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28 April 1969

US-221

(m)

PRELIMINARY ISSUE

SEQ. 301 - ACTIVATE AND CHECKOUT  
OV SYSTEMS - PRE-TRANSFER

ACTION ITEM FOR REVIEW AND COORDINATION  
AT 12 MAY 1969 SEQUENCE DEFINITION  
WORKING GROUP MEETING

Submitted Under Contract F04695-67-C-0023, in Accordance  
with Seq. No. 26S, Item No. U-S-221.

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THE AGENCIES OF THE US GOVERNMENT MUST HAVE  
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(SMEA), SPACE & MISSILE SYSTEMS ORGANIZATION,  
AF UNIT P.O. LOS ANGELES, CA 90045



GEMINI B  
MCDONNELL DOUGLAS ASTRONAUTICS COMPANY  
EASTERN DIVISION

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AF UNIT P.O., LOS ANGELES, CA 90045

1.0 NUMBER AND TITLE

301 ACTIVATE AND CHECKOUT OV SYSTEMS - PRE-TRANSFER

2.0 OBJECTIVE

- A. TO SEPARATE THE TIIM FROM THE OV.
- B. APPLY ACTS TO NULL SEPARATION TIP-OFF RATES
- C. PRESSURIZE IM
- D. ROLL OV TO HEADS UP ATTITUDE AND MAINTAIN WITH ACTS
- E. EVALUATE ORBIT
- F. LOAD REENTRY DATA (MODULE IV) INTO AUXILIARY TAPE MEMORY (ATM)
- G. DEACTIVATE INERTIAL GUIDANCE SYSTEM
- H. DEACTIVATE GB MAIN REENTRY BATTERIES
- I. PERFORM POST-INSERTION SYSTEMS MANAGEMENT

3.0 OPERATIONAL DESCRIPTION

THIS SEQUENCE REQUIRES BOTH CREWMEN'S PARTICIPATION THROUGHOUT THE ENTIRE SEQUENCE. THIS SEQUENCE BEGINS AT SEPARATION OF THE BOOSTER FROM THE OV WITH CREWMAN A APPLYING THE ACTS TO NULL SEPARATION TIP-OFF RATES IN PITCH, YAW, AND ROLL.

CREWMAN B'S FIRST TASK IS TO INITIATE PRESSURIZATION OF THE IM. THIS IS PERFORMED IN TWO STEPS WITH APPROXIMATELY 5 MIN. BEING REQUIRED TO PRESSURIZE FROM 0 TO 3.7 PSI AND APPROXIMATELY 85 MIN. REQUIRED TO PRESSURIZE FROM 3.7 TO 5.0 PSI.

TWENTY FIVE SECONDS AFTER TIIM/OV SEPARATION, CREWMAN A INITIATES A 1°/SEC. ROLL RATE TO PLACE THE OV IN HEADS UP, LOCAL VERTICAL ORBITAL PLANE ATTITUDE, AND THEN SELECTS ACTS ATTITUDE CONTROL MODE LVOP TO MAINTAIN THIS ATTITUDE.

IMMEDIATELY AFTER STABILIZING IN THE LVOP ATTITUDE, THE CREWMEN EVALUATE THE ACCURACY OF THE ORBIT TO DETERMINE IF AN ORBIT ADJUST MANEUVER IS REQUIRED. THIS MANEUVER IS NOT EXPECTED TO BE REQUIRED AND IS THEREFORE NOT INCLUDED IN THE NOMINAL MISSION.

WHEN A SAFE ORBIT IS ASSURED, CREWMAN B LOADS MODULE 4 (REENTRY MODULE) INTO THE ATM.

IF NO ORBIT ADJUST MANEUVER IS REQUIRED (NOMINAL MISSION) THE REENTRY BATTERIES ARE SWITCHED OFF FOLLOWING LOADING OF THE ATM. IF THIS MANEUVER IS REQUIRED, THE REENTRY BATTERIES WILL BE DEACTIVATED UPON COMPLETION OF THE MANEUVER AND PRIOR TO LOADING THE REENTRY MODULE INTO THE ATM.

THIS SEQUENCE ENDS AFTER THE GEMINI B SYSTEMS HAVE BEEN CONFIGURED FOR ORBITAL OPERATIONS WITH CREW OCCUPANCY IN GEMINI B.

