

## APPENDIX

### **Poker Flat Research Range Launches**

**1969-2005**

(Compiled by Neil Davis and Neal Brown)

#### **Note**

This table is based on one prepared by the Poker Flat Research Range as of October 2005, and is augmented with information largely contained in files at the range.

See <http://www.pfrr.alaska.edu/pfrr/pastlaunches.html>

#### **Abbreviations used in the table**

AEC—Atomic Energy Commission

AFCRL—Air Force Cambridge Research Laboratory (later AFGL)

AFGL—Air Force Geophysics Laboratory

ARPA—Advanced Research Projects Agency

BMO—U.S. Air Force Ballistic Missile Office

DASA—Defense Atomic Support Agency

DNA—Defense Nuclear Agency

GSFC—Goddard Space Flight Center (NASA)

LASL—Los Alamos Scientific Laboratory (now Los Alamos National Laboratory)

MIT—Massachusetts Institute of Technology

NASA—National Aeronautics and Space Administration

NSF—National Science Foundation

SDIO—Strategic Defense Initiative Organization

SRI—SRI International (formerly Stanford Research Institute)

<b>Poker Flat Number and Vehicle Type</b>	<b>Universal Time and Date of Launch</b>	<b>Agency Designation/Principal Scientist/Affiliation/Payload Description or Function/Special Comments</b>
PF-NH-1 Nike-Hydac	04:30:00 05 Mar 1969	SECEDE III Juniper, R. Michael Dowe, Warren Berning, and Donald M. Kerr/ ARPA-DASA-AEC/ 6-kg thermite barium release at 170 km
PF-NH-2 Nike-Hydac	04:30:00 06 Mar 1969	SECEDE III Elm/ R. Michael Dowe, Warren Berning, and Donald M. Kerr/ ARPA-DASA-AEC/ 12-kg thermite barium release at 170 km
PF-NH-3 Nike-Hydac	14:08:00 11 Mar 1969	SECEDE III Ironwood/ R. Michael Dowe, Warren Berning, and Donald M. Kerr/ ARPA-DASA-AEC/ 12-kg thermite barium release at 140 km
PF-HjNJ-4 Honest John-Nike-Javelin	05:06:00 15 Mar 1969	SECEDE III Fir/ R. Michael Dowe, Warren Berning, and Donald M. Kerr/ ARPA-DASA-AEC/ 12-kg thermite barium release at 165 km
PF-NT-5 Nike-Tomahawk	12:38:00 17 Mar 1969	NASA 18.15UE/ Neil Davis and Alan Johnstone/ U of Alaska/ Rubidium-vapor magnetometer, particle counters, flashing beacons/ Mother-daughter payload
PF-HjNJ-6 Honest John-Nike-Javelin	05:17:00 18 Mar 1969	SECEDE III Gum/ R. Michael Dowe, Warren Berning, and Donald M. Kerr/ ARPA-DASA-AEC/ 48-kg thermite barium release at 168 km
PF-TrSh-7 Terrier-Sandhawk	05:37:00 20 Mar 1969	SECEDE III Hemlock/ R. Michael Dowe, Warren Berning, and Donald M. Kerr/ ARPA-DASA-AEC/ 96-kg thermite barium release at 176 km
PF-NT-8 Nike-Tomahawk	04:30:00 04 Mar 1970	NASA 18.90UE-Ba./ J. P. Heppner/ GSFC(BTI)/ Four 3-kg thermite barium releases/ Simultaneous launch at Barter Island of identical payload
PF-NT-9 Nike-Tomahawk	14:53:00 03 Mar 1970	NASA 18.108-Ba./ J. P. Heppner/ GSFC(BTI)/ Four 3-kg thermite barium releases/ simultaneous launch at Barter Island of identical payload
PF-NT-10 Nike-Tomahawk	14:41:00 04 Mar 1970	NASA 18.109-Ba./ J. P. Heppner/ GSFC(BTI)/ Four 3-kg thermite barium releases/ Simultaneous launch at Barter Island of identical payload.

