

Observation Log for New Horizons Launch, Jupiter and Pluto Cruise mission phases

1. List of Observation Types

The following tables list New Horizons (NH) sequences for all observations planned for the NH REX instrument during the NH Launch, Jupiter and Pluto Cruise mission phases, from launch in January, 2006 through January, 2015.

Each table groups items by SAP (Science Activity Plan), that is, grouped by generic observation type, with the Sequence IDs and times of observations matching each type listed in the table.

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Table 1 **REX Test Patterns (SSR [TYLERETAL2008] Section 6.2) ...**

| | |
|-------------------------------------|---|
| Long description: | <p>Non-science observation(s); one of several of instrument commissioning, Annual Check-Out, and instrument characterization, performance and calibration activities.</p> <p>Instead of processing the signal from the HGA antenna, REX is commanded to process any of a set of internal test patterns stored in the REX signal processor: impulse response; three square waves of different frequencies; two pseudo-random number sequences of different amplitudes; all zeros. Because in these cases the inputs are known, the outputs will be deterministic and can be used to confirm proper REX operation.</p> <p>N.B. Almost all antenna-source observations are preceded by a small number of frames of Test Patterns</p> |
| Observations (UTC, SCLK, VISIT): | <ul style="list-style-type: none"> • 2006-109T11:59:48, 1/0007753906, 06098:CORX01a.01.TstPatt • 2006-152T17:29:48, 1/0011488906, 06143:CORX01a.01.TstPatt • 2006-172T01:59:48, 1/0013161106, 06171:CORX01a.02.TstPatt • 2006-180T11:49:48, 1/0013887706, 06180:CORX01a.01.TstPatt • 2007-005T13:56:21, 1/0030311299, 06361:CORX01b.01.TstPatt • 2007-011T09:12:51, 1/0030812689, 07009:CORX01b.01.TstPatt • 2007-055T02:44:48, 1/0034591006, 07052:JRExCal.01.TstPatt • 2007-064T11:56:48, 1/0035401726, 07052:JRExCal.02.TstPatt • 2007-072T09:40:49, 1/0036084767, 07066:CORX01b.01.TstPatt • 2007-093T13:34:48, 1/0037913206, 07092:CORX01b.01.TstPatt • 2007-146T20:09:48, 1/0042516106, 07141:JERE.01.IFTstPatt • 2007-273T05:39:49, 1/0053436706, 07267:CORX01a.01.TstPatt • 2007-273T11:24:49, 1/0053457406, 07267:CORX01a.02.TstPatt • 2007-278T08:04:49, 1/0053877406, 07267:CORX01a.03.TstPatt • 2007-281T20:09:49, 1/0054180106, 07281:CORX01a.04.TstPatt • 2007-287T00:24:49, 1/0054627406, 07281:CORX01a.01.TstPatt • 2007-288T17:24:49, 1/0054775006, 07281:CORX01a.02.TstPatt • 2007-303T19:39:49, 1/0056079106, 07297:CORX01a.01.TstPatt • 2007-313T18:59:49, 1/0056940706, 07313:CORX01a.01.TstPatt • 2008-291T14:24:48, 1/0086559405, 08287:A2RX01b.01.TstPatt • 2009-211T12:27:48, 1/0111262786, 09205:A3RX123.01.a • 2009-219T13:38:48, 1/0111958246, 09205:A3RX123.01.b |

Table 2 No Uplink Spur Measurement (SSR [TYLERETAL2008] Section 6.3) ...

| | |
|-------------------------------------|--|
| Long description: | <p>Non-science observation(s); one of several of instrument commissioning, Annual Check-Out, and instrument characterization, performance and calibration activities.</p> <p>The test for spurs in the REX band is part of the Annual Checkout activities for New Horizons. The test involves setting the open-loop AGC to near the upper end of it's range and acquiring REX data with no uplink. A spur is a narrowband frequency, revealed as a narrow spectral line in the time-integrated spectrum of the REX band.</p> |
| Observations (UTC, SCLK, VISIT): | <ul style="list-style-type: none"> • 2006-109T12:04:48, 1/0007754206, 06098:CORX02a.01_SpurMeas • 2006-152T17:34:47, 1/0011489205, 06143:CORX02a.01_SpurMeas • 2007-005T14:01:20, 1/0030311598, 06361:CORX02b.01_SpurMeas • 2007-011T09:17:50, 1/0030812988, 07009:CORX16b.01_WkTone • 2007-072T09:45:48, 1/0036085066, 07066:CORX16b.01_WkTone • 2007-273T11:29:48, 1/0053457705, 07267:CORX02a.01_SpurMeas • 2007-303T19:29:48, 1/0056078505, 07297:CORX02a.01_SpurMeas |