4.0 OPERATIONAL REQUIREMENTS

4.1 DEFINITION OF TERMS

4.1 DEFINITION OF TERMS (Continued)

T<sub>1</sub> - TIME OF OV/MIIM SEPARATION  
T<sub>2</sub> - DEFINED AS TIME ONE OF THE EVAPORATOR HOT LIGHTS ILLUMINATES  
ACTS - ATTITUDE CONTROL THRUSTER SYSTEM  
IM - LABORATORY MODULE  
LVOP - LOCAL VERTICAL ORBITAL PLANE  
OV - ORBITAL VEHICLE  
TPW - TAPE POSITION WORD  
ATM - AUXILIARY TAPE MEMORY

4.2 GROUND RULES (TBD)

4.3 VEHICLE CONSTRAINTS

- A. ATM LOADING AND REENTRY BATTERIES DEACTIVATION MUST BE COMPLETED 24 MINUTES AFTER LIFTOFF.
- B. ATM LOADING CANNOT BE PERFORMED DURING THE OV ROLL MANEUVER.  
(SEE PAGE 301-3A)

4.4 GROUND CONSTRAINTS (TBD)

4.5 UPLINK REQUIREMENTS - COMMANDS (TBD)

4.6 INITIAL VEHICLE CONFIGURATION  
301 ACTIVATE AND CHECKOUT OV SYSTEMS-PRE-TRANSFER

4.7 SPECIAL GROUND SUPPORT REQUIREMENTS (NONE)

5.0 SCHEDULING

5.1 SCHEDULING CRITERIA

- A. SEQUENCE PERFORMED ONCE DURING EARLY ORBIT

5.2 DURATION  
2 HRS. 36 MIN. 15 SEC.

5.3 PRE-REQUISITE SEQUENCE  
ASCENT

5.4 SEQUENCE CONFLICTS (SEE PAGE 301-3A)

6.0 EXPENDABLES CONSUMPTION

6.1 IM POWER (TBD)

6.2 IM OXIDIZER (TBD)

6.3 IM FUEL (TBD)

6.4 IM OXYGEN, CRYOGENIC (TBD)

6.5 LM HYDROGEN, CRYOGENIC (TBD)

6.6 LM HELIUM (TBD)

6.7 LM O<sub>2</sub> CABIN ATMOSPHERE (TBD)

6.8 MM INFORMATION (TBD)

6.9 GEMINI B

OXYGEN, LOW RATE	2 LB/MAN/DAY
OXYGEN, CABIN MAKE UP	1.755 LB/DAY
LIQH RATE	.113 LB/MAN/HR
ELECT, PWR	TBD

7.0 PROBLEM AREAS TO BE RESOLVED (NONE)

8.0 TABLE OF CONTENTS PAGE

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COMPLETE SEQUENCE LISTING	301-4
POWER PROFILE	TBD
SCHEMATIC	TBD

CONFLICT: ORBITING VEHICLE ROLL CONCURRENT WITH GEMINI B AUXILIARY MEMORY TAPE LOADING. CAUSES TIME-SHARING SCHEDULE CONFLICT.

1.0 DESCRIPTION

A. THE OV ROLL PROGRAM WAS INITIATED AT 180 SECONDS AFTER SSECO. GEMINI B REQUIRES IT TO START EARLIER FOR THE FOLLOWING REASONS:

1. ATM LOADING AND REENTRY BATTERIES DEACTIVATION MUST BE COMPLETED 24 MINUTES AFTER LIFTOFF. (POWER CONSTRAINT)
2. ATM LOADING CANNOT BE PERFORMED DURING THE OV ROLL MANEUVER.

B. THE OV ROLL IS CONSTRAINED BY THE FOLLOWING:

1. THE MISSION MODULE, HORIZON SENSOR AND THE VELOCITY VECTOR SENSOR ASSEMBLY FAIRINGS MUST BE JETTISONED AT TBD ATTITUDE.
2. THE FAIRING JETTISONMENT MUST BE ACCOMPLISHED AND CONFIRMED PRIOR TO TELEMETRY LOSS BY THE MOL INSERTION SHIP.

