In Column 1
* = Required
; = Comment or redundant
+ = Other

This sequence listing has been sync's with the DESC_FM.08F file containing the information used to program the instrument.

Name = **TITAN011**
March 25, 1997
John Haberman
NASA/GSFC, Code 915
L. Frost:: desc_fm.08f
(dated 7-March-1997)

Revisions:	
3/29/2004	
typos fixed	
Add Comments	

Huygens Titan Mission Sampling Sequence

	Time	Operation	Comments		Time (sec)
*	0:00:00	**Sequence START**	*Start MS Instrument (Detection may require 2 sec.)*	Colored Divisions relate to the Yelle Fast Entry Timeline (T4-FAST)	0.0
+	0:00:00	Enable Valves	*(30 commands, 1 for each valve)*		0.0
+	0:00:00	Enable Heaters			0.0
+	0:00:00	Disable GC Heaters			0.0
+	0:00:00	Enable Filaments			0.0
+	0:00:00	Enable Ion Pumps			0.0
+	0:00:00	Set for Direct MS ONLY			0.0
+	0:00:00	Set Hi-Res Scans	*Hi-Res Scan every 320 Scans (each 2 - 141 scan ~ 970 ms)*		0.0
+	0:00:00	IP1, IP2 & IP3 ON	*Ion Pumps ON*		0.0
*	0:00:00	HA OFF	ACP Transfer Line Heater OFF		0.0
*	0:00:00	HE OFF	EC Heater OFF		0.0
*	0:00:00	HGC1 OFF	GC Column 1 Heater OFF		0.0
*	0:00:00	HGC2 OFF	GC Column 2 Heater OFF		0.0
*	0:00:00	HGC3 OFF	GC Column 3 Heater OFF		0.0
*	0:00:00	VL1 Close	Inlet to IS1 (Large Leak)		0.0
*	0:00:01	VD1 Open	Inlet to Manifold		1.0
*	0:00:02	VL2 Close	Inlet to IS1 (Small Leak)		2.0
*	0:00:03	VD2 Open	Manifold to Outlet		3.0
*	0:00:04	VL4 Close	ACP Line to IS2		4.0
*	0:00:05	VV Open	EC/RG Cell to Expansion Volume		5.0
*	0:00:06	VX Close	GC to Vent		6.0
+	0:00:07	IP4, IP5 & IP6 ON	*Ion Pumps ON*		7.0
*	0:00:08	VC1 Open	GC to IS3		8.0
+	0:00:09	IS1 (Fil 1) ON			9.0
*	0:00:10	VC2 Open	GC to IS4		10.0
+	0:00:11	IS2 (Fil 2) ON			11.0
*	0:00:12	VC3 Open	GC to IS5		12.0
+	0:00:13	IS3 (Fil 3) ON			13.0
*	0:00:14	VZ Close	Inlet to IS1 (Large Leak)		14.0
+	0:00:15	IS4 (Fil 4) ON			15.0
*	0:00:16	VS7 Close	Inlet to Enrichment Cell (EC)		16.0
+	0:00:17	IS5 (Fil 5) ON			17.0
*	0:00:18	VE Close	EC to RG Cell		18.0
*	0:00:20	VL3 Close	RG Cell to IS1		20.0
;	0:00:21	HE OFF	EC Heater OFF		21.0
*	0:00:22	VD3 Close	Inlet to H2 Storage System		22.0
*	0:00:23	HI ON	Inlet Line Heaters ON		23.0

Note:
The cruise position for ALL VALVES is OPEN. Valves are NEVER OPERATED prior to To!

Note:
A minimum of 2 seconds is recommended between same direction valve operations.

These steps define the initial valve configuration.

144 km
2.8 mBars

Note: VC1, VC2 & VC3 operations are permanently disabled (6-May-1997)

Huygens Titan Mission Sampling Sequence

	Time	Operation	Comments	Time (sec)
*	0:00:24	VD4 Close	H2 Storage System to GC	24.0
*	0:00:26	VS6 Close	ACP Line to GC	26.0
*	0:00:28	VS5 Close	Inlet Manifold to GC	28.0
*	0:00:30	VG1 Close	SV1 to GC	30.0
*	0:00:32	VG2 Close	SV2 to GC	32.0
*	0:00:34	VG3 Close	SV3 to GC	34.0
*	0:00:36	VS1 Close	Inlet Manifold to SV1	36.0
*	0:00:38	VS2 Close	Inlet Manifold to SV2	38.0
*	0:00:40	VS3 Close	Inlet Manifold to SV3	40.0
*	0:00:41	VD6 Open	SV1 to G4 (Getter Pump)	41.0
*	0:00:42	VG Close	RG Cell to G3 (Getter Pump)	42.0
*	0:00:44	VAA Close	ACP Line to Vent (Large Leak)	44.0
*	0:00:46	VAB Close	ACP Line to Vent (Small Leak)	46.0
;				
*	0:00:50	INLET/OUTLET OPEN	OPEN INLET - SPACECRAFT!!!	50.0
;				
*	0:00:52	VZ Open	L1 to IS1	52.0
;	0:00:54	VZ Open		54.0
;	0:00:55	VG1 Close	SV1 to GC Columns	55.0
*	0:00:56	**VL1 Open**	Inlet to L1 to IS1	56.0
;	0:00:57	HI On	Inlet Heater	57.0
;	0:00:58	VL1 Open		58.0
;	0:00:58	VG1 Close	SV1 to GC Columns	58.0
;	0:01:00	VD6 Open	G4 to SV1	60.0
;				
;	0:15:30	VC1 Open	GC to IS3	930.0
;	0:15:32	VD1 Open	Inlet to Manifold	932.0
;	0:15:34	VC2 Open	GC to IS4	934.0
;	0:15:38	VD2 Open	Manifold to Outlet	938.0
;	0:15:42	VC3 Open	GC to IS5	942.0
;	0:15:46	VV Open	EC/RG Cell to Expansion Volume	946.0
;	0:15:50	VX Close	GC to Vent	950.0
;	0:15:56	VL4 Close	ACP Line to IS2	956.0
;	0:16:00	VL2 Close	Inlet to IS1 (Small Leak)	960.0
;	0:16:04	VL1 Open	Inlet to IS1 (Large Leak)	964.0
;	0:16:08	VZ Open	Inlet to IS1 (Large Leak)	968.0
;	0:16:12	VS7 Close	Inlet to Enrichment Cell (EC)	972.0
;	0:16:16	VE Close	EC to RG Cell	976.0
;	0:16:20	VL3 Close	RG Cell to IS1	980.0
;	0:16:24	VD3 Close	Inlet to H2 Storage System	984.0
;	0:16:28	VD4 Close	H2 Storage System to GC	988.0
;	0:16:32	VS6 Close	ACP Line to GC	992.0
;	0:16:36	VS5 Close	Inlet Manifold to GC	996.0

138 km
3.3 mBars

MS Instrument is isolated from Inlet line until
6 sec. after Inlet/Outlet Open to prevent contamination?