Table 3 Acquire uplink, characterize SNR (SSR [TYLERETAL2008], Section 6.4) ...

| | |
|-------------------------------------|--|
| Long description: | <p>Non-science observation(s); one of several of instrument commissioning, Annual Check-Out, and instrument characterization, performance and calibration activities.</p> <p>To verify that REX has adequate sensitivity the REX commissioning SNR tests emulated the expected uplink signal strength at 40 AU by reducing the transmitted power from the DSN to a level which resulted in a signal strength of -110 dBm in REXs baseband channel. The data obtained under those conditions were use to quantify the uplink signal strength, the Spurious Free Dynamic Range (SFDR), and the level of the noise floor.</p> |
| Observations (UTC, SCLK, VISIT): | <ul style="list-style-type: none"> • 2006-109T12:19:48, 1/0007755106, 06098:CORX03a.01_UplkSnr • 2006-152T17:49:47, 1/0011490105, 06143:CORX03a.01_UplkSnr • 2007-005T14:36:20, 1/0030313698, 06361:CORX03b.01_UplkSnr |

Table 4 Gain Linearity ...

| | |
|-------------------------------------|--|
| Long description: | <p>Non-science observation(s); one of several of instrument commissioning, Annual Check-Out, and instrument characterization, performance and calibration activities.</p> <p>The gain setting (AGC or AGCGAIN) is designed to produce linear results in the radiometry calibration formula in units of dBm (the formula is available in the Science Operations Center/Instrument Interface Control Document - SOC_INST_ICD).</p> <p>To linear performance with gain, these tests varied the gain setting (steps of two in the gain setting, equivalent to 1dB) while measuring a single target source i.e. an unmodulated, constant-strength signal sent from the DSN.</p> |
| Observations (UTC, SCLK, VISIT): | <ul style="list-style-type: none"> • 2006-109T12:29:43, 1/0007755701, 06098:CORX04a.01_GainLin • 2006-152T17:59:43, 1/0011490701, 06143:CORX04a.01_GainLin • 2007-005T14:46:16, 1/0030314294, 06361:CORX04b.01_GainLin • 2007-273T13:49:44, 1/0053466101, 07267:CORX04a.01_GainLin • 2007-303T18:59:44, 1/0056076701, 07297:CORX04a.01_GainLin |

Table 5 **REX Passband characterization (SSR [TYLERETAL2008] Section 6.6) ...**

| | |
|-------------------------------------|--|
| Long description: | <p>Non-science observation(s); one of several of instrument commissioning, Annual Check-Out, and instrument characterization, performance and calibration activities.</p> <p>In order to measure the in-flight response of the REX narrow band filter, a DSN uplink signal frequency was swept slowly across the REX passband.</p> <p>N.B. For some of these passband characterizaion tests, the spacecraft was in its spin-stabilized attitude control mode, a small sinusoidal variation of +/-0.5 dB was observed in the received power at the spin frequency. This is attributed to a slight misalignment of the spacecraft spin axis with the HGA's boresight. Analysis compensates for this effect by modeling the power variations and removing the effect of the spin from the data.</p> |
| Observations (UTC, SCLK, VISIT): | <ul style="list-style-type: none"> • 2006-109T12:59:29, 1/0007757487, 06098:CORX05a.01_BandPass • 2006-152T18:29:28, 1/0011492486, 06143:CORX05a.01_BandPass • 2007-005T15:26:01, 1/0030316679, 06361:CORX05b.01_BandPass |

Table 6 **Uplink simulates multi-tones to assess intermodulation distortion ...**

| | |
|-------------------------------------|--|
| Long description: | <p>Non-science observation(s); one of several of instrument commissioning, Annual Check-Out, and instrument characterization, performance and calibration activities.</p> <p>Two uplinks, close in frequency in the REX band, were transmitted to New Horizons in each of Right-hand and Left-hand Circular Polarization (RCP and LCP), to assess the incidence of intermodulation distortion.</p> |
| Observations (UTC, SCLK, VISIT): | <ul style="list-style-type: none"> • 2006-109T14:09:48, 1/0007761706, 06098:CORX06a.01_ModUplk • 2006-152T19:39:47, 1/0011496705, 06143:CORX06a.01_ModUplk • 2007-005T16:26:20, 1/0030320298, 06361:CORX06b.01_ModUplk |