PF-NH-11 Nike-Hydac	09:03:00 03 Apr 1970	GI-SF6/ Neil Davis and Gil Moore/ U of Alaska, Thiokol/ Sulfur-hexafluoride release in auroral arc/ No effect observed
PF-NT-12 Nike-Tomahawk	11:09:00 10 Nov 1970	NASA 18.92/ Larry Cahill/ U of Minnesota/ Multi-instrument: including proton magnetometer, electron counters, electric field probe
PF-NT-13 Nike-Tomahawk	12:30:00 18 Nov 1970	NASA 18.93/ Larry Cahill/ U of Minnesota/ Multi-instrument: including proton magnetometer, electron counters, electric field probe
PF-BA-14 Bullpup-Apache	02:18:00 24 Nov 1970	NSF-Sh.Ba.Chg/ Eugene Wescott/ U of Alaska/ Small shaped-charge barium release.
PF-BA-15 Bullpup-Apache	02:00:00 02 Dec 1970	NSF-Sh.Ba.Chg/Eugene Wescott/ U of Alaska/ Small shaped-charge barium release.
PF-NT-16 Nike-Tomahawk	08:17:00 14 Feb 1971	NASA 18.110/Hugh Anderson and Paul Cloutier/ Rice University/ Cesium-vapor magnetometer, attitude sensor, particle counters
PF-TrT-17 Terrier-Tomahawk	11:38:00 08 Mar 1971	Sandia-Caribou V/ Karl Theobald/ LASL/ UV radiation detectors/ <u>Recovery</u> / <i>Vehicle Failure</i>
PF-NT-18 Nike-Tomahawk	10:37:00 11 Mar 1971	Sandia-Caribou V/ Karl Theobald/ LASL/ UV radiation detectors/ <u>Recovery</u>
PF-NT-19 Nike-Tomahawk	09:05:00 16 Mar 1971	NASA 18.14/ Neil Davis and Alan Johnstone/ U of Alaska/ Rubidium-vapor magnetometer, particle counters, flashing beacons/ Mother-daughter payload
PF-NT-20 Nike-Tomahawk	10:57:00 17 Mar 1971	NASA 18.95/ Wallace Murcay/ U of Alaska/ Photometers for observing auroral emissions
PF-NT-21 Nike-Tomahawk	12:05:00 19 Mar 1971	NASA 19.94/ Wallace Murcay, U of Alaska/ Photometers for observing auroral emissions
PF-NT-22 Nike-Tomahawk	12:38:00 19 Mar 1971	Sandia/ Hugh Chivers/ U of California at San Diego/ Photometers, deployed mylar foil for detecting protons and helium ions/ <u>Recovery</u>

PF-NT-23 Nike- Tomahawk	08:15:00 20 Mar 1971	NASA 18.17/ Neil Davis and Alan Johnstone/ U of Alaska/ Particle detectors, flashing beacon/ Mother-daughter payload
PF-NT-24 Nike- Tomahawk	12:26:00 27 Mar 1971	Sandia/ Hugh Chivers/ U of California at San Diego/ Photometers, deployed mylar foil for detecting protons and helium ions/ <u>Recovery</u>
PF-BA-25 Bullpup Apache	09:00:00 27 Aug 1971	NSF/Jim Barcas/ U of Denver/ High-energy particle detectors
PF-NT-26 Nike- Tomahawk	11:25:00 02 Feb 1972	NASA 18.111/ Hugh Anderson and Paul Cloutier/ Rice University/ Cesium-vapor magnetometer, attitude sensor, particle counters/ <i>Payload failure</i>
PF-NT-27 Nike- Tomahawk	07:23:00 25 Feb 1972	NASA 18.112/ Hugh Anderson and Paul Cloutier/ Rice University/ Cesium-vapor magnetometer, attitude sensor, particle counters
PF-Ad-28 Astrobee D	12:14:00 06 Mar 1972	DNA A30.205-3/ICECAP 72/James Ulwick and Kay Baker/AFCRL/ Multi-instrumented: IR emissions radiometers, photometers, electron density detector
PF-NT-29 Nike- Tomahawk	05:16:00 07 Mar 1972	NASA 18.141-Ba+ TMA/ James Heppner/ GSFC/ Four 2 kg thermite barium releases and one 2.5 kg TMA/TME release
PF-ShT-30 Sandhawk- Tomahawk	06:52:00 07 Mar 1972	Sandia 152-188-Oosik-Sh.Ba+ Chg/Eugene Wescott/ U of Alaska, LASL/ Shaped- charge barium with 0.88 kg Ba liner in 15 kg PBX9404 explosive/Created very long field line tracer
PF-NT-31 Nike- Tomahawk	14:26:00 07 Mar 1972	NASA 18.142-Ba+ TMA/ James Heppner/ GSFC/ Four 2-kg thermite barium releases and a 2.5-kg TMA/TME release
PF-Ad-32 Astrobee D	10:52:00 09 Mar 1972	DNA A30.205-4-ICECAP 72/ James Ulwick and Kay Baker/AFCRL/ Multi-instrumented: IR emissions radiometers, photometers, electron density detector
PF-NT-33 Nike- Tomahawk	14:08:00 09 Mar 1972	NASA 18.143-Ba+ TMA/ James Heppner/ GSFC/ Four 2-kg thermite barium releases and a 2.5-kg TMA/TME release

