X-38 Mission Timeline

5/17/01

V201 Mission

Stokes McMillan

- Current launch date 2/20/03, STS-116
- Brief power-up of core systems on flight day 1 (FD1)
- Systems checkout on FD2 and FD3
- Deploy rehearsal day on FD4
- Deploy to landing on FD5
  - 3 subsequent deorbit opportunities to Australia
    - » TIG 1 @ MET 3/2357
    - » Landing MET 4/0106

Comm mission design philosophy

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- Primary means of commanding V201 will be from POCC
- Crew will have backup command capability via Ethernet umbilical or UHF
- Checkout various comm capabilities on FD2 and FD3
- Except for FD1 night, V201 will be powered continuously
  - Downlink data during crew sleep via OCA, with direct S-band backup
  - S-bd xmitter off during sleep due to thermal reasons, can be commanded on if necessary
- Will do GSTDN tests using approximate ground track of deployed V201 FD3 and FD4
  - Requires Orbiter to be in –ZLV attitude. This loses GPS for important SIGI tests, so uncertain now as to which GSTDN sites we'll try to acquire
- Assuming GSTDN sites: DFRC, MILA, WLPS, Perth.

V201 Timeline Summary

Preliminary

Event	MET	Comments	Attitude
Day 1			
Crew awake			
Launch			
OPS 201			
PLBD open			
PGSC setup			
OCA ground comm. check			
V201 core sys power up			
Flight recorder dump			
V201 power down for sleep			
Maneuver to sleep attitude			
Crew sleep	0/07		
Day 2			
Crew awake	0/15		
Maneuver to V201 checkout attitude			
V201 power up	0/17		
RMS checkout and survey in parallel with V201 activity, then power down			
Activate GNC			
Activate SIGI			
Activate control bus/critical function			
S-Bd power on			
S-Bd TDRS check			
S-Bd PI check			
S-Bd off			
6-hr. SIGI run	0/21 – 1/03		+ZLV, -YVV
FADS activation and checkout, then power down			
GNC uplink I-load updates practice			
GNC confirm I-load updates			
GNC perform targeting sequence practice			
UHF power on			
UHF check			
UHF off			
SIGI off			
Flight recorder dump			
S-Bd transmitter off			
Maneuver to sleep attitude			
Crew sleep (V201 powered)	1/07		-ZLV, -YVV

Day 3

Crew awake	1/15		
Maneuver to V201 checkout attitude			
S-Bd transmitter power on			
Activate SIGI			
SIGI ops begin		8 hrs., in parallel with other activities	+ZLV, +YVV
EMA activation			
EMA flap sweep			
EMA power down			
Switch to in-cabin batteries until 90%		Prep for DPS batt conditioning	
Maneuver to –ZLV			-ZLV, -YVV
Horizon sensor activation and checkout, then power off		* in parallel	
Alternate attitude camera activation and checkout, then power off		*	
S-Bd GSTN checks		*	
Prime: Perth	1/2342		
DFRC	2/0020		
MILA	2/0025		
B/U: Perth	2/0116		
DFRC	2/0151		
MILA	2/0200		
Mnvr to +ZLV			+ZLV, +YVV
SIGI off			
Cabin fan switch		Data collect	
Flight recorder dump			
S-Bd transmitter off			
Maneuver to sleep attitude			
Crew sleep	2/07		-ZLV, -YVV

Day 4

Crew awake	2/15		+ZLV, +YVV
Maneuver to V201 checkout attitude	2/1630		
S-Bd transmitter power on			
Activate SIGI		Leave up for remainder of flight	
Initialize GNC software			
Activate GNC			
Activate SOPS			
Activate SIGIs			
Check SIGI RM			
Check SIGI Antenna RM			
Activate Navigation CSC			
Confirm Navigation activation			
Orbiter height adjust burn 1	2/1900	150 x 120 nmi	
Orbiter height adjust burn 2	2/1945	120 nmi circ.	
Compare on-board SV to gnd; uplink new SV if reqd			
Weather brief			
Initiate targeting sequence			

