ARM (Twice)	Arm The Landing Gear
1034	Mission Dep.	HUD Display Window		* Press LANDING GEAR DOWN (Twice)	Deploy Landing Gear
1035	Mission Dep.	HUD Display Window		* Press SHUTE ARM (Twice) * Press DEPLOY SHUTE (Twice) * Press CHUTE JETT (Twice)	Touchdown: Gently Push The Nose Down Until The Nose Wheel Touches The Runway. Use The Rudder To Steer. Apply Wheel Brakes.
1036	Mission Dep.	HUD Display Window		* Press CHUTE JETT (Twice)	Release Brake Shute
1037	Mission Dep.				End Of Mission

Commence Shutdown



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SHUTDOWN CHECKLIST

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COMM	MET	PANEL SECTION	PANEL	PROCEDURE	NOTES
	Mission Dep.	Left Panel Right Panel Front Left Panel Front Right Panel Front Left Panel Front Right Panel	L2 R2 R1 F6 F8 F3 F3	* SPD BK - MAN (Full FWD) * NWS - OFF * APU Auto Shutdown (1/2/3) - ENABLE * APU Speed Select (1/2/3) - NORM * AC BUS SNSR (1/2/3) - AUTO TRIP * Commander FLT CNTLR POWER - OFF * Pilot FLT CNTLR POWER - OFF * Commander HUD POWER - OFF * Pilot HUD POWER - OFF	
	Mission Dep.	Center Panel	C3	(PERFORMED IF ELS) * MSTR MADS - OFF (DoD ELS, MCC call DoD OSC on NCC)	Note: MCC Will Report Go/No-Go To DOFF Suits. (Post Safety Assessment)
	Mission Dep.	Center Panel Overhead Aft Panel	C3 O14 O15 O16 O14 O15 O16 O14 O15 O16 O14 O16	* OMS ENG (Left & Right) - OFF * RJDA 1A DRIVER (L2/R2 MANF) - OFF * RJDA 2A DRIVER (L4/R4 MANF) - OFF * RJDF 1B DRIVER (F1 MANF) - OFF * RJDA 1B DRIVER (L1/R1 MANF) - OFF * RJDF 1A DRIVER (F2 MANF) - OFF * RJDA 2B DRIVER (L1/R1 MANF) - OFF * RJDF 2A DRIVER (F1 MANF) - OFF * RJDF 2B DRIVER (F1 MANF) - OFF * RJDA 1A LOGIC (L2/R2 MANF) - OFF * RJDA 2A LOGIC (L4/R4 MANF) - OFF * RJDF 1B LOGIC (F1 MANF) - OFF * RJDA 1B LOGIC (L1/R1 MANF) - OFF * RJDF 1A LOGIC (F2 MANF) - OFF * RJDA 2B LOGIC (L1/R1 MANF) - OFF * RJDF 2A LOGIC (F1 MANF) - OFF * RJDF 2B LOGIC (F1 MANF) - OFF * L OMS ENG VLV - OFF * R OMS ENG VLV - OFF	RMS OMS Safing (RDJs)
	Mission Dep.	Overhead Aft Panel	O15 O16 F2 F3 F4	(NOT PERFORMED IF ELS) * MNB - DRAG CHUTE SYS 2 - op * MNC - DRAG CHUTE SYS 1 - op * DRAG SHUTE - LT OFF * DRAG SHUTE - LT OFF * DRAG SHUTE - LT OFF	Drag Chute Safing
	Mission Dep.	Center Panel	C3	* AIR DATA PROBE (Left & Right) - DEPLOY	Deactivate Air Data Probe HTRS
	Mission Dep.	Right Aft Panel Aft Right Panel Front Left Panel Front Right Panel Aft Right Panel Right Aft Panel	R14 A12 F6 F8 A12 R14	(NOT PERFORMED IF ELS) * ESS 1BC LDG GEAR / ARM/DN - RESET CL * LG ARM/DN RESET - Set Switch To The RESET Position * LDG GEAR - LT OFF * LDG GEAR - LT OFF * LG ARM/DN RESET - Set Switch To The Down Position * ESS 1BC LDG GEAR / ARM/DN - RESET OP	Landing Gear Safing
	Mission Dep.	Right Panel	R2	* ET UMBILICAT DOOR / MODE - GCP/MAN * ET UMBILICAT DOOR / RIGHT LATCH - RELEASE * ET UMBILICAT DOOR / RIGHT LATCH - OFF * ET UMBILICAT DOOR / LEFT LATCH - RELEASE * ET UMBILICAT DOOR / LEFT LATCH - OFF * ET UMBILICAL DOOR / MODE - GCP	ET Umbilical Door Opening
	Mission Dep.	Front Right Panel Front Left Panel Right Panel Center Panel	F4 F8 R2 C3 R2	* BODY FLAP - MAN * FLT CNTLR PWR - ON * HYD MAIN PUMP PRESS #1 - LO * Run Full Load Test * HYD MAIN PUMP PRESS #1 - NORM * HYD MAIN PUMP PRESS #3 - LO * Repeat Load Test * HYD MAIN PUMP PRESS #3 - NORM	Hydraulic Load Test A Minimum Of Two Operating Hydraulic Systems Are Required For This Test
	Mission Dep.	Center Panel Front Right Panel Center Panel Right Panel Center Panel Right Panel Center Panel	C3 C2 F4 C3 R4 C2 R4 C2	* BFC CRT DISPLAY - ON * Enter Item OPS 000 PRO (Right Keypad) * Enter Item OPS 901 PRO (Right Keypad) * BODY FLAP - MAN * BODY FLAP - DOWN * HYDRAULICS - MPS/TVC ISOL VLV (SYS 1, SYS 2, SYS 3) OPEN * Enter ITEM 8 EXEC (Right Keypad) * Enter ITEM 1 +0 2 EXEC (Right Keypad) * Enter ITEM 5 EXEC (Right Keypad) * HYDRAULICS - MPS/TVC ISOL VLV (SYS 1, SYS 2, SYS 3) CLOSE * Enter ITEM 23 EXEC (Right Keypad) * Enter ITEM 1 EXEC (Right Keypad) * Enter ITEM 29+1 EXEC (Right Keypad) * Enter ITEM 30+8 EXEC (Right Keypad) * Enter ITEM 31 EXEC (Right Keypad) * Enter ITEM 32 EXEC (Right Keypad)	DPS Transition GNC 9 (If Pass)