Resend IP ON and HI ON commands every 5 minutes.

"Excessively Redundant" (as defined by engineers!) valve operations have been removed.

Huygens Titan Mission Sampling Sequence

	Time	Operation	Comments	Time (sec)
;	0:16:40	VG1 Close	SV1 to GC	1000.0
;	0:16:44	VG2 Close	SV2 to GC	1004.0
;	0:16:48	VG3 Close	SV3 to GC	1008.0
;	0:16:52	VS1 Close	Inlet Manifold to SV1	1012.0
;	0:16:56	VS2 Close	Inlet Manifold to SV2	1016.0
;	0:17:00	VS3 Close	Inlet Manifold to SV3	1020.0
;	0:17:04	VD6 Open	SV1 to G4 (Getter Pump)	1024.0
;	0:17:08	VG Close	RG Cell to G3 (Getter Pump)	1028.0
;	0:17:12	VAA Close	ACP Line to Vent (Large Leak)	1032.0
;	0:17:16	VAB Close	ACP Line to Vent (Small Leak)	1036.0
;				
;	0:24:50	VL3 Close	RG Cell to L3 to IS1	1490.0
;	0:24:51	VV Open	Expansion Volume	1491.0
;	0:24:52	VL3 Close		1492.0
*	0:24:53	VE Open	EC to RG Cell	1493.0
;	0:24:54	VG Close	RG Cell to G3 (Getter Pump)	1494.0
;	0:24:55	VV Open		1495.0
;	0:24:56	VG Close		1496.0
;	0:24:58	VE Open		1498.0
*	0:25:00	**VS7 Open**	Inlet Manifold to EC Volume	1500.0
;	0:25:02	VL3 Close		1502.0
;	0:25:03	VS7 Open		1503.0
*	0:25:45	**VS7 Close**	Inlet Manifold to EC Volume	1545.0
;	0:25:47	VS7 Close		1547.0
;				
;	0:25:49	VV Close	RG Cell to Expansion Volume	1549.0
*	0:25:50	VG Open		1550.0
;	0:25:51	VV Close		1551.0
;	0:25:52	VG Open		1552.0
*	0:28:00	VE Close	EC to RG Cell	1680.0
*	0:28:00	HE ON	EC Heater (is on Protected Power Line won't start until 29:00 minutes)	1680.0
;	0:28:02	VE Close		1682.0
;				
*	0:28:34	VD1 Close	Inlet to Sampling Manifold	1714.0
;	0:28:36	VD4 Close	H2 line to GC	1716.0
;	0:28:37	VD2 Open	Manifold to GC	1717.0
;	0:28:38	VD3 Close	H2 line to sampling manifold	1718.0
;	0:28:40	VG3 Close	SV3 to GC	1720.0
;	0:28:42	VG2 Close	SV2 to GC	1722.0
;	0:28:46	VX Close	GC Column Vent	1726.0
;	0:28:48	VS5 Close	Direct Injection Path	1728.0

Collect RG-EC Sample
68 km
27 mBars
(45 sec.)

Pump the residual gas.
Process (heat) the EC1 Sample

Huygens Titan Mission Sampling Sequence

	Time	Operation	Comments	Time (sec)
;	0:28:50	VS1 Close	Manifold to SV1	1730.0
;	0:28:52	VS2 Close	Manifold to SV2	1732.0
;	0:28:54	VS3 Close	Manifold to SV3	1734.0
;	0:28:56	VS6 Close	ACP to GC Link	1736.0
;	0:28:58	VD1 Close	Inlet to Sampling Manifold	1738.0
+	0:29:00		*PROTECTED POWER ON (EC Heater comes ON Here!)*	1740.0
;	0:29:00	VD4 Close		1740.0
;	0:29:01	VD2 Open		1741.0
;	0:29:02	VD3 Close		1742.0
;	0:29:04	VG3 Close		1744.0
;	0:29:06	VG2 Close		1746.0
;				
*	0:29:08	**VL1 Close**		1748.0
;	0:29:10	VL1 Close		1750.0
;				
*	0:29:19	**IV Open**	***Start H2 flow***	1759.0
;	0:29:23	IV Open		1763.0
;	0:29:24	VS5 Close		1764.0
*	0:29:25	VD3 Open	Vent the first 'slug' of H2	1765.0
;	0:29:26	VS1 Close		1766.0
;	0:29:27	IV Open		1767.0
;	0:29:28	VS2 Close		1768.0
;	0:29:29	VD3 Open		1769.0
;	0:29:30	VS3 Close		1770.0
;	0:29:32	VS6 Close		1772.0
*	0:29:34	VD3 Close	END H2 Venting	1774.0
*	0:29:35	VD4 Open	Pressurize GC Line	1775.0
;	0:29:36	VD3 Close		1776.0
*	0:29:37	VD1 Open		1777.0
;	0:29:39	VD4 Open		1779.0
;	0:29:41	VD1 Open		1781.0
;	0:29:52	VL4 Close	ACP Line to IS2	1792.0
;	0:29:54	VL2 Close	Inlet to IS1 (Small Leak)	1794.0
;	0:29:56	VL3 Close	RG/EC to L3 to IS1	1796.0
;	0:29:58	VS7 Close	Inlet to EC/RG Cell	1798.0
*	0:30:00	VZ Close	Leak 1 to MS (IS1)	1800.0
;	0:30:02	VZ Close		1802.0
*	0:30:04	VX Open	GC Column Vent	1804.0
;	0:30:06	VX Open		1806.0
;				
*	0:31:18	VG Close	G3 to RG Sample	1878.0
;	0:31:20	VG Close		1880.0

MS Background Analysis
tbd km
tbd mBars

Start the hydrogen gas flow. Pressurize the GC Columns System.

Vent H2 for 9 sec.

Pressurize GC line with H2 for 29 sec. before starting flow.