Uplink I-Load updates (if req'd)		
Confirm I-Load updates (if reqd)		
Configure for RMS Ops (crew)		
Verify Orbiter in TDRS check attitude		+ZLV, +YVV
TDRS S-Bd String #2 check (from POCC)		
Backup TDRS S-Bd String #2 check (crew)		
TDRS S-Bd String #1 check (from POCC)		
Backup TDRS S-Bd String #1 check (crew)		
Configure S-Bd String #2 for STDN, 1 Mbps		
UHF string 1 command & telemetry check (crew procedures)		
UHF string 2 command & telemetry check (crew procedures)		
(SIM) RMS grapple ops (crew)		
(SIM) Enable ACS/PYRO function (crew)		
(SIM) PRLA release (crew)		
(SIM) Unfold fins and lock in flight position (crew)		
(SIM)Config for EMA sweep		
(SIM)EMA sweep		
DPS battery conditioning		
FADS activation and checkout, then power down		
Horizon sensor activation and checkout	Leave up for remainder of flight; no FD5 check	
Alternate attitude camera activation and checkout	Leave up for remainder of flight; no FD5 check	
Command SIGI GPS attitude determination – off		
Weather update		
(SIM) Activate sublimator		
Configure system for umbilical release		
(SIM) Remove Orbiter power (crew)		
(SIM) Umbilical release (crew)		
Maneuver RMS to V201 release positione (crew)		
Final weather check		
Go/No-go poll for release		
(SIM) Orbiter Ku to radar mode (crew)		
(SIM) Rescue Flt to P/L: Go for V201 release		
(SIM) V201 release (crew)		
Mnvr Orbiter to deployed X-38		
GSTDN check att		
Stow RMS (crew)		
Deconfigure from Bent pipe mode		
Deconfigure from EMA flap sweep		

Mnvr to post-RCS Jet Firing DTO att		Post deploy V201 maneuver emulation	+ZLV, -YVV (P=0, Y=90, R=0)
GSTDN—Perth	2/2017		
RCS rotation DTO: +180° roll	2/2039	Lose GPS	To –ZLV, +YVV (P=0, Y=90, R=180)
Horiz sensor data take 1	2/2049	Takes 20 min.	
GSTDN—MILA	2/2104		
RCS –180° pitch	2/2109	Acquire GPS	To +ZLV, +YVV (0, -90, 0)
RCS –180° yaw	2/2114		To +ZLV, -YVV (0, 90, 0)
RCS –180° roll	2/ 2119	Lose GPS	To –ZLV, +YVV (0, 90, 180)
Horiz sensor data take 2	2/2124	Takes 10 min.	
RCS +180° pitch	2/2234		To +ZLV, +YVV (0, -90, 0)
GSTDN—Perth	2/2149	TBD if we want to mnvr to acquire this pass	
GSTDN—MILA	2/2232	“	
GSTDN—WLPS	2/2234	“	
S-Bd transmitter off			
Maneuver to sleep attitude			
Crew sleep	3/06	SIGI operations	+ZLV, +/-YVV

Day 5

Crew awake	3/14		
Maneuver to V201 checkout att	3/1430		+ZLV, +YVV
S-Bd transmitter power on	3/1445	POCC executes V201 procedures during crew post-sleep activities	
Initialize GNC software			
Activate GNC			
Activate SOPS			
Check SIGI RM			
Check SIGI Antenna RM			
Compare on-board SV to gnd; uplink new SV if reqd			
Weather brief			
Initiate targeting sequence			
Uplink I-Load updates (if req’d)			
Confirm I-Load updates (if reqd)			
TDRS S-Bd String #1 check (from POCC)			
UHF string 1 command & telemetry check (crew procedures)	3/1530		
UHF string 2 command & telemetry check (crew procedures)			
Configure for RMS Ops (crew)	3/1530		
RMS grapple ops (crew)			
Enable ACS/PYRO function (crew)	3/1625		
PRLA release (crew)	3/1630		
Unfold fins and lock in flight position	3/1650		