Table 7 **USO Short Stability (SSR [TYLERETAL2008] Section 6.6) ...**

| | |
|-------------------------------------|---|
| Long description: | <p>Non-science observation(s); one of several of instrument commissioning, Annual Check-Out, and instrument characterization, performance and calibration activities.</p> <p>DNS uplink signal was transmitted with the radiated frequency adjusted for Doppler shifts associated with the Earth and spacecraft in order to control the received frequency at NH. Signal acquisitions by REX spanned periods of typically 100 seconds (USO short stability), but occasionally lasting up to 1000 seconds (USO long stability). From these observations the REX-based estimates of uplink frequency can be made, and from those estimates the USO stability (Allan deviation) can be calculated.</p> |
| Observations (UTC, SCLK, VISIT): | <ul style="list-style-type: none"> • 2006-109T14:24:48, 1/0007762606, 06098:CORX09a.01.USOShrt • 2006-152T19:54:47, 1/0011497605, 06143:CORX09a.01.USOShrt • 2007-093T13:39:47, 1/0037913505, 07092:CORX09b.01.USOShrt • 2007-278T08:09:48, 1/0053877705, 07267:CORX10a.01.USOLong • 2007-281T20:14:48, 1/0054180405, 07281:CORX10a.02.USOLong • 2007-287T00:29:48, 1/0054627705, 07281:CORX09a.01.USOShrt • 2007-288T17:29:48, 1/0054775305, 07281:CORX10a.01.USOLong • 2008-294T18:07:48, 1/0086831985, 08287:P12_A2RX010.01_b.uso.longterm • 2008-301T17:41:48, 1/0087435225, 08287:P12_A2RX010.02_b.uso.longterm • 2008-312T06:04:48, 1/0088343805, 08302:P12_A2RX010.01_b.uso.longterm • 2008-319T22:27:48, 1/0089007585, 08318:P12_A2RX010.01_b.uso.longterm |

Table 8 **HGA response mapping beam pattern (SSR [TYLERETAL2008] Section 6.5) ...**

| | |
|-------------------------------------|--|
| Long description: | <p>Non-science observation(s); one of several of instrument commissioning, Annual Check-Out, and instrument characterization, performance and calibration activities.</p> <p>The REX science team obtained the beam pattern by tuning the frequency of an unmodulated uplink signal of constant power from the DSN to arrive at the NH spacecraft with a constant frequency; the signal served as a calibration source. At the same time, the team varied the spacecraft attitude with respect to the direction to Earth, thus implementing a scan of the HGA beam over a small range of angles about the Earth direction, centered approximately on the beam maximum. The initial offset of the scan was set at the upper left corner of a 2deg x 2deg angular box. The beam direction then was made to 'nod and step' parallel to the box edges so as to perform a raster scan about the Earth direction. During the scan, REX processed the uplink signal from the transceiver, with the REX output recorded and time-tagged on-board. At the same time the spacecraft body vectors were logged and time-tagged. The combination of these two time sequences allowed the team to map estimates of the uplink signal power to the spacecraft pointing direction.</p> |
| Observations (UTC, SCLK, VISIT): | <ul style="list-style-type: none"> • 2006-172T02:09:24, 1/0013161682, 06171:CORX08a.beampatt • 2007-005T16:45:57, 1/0030321475, 06361:CORX08b.01.BmPat |

Table 9 Cold Sky Cal ...

| | |
|-------------------------------------|---|
| Long description: | <p>Non-science observation(s); one of several of instrument commissioning, Annual Check-Out, and instrument characterization, performance and calibration activities.</p> <p>For the NH radio subsystem, without an absolutely calibrated thermal noise source, it is possible to calculate the System Noise Temperature (SNT) using multiple standard radio sources and Cold Sky: 'on' is when the HGA is pointing at a standard radio source; 'off' is when the HGA is pointing at Cold Sky. The typical Cold Sky location chosen for NH REX is [RA,DEC] = [15.2deg, -8.1deg], where the the sky temperature is within a few tenth's of a Kelvin of the Cosmic Microwave Background - CMB - over a section of the sky larger than several times the half-power beam width of the HGA.</p> |
| Observations (UTC, SCLK, VISIT): | <ul style="list-style-type: none"> • 2006-180T11:56:43, 1/0013888121, 06180:CORX07a.11acoldrad • 2007-273T06:30:44, 1/0053439761, 07267:CORX07a.11acoldrad • 2007-313T19:50:44, 1/0056943761, 07313:CORX07a.11acoldrad |