Huygens Titan Mission Sampling Sequence

	Time	Operation	Comments	Time (sec)
;	0:31:24	VE Close	EC to RG Cell	1884.0
;	0:31:24	HE ON	EC Cell Heater	1884.0
;	0:31:26	VV Close	RG Cell to Expansion Volume	1886.0
;	0:31:26	HE ON		1886.0
;				
*	0:31:29	**VL3 Open**	RG to MS (IS1)	1889.0
;	0:31:30	VG Close		1890.0
;	0:31:30	HE ON	EC Heater	1890.0
;	0:31:32	VL3 Open		1892.0
;	0:32:56	VV Close	RG Cell to Expansion Volume	1976.0
;	0:32:56	HE ON	EC Heater	1976.0
*	0:33:00	**VE Open**	EC & RG to MS (IS1)	1980.0
;	0:33:01	VV Close		1981.0
;	0:33:02	VE Open		1982.0
;	0:33:40	VC1 Open		2020.0
;	0:33:42	VD1 Open		2022.0
;	0:33:44	VC2 Open		2024.0
;	0:33:46	VD2 Open		2026.0
;	0:33:48	VC3 Open		2028.0
;	0:33:50	VD4 Open		2030.0
;	0:33:57	IV Open		2037.0
;	0:33:58	VS6 Close		2038.0
;	0:34:10	VD3 Close		2050.0
;	0:34:12	VL1 Close		2052.0
;	0:34:14	VZ Close		2054.0
;	0:34:16	VL2 Close		2056.0
;	0:34:18	VS7 Close		2058.0
;	0:34:20	VL4 Close		2060.0
;	0:34:22	VS1 Close		2062.0
;	0:34:24	VS2 Close		2064.0
;	0:34:26	VS3 Close		2066.0
*	0:34:30	**VL3 Close**	Background #2	2070.0
*	0:34:31	VG Open	RG Volume to Getter (G3)	2071.0
;	0:34:31	HE OFF	EC Heater OFF	2071.0
;	0:34:32	VL3 Close		2072.0
;	0:34:33	VG Open		2073.0
;	0:34:33	HE OFF		2073.0
*	0:34:34	VE Close	EC to RG Cell	2074.0
;	0:34:36	VE Close		2076.0
*	0:34:55	VAA Open	ACP Flow Unrestricted Line	2095.0
;	0:34:57	VAA Open		2097.0
*	0:35:05	**IVA Open**	ACP to GC-MS Isolation Valv	2105.0
;	0:35:09	IVA Open		2109.0

Prepare for Rare Gas Analysis

RG Cell: 91 sec.

Enrichment Cell + Rare Gas for 90 sec.

Open ACP to GC-MS transfer line. ACP will purge

Instrument Ba

Huygens Titan Mission Sampling Sequence

	Time	Operation	Comments	Time (sec)
*	0:35:09	HA ON	ACP Line Heater	2109.0
*	0:35:11	VAB Open	ACP Flow Restricted Line	2111.0
;	0:35:15	VAB Open		2115.0
;	0:35:18	IVA Open		2118.0
;	0:35:18	HA ON		2118.0
;	0:35:20	VL1 Close		2120.0
;	0:35:22	VE Close		2122.0
;	0:35:23	VG Open		2123.0
;	0:35:24	VL3 Close		2124.0
;	0:35:25	VAA Open		2125.0
;	0:35:26	VL4 Close		2126.0
;	0:35:27	VAB Open		2127.0
;	0:35:29	VC1 Open		2129.0
;	0:35:31	VD6 Open		2131.0
;	0:35:33	VC2 Open		2133.0
;	0:35:35	VD1 Open		2135.0
;	0:35:37	VC3 Open		2137.0
;	0:35:39	VD2 Open		2139.0
;	0:35:46	VG1 Close		2146.0
;	0:35:58	VV Close		2158.0
*	0:36:00	**VL2 Open**	Inlet to MS via DIRECT LEAK 2	2160.0
+	0:36:00		*Enable GC Heaters*	2160.0
;	0:36:00	HI ON	INLET Heaters	2160.0
*	0:36:00	GC Heaters ON	GC Heaters ON	2160.0
;	0:36:02	VL2 Open		2162.0
;	0:36:02	GC Heaters ON		2162.0
;				
;	0:37:58	VD4 Open		2278.0
;	0:38:00	VX Open		2280.0
;	0:38:01	VG2 Close		2281.0
;	0:38:02	VX Open		2282.0
;	0:38:03	VG3 Close		2283.0
;	0:38:10	VD2 Open		2290.0
*	0:38:11	VD1 Close		2291.0
;	0:38:12	VD2 Open		2292.0
;	0:38:14	VD4 Open		2294.0
*	0:38:16	VS5 Open		2296.0
*	0:38:21	VS5 Close		2301.0
;	0:38:23	VS5 Close		2303.0
*	0:38:25	VD3 Open		2305.0
*	0:38:30	VD3 Close		2310.0
*	0:38:31	VD1 Open		2311.0
;	0:38:32	VD3 Close		2312.0

the line with nitrogen?

ckground: 90 sec.

Direct Leak 2 Sampling Start 50 km 72 mBars

Vent hydrogen for 5 sec. via. VS5

Vent hydrogen via. VD3 for 5 sec.

Huygens Titan Mission Sampling Sequence

	Time	Operation		Comments	Time (sec)
;	0:38:33	VD1 Open			2313.0
;	0:38:40	VX Open			2320.0
;	0:38:41	VD3 Close			2321.0
;	0:38:42	VX Open			2322.0
;	0:38:43	VS5 Close			2323.0
;	0:38:44	VC1 Open			2324.0
;	0:38:46	VC2 Open			2326.0
;	0:38:48	VC3 Open			2328.0
;					
*	0:38:52	VD6 Close		G4 to SV3	2332.0
;	0:38:54	VD6 Close			2334.0
;	0:38:58	VG3 Close			2338.0
*	0:39:00	**VS3 Open**	GC Sample #1	Inlet Manifold to SV3	2340.0
;	0:39:02	VS3 Open			2342.0
;	0:39:25			***Disable Hi-Res on Direct***	2365.0
+	0:39:28	IS1, IS3, IS4, IS5		*Direct & GCs*	2368.0
;	0:39:30	**VS3 Close**		Inlet Manifold to SV3	2370.0
;	0:39:34	VS3 Close			2374.0
;	0:39:37	VD6 Close			2377.0
;	0:39:41	VS1 Close			2381.0
;	0:39:44	VS2 Close			2384.0
;	0:39:48	VS6 Close			2388.0
;	0:39:49	VX Open			2389.0
*	0:39:50	VD1 Close		Inlet to Manifold	2390.0
;	0:39:52	VD1 Close			2392.0
*	0:39:53	VD3 Open		H2 source to Manifold	2393.0
*	0:39:54	VD2 Close		Manifold to Instrument Vent	2394.0
;	0:39:55	VD3 Open			2395.0
;	0:39:56	VD2 Close			2396.0
*	0:39:57	VS3 Open		Manifold to SV3	2397.0
*	0:39:58	VD4 Close		H2 Source to GC Line	2398.0
+	0:40:00	Hi-Res every 320 scans		***Enable Hi-Res Scans (IS1 only?)***	2400.0
*	0:40:00	**VG3 Open**		**GC Sample INJECTION**	2400.0
*	0:40:01	**VG3 Close**		SV1 to GC Columns	2401.0
*	0:40:02	VD4 Open		H2 to GC Lines	2402.0
;	0:40:04	VG3 Close			2404.0
*	0:40:06	VS3 Close		Manifold to SV3	2406.0
;	0:40:07	VD4 Open			2407.0
*	0:40:08	VD3 Close		H2 Reservoir to Manifold	2408.0
*	0:40:09	VD2 Open		Manifold to Instrument Vent	2409.0
;	0:40:10	VS3 Close			2410.0
;	0:40:11	VD2 Open			2411.0

Collect GC Sample for 30 sec.