PF-TrSh-34 Terrier- Sandhawk	09:54:00 16 Mar 1972	Sandia 281-24-CARIBOU VI/ Karl Theobald, LASL/ Scanning spectrometer, photometers/ <i>Payload failure</i>
PF-BbV-35 Black Brant 5	10:16:00 16 Mar 1972	DNA A17-110-3-ICECAP 72/ James Ulwick and Kay Baker/ AFCRL/ Detectors for IR and visible emissions, ion composition, electron density and temperature, energetic particle fluxes
PF-TrSh-36 Terrier- Sandhawk	09:39:00 17 Mar 1972	Sandia 281-25-CARIBOU VI/ Karl Theobald, LASL/ Scanning spectrometer, photometers/ <i>Payload failure</i>
PF-UA-37 Ute-Apache	09:03:00 18 Mar 1972	NSF/Kay Baker/ Utah State University/ Photometers and IR radiometer to measure molecular oxygen and OH emissions.
PF-PA-38 Piaute-Apache	12:12:00 28 Mar 1972	NSF/ James Barcus/ U of Denver/ High-energy particle detectors/ <i>Vehicle failure</i>
PF-BA-39 Bullpup- Apache	20:24:00 29 Mar 1972	NSF/ James Barcus/ U of Denver/ High-energy particle detectors
PF-af-39A No rocket involved	02:35:00 07 Apr 1972	GI/A-Frame Destruction/ Neal Brown, U of Alaska/ Explosive destruction of A-frame launcher cover
PF-TrSh-40 Terrier- Sandhawk	18:51:00 10 Jul 1972	Sandia 281-28-Solar Eclipse/ H. E. Hansen/ LASL/ Instrumented to measure zodiacal light during a total eclipse/ <u>Recovery</u>
PF-ShT-41 Sandhawk- Tomahawk	12:51:35 09 Oct 1972	Sandia 152-191-Picaposte-Chachalaca-Sh.Ba+Chg/ Eugene Wescott/ U of Alaska and LASL/ Shaped charge with 0.88-kg Ba liner in 15-kg PBX 9404 explosive
PF-ShT-42 Sandhawk- Tomahawk	13:13:00 11 Oct 1972	Sandia 152-192-Faison-Sh.Ba+Chg/ Eugene Wescott/ U of Alaska and LASL/ Shaped charge with 0.88-kg Ba liner in 15-kg PBX 9404 explosive/ <i>Vehicle failure</i>
PF-NA-43 Nike-Apache	03:39:00 13 Oct 1972	NASA 14.506CA-TMA/ John F. Bedinger/ GCA/ Calcium and Trimethylaluminum (TMA) release to measure mesospheric winds/ <i>Vehicle failure</i>
PF-NA-44 Nike-Apache	15:11:00 13 Oct 1972	NASA 14.504CA-Na.Li./ John F. Bedinger/ GCA/ Calcium, sodium, lithium release to measure mesospheric winds

PF-NA-45 Nike-Apache	16:39:00 13 Oct 1972	NASA 14.505CA-Na.Li./ John F. Bedinger/ GCA/ Calcium, sodium, lithium release to measure mesospheric winds
PF-NT-46 Nike- Tomahawk	13:16:13 21 Oct 1972	NASA 18.151UE/ Larry Cahill and Roger Arnoldy/ U of Minnesota and U of New Hampshire/ Proton and electron detectors, Langmuir probe to measure electric field/ <i>Payload failure</i>
PF-ShT-47 Sandhawk- Tomahawk	04:48:49 05 Feb 1973	Sandia 152-201-Zurita-Sh.Ba+Chg/ Eugene Wescott/ U of Alaska and LASL/ Shaped charge barium/ <i>Vehicle failure</i>
PF-NT-48 Nike- Tomahawk	10:35:00 06 Feb 1973	Sandia 152-199-CARIBOU VII/ Karl Theobold/ LASL/ Spectrometers to measure UV emissions/ <i>Payload failure</i>
PF-NT-49 Nike- Tomahawk	10:40:00 16 Mar 1973	NASA 18.152UE/ Larry Cahill and Roger Arnoldy/ U of Minnesota and U of New Hampshire/ Proton and electron detectors, Langmuir probe to measure electric field
PF-NT-50 Nike- Tomahawk	06:00:00 21 Mar 1973	NASA 18.144-Ba+/ James P. Heppner/ GSFC/ Two 1.5-kg thermite releases: barium 74%, copper 25%, strontium 1%
PF-Ad-51 Astrobee D	10:11:00 21 Mar 1973	DNA A30.205-5-ICECAP 73A/ J. C. Ulwick/ AFCRL/Infrared radiometers
PF-NT-52 Nike- Tomahawk	06:02:00 22 Mar 1973	NASA 18.145-Ba+/ James P. Heppner/ GSFC/ Two 1.5-kg thermite releases: barium 74%, copper 25%, strontium 1%
PF-BbV-53 Black Brant 5	12:12:00 22 Mar 1973	DNA A18.006-2-ICECAP 73A/ A. T. Stair/ AFCRL/ Long wave infrared (LWIR) spectrometer/ <u>Recovery</u>
PF-PT-54 Piaute- Tomahawk	10:31:00 24 Mar 1973	DNA A10.205-2-ICECAP 73A/ Kay Baker/ AFCRL/ Short-wave infrared spectrometer (SWIR), electron detectors
PF-BbV-55 Black Brant 5	09:37:45 27 Mar 1973	DNA A18.205-1-ICECAP 73A/ Kay Baker/ AFCRL/Atmospheric composition and particle input detectors/ <u>Recovery</u>
PF-PT-56 Piaute- Tomahawk	09:38:25 27 Mar 1973	DNA A10-216-3-ICECAP 73A/Andy C. Faire/ AFCRL/ <i>Payload failure</i>