Table 10 REX - looking at Jupiter ...

| | |
|-------------------------------------|--|
| Long description: | <p>Non-science observation(s); one of several of instrument commissioning, Annual Check-Out, and instrument characterization, performance and calibration activities.</p> <p>REX radiometry of Jupiter, taken as part of the REX radiometer calibration.</p> |
| Observations (UTC, SCLK, VISIT): | <ul style="list-style-type: none"> • 2007-055T02:05:00, 1/0034588617, JREXCAL01 • 2007-055T02:55:46, 1/0034591664, 07052:JRExCal_01 • 2007-064T11:42:00, 1/0035400837, JREXCAL02 • 2007-064T12:07:46, 1/0035402384, 07052:JRExCal_02 |

Table 11 Multi-insrument interference test ...

| | |
|-------------------------------------|--|
| Long description: | <p>Non-science observation(s); one of several of instrument commissioning, Annual Check-Out, and instrument characterization, performance and calibration activities.</p> <p>For REX, both REX and ALICE will operate simultaneously to observe the occultations of the Earth and Sun by Pluto and Charon. The mutual interference test for REX and ALICE had both instruments on, i.e. both REX and ALICE were acquiring data REX without an uplink and ALICE without the Sun in it's aperture.</p> |
| Observations (UTC, SCLK, VISIT): | <ul style="list-style-type: none"> • 2007-146T20:14:47, 1/0042516405, 07141:JERE.01_Interference • 2008-292T16:51:48, 1/0086654625, 08287:A2RX105.01_REXREXALiceInt |

Table 12 **Spur Meas, USO Stability (SSR [TYLERETAL2008] Sections 6.2, 6.6) ...**

| | |
|------------------------------------|--|
| Long description: | <p>Non-science observation(s); one of several of instrument commissioning, Annual Check-Out, and instrument characterization, performance and calibration activities.</p> <p>The test for spurs in the REX band is part of the Annual Checkout activities for New Horizons. The test involves setting the open-loop AGC to near the upper end of it's range and acquiring REX data with no uplink. A spur is a narrowband frequency, revealed as a narrow spectral line in the time-integrated spectrum of the REX band.</p> <p>DNS uplink signal was transmitted with the radiated frequency adjusted for Doppler shifts associated with the Earth and spacecraft in order to control the received frequency at NH. Signal acquisitions by REX spanned periods of typically 100 seconds (USO short stability), but occasionally lasting up to 1000 seconds (USO long stability). From these observations the REX-based estimates of uplink frequency can be made, and from those estimates the USO stability (Allan deviation) can be calculated.</p> |
| Observation (UTC, SCLK, VISIT): | <ul style="list-style-type: none"> • 2008-291T07:26:42, 1/0086534319, 08287:P12_A2RX002_01_004_009_b_spur_gain_uso |

Table 13 **REX Radiometer Calibration (SSR [TYLERETAL2008] Section 6.8) ...**

| | |
|------------------------------------|---|
| Long description: | <p>Non-science observation(s); one of several of instrument commissioning, Annual Check-Out, and instrument characterization, performance and calibration activities.</p> <p>Crossed scans of radio astronomy sources, sometimes together with dwells on cold sky. Typically, the spacecraft HGA was commanded to point at an offset from the source direction of -1 degree along the NH body X coordinate, and then scanned across the source at $1E-4$ rad/s to $X = +1$ degree, a maneuver that required approximately 350s. Similar scans were performed for the vertical, or Z coordinate, but with a dwell of 300 s at the origin $X = Z = 0$.</p> |
| Observation (UTC, SCLK, VISIT): | <ul style="list-style-type: none"> • 2008-291T15:15:47, 1/0086562464, 08287:A2RX11b_01_RadCal |