--FAST--
47 km
90 mBars

-SLOW-
55 km
54 mBar

Pressurize the manifold with hydrogen to force the sample into the GC Column

First GC Sample, 1 s injection

Huygens Titan Mission Sampling Sequence

	Time	Operation	Comments	Time (sec)
;	0:40:12	VD3 Close		2412.0
*	0:40:13	VD1 Open	Inlet to GC Sampling Manifold	2413.0
;	0:40:14	VS3 Close		2414.0
;	0:40:15	VD1 Open		2415.0
;				
;	0:52:28	VG2 Close	SV2 to GC Manifold	3148.0
*	0:52:30	**VS2 Open**	Inlet Manifold to SV2	3150.0
;	0:52:32	VS2 Open		3152.0
*	0:53:00	**VS2 Close**	Inlet Manifold to SV2	3180.0
;	0:53:02	VS2 Close		3182.0
;				
;	0:53:13	VS2 Close	Manifold to SV2	3193.0
;	0:53:19	VS6 Close	ACP Line to GC	3199.0
;	0:53:20	VX Open	GC Column Vent	3200.0
*	0:53:21	VD1 Close	Inlet to Manifold	3201.0
;	0:53:23	VD1 Close		3203.0
*	0:53:24	VD3 Open	H2 source to Manifold	3204.0
*	0:53:25	VD2 Close	Manifold to Instrument Vent	3205.0
;	0:53:26	VD3 Open		3206.0
;	0:53:27	VD2 Close		3207.0
*	0:53:28	VS2 Open	Manifold to SV2	3208.0
;	0:53:29	VD4 Close	H2 Source to GC Line	3209.0
+	0:53:29		***Disable Hi-Res Scans***	3209.0
*	0:53:30	**VG2 Open**	GC Sample INJECTION	3210.0
*	0:53:31	**VG2 Close**	SV2 to GC Columns	3211.0
+	0:53:31		***Enable Hi-Res Scans***	3211.0
*	0:53:32	VD4 Open	H2 to GC Lines	3212.0
;	0:53:34	VG2 Close		3214.0
*	0:53:36	VS2 Close	Manifold to SV2	3216.0
;	0:53:37	VD4 Open		3217.0
*	0:53:38	VD3 Close	H2 Reservoir to Manifold	3218.0
*	0:53:39	VD2 Open	Manifold to Instrument Vent	3219.0
;	0:53:40	VS2 Close		3220.0
;	0:53:41	VD2 Open		3221.0
;	0:53:42	VD3 Close		3222.0
*	0:53:43	VD1 Open	Inlet to GC Sampling Manifold	3223.0
;	0:53:44	VS1 Close		3224.0
;	0:53:45	VD1 Open		3225.0
;				
;	0:59:00	HA ON	ACP Transfer line Heater	3540.0
;	0:59:00	GC Heaters ON	GC Heaters	3540.0
;	0:59:10	HA ON		3550.0
;	0:59:10	GC Heaters ON		3550.0

--FAST--
Collect GC Sample
35 km
192 mBars
(30 sec.)

-SLOW-
41 km
129 mBar

Pressurize the manifold with hydrogen to force the sample into the GC Column

Second GC Sample, 1 second injection

Vent the ACP transfer line.

Huygens Titan Mission Sampling Sequence

	Time	Operation	Comments		Time (sec)
;	1:03:00	VAA Open	ACP Unrestricted Vent		3780.0
*	1:04:00	VAA Close		26 km 324 mBars	3840.0
;	1:04:02	VAA Close			3842.0
*	1:04:04	VAB Close	ACP Restricted Vent		3844.0
;	1:04:06	VAB Close			3846.0
+	1:04:46	IS2 ONLY	***ACP***		3886.0
+	1:04:46		***No Hi-Res!***	ACP Ambient Temp. MS Sample	3886.0
;			***ACP Sample #1***		
*	1:04:56	**VL4 Open**	ACP to GC-MS IS2		3896.0
*	1:04:56	***OPEN SYNC WINDOW***			3896.0
*	1:05:01	VAB Open	VAB Open	3901.000	
*	1:05:01	VAB Close	VAB Close	3901.875	
*	1:05:06	VAB Open	VAB Open	3906.625	
*	1:05:07	VAB Close	VAB Close	3907.500	
*	1:05:12	VAB Open	VAB Open	3912.250	
*	1:05:13	VAB Close	VAB Close	3913.125	
*	1:05:17	VAB Open	VAB Open	3917.875	
*	1:05:18	VAB Close	VAB Close	3918.750	
*	1:05:23	VAB Open	VAB Open	3923.500	
*	1:05:24	VAB Close	VAB Close	3924.375	
*	1:05:29	VAB Open	VAB Open	3929.125	
*	1:05:30	VAB Close	VAB Close	3930.000	
*	1:05:35	VAA Open	VAA Open	3935.750	
*	1:05:40	VAA Close	VAA Close	3940.750	
*	1:05:43	VAB Open	VAB Open	3943.875	
*	1:05:44	VAB Close	VAB Close	3944.625	
*	1:05:49	VAB Open	VAB Open	3949.500	
*	1:05:50	VAB Close	VAB Close	3950.250	
*	1:05:56	VAA Open	VAA Open	3956.375	
*	1:06:01	VAA Close	VAA Close	3961.375	
*	1:06:10	***CLOSE SYNC WINDOW***			3970.0
*	1:06:10	**VL4 Close**	ACP to GC-MS IS2		3970.0
;					
+	1:06:10	IS1, IS2, IS3, IS4, IS5	***Direct Leak 2, GCs & ACP***		3970.0
;	1:06:12	VL4 Close			3972.0
;					
+	1:07:46	IS2 ONLY	***ACP***		4066.0
+	1:07:50		*Raise GC3 Temp to 70°*		4070.0
*	1:07:56	**VL4 OPEN**	ACP to GC-MS IS2		4076.0
*	1:07:56	***OPEN SYNC WINDOW***			4076.0
*	1:08:01	VAB Open	VAB Open	4081.000	
*	1:08:01	VAB Close	VAB Close	4081.875	
*	1:08:06	VAB Open	VAB Open	4086.625	

Actual time will be controlled by the SYNC pulses from the ACP Instrument.