2.0 RESOLUTION

THE OV ROLL PROGRAM INITIALIZATION HAS BEEN CHANGED TO 25 SECONDS AFTER BOOSTER SEPARATION.

3.0 STATUS OF RESOLUTION

- A. A VERBAL CONCURRENCE WAS RECEIVED FROM MDAC-WD.
- B. THE RESOLUTION HAS BEEN DOCUMENTED IN THE ENCLOSED GEMINI B SEQUENCE LISTING.
- C. THIS CONFLICT IS CONSIDERED RESOLVED AND CLOSED.

SEQUENCE NO. 301

TITLE ACTIVATE AND CHECKOUT OV SYSTEMS - PRE TRANSFER

ITEM NO.	START TIME	DUR SEC	CM	TASK NO.	CMD NO.	TASK, TASK ELEMENT/FUNCTION STATE	DESCRIPTION/REMARKS
1	T1+0	176	Y	3.9.2	X	Perform Communications with MIS (01) Depress PTT Button and Hold (02) Report Flight and Vehicle Status	Exercise Seq. No. 307 Assume estimate 75% of the time within the MIS Tracking Cone. Reporting includes: Separation accomplished IM Pressurization Initiate IM Tip Off Rates Nulled Safing Rockets Roll Heads Up Initiate Roll Heads Up Terminate
2	T1+0	03	Y	3.9.2			
3	T1+3	172	Y	3.9.2			
4	T1+175	01	Y	3.9.2	X	(03) Release PTT Button	2°/Sec Max. Tip Off Rates  Transfer Rate 3 Lb/Min.  Requires 5 Min. to pressurize IM to 3.7 psia. Requires 85 Min. to pressurize IM to 5.0 psia.
5	T1+176		Y	3.9.2		End Task	
6	T1+0	05	A	6.5.12	X	Perform Separation Maneuver	
7	T1+0	03	A	6.5.12		(01) Depress Sep Booster Button	
8	T1+3	01	A	6.5.12	X	(02) Verify Sep Booster Lt Illuminates	
9	T1+4	01	A	6.5.12		(03) Release Sep Booster Button	
10	T1+5			6.5.12		End Task	
11	T1+0	25	A	5.10.1	X	Null Pitch, Yaw and Roll Rates	
12	T1+0	25	A	5.10.1		(01) Deflect Hand Controller As Required	
13	T1+25		A	5.10.1		End Task	
14	T2+0	46	B	5.9.4	X	Transfer H <sub>2</sub> O to Evaporator	
15	T2+0	03	B	5.9.4	X	(01) H <sub>2</sub> O Tanks No. 1 SW-OPEN	
16	T2+43	03	B	5.9.4	X	(02) H <sub>2</sub> O Tanks No. 1 SW-CLOSE	
17	T2+46		B	5.9.4		End Task	
18	T1+10	5409	B	6.5.12	X	Pressurize Laboratory Module	
19	T1+10	03	B	6.5.12		(01) Set Gas CNTL SW to 0-3.7	
20	T1+313	03	B	6.5.12	X	(02) Set Gas CNTL SW to 3.7-5.0	
21	T1+546	03	B	6.5.12	X	(03) Set Gas CNTL SW-OFF	
22	T1+549		B	6.5.12		End Task	