PF-NT-57 Nike- Tomahawk	12:58:00 27 Mar 1973	NASA 18.146-Ba+/ James P. Heppner/ GSFC/ Two 1.5-kg thermite releases: barium 74%, copper 25%, strontium 1%
PF-NT-58 Nike- Tomahawk	12:34:00 30 Mar 1973	NASA 18.147-Ba+/ James P. Heppner/ GSFC/ Two 1.5-kg thermite releases: barium 74%, copper 25%, strontium 1%
PF-NT-59 Nike- Tomahawk	12:27:00 31 Mar 1973	NASA 18.148-Ba+/ James P. Heppner/ GSFC/ Two 1.5-kg thermite releases: barium 74%, copper 25%, strontium 1%
PF-Ad-60 Astrobee D	08:45:00 06 Apr 1973	DNA A30.205-6-ICECAP 73A/ J. C. Ulwick/ AFCRL/ Infrared radiometers
PF-UT-61 Ute- Tomahawk	15:50:15 18 Sep 1973	DNA A09.312-5-ICECAP 73B/ J. C. Ulwick/ AFCRL/ Long-Wave Infrared (LWIR) liquid helium cooled radiometer/ Simultaneous with balloon/ <a href="#">Recovery</a>
PF-UT-62 Ute- Tomahawk	17:21:39 18 Sep 1973	DNA A09.312-4-ICECAP 73B/ J. C. Ulwick/ AFCRL/ Long-Wave Infrared (LWIR) liquid helium cooled radiometer/ Simultaneous with balloon/ <a href="#">Recovery</a>
PF-BbV-63 Black Brant V	15:06:33 27 Nov 1973	NASA 19.008-SKYLAB III-Sh.Ba+Chg/ Eugene Wescott/ U of Alaska, LASL/ Shaped- charge barium release with SKYLAB III coordinated observation
PF-BbV-64 Black Brant V	15:20:33 04 Dec 1973	NASA 19.009-SKYLAB III-Sh.Ba+Chg/ Eugene Wescott/ U of Alaska, LASL/ Shaped- charge barium release with SKYLAB III coordinated observation
PF-NT-65 Nike- Tomahawk	02:37:00 16 Jan 1974	NASA 18.160GE-Ba+.TMA/ James P. Heppner/ GSFC/ Four 1.5-kg thermite barium releases and one 2.5-kg 80% TMA, 20% TEA release
PF-NT-66 Nike- Tomahawk	02:39:00 21 Jan 1974	NASA 18.161GE-Ba+.TMA/ James P. Heppner/ GSFC/ Four 1.5-kg thermite barium releases and one 2.5-kg 80% TMA, 20% TEA release
PF-NT-67 Nike- Tomahawk	02:41:00 22 Jan 1974	NASA 18.162GE-Ba+.TMA/ James P. Heppner/ GSFC/ Four 1.5-kg thermite barium releases and one 2.5-kg 80% TMA, 20% TEA release