Vent & Purge the ACP to GC-MS transfer line

ACP 250° Sample to MS Timing determined by ACP provided

Huygens Titan Mission Sampling Sequence

	Time	Operation	Comments		Time (sec)
*	1:08:07	VAB Close	VAB Close	4087.500	
*	1:08:12	VAB Open	VAB Open	4092.250	
*	1:08:13	VAB Close	VAB Close	4093.125	
*	1:08:17	VAB Open	VAB Open	4097.875	
*	1:08:18	VAB Close	VAB Close	4098.750	
*	1:08:23	VAB Open	VAB Open	4103.500	
*	1:08:24	VAB Close	VAB Close	4104.375	
+	1:08:27		***Forced Low IP (eV)***		4107.375
*	1:08:29	VAB Open	VAB Open	4109.125	
*	1:08:30	VAB Close	VAB Close	4110.000	
*	1:08:35	VAA Open	VAA Open	4115.750	
*	1:08:40	VAA Close	VAA Close	4120.750	
+	1:08:40		***Return to Standard IP (eV)***		4120.750
*	1:08:43	VAB Open	VAB Open	4123.875	
*	1:08:44	VAB Close	VAB Close	4124.625	
*	1:08:49	VAB Open	VAB Open	4129.500	
*	1:08:50	VAB Close	VAB Close	4130.250	
*	1:08:56	VAA Open	VAA Open	4136.375	
*	1:09:01	VAA Close	VAA Close	4141.375	
*	1:09:05	***CLOSE SYNC WINDOW***			4145.0
*	1:09:10	**VL4 Close**	ACP to GC-MS IS2		4150.0
;					
+	1:09:10	IS1, IS2, IS3, IS4 & IS5	***Direct Leak 2, GCs & ACP***		4150.0
;					
+	1:12:55	IS2, IS3, IS4 & IS5	***ACP & GCs***		4375.0
*	1:12:56	**VL4 OPEN**	ACP to GC-MS IS2		4376.0
*	1:12:56	***OPEN SYNC WINDOW***			4376.0
*	1:13:01	VAB Open		4381.000	
*	1:13:01	VAB Close		4381.875	
*	1:13:06	VAB Open		4386.625	
*	1:13:07	VAB Close		4387.500	
*	1:13:08	VS6 Open		4388.625	
*	1:13:08	VS6 Close		4388.725	
*	1:13:12	VAB Open		4392.250	
*	1:13:13	VAB Close		4393.125	
*	1:13:17	VAB Open		4397.875	
*	1:13:18	VAB Close		4398.750	
*	1:13:23	VAB Open		4403.500	
*	1:13:24	VAB Close		4404.375	
*	1:13:29	VAB Open		4409.125	
*	1:13:30	VAB Close		4410.000	
*	1:13:35	VAA Open		4415.750	
*	1:13:40	VAA Close		4420.750	

Actual time will be controlled by the SYNC pulses from the ACP Instrument.

Actual time will be controlled by the SYNC pulses from the ACP Instrument.

SYNC signals

Vent & Purge the ACP to GC-MS transfer line

ACP 650° Sample to MS

100 ms GC injection of ACP Sample

All timings relative to ACP provided SYNC Pulse

Vent & Purge the ACP to GC-MS

Huygens Titan Mission Sampling Sequence

	Time	Operation	Comments		Time (sec)
*	1:13:43	VAB Open	ACP to GC-MS transfer line	4423.875	
*	1:13:44	VAB Close		4424.625	
*	1:13:49	VAB Open		4429.500	
*	1:13:50	VAB Close		4430.250	
*	1:13:56	VAA Open		4436.375	
*	1:14:01	VAA Close		4441.375	
*	1:14:05	***CLOSE SYNC WINDOW***			4445.0
;					
+	1:14:05	IS1, IS2, IS3, IS4, IS5	***Direct Leak 2, GCs & ACP***		4445.0
+	1:14:05		***Begin Hi-Res on Direct***		4445.0
*	1:14:10	**VL4 Close**	ACP to GC-MS IS2		4450.0
;	1:14:12	VL4 Close			4452.0
;	1:14:14	VAA Close	ACP to Vent (Unrestricted)		4454.0
;	1:14:16	VAA Close			4456.0
;	1:14:18	VAB Close	ACP to Vent (Restricted)		4458.0
;	1:14:20	VAB Close			4460.0
;					
+	1:20:00	IS1, IS3, IS4 & IS5	***Direct Leak 2 & GCs***		4800.0
+	1:23:00		*Reduce GC3 to 40°*		4980.0
;	1:25:28	VG1 Close			5128.0
*	1:25:30	**VS1 Open**	Inlet Manifold to SV1	--FAST-- Collect GC Sample 16 km 610 mBars (30 sec.)	5130.0
;	1:25:32	VS1 Open		-SLOW- 21 km 458 mBar	5132.0
*	1:26:00	**VS1 Close**			5160.0
;	1:26:02	VS1 Close			5162.0
;					
;	1:26:11	VS1 Close	Manifold to SV1		5171.0
;	1:26:13	VS2 Close	Manifold to SV2	Pressurize the manifold with hydrogen to force the sample into the GC Column	5173.0
;	1:26:15	VS3 Close	Manifold to SV3		5175.0
;	1:26:17	VS5 Close	Direct GC Injection Path		5177.0
;	1:26:19	VS6 Close	ACP Line to GC		5179.0
;	1:26:20	VX Open	GC Column Vent		5180.0
*	1:26:21	VD1 Close	Inlet to Manifold		5181.0
+	1:26:21		***Disable Hi-Res***		5181.0
;	1:26:23	VD1 Close			5183.0
*	1:26:24	VD3 Open	H2 source to Manifold		5184.0
*	1:26:25	VD2 Close	Manifold to Instrument Vent		5185.0
;	1:26:26	VD3 Open			5186.0
;	1:26:27	VD2 Close			5187.0
*	1:26:28	VS1 Open	Manifold to SV1		5188.0
*	1:26:29	VD4 Close	H2 Source to GC Line		5189.0
*	1:26:30	**VG1 Open**	GC Sample INJECTION	Third GC Sample, 1 second injection	5190.0
*	1:26:31	**VG1 Close**	SV1 to GC Columns		5191.0
*	1:26:32	VD4 Open	H2 to GC Lines		5192.0