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TITLE ACTIVATE AND CHECKOUT OV SYSTEMS-PRE TRANSFER

ITEM NO.	START TIME	DUR SEC	CM	TASK NO.	CMD NO.	TASK, TASK ELEMENT/FUNCTION STATE	DESCRIPTION/REMARKS
23	T1+35	09	A	5.1.4	X	Manage Retrograde Propulsion System	
24	T1+35	03	A	5.1.4	X	(01) Set Retro Rocket Squib SW No. 4-SAFE	
25	T1+38	03	A	5.1.4	X	(02) Set Retro Rocket Squib SW No. 6-SAFE	
26	T1+41	03	A	5.1.4	X	(03) Set ASC and Abort SW-SAFE	
27	T1+44		A	5.1.4		End Task	
28	T1+176	06	B	5.9.2	X	Deactivate GB Communication System	
29	T1+176	03	B	5.9.2	X	(01) Set VHF SW-OFF	
30	T1+179	03	B	5.9.2	X	(02) Set C-Band SW-OFF	
31	T1+182		B	5.9.2		End Task	
32	T1+25	100	A	5.10.1	X	Roll OV 90° CCW to Heads Up ATT	Establish 1°/sec roll rate
33	T1+25	05	A	5.10.1		(01) Activate Roll Left ACTS Thrusters	
34	T1+120	05	A	5.10.1	X	(02) Activate Roll Right ACTS Thrusters	Null 1°/sec roll rate
35	T1+125		A	5.10.1		End Task	
36	T1+125	03	A	5.10.1	X	Select ACTS LVOP Mode	
37	T1+125	03	A	5.10.1	X	(01) Set ACTS ATT CNTL Norm SW-LVOP	
38	T1+128		A	5.10.1		End Task	
39	T1+125	60	Y	5.1.1		Evaluate Orbit	
40	T1+125	60	Y	5.1.1		(01) Monitor Guidance Displays	
41	T1+185		Y	5.1.1		End Task	
42	T1+185	649	Y	5.1.4		Perform Reentry Module Loading And Verify	
43	T1+185	05	B	5.1.4	X	(01) Rotate Comp Mode SW-STBY	
44	T1+190	05	B	5.1.4	X	(02) Rotate ATM Mode Select-STBY	
45	T1+195	03	B	5.1.4	X	(03) Set ATM Power SW-On RES	
46	T1+198	10	B	5.1.4	X	(04) Verify Comp LT-On	
47	T1+208	05	B	5.1.4	X	(05) Rotate ATM Mode Select-Auto	
48	T1+213	10	B	5.1.4	X	(06) Insert O3XXX03 In MDIU	
49	T1+223	08	B	5.1.4	X	(07) Depress MDRU Enter Button	Momentary SW Dur. time includes 5 sec. for display to enter
50	T1+231	05	B	5.1.4		(08) Verify Comp LT Off	
51	T1+236	20	B	5.1.4		(09) Verify FWD-AFT And R-L IVI Channels Zero	
52	T1+256	05	B	5.1.4		(10) Verify ATM Run LT On	
53	T1+261	05	Y	5.1.4		(11) Verify R-L IVI is Displaying TPW'S of Module Preceding Reentry Module	