PF-Ad-67A Astrobee D	04:16:21 08 Feb 1974	DNA A30.311-4-Ballistic Test/AFCRL/ Test of Astrobee-D; predicted apogee 105 km, actual 91 km
PF-BbV-68 Black Brant V	06:07:00 14 Feb 1974	DNA A18.006-4-ICECAP 74A/ A. T. Stair/ AFCRL/ Circular variable filter (CVF) (LWIR) radiometer/ paired flight with PF-UT-69/ <u>Recovery</u>
PF-UT-69 Ute- Tomahawk	06:44:00 14 Feb 1974	DNA A09.307-3-ICECAP 74A/ K. S. W. Champion/ AFCRL/ Measure atmospheric density and wind/ <i>second stage vehicle failure (no ignition)</i>
PF-NH-70 Nike-Hydac	07:43:00 19 Feb 1974	DNA NH74-1-ICECAP 74A/ K. S. W. Champion/ AFCRL/ measure atmospheric density and wind
PF-BbV-71 Black Brant V	09:16:00 21 Feb 1974	DNA A18.116-1-ICECAP 74A/A. T. Stair/ AFCRL/ High-resolution interferometer spectrometer (HIRIS) for LWIR/ <u>Recovery</u>
PF-BbV-72 Black Brant V	07:38:00 24 Feb 1974	DNA A18-219-1-ICECAP 74A/ J. C. Ulwick and Kay Baker/ AFCRL/ Multi instrumented for Short-Wave Infrared (SWIR) measurement/ <u>Recovery</u>
PF-NT-73 Nike- Tomahawk	09:20:00 14 Mar 1974	NASA 18.158/ Hugh Anderson and Paul Cloutier/ Rice University/ Measure field-aligned currents and auroral particles
PF-ST-74 Strypi- Tomahawk	12:28:00 16 Mar 1974	Sandia-Acanta-Contiga-Sh.Ba+Chg/ Eugene Wescott/ U of Alaska, LASL/ Shaped-charge barium release
PF-NT-75 Nike- Tomahawk	13:48:00 16 Mar 1974	Sandia-Acanta-Contiga/Scientist ot specified/ LASL, U of Sheffield/ Shaped-charge barium release
PF-S-76 Strypi	08:11:00 23 Mar 1974	Sandia-Acanta-Contiga-Sh.Ba+Chg/Scientist not specified/ LASL, U of Alaska/ <i>Vehicle Failure</i>
PF-NJ-77 Nike-Javelin	08:00:00 11 Apr 1974	DNA NJ-74-1-ICECAP 74B/ J. C.Ulwick/ AFCRL/ CVF radiometer for SWIR
PF-Ad-78 Astrobee D	23:38:16 11 Apr 1974	DNA A30.413-1-ICECAP 74B/ Scientist not specified/ AFCRL/ Gerdian condenser to measure positive and negative atmospheric ions/ <i>Vehicle Failure</i>



PF-Ad-79 Astrobee D	23:25:00 12 Apr 1974	DNA A30.413-2-ICECAP 74B/ Scientist not specified/ AFCRL/ Payload probably same as PR-Ad-78
PF-BbV-80 Black Brant 5	10:23:00 17 Apr 1974	NASA 21.026UE-ECHO/ John Winckler/ U of Minnesota/ Electron beam accelerator and electron counters/ Went long, landing in Canada
PF-PT-81 Piaute- Tomahawk	08:40:15 18 Apr 1974	DNA A10.312-3-ICECAP 74B/Kay Baker of Utah State U/ AFCRL/ Measure direction and magnitude of electric field over an auroral arc/ <u>Recovery</u>
PF-SgtH-82 Sergeant- Hydac	00:58:03 18 Dec 1974	DNA SH74-1-Ballistics Test/ probably Edward F. Allen/ DNA/ Ballistic test of rocket conducted by Space Data Corp.
PF-Ad-83 Astrobee D	22:50:00 27 Feb 1975	DNA IC503.22-1-ICECAP 75A/ Scientist not specified/ DNA/ Gerdian condenser to measure atmospheric ions
PF-Ad-84 Astrobee D	01:00:00 01 Mar 1975	DNA IC503-14-3-ICECAP 75A/ Scientist not specified/ DNA/ Infrared photometer to measure OH emissions
PF-NT-85 Nike- Tomahawk	06:55:00 01 Mar 1975	NASA 18.159/ Hugh Anderson and Paul Cloutier/ Rice University/ Measure field-aligned currents and auroral particles
PF-NJ-86 Nike-Javelin	07:39:30 04 Mar 1975	DNA IC506.14-2-ICECAP 75A/ Scientist not specified/ DNA/ Infrared radiometer to measure OH emissions
PF-NH-87 Nike-Hydac	03:43:00 06 Mar 1975	DNA IC507.11-1A-ICECAP 75A/ Scientist not specified/ DNA/ Infrared radiometer to measure OH emissions/ <u>Recovery</u>
PF-NH-88 Nike-Hydac	06:16:30 06 Mar 1975	DNA IC507.11-3-ICECAP 75A/ Scientist not specified/ DNA/ Infrared radiometer to measure LWIR/ <u>Recovery</u>
PF-NH-89 Nike-Hydac	09:12:20 10 Mar 1975	DNA IC507.11-2A-ICECAP 75A/ Scientist not specified/ DNA/ Infrared radiometer to measure LWIR/ <u>Recovery</u>
PF-HjNJ-90 Honest John- Nike-Javelin	06:33:09 11 Mar 1975	DNA IC511.21-1A-ICECAP 75A/ J. C. Ulwick/ AFCRL/ Instrumented to measure electric fields/ <u>Recovery</u>