Huygens Titan Mission Sampling Sequence

	Time	Operation	Comments		Time (sec)
;	1:26:34	VG1 Close			5194.0
*	1:26:36	VS1 Close	Manifold to SV1		5196.0
;	1:26:37	VD4 Open			5197.0
*	1:26:38	VD3 Close	H2 Reservoir to Manifold		5198.0
*	1:26:39	VD2 Open	Manifold to Instrument Vent		5199.0
;	1:26:40	VS3 Close			5200.0
;	1:26:41	VD2 Open			5201.0
;	1:26:42	VD3 Close			5202.0
*	1:26:43	VD1 Open	Inlet to GC Sampling Manifold		5203.0
;	1:26:45	VD1 Open			5205.0
;					
;	1:26:45	HA ON	ACP Transfer line Heater		5205.0
*	1:37:00	VAA Open	ACP Unrestricted Vent	Vent the ACP transfer line.	5820.0
+	1:37:00		***No Hi-Res***		5820.0
;	1:37:02	VAA Open			5822.0
*	1:38:00	VAA Close	ACP Unrestricted Vent		5880.0
;	1:38:02	VAA Close			5882.0
;	1:38:04	VAB Close	ACP Restricted Vent		5884.0
;	1:38:06	VAB Close			5886.0
+	1:38:55	IS2 only	***ACP ONLY***	ACP Ambient Temp. MS Sample	5935.0
;			***ACP Sample #2***		
*	1:38:56	**VL4 OPEN**	ACP to GC-MS IS2		5936.0
*	1:38:56	***OPEN SYNC WINDOW***			5936.0
*	1:39:01	VAB Open		10 km 842 mBars	5941.000
*	1:39:01	VAB Close			5941.875
*	1:39:06	VAB Open			5946.625
*	1:39:07	VAB Close			5947.500
*	1:39:12	VAB Open			5952.250
*	1:39:13	VAB Close			5953.125
*	1:39:17	VAB Open			5957.875
*	1:39:18	VAB Close			5958.750
*	1:39:23	VAB Open			5963.500
*	1:39:24	VAB Close			5964.375
*	1:39:29	VAB Open			5969.125
*	1:39:30	VAB Close			5970.000
*	1:39:35	VAA Open			5975.750
*	1:39:40	VAA Close		Vent & Purge the ACP to GC-MS transfer line	5980.750
*	1:39:43	VAB Open			5983.875
*	1:39:44	VAB Close			5984.625
*	1:39:49	VAB Open			5989.500
*	1:39:50	VAB Close			5990.250
*	1:39:56	VAA Open			5996.375
*	1:40:01	VAA Close			6001.375

Actual time will be controlled by the SYNC pulses from the ACP Instrument.

Huygens Titan Mission Sampling Sequence

	Time	Operation	Comments		Time (sec)
*	1:40:05	***CLOSE SYNC WINDOW***			6005.0
*	1:40:10	**VL4 Close**	ACP to GC-MS IS2		6010.0
;					
+	1:40:10	IS1, IS2, IS3, IS4, IS5	***Direct Leak 2, GCs & ACP***		6010.0
;	1:40:12	VL4 Close			6012.0
;					
+	1:41:55	IS2 ONLY	***ACP ONLY***		6115.0
*	1:41:56	**VL4 OPEN**	ACP to GC-MS IS2		6116.0
*	1:41:56	***OPEN SYNC WINDOW***			6116.0
*	1:42:01	VAB Open	VAB Open	6121.000	
*	1:42:01	VAB Close	VAB Close	6121.875	
*	1:42:06	VAB Open	VAB Open	6126.625	
*	1:42:07	VAB Close	VAB Close	6127.500	
*	1:42:12	VAB Open	VAB Open	6132.250	
*	1:42:13	VAB Close	VAB Close	6133.125	
*	1:42:17	VAB Open	VAB Open	6137.875	
*	1:42:18	VAB Close	VAB Close	6138.750	
*	1:42:23	VAB Open	VAB Open	6143.500	
*	1:42:24	VAB Close	VAB Close	6144.375	
+	1:42:27		***Forced Low IP (eV)***		6147.375
*	1:42:29	VAB Open	VAB Open	6149.125	
*	1:42:30	VAB Close	VAB Close	6150.000	
+	1:42:34		***Return to Standard IP (eV)***		6154.000
*	1:42:35	VAA Open	VAA Open	6155.750	
*	1:42:40	VAA Close	VAA Close	6160.750	
*	1:42:43	VAB Open	VAB Open	6163.875	
*	1:42:44	VAB Close	VAB Close	6164.625	
*	1:42:49	VAB Open	VAB Open	6169.500	
*	1:42:50	VAB Close	VAB Close	6170.250	
*	1:42:56	VAA Open	VAA Open	6176.375	
*	1:43:01	VAA Close	VAA Close	6181.375	
*	1:43:05	***CLOSE SYNC WINDOW***			6185.0
*	1:43:10	**VL4 Close**	ACP to GC-MS IS2		6190.0
;					
+	1:43:10	IS1, IS2, IS3 IS4, IS5	***Direct Leak 2, GCs & ACP***		6190.0
;	1:43:12	VL4 Close			6192.0
;					
;	1:46:11	VD1 Open			6371.0
;	1:46:12	VS6 Close			6372.0
;	1:46:13	VD2 Open			6373.0
;	1:46:14	VD3 Close			6374.0
;	1:46:15	VD4 Open			6375.0
;	1:46:16	VS1 Close			6376.0

ACP 250° Sample to MS

Actual time will be controlled by the SYNC pulses from the ACP Instrument.

Vent & Purge the ACP to GC-MS transfer line

Prepare valves for ambient atmosphere injection

Huygens Titan Mission Sampling Sequence

	Time	Operation	Comments		Time (sec)
;	1:46:17	VC1 Open			6377.0
;	1:46:19	VC2 Open			6379.0
;	1:46:20	VS3 Close			6380.0
;	1:46:21	VC3 Open			6381.0
;	1:46:22	VG1 Close			6382.0
;	1:46:23	VL2 Open			6383.0
;	1:46:24	VG2 Close			6384.0
;	1:46:26	VG3 Close			6386.0
;	1:46:28	VL1 Close			6388.0
;	1:46:30	VZ Close			6390.0
;	1:46:32	VS7 Close			6392.0
;	1:46:36	VL3 Close			6396.0
;					
+	1:46:55	IS2 Only	***ACP ONLY***		6415.0
;	1:46:56	**VL4 OPEN**	ACP to GC-MS IS2		6416.0
*	1:46:56	***OPEN SYNC WINDOW***			6416.0
*	1:47:01	VAB Open	VAB Open	6421.000	
*	1:47:01	VAB Close	VAB Close	6421.875	
*	1:47:06	VAB Open	VAB Open	6426.625	
*	1:47:07	VAB Close	VAB Close	6427.500	
*	1:47:12	VAB Open	VAB Open	6432.250	
*	1:47:13	VAB Close	VAB Close	6433.125	
*	1:47:17	VAB Open	VAB Open	6437.875	
*	1:47:18	VAB Close	VAB Close	6438.750	
*	1:47:23	VAB Open	VAB Open	6443.500	
*	1:47:24	VAB Close	VAB Close	6444.375	
*	1:47:29	VAB Open	VAB Open	6449.125	
*	1:47:30	VAB Close	VAB Close	6450.000	
*	1:47:35	VAA Open	VAA Open	6455.750	
*	1:47:40	VAA Close	VAA Close	6460.750	
*	1:47:43	VAB Open	VAB Open	6463.875	
*	1:47:44	VAB Close	VAB Close	6464.625	
*	1:47:49	VAB Open	VAB Open	6469.500	
*	1:47:50	VAB Close	VAB Close	6470.250	
*	1:47:56	VAA Open	VAA Open	6476.375	
*	1:48:01	VAA Close	VAA Close	6481.375	
*	1:48:05	***CLOSE SYNC WINDOW***			6485.0
;					
+	1:48:05	IS1, IS2, IS3, IS4 & IS5	***Direct Leak 2, GCs & ACP***		6485.0
*	1:48:05	HA OFF	ACP Transfer Line Heaters OFF!		6485.0
*	1:48:07	**VL4 Close**	ACP line to MS (IS2)		6487.0
*	1:48:08	VAA Open	ACP Transfer Unrestricted Line		6488.0
;	1:48:09	VS6 Close	ACP Line to GC		6489.0

Actual time will be controlled by the SYNC pulses from the ACP Instrument.