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TITLE ACTIVATE AND CHECKOUT OV SYSTEMS-PRE TRANSFER

ITEM NO.	START TIME	DUR SEC	CM	TASK NO.	CMD NO.	TASK, TASK ELEMENT/FUNCTION STATE	DESCRIPTION/REMARKS
54	T <sub>1</sub> +266	05	B	5.1.4		(12) Verify Comp LT On	
55	T <sub>1</sub> +271	05	Y	5.1.4		(13) Verify FWD-AFT IVI is Displaying 004	
56	T <sub>1</sub> +276	300	Y	5.1.4		(14) Verify R-L IVI is Displ. Correct TPW'S	
57	T <sub>1</sub> +576	05	Y	5.1.4		(15) Verify R-L IVI is Displaying Reentry Mode Last TPW	
58	T <sub>1</sub> +581	20	Y	5.1.4		(16) Verify R-L IVI Zeros	
59	T <sub>1</sub> +601	10	B	5.1.4		(17) Verify ATM Run LT On	
60	T <sub>1</sub> +611	05	Y	5.1.4		(18) Verify R-L IVI is Displaying TPW'S of Module Preceding the Reentry Module	
61	T <sub>1</sub> +616	180	Y	5.1.4		(19) Verify R-L IVI is Displ. Correct TPW'S	
62	T <sub>1</sub> +796	05	B	5.1.4		(20) Verify Comp LT Off	
63	T <sub>1</sub> +801	10	B	5.1.4		(21) Verify ATM Run LT Off	
64	T <sub>1</sub> +811	10	Y	5.1.4		(22) Verify R-L IVI is Displaying Reentry Module Last TPW	
65	T <sub>1</sub> +821	05	B	5.1.4	X	(23) Rotate ATM Mode Select-STBY	
66	T <sub>1</sub> +826	03	B	5.1.4	X	(24) Set ATM Power SW-Off	
67	T <sub>1</sub> +829	05	B	5.1.4		(25) Verify Comp LT On	
68	T <sub>1</sub> +834		B	5.1.4		End Task	
69	T <sub>1</sub> +235	115	A	5.9.4		Manage Environmental Control System	
70	T <sub>1</sub> +235	10	A	5.9.4		(01) Stow ARM Restraints	
71	T <sub>1</sub> +245	10	A	5.9.4		(02) Release and Secure Lap Belt	
72	T <sub>1</sub> +255	20	A	5.9.4		(03) Disconnect Parachute Risers	
73	T <sub>1</sub> +275	30	A	5.9.4		(04) Turn Around in Seat	
74	T <sub>1</sub> +305	05	A	5.9.4	X	(05) Set Reg. By-Pass Valve-Off	
75	T <sub>1</sub> +310	20	A	5.9.4		(06) Assume Seat Position	
76	T <sub>1</sub> +330	20	A	5.9.4		(07) Fasten Lap Belt	
77	T <sub>1</sub> +350		A	5.9.4		End Task	
78	T <sub>1</sub> +834	32	Y	5.1.4		Deactivate Inertial Guidance Sys.	
79	T <sub>1</sub> +834	03	A	5.1.4	X	(01) Set Left ATT IND LT SW-Off	
80	T <sub>1</sub> +837	03	A	5.1.4	X	(02) Set Left ATT IND SW-Off	
81	T <sub>1</sub> +840	03	A	5.1.4	X	(03) Set Event Timer SW-Stop	
82	T <sub>1</sub> +834	03	B	5.1.4	X	(04) Set Right ATT IND LT SW-Off	
83	T <sub>1</sub> +837	03	B	5.1.4	X	(05) Set Right ATT IND SW-Off	
84	T <sub>1</sub> +840	03	B	5.1.4	X	(06) Set MDIU PWR SW-Off	
85	T <sub>1</sub> +843	03	B	5.1.4	X	(07) Set Computer PWR SW-Off	
86	T <sub>1</sub> +846	05	B	5.1.4	X	(08) Rotate Plat Mode Select-Off	
87	T <sub>1</sub> +851	03	B	5.1.4	X	(09) Set Pitch Rate Gyros SW-Off	

O<sub>2</sub> Partial press. reaches 3.5 PSI

Start time same as (01)

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ITEM NO.	START TIME	DUR SEC	CM	TASK NO.	CMD NO.	TASK, TASK ELEMENT/FUNCTION STATE	DESCRIPTION/REMARKS
88	T <sub>1</sub> +854	03	B	5.1.4	X	(10) Set Yaw Rate Gyros SW-Off	
89	T <sub>1</sub> +857	03	B	5.1.4	X	(11) Set Roll Rate Gyros SW-Off	
90	T <sub>1</sub> +860	03	B	5.1.4	X	(12) Set RCS ATT CNTL SW-Off	
91	T <sub>1</sub> +863	03	B	5.1.4	X	(13) Set AC PWR SW-Off	
92	T <sub>1</sub> +866		D	5.1.4		End Task	
93	T <sub>1</sub> +866	30	B	5.9.1		Switch Elect Power (GB To IM)	
94	T <sub>1</sub> +866	20	B	5.9.1		(01) Monitor IM Voltmeter	
95	T <sub>1</sub> +866	05	B	5.9.1	X	(02) Rotate GB PSM Select-Sub	Start time same as (01)
96	T <sub>1</sub> +871	03	B	5.9.1		(03) Set Sub Bus PWR SW-Lab	
97	T <sub>1</sub> +874	10	B	5.9.1		(04) Verify Sub Bus PWR Normal	
98	T <sub>1</sub> +884	03	B	5.9.1	X	(05) Set Main Reentry Batt. No. 1-Off	
99	T <sub>1</sub> +887	03	B	5.9.1	X	(06) Set Main Reentry Batt. No. 2-Off	
100	T <sub>1</sub> +890	03	B	5.9.1	X	(07) Set Main Reentry Batt. No. 3-Off	
101	T <sub>1</sub> +893	03	B	5.9.1	X	(08) Set Main Reentry Batt. No. 4-Off	
102	T <sub>1</sub> +896		B	5.9.1		End Task	
103	T <sub>1</sub> +896		Y	5.9.4		Perform Post Insertion Activities	
104	T <sub>1</sub> +896	10	B	5.9.4		(01) Stow ARM Restraints	
105	T <sub>1</sub> +906	10	Y	5.9.4		(02) Adjust Lap Belt	
106	T <sub>1</sub> +916	20	B	5.9.4		(03) Disconnect Parachute Risers	
107	T <sub>1</sub> +916	05	A	5.9.4	X	(04) Rotate Suit Loop Select-No. 1	Start time same as (03)
108	T <sub>1</sub> +921	05	A	5.9.4	X	(05) Set Sec Loop Pump SW-Off	
109	T <sub>1</sub> +926	05	A	5.9.4	X	(06) Open RECIRC Valve	
110	T <sub>1</sub> +931	10	Y	5.9.4	X	(07) Open ABS Press CNTRLR on PSA	
111	T <sub>1</sub> +941	20	Y	5.9.4		(08) Stow D Ring	
112	T <sub>1</sub> +961	30	Y	5.9.4	X	(09) Install Drogue Pins	
113	T <sub>1</sub> +991		Y	5.9.4		End Task	
114	T <sub>1</sub> +991	8384	Y	5.9.4		Monitor FV Systems	
115	T <sub>1</sub> +991	8384	Y	5.9.4		(01) Monitor all FV Sys. Displays	
116	T <sub>1</sub> +9375		Y	5.9.4		End Task	
117	T <sub>1</sub> +2616	472	Y	3.9.2		Perform Communications With Ground Station	
118	T <sub>1</sub> +2616	03	Y	3.9.2	X	(01) Set VHF SW-No. 1	Transceiver warm up time 30 sec
119	T <sub>1</sub> +2649	03	Y	3.9.2	X	(02) Depress PTT Button and Hold	Assume estimate 25% of the time within the ground station tracking cone
120	T <sub>1</sub> +2652	430	Y	3.9.2		(03) Communicate with Ground Sta.	