PF-NJ-91 Nike-Javelin	06:34:11 11 Mar 1975	DNA IC506.36-1-ICECAP 75A/ J. C. Ulwick/ AFCRL/ Motor burning aluminum to make a long smoke trail (SMOKE)/ <i>Second-stage vehicle failure</i>
PF-SgtH-92 Sergeant- Hydac	07:48:10 12 Mar 1975	DNA IC519.07-1B-ICECAP 75A/ J. C. Ulwick/ AFCRL/ SWIR CVF spectrometer and other instruments/ <u>Recovery</u>
PF-NT-93 Nike- Tomahawk	08:27:00 18 Mar 1975	NASA 18.165/ Larry Cahill and Roger Arnoldy/ U Minnesota and U New Hampshire/ Measure electric and magnetic fields and auroral electrons in active aurora
PF-NT-94 Nike- Tomahawk	11:18:20 23 Mar 1975	NASA 18.166/ Larry Cahill and Roger Arnoldy/ U Minnesota and U New Hampshire/ Measure electric and magnetic fields and auroral electrons in active aurora
PF-NT-95 Nike- Tomahawk	12:00:00 04 Apr 1975	NASA 18.172GE-Ba+.TMA/ James P. Heppner/ GSFC/ Four 1.5-kg barium releases and one 2.5-kg TMA/TEA release/ <i>Vehicle Failure</i>
PF-NT-96 Nike- Tomahawk	08:15:00 13 Apr 1975	NASA 18.174GE-Ba+.TMA/ James P. Heppner/ GSFC/ Four 1.5-kg barium releases and one 2.5-kg TMA/TEA release
PF-C-97 Castor	09:46:00 13 Apr 1975	DNA EX531.43-1-ICECAP 75A/ J. C. Ulwick/ AFCRL/ EXCEDE electron accelerator and radiometer
PF-NT-98 Nike- Tomahawk	10:38:00 13 Apr 1975	NASA 18.173GE-Ba+.TMA/ James P. Heppner/ GSFC/ Four 1.5-kg barium releases and one 2.5-kg TMA/TEA release
PF-NT-99 Nike- Tomahawk	09:15:00 16 Apr 1975	NASA 18.175GE-Ba+.TMA/ James P. Heppner/ GSFC/ Four 1.5-kg barium releases and one 2.5-kg TMA/TEA release
PF-Sgt-100 Sergeant	00:19:00 13 June 1975	DNA S75-1-Bal.Test/ Edward F. Allen/ Space Data Corp./ Vehicle test/ <i>Vehicle failure</i>
PF-Sgt-101 Sergeant	23:52:31 30 Oct 1975	DNA EX530.90-1-Bal.Test/ Edward F. Allen/ Space Data Corp./ Vehicle test/ <u>Recovery</u>
PF-Sgt-102 Sergeant	10:06:40 23 Jan 1976	DNA WA630.50.1-Opt.Trk.Test/ Edward F. Allen/ Space Data Corp./ Test impedance probe, aluminum smoke motor (60-sec trail) and optical tracker

PF-BbV-103 Black Brant 5	06:44:10 31 Jan 1976	NASA 21.027UE-ECHO IV/ John Winckler/ U of Minnesota/ Electron accelerator and electron detectors/ Bounced accelerated electrons off southern hemisphere
PF-N-103A Nike	00:05:10 07 Feb 1976	GI-PFRR-Launcher Test/ Neal Brown/ U of Alaska/ Test of vehicle launcher
PF-NT-104 Nike- Tomahawk	07:05:59 18 Feb 1976	NASA 18.1001/ Hugh Anderson and Paul Cloutier/ Rice University/ Measure field-aligned currents and auroral particles/ <u>Recovery</u>
PF-PT-105 Piaute- Tomahawk	01:18:00 22 Feb 1976	DNA A10.504-1/ L. H. Weeks and Andy C. Faire/ AFGL/ Measure atmospheric density and temperature, ozone, O <sub>2</sub> , soft x-rays
PF-Sgt-106 Sergeant	05:46:40 28 Feb 1976	DNA EX630.42-1-EXCEED/ J. C. Ulwick/ AFGL/ 3-KW, 1-amp electron accelerator, UV and visible band photometers/ <u>Recovery</u>
PF-NT-107 Nike- Tomahawk	12:12:50 28 Feb 1976	NASA 18.1003/ A. B. Christensen/ U of Texas at Dallas/ Measure XUV radiation
PF-NT-108 Nike- Tomahawk	10:45:45 01 Mar 1976	NASA 18.1002/ Hugh Anderson and Paul Cloutier/ Rice University/ Measure field-aligned currents and auroral particles/ <u>Recovery</u>
PF-PT-109 Piaute- Tomahawk	17:44:00 03 Mar 1976	DNA A10.507-1/ L. H. Weeks and Andy C. Faire/ AFGL/ Measure atmospheric density and temperature, ozone, O <sub>2</sub> , soft x-rays
PF-NH-110 Nike-Hydac	13:40:00 26 Mar 1976	DNA IC607.11-2C-ICECAP 76/ J. C. Ulwick/ AFGL/ Payload not specified
PF-NT-111 Nike- Tomahawk	06:43:00 27 Mar 1976	NASA 18.176-Chem./ James P. Heppner/ GSFC/ Four 1.5-kg Barium releases, one 8-kg sodium release, lithium trail release
PF-NT-112 Nike- Tomahawk	12:50:00 27 Mar 1976	NASA 18.194-Chem./ James P. Heppner/ GSFC/ Two barium releases, one barium + sodium release and one barium + lithium release
PF-NT-113 Nike- Tomahawk	13:00:00 28 Mar 1976	NASA 18.195-Chem./ James P. Heppner/ GSFC/ Two barium releases, one barium + sodium release, and one barium + lithium release