Table 14 **ACO (Test Patterns, Spur Measurement, Gain- and USO Short-Stability) ...**

| | |
|-------------------------------------|---|
| Long description: | <p>Non-science observation(s); one of several of instrument commissioning, Annual Check-Out, and instrument characterization, performance and calibration activities.</p> <p>Instead of processing the signal from the HGA antenna, REX is commanded to process any of a set of internal test patterns stored in the REX signal processor: impulse response; three square waves of different frequencies; two pseudo-random number sequences of different amplitudes; all zeros. Because in these cases the inputs are known, the outputs will be deterministic and can be used to confirm proper REX operation.</p> <p>The test for spurs in the REX band is part of the Annual Checkout activities for New Horizons. The test involves setting the open-loop AGC to near the upper end of it's range and acquiring REX data with no uplink. A spur is a narrowband frequency, revealed as a narrow spectral line in the time-integrated spectrum of the REX band.</p> <p>To linear performance with gain, these tests varied the gain setting (steps of two in the gain setting, equivalent to 1dB) while measuring a single target source i.e. an unmodulated, constant-strength signal sent from the DSN.</p> <p>DNS uplink signal was transmitted with the radiated frequency adjusted for Doppler shifts associated with the Earth and spacecraft in order to control the received frequency at NH. Signal acquisitions by REX spanned periods of typically 100 seconds (USO short stability), but occasionally lasting up to 1000 seconds (USO long stability). From these observations the REX-based estimates of uplink frequency can be made, and from those estimates the USO stability (Allan deviation) can be calculated.</p> |
| Observations (UTC, SCLK, VISIT): | <ul style="list-style-type: none"> • 2010-173T06:09:48, 1/0139492906, 10162:A4REX_1a_2a_4a_9a • 2010-186T13:37:02, 2/0140642940, 10184:A4RX_01_02_04_09_b_spur_gain_uso |

Table 15 **Test Patterns, No signal spur test, gain linearity, Lunar Occultatn ...**

| | |
|-------------------------------------|--|
| Long description: | <p>Non-science observation(s); one of several of instrument commissioning, Annual Check-Out, and instrument characterization, performance and calibration activities.</p> <p>Instead of processing the signal from the HGA antenna, REX is commanded to process any of a set of internal test patterns stored in the REX signal processor: impulse response; three square waves of different frequencies; two pseudo-random number sequences of different amplitudes; all zeros. Because in these cases the inputs are known, the outputs will be deterministic and can be used to confirm proper REX operation.</p> <p>The test for spurs in the REX band is part of the Annual Checkout activities for New Horizons. The test involves setting the open-loop AGC to near the upper end of it's range and acquiring REX data with no uplink. A spur is a narrowband frequency, revealed as a narrow spectral line in the time-integrated spectrum of the REX band.</p> <p>To linear performance with gain, these tests varied the gain setting (steps of two in the gain setting, equivalent to 1dB) while measuring a single target source i.e. an unmodulated, constant-strength signal sent from the DSN.</p> <p>In 2011 and 2012, REX observations were made during a Lunar occultation of Earth, similar to what would be done during the Pluto Encounter. DSN uplink signal was detected before the occultation and affected near the ingress limb crossing, lost behind the Moon, affected again near the egress limb crossing and detected after the occultation.</p> |
| Observations (UTC, SCLK, VISIT): | <ul style="list-style-type: none"> • 2011-140T13:59:48, 3/0168205906, 11132:A5REX_1ab_2ab_4ab_occ • 2012-021T18:54:48, 3/0189478005, 12006:A6REX_1ab_2ab_4ab_occ |

Table 16 **ACO5 test patt, no-uplk spur, gain lin (SSR [TYLERETAL2008] Sect. 6) ...**

| | |
|-------------------------------------|---|
| Long description: | <p>Non-science observation(s); one of several of instrument commissioning, Annual Check-Out, and instrument characterization, performance and calibration activities.</p> <p>Instead of processing the signal from the HGA antenna, REX is commanded to process any of a set of internal test patterns stored in the REX signal processor: impulse response; three square waves of different frequencies; two pseudo-random number sequences of different amplitudes; all zeros. Because in these cases the inputs are known, the outputs will be deterministic and can be used to confirm proper REX operation.</p> <p>The test for spurs in the REX band is part of the Annual Checkout activities for New Horizons. The test involves setting the open-loop AGC to near the upper end of it's range and acquiring REX data with no uplink. A spur is a narrowband frequency, revealed as a narrow spectral line in the time-integrated spectrum of the REX band.</p> <p>To linear performance with gain, these tests varied the gain setting (steps of two in the gain setting, equivalent to 1dB) while measuring a single target source i.e. an unmodulated, constant-strength signal sent from the DSN.</p> |
| Observations (UTC, SCLK, VISIT): | <ul style="list-style-type: none"> • 2011-175T10:49:49, 3/0171218506, 11175:A5REX_1ab_2ab_4ab • 2013-021T15:09:46, 3/0221086903, 13014:A7REX_1ab_2ab_4ab • 2014-194T11:54:48, 3/0267558405, 14183:A8REX_1ab_2ab_4ab_17ab |