(crew)			
Config for EMA sweep	3/1720		
EMA sweep	3/1730		
DPS battery conditioning	3/1800		
FADS activation and checkout	3/1805		
Weather update			
Activate sublimator	3/1810		
Configure system for umbilical release	3/1815		
Remove Orbiter power (crew)	3/1820		
Umbilical release (crew)	3/1823		
Maneuver RMS to V201 release position (crew)	3/1826		
Final weather check	3/1930		
Go/No-go for release	3/1945		
Orbiter Ku to radar mode (crew)			
GSTDN—Perth	3/1958		
V201 release (crew)	3/2011		Orbiter : +ZLV, +YVV V201 : +ZLV, +XVV (P=0, Y=0, R=0)
Orbiter Sep 1 burn	3/2012		
Master Arm Command sent	3/2014		
ACS activation	3/2019	Pri on ECS N2; Sec on ACS N2	
Activate DPS cat bed heaters			
ACS rate null, then LVLH att hold DTO	3/2019		
Maneuver to ACS reference attitude	3/2023		P=0, Y=0, R=0
ACS Primary jet firing DTO	3/2031	No att change	
ACS Secondary jet firing DTO	3/2034		
Verify DPS cat bed heaters	3/2035		
ACS rotation DTO	3/2043	Series of maneuvers	0, 0, 0
GSTDN—MILA	3/2041		
GSTDN—WLPS	3/2045		
Pyro bus activates	3/2056	H/w timer	
DPS wetted	3/2059	S/w timer	
Orbiter Sep 2 burn	TBD		
RCS rate null, then LVLH att Hold DTO	3/2102		0, 0, 0
RCS -90° yaw	3/2107		0, 270, 0
Trunnion pin retract	TBD		
Cabin pressure control enabled	TBD		
RCS Jet Firing DTO, sequence 1	3/2111	No att change	0, 270, 0
RCS Jet Firing DTO, sequence 2	3/2116	No att change	0, 270, 0
GSTDN—Perth	3/2130		
ACS +Z translation DTO	3/2131	No att change	0, 270, 0
ACS to Standby	3/2136		
RCS rotation DTO: $+8^{o}$ pitch	3/2141		To 90, 278, 90
RCS $+180^{o}$ roll	3/2143	Lose GPS	To 90, 278, 270
Horiz sensor data take 1		15 min.	
RCS multiaxis rotation	3/2158	Acquire GPS	To 0, 270, 0
RCS multiaxis rotation	3/2211	Lose GPS	To 90, 278, 270
Horiz sensor data take 2		10 min.	
GSTDN—MILA	3/2213		

GSTDN—WLPS	3/2215		
RCS multiaxis rotation	3/2221	Acquire GPS	To 0, 270, 0
Inertial attitude hold DTO	3/2231		
Maneuver to DPS reference attitude	3/2235		To 0, 270, 0
Verify good Nav solution and PVA	3/2240		
Deorbit target confirmation			
Prep for EMA sweep	3/2240		
EMA sweep	3/2250		
GSTDN—Perth	3/2304		
Maneuver to D/O attitude	3/2315		TBD
ACS wake-up	3/2320		
Close cabin battery relays	3/2325	Two sources	
Recorder dump	3/2330		
Configure to Entry comm. Mode	3/2335		
GSTDN—DFRC	3/2341		
GSTDN—MILA	3/2347		
GSTDN—WLPS	3/2348		
Inertial att hold	3/2355		150, 0, 180
D/O ignition	3/2357		
4 jet Australia		Can make nom targets using 4 jets	
D/O burn cutoff			
Trim burn (if reqd)			
Maneuver to DPS sep att			-135, 0, 180
Configure for DPS sep			
DPS sep			
DPS sep burn			
Maneuver to EI att			
EMA controllers on			
Enable flap EMA motors, disengage brakes			
Verify flaps ~ 20°, rudders 0°			
Start entry guidance			
EI			
Enable rudder EMA motors, disengage brakes			
Sublimator inactive			
Power down ACS			
Switch to parafoil comm config			
Power on winches			
Drogue full deploy			
Drogue release			
Power down EMA controllers			
Parafoil full deploy			
Landing	4/0106		
Power down complete			