PF-NT-114 Nike- Tomahawk	12:30:00 30 Mar 1976	NASA 18.177-Chem./ James P. Heppner/ GSFC/ Four 1.5-kg Barium releases, one 8-kg sodium release, lithium trail release
PF-NH-115 Nike-Hydac	12:56:00 30 Mar 1976	NSF-Sh.Ba+Chg/ Neil Davis and Eugene Wescott/ U of Alaska/ Shaped-charge barium release
PF-Sgt-116 Sergeant	08:05:20 01 Apr 1976	DNA IC630.02-1A-ICECAP 76A/ J. C. Ulwick/ AFGL/ High-resolution interferometer spectrometer (HIRIS)/ <u>Recovery</u>
PF-HjH-117 Honest John- Hydac	09:28:20 01 Apr 1976	DNA WS650.27-1-Ballistics/ Edward F. Allen, Jr./ Space Data Corp./ Langmuir probe
PF-NT-118 Nike- Tomahawk	12:52:00 21 Sep 1976	NASA 18.178GE/ R. A. Goldberg/ GSFC/ Measure effects of bremsstrahlung radiation, electron density and temperature, x-ray scintillation detectors, plasma probes
PF-NT-119 Nike- Tomahawk	11:37:10 23 Sep 1976	NASA 18.179GE/ R. A. Goldberg/ GSFC/ Measure effects of bremsstrahlung radiation, electron density and temperature, x-ray scintillation detectors, plasma probes
PF-NT-120 Nike- Tomahawk	12:53:25 30 Sep 1976	NASA 18.180GE/ R. A. Goldberg/ GSFC/ Measure effects of bremsstrahlung radiation, electron density and temperature, x-ray scintillation detectors, plasma probes/ <i>Vehicle failure</i>
PF-HjNH-121 Honest John- Nike-Hydac	10:31:30 13 Nov 1976	DNA WS614.51-3-WIDEBAND/ John Clark/ DNA/ Radio wave scintillation detector, plasma density probes/ Coordinated with satellite pass
PF-T1SgtH- 122 Talos- Sergeant- Hydac	03:18:20 15 Nov 1976	DNA TE634.52-1-Ballistics/ Steve Fisher/ Space Data Corp./ Test of rocket configuration, but also involving a 125-kg water dump at 250 km altitude to determine its effect on the ionosphere
PF-T1C-123 Talos-Castor	04:06:40 19 Nov 1976	DNA EX651.92-1-EXCEDE/ Herb Mitchell/ DNA/ Electron accelerator, onboard TV, light beacon, DC probe/ <u>Recovery</u>
PF-HjNH-124 Honest John- Nike-Hydac	10:25:40 26 Nov 1976	DNA WS614.51-4-WIDEBAND/ John Clark/ DNA/ Radio-wave scintillation detector, plasma density probes/ Coordinated with satellite pass