Table 17 **Rehearsal plasma roll, not Earth pointed ...**

| | |
|-------------------------------------|--|
| Long description: | <p>Non-science observation(s); one of a few spacecraft instrument rehearsals, performed during the Pluto Cruise mission phase, for testing and validating the Pluto flyby sequence. During these rehearsals, the spacecraft was typically not pointed as it would be for the Pluto Encounter. Also, data recorded on-board during the rehearsals was only partially downlinked.</p> <p>Refer to the observation log for the Pluto Encounter mission phase for a description of the various sequences rehearsed.</p> |
| Observations (UTC, SCLK, VISIT): | <ul style="list-style-type: none"> • 2012-150T20:24:19, 3/0200628976, 12150:PERX_X_PLASMAROLL_1 • 2012-151T05:57:51, 3/0200663388, 12150:PERX_X_PLASMAROLL_2 • 2012-151T06:15:34, 3/0200664451, 12150:PERX_PC_REX_DISK THERM • 2012-151T11:45:49, 3/0200684266, 12150:PERX_P_REX_THERMSCAN • 2012-151T12:08:00, 3/0200685597, 12150:PERX_P_OCC • 2012-151T13:22:54, 3/0200690091, 12150:PERX_X_PLASMAROLL_3 • 2012-151T13:38:14, 3/0200691011, 12150:PERX_C_OCC • 2013-187T18:38:33, 3/0235441831, 13186:PERX_X_PLASMAROLL_D.4 • 2013-189T19:06:16, 3/0235616294, 13186:PERX_X_PLASMAROLL_E.1 • 2013-190T18:56:16, 3/0235702094, 13186:PERX_X_PLASMAROLL_E.2 • 2013-192T04:14:53, 3/0235822011, 13186:PERX_X_PLASMAROLL_E.3 • 2013-192T15:13:09, 3/0235861507, 13186:PERX_O_REX_TEST_PATTERN_1 • 2013-192T21:33:50, 3/0235884348, 13186:PERX_X_PLASMAROLL_1 • 2013-193T06:56:35, 3/0235918113, 13186:PERX_X_PLASMAROLL_2 • 2013-193T07:21:40, 3/0235919618, 13186:PERX_PC_REX_DISK THERM • 2013-193T12:51:55, 3/0235939433, 13186:PERX_P_REX_THERMSCAN • 2013-193T13:14:06, 3/0235940764, 13186:PERX_P_OCC • 2013-193T14:26:38, 3/0235945116, 13186:PERX_X_PLASMAROLL_3 • 2013-193T14:44:20, 3/0235946178, 13186:PERX_C_OCC |

Table 18 **Test Pattern, Cold Sky Radiometric Cal ...**

| | |
|------------------------------------|--|
| Long description: | <p>Non-science observation(s); one of several of instrument commissioning, Annual Check-Out, and instrument characterization, performance and calibration activities.</p> <p>Instead of processing the signal from the HGA antenna, REX is commanded to process any of a set of internal test patterns stored in the REX signal processor: impulse response; three square waves of different frequencies; two pseudo-random number sequences of different amplitudes; all zeros. Because in these cases the inputs are known, the outputs will be deterministic and can be used to confirm proper REX operation.</p> <p>For the NH radio subsystem, without an absolutely calibrated thermal noise source, it is possible to calculate the System Noise Temperature (SNT) using multiple standard radio sources and Cold Sky: 'on' is when the HGA is pointing at a standard radio source; 'off' is when the HGA is pointing at Cold Sky. The typical Cold Sky location chosen for NH REX is [RA,DEC] = [15.2deg, -8.1deg], where the the sky temperature is within a few tenth's of a Kelvin of the Cosmic Microwave Background - CMB - over a section of the sky larger than several times the half-power beam width of the HGA.</p> |
| Observation (UTC, SCLK, VISIT): | <ul style="list-style-type: none"> • 2014-198T04:34:48, 3/0267877605, 14195:A8REX_7ab |

Table 19 **Test Pattern, 80kW uplink test ...**

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|------------------------------------|--|
| Long description: | <p>Non-science observation(s); one of several of instrument commissioning, Annual Check-Out, and instrument characterization, performance and calibration activities.</p> <p>Operational test to verify the project can operate REX in synchrony with DSN radiating at 80kW.</p> |
| Observation (UTC, SCLK, VISIT): | <ul style="list-style-type: none"> • 2014-219T05:57:48, 3/0269696985, 14208:A8REX_1a_3a |