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TITLE ACTIVATE AND CHECKOUT OV SYSTEMS--PRE TRANSFER

ITEM NO.	START TIME	DUR SEC	CM	TASK NO.	CMD NO.	TASK, TASK ELEMENT/FUNCTION STATE	DESCRIPTION/REMARKS
121	T <sub>1</sub> +3082	03	Y	3.9.2	X	(04) Release PTT Button	Transceiver warm up time 30 sec Assume estimate 25% of the time within the ground station tracking cone
122	T <sub>1</sub> +3085	03	Y	3.9.2	X	(05) Set VHF SW-Off	
123	T <sub>1</sub> +3088		Y	3.9.2		End Task	
124	T <sub>1</sub> +4269	146	Y	3.9.2	X	Perform Communications with Ground Station	
125	T <sub>1</sub> +4269	03	Y	3.9.2	X	(01) Set VHF SW-No. 1	
126	T <sub>1</sub> +4272	03	Y	3.9.2	X	(02) Depress PTT Button and Hold	
127	T <sub>1</sub> +4275	104	Y	3.9.2	X	(03) Communicate with Ground Station	
128	T <sub>1</sub> +4379	03	Y	3.9.2	X	(04) Release PTT Button	
129	T <sub>1</sub> +4382	03	Y	3.9.2	X	(05) Set VHF SW-Off	
130	T <sub>1</sub> +4385		Y	3.9.2		End Task	
131	T <sub>1</sub> +4599	312	Y	3.9.2	X	Perform Communications with Ground Station	
132	T <sub>1</sub> +4599	03	Y	3.9.2	X	(01) Set VHF SW-No. 1	
133	T <sub>1</sub> +4632	03	Y	3.9.2	X	(02) Depress PTT Button and Hold	
134	T <sub>1</sub> +4635	270	Y	3.9.2	X	(03) Communicate with Ground Station	Transceiver warm up time 30 sec Assume Estimate 25% of the time within the ground station tracking cone Verification to Transfer to IM
135	T <sub>1</sub> +4905	03	Y	3.9.2	X	(04) Release PTT Button	
136	T <sub>1</sub> +4908	03	Y	3.9.2	X	(05) Set VHF SW-Off	
137	T <sub>1</sub> +4911		Y	3.9.2		End Task	