ACP 650° Sample to MS

Vent & Purge the ACP to GC-MS transfer line

Huygens Titan Mission Sampling Sequence

	Time	Operation	Comments	Time (sec)
;	1:48:10	VAA Open		6490.0
;	1:48:11	VL4 Close		6491.0
*	1:48:15	VAA Close	ACP transfer Unrestricted Line	6495.0
;	1:48:17	VAA Close		6497.0
+	1:48:19	IS1, IS3, IS4, IS5	***Direct Leak 2 & GCs***	6499.0
;				
;	1:48:20	VD3 Close		6500.0
;	1:48:21	HA Off	ACP Transfer Line Heater OFF	6501.0
+	1:48:21	IS2 OFF	*ACP IS OFF*	6501.0
;	1:48:21	VX Open	GC Column Vent	6501.0
;	1:48:22	VS5 Close	Sampling Manifold to GC	6502.0
*	1:48:24	VD2 Close	Sampling Manifold to Vent	6504.0
*	1:48:26	VD1 Close	Inlet to Sampling Manifold	6506.0
*	1:48:28	VD4 Close	H2 Source to GC Columns	6508.0
*	1:48:29	VD3 Open	H2 Source to Sampling Manifold	6509.0
*	1:48:30	VD3 Close		6510.0
*	1:48:31	**VS5 Open**	Inlet to GC Column Valve	6511.0
*	1:48:32	**VS5 Close**		6512.0
*	1:48:33	VD2 Open	Sampling Manifold to Vent	6513.0
*	1:48:35	VD3 Open	H2 Source to Sampling Manifold	6515.0
*	1:48:36	VD3 Close		6516.0
*	1:48:37	VD4 Open	H2 Source to GC Columns	6517.0
;	1:48:38	VD3 Close	H2 Source to Sampling Manifold	6518.0
*	1:48:39	VD1 Open	Inlet to Sampling Manifold	6519.0
;	1:48:40	VS5 Close	Sampling Manifold to GC	6520.0
;	1:48:41	VD2 Open		6521.0
;	1:48:42	VS5 Close		6522.0
;	1:48:43	VD2 Open		6523.0
;	1:48:44	VD3 Close		6524.0
;	1:48:46	VD1 Open		6526.0
+	1:48:50		***Enable Hi-Res Scans***	6530.0
;				
;	2:01:17	VL2 Open		7277.0
;	2:01:18	VL1 Close		7278.0
;	2:01:19	VD1 Open		7279.0
;	2:01:20	VZ Close		7280.0
;	2:01:21	VD2 Open		7281.0
;	2:01:22	VS7 Close		7282.0
;	2:01:23	VD4 Open		7283.0
;	2:01:24	VE Close		7284.0
;	2:01:25	VC1 Open		7285.0
;	2:01:26	VL3 Close		7286.0
;	2:01:27	VC2 Open		7287.0

Prepare for Ambient Atmosphere Injection.

--FAST--
1 s injection

6.6 km
1018 mBar

-SLOW-
11 km
801 mBar

Huygens Titan Mission Sampling Sequence

	Time	Operation	Comments	Time (sec)
;	2:01:28	VS1 Close		7288.0
;	2:01:29	VC3 Open		7289.0
;	2:01:30	VS2 Close		7290.0
;	2:01:31	VX Open		7291.0
;	2:01:32	VS3 Close		7292.0
;	2:01:34	VS5 Close		7294.0
;	2:01:36	VL4 Close		7296.0
;	2:01:38	VS6 Close		7298.0
;	2:01:40	VG1 Close		7300.0
;	2:01:42	VG2 Close		7302.0
;	2:01:44	VG3 Close		7304.0
;	2:01:46	VD3 Close		7306.0
;				
;	2:01:50	VD3 Close		7310.0
;	2:01:51	VX Open	GC Column Vent	7311.0
;	2:01:52	VS5 Close	Sampling Manifold to GC	7312.0
*	2:01:54	VD2 Close	Sampling Manifold to Vent	7314.0
*	2:01:56	VD1 Close	Inlet to Sampling Manifold	7316.0
*	2:01:58	VD4 Close	H2 Source to GC Columns	7318.0
*	2:01:59	VD3 Open	H2 Source to Sampling Manifold	7319.0
*	2:02:00	VD3 Close		7320.0
*	2:02:01	**VS5 Open**	Inlet to GC Column Valve	7321.0
*	2:02:02	**VS5 Close**		7322.0
*	2:02:03	VD2 Open	Sampling Manifold to Vent	7323.0
*	2:02:05	VD3 Open	H2 Source to Sampling Manifold	7325.0
*	2:02:06	VD3 Close		7326.0
*	2:02:07	VD4 Open	H2 Source to GC Columns	7327.0
;	2:02:08	VD3 Close	H2 Source to Sampling Manifold	7328.0
*	2:02:09	VD1 Open	Inlet to Sampling Manifold	7329.0
;	2:02:10	VS5 Close	Sampling Manifold to GC	7330.0
;	2:02:11	VD2 Open		7331.0
;	2:02:12	VS5 Close		7332.0
;	2:02:13	VD2 Open		7333.0
;	2:02:14	VD3 Close		7334.0
;	2:02:16	VD1 Open		7336.0
;				
;	2:14:49	VD1 Open		8089.0
;	2:14:51	VD2 Open		8091.0
;	2:14:53	VD4 Open		8093.0
;	2:15:02	VS3 Close		8102.0
;	2:15:04	VS5 Close		8104.0
;	2:15:06	VL4 Close		8106.0
;	2:15:08	VS6 Close		8108.0

Prepare valves for ambient atmosphere injection

REPEAT every 13.5 minutes

Repeat the Ambient Atmosphere GC Sampling until END OF MISSION.

--FAST--
2.5 km
1245 mBar

-SLOW-
6.3 km
1030 mBar

Huygens Titan Mission Sampling Sequence

	Time	Operation	Comments	Time (sec)
;	2:15:16	VD3 Close		8116.0
;	2:15:20	VD3 Close		8120.0
;	2:15:21	VX Open	GC Column Vent	8121.0
;	2:15:22	VS5 Close	Sampling Manifold to GC	8122.0
*	2:15:24	VD2 Close	Sampling Manifold to Vent	8124.0
*	2:15:26	VD1 Close	Inlet to Sampling Manifold	8126.0
*	2:15:28	VD4 Close	H2 Source to GC Columns	8128.0
*	2:15:29	VD3 Open	H2 Source to Sampling Manifold	8129.0
*	2:15:30	VD3 Close		8130.0
*	2:15:31	**VS5 Open**	Inlet to GC Column Valve	8131.0
*	2:15:32	**VS5 Close**		8132.0
*	2:15:33	VD2 Open	Sampling Manifold to Vent	8133.0
*	2:15:35	VD3 Open	H2 Source to Sampling Manifold	8135.0
*	2:15:36	VD3 Close		8136.0
*	2:15:37	VD4 Open	H2 Source to GC Columns	8137.0
;	2:15:38	VD3 Close	H2 Source to Sampling Manifold	8138.0
*	2:15:39	VD1 Open	Inlet to Sampling Manifold	8139.0
;	2:15:40	VS5 Close	Sampling Manifold to GC	8140.0
;	2:15:41	VD2 Open		8141.0
;	2:15:42	VS5 Close		8142.0
;	2:15:43	VD2 Open		8143.0
;	2:15:44	VD3 Close		8144.0
;	2:15:46	VD1 Open		8146.0
;				
;	2:28:19	VD1 Open		8899.0
;	2:28:21	VD2 Open		8901.0
;	2:28:23	VD4 Open		8903.0
;	2:28:25	VC1 Open		8905.0
;	2:28:27	VC2 Open		8907.0
;	2:28:29	VC3 Open		8909.0
;	2:28:34	VS5 Close		8914.0
;	2:28:38	VS6 Close		8918.0
;	2:28:46	VD3 Close		8926.0
;	2:28:50	VD3 Close		8930.0
;	2:28:51	VX Open	GC Column Vent	8931.0
;	2:28:52	VS5 Close	Sampling Manifold to GC	8932.0
*	2:28:54	VD2 Close	Sampling Manifold to Vent	8934.0
*	2:28:56	VD1 Close	Inlet to Sampling Manifold	8936.0
*	2:28:58	VD4 Close	H2 Source to GC Columns	8938.0
*	2:28:59	VD3 Open	H2 Source to Sampling Manifold	8939.0
*	2:29:00	VD3 Close		8940.0
*	2:29:01	**VS5 Open**	Inlet to GC Column Valve	8941.0
*	2:29:02	**VS5 Close**		8942.0

Huygens Titan Mission Sampling Sequence

	Time	Operation	Comments	Time (sec)
*	2:29:03	VD2 Open	Sampling Manifold to Vent	8943.0
*	2:29:05	VD3 Open	H2 Source to Sampling Manifold	8945.0
*	2:29:06	VD3 Close		8946.0
*	2:29:07	VD4 Open	H2 Source to GC Columns	8947.0
;	2:29:08	VD3 Close	H2 Source to Sampling Manifold	8948.0
*	2:29:09	VD1 Open	Inlet to Sampling Manifold	8949.0
;	2:29:10	VS5 Close	Sampling Manifold to GC	8950.0
;	2:29:11	VD2 Open		8951.0
;	2:29:12	VS5 Close		8952.0
;	2:29:13	VD2 Open		8953.0
;	2:29:14	VD3 Close		8954.0
;	2:29:16	VD1 Open		8956.0
;				
;	2:41:49	VD1 Open		9709.0
;	2:41:51	VD2 Open		9711.0
;	2:41:53	VD4 Open		9713.0
;	2:42:04	VS5 Close		9724.0
;	2:42:08	VS6 Close		9728.0
;	2:42:16	VD3 Close		9736.0
;	2:42:20	VD3 Close		9740.0
;	2:42:21	VX Open	GC Column Vent	9741.0
;	2:42:22	VS5 Close	Sampling Manifold to GC	9742.0
*	2:42:24	VD2 Close	Sampling Manifold to Vent	9744.0
*	2:42:26	VD1 Close	Inlet to Sampling Manifold	9746.0
*	2:42:28	VD4 Close	H2 Source to GC Columns	9748.0
*	2:42:29	VD3 Open	H2 Source to Sampling Manifold	9749.0
*	2:42:30	VD3 Close		9750.0
*	2:42:31	**VS5 Open**	Inlet to GC Column Valve	9751.0
*	2:42:32	**VS5 Close**		9752.0
*	2:42:33	VD2 Open	Sampling Manifold to Vent	9753.0
*	2:42:35	VD3 Open	H2 Source to Sampling Manifold	9755.0
*	2:42:36	VD3 Close		9756.0
*	2:42:37	VD4 Open	H2 Source to GC Columns	9757.0
;	2:42:38	VD3 Close	H2 Source to Sampling Manifold	9758.0
*	2:42:39	VD1 Open	Inlet to Sampling Manifold	9759.0
;	2:42:40	VS5 Close	Sampling Manifold to GC	9760.0
;	2:42:41	VD2 Open		9761.0
;	2:42:42	VS5 Close		9762.0
;	2:42:43	VD2 Open		9763.0
;	2:42:44	VD3 Close		9764.0
;	2:42:46	VD1 Open		9766.0
;				
;	2:55:19	VD1 Open		10519.0

			Huygens Titan Mission Sampling Sequence			
	Time		**Operation**		**Comments**	Time (sec)
;	2:55:21		VD2 Open			10521.0
;	2:55:23		VD4 Open			10523.0
;	2:55:34		VS5 Close			10534.0
;	2:55:38		VS6 Close			10538.0
;	2:55:46		VD3 Close			10546.0
;	2:55:50		VD3 Close			10550.0
;	2:55:51		VX Open		GC Column Vent	10551.0
;	2:55:52		VS5 Close		Sampling Manifold to GC	10552.0
*	2:55:54		VD2 Close		Sampling Manifold to Vent	10554.0
*	2:55:56		VD1 Close		Inlet to Sampling Manifold	10556.0
*	2:55:58		VD4 Close		H2 Source to GC Columns	10558.0
*	2:55:59		VD3 Open		H2 Source to Sampling Manifold	10559.0
*	2:56:00		VD3 Close			10560.0
*	2:56:01		**VS5 Open**		Inlet to GC Column Valve	10561.0
*	2:56:02		**VS5 Close**			10562.0
*	2:56:03		VD2 Open		Sampling Manifold to Vent	10563.0
*	2:56:05		VD3 Open		H2 Source to Sampling Manifold	10565.0
*	2:56:06		VD3 Close			10566.0
*	2:56:07		VD4 Open		H2 Source to GC Columns	10567.0
;	2:56:08		VD3 Close		H2 Source to Sampling Manifold	10568.0
*	2:56:09		VD1 Open		Inlet to Sampling Manifold	10569.0
;	2:56:10		VS5 Close		Sampling Manifold to GC	10570.0
;	2:56:11		VD2 Open			10571.0
;	2:56:12		VS5 Close			10572.0
;	2:56:13		VD2 Open			10573.0
;	2:56:14		VD3 Close			10574.0
;	2:56:16		VD1 Open			10576.0
;						
;					**NO Surface Science Sequence**	