PF-TrM-125 Terrier- Malemute	10:18:10 14 Jan 1977	NASA 29.003AE/ David S. Evans/ NOAA/ Electron detectors, Langmuir probe, swept frequency radiation detector, neutral constituents detector
PF-TrM-126 Terrier- Malemute	05:43:20 18 Jan 1977	NASA 29.004UE/ Donald Lynch and Frank S. Scherb/ U of Wisconsin/ Detectors to measure energetic ion mass energy, mass and spectra of positive ions in aurora, also electron detectors/ <i>Vehicle failure</i>
PF-NT-127 Nike- Tomahawk	04:51:40 07 Feb 1977	NASA 18.1011UE-Sh.Ba+Chg/ Neil Davis and Eugene Wescott/ U of Alaska/ Four small shaped-charge barium releases with piezoelectric acceleration boosters
PF-NT-128 Nike- Tomahawk	04:48:40 11 Feb 1977	NASA 18.1012UE-Sh.Ba+Chg/ Neil Davis and Eugene Wescott/ U of Alaska/ Four small shaped-charge barium releases with piezoelectric acceleration boosters
PF-HjJ-129 Honest John- Javelin	22:34:00 06 June 1977	DNA TE720.93-1-Ballistics/ Edward F. Allen/ Space Data Corp./ Test of improved Honest John (M66) and Javelin III boosting 106-kg payload to 167 km
PF-T1C-130 Talos-Castor	15:33:16 28 Sep 1977	DNA IC733.03-1-SPIRE I/ J. C. Ulwick/ AFGL/ NS-2-CVF spectrometer, celestial aspect sensor, TV camera, star mapper/ <u>Recovery</u>
PF-Sgt-131 Sergeant	08:55:00 13 Nov 1977	DNA IC730/09-1-FWIF/ J. C. Ulwick/ AFGL/ Liquid helium cooled field widened interferometer for infrared emissions measurement/ <u>Recovery</u>
PF-HjH-132 Honest John- Hydac	10:33:40 15 Nov 1977	DNA WS710.51-1-WIDEBAND/ Edward Fremouw/ SRI/ Payload not specified
PF-N-132A Nike	23:52:00 19 Nov 1977	U of Alaska NERDD/ Neal Brown/ U of Alaska/ testing of launcher flexure during a rocket launch
PF-TrM-133 Terrier- Malemute	08:54:00 02 Feb 1978	NASA 29.008UE/ Frank S. Scherb and Donald Lynch/ U of Wisconsin/ NOAA Energetic ion mass spectrograph measuring energy, mass, and spectra of positive ions in aurora, also electron detectors

PF-NT-134 Nike- Tomahawk	05:43:36 27 Feb 1978	NASA 18.1017UE-Sh.Ba+Chg/ Eugene Wescott/ U of Alaska/ 15-cm diameter shaped-charge barium release involving 16 kg of high explosive
PF-NT-135 Nike- Tomahawk	04:17:00 28Feb 1978	NASA 18.1015UE-Ba+/ Michael C. Kelley and T. Stockflet Jorgenson/ Cornell University and Danish Meteorological Institute/ Three barium and two TMA releases
PF-SgtH-136 Sergeant- Hydac	08:10:50 28 Feb 1978	DNA IC819.08-1-MULTI-WIDEBAND/ Murray Baron, J. C. Ulwick/ SRI and AFGL/ Instuments include photometers, magnetometers, electric field probe
PF-T1SgtH-137 Talos- Sergeant- Hydac	11:44:40 28 Feb 1978	DNA WS834.55-1-Ballistics/ Edward F. Allen, Jr./ Space Data Corp./ Test of attitude control system and TV camera
PF-HjH-138 Honest John- Hydac	19:06:00 01 Mar 1978	DNA WS810.51-2-WIDEBAND/ Murray Baron/ SRI/ Plasma frequency probe, capacitance probe, DC probe, ranging antenna, roll magnetometers
PF-NT-139 Nike- Tomahawk	04:23:00 02 Mar 1978	NASA 18.1016UE/ Michael C. Kelley and T. Stockflet Jorgenson/ Cornell University and Danish Meteorological Institute/ Three barium and two TMA releases
PF-TrM-140 Terrier- Malemute	08:13:10 09 Mar 1978	NASA 29.007UE/ Hugh Anderson/ Rice University/ Measure vector electric and magnetic fields, electron flux and pitch angle distribution, also ion mass spectrometer/ <u>Recovery</u>
PF-NT-141 Nike- Tomahawk	13:15:31 10 Mar 1978	NASA 18.1018UE-Sh.Ba+Chg/ Eugene Wescott/ U of Alaska/ 15-cm diameter shaped-charge barium release involving 16 kg of high explosive
PF-NT-142 Nike- Tomahawk	0:27:00 27 Mar 1978	NASA 18.215GE/ Richard A. Goldberg/ GSFC/ Measure effects of bremsstrahlung radiation
PF-NT-143 Nike- Tomahawk	16:50:00 29 Mar 1978	NASA 18.214GE/ Richard A. Goldberg/ GSFC/ Measure effects of bremsstrahlung radiation

PF-Sgt-144 Sergeant	20:00:00 08 June 1978	DNA EX830.56-1-Rec.Test/ Edward F. Allen, Jr./ Space Data Corp./ Verify recovery system for EXCEDE experiments, 840-kg payload to 105 km/ <u>Recovery</u>
PF-NH-145 Nike-Hydac	09:16:31 26 Oct 1978	DNA IR807.57-1/ J. C. Ulwick/ AFGL/ Atomic oxygen detector, photometers, plasma frequency probe, energy deposition scintillator/ <u>Recovery/</u> Delayed until May 26, 1979
PF-NJ-146 Nike-Javelin	09:20:20 26 Oct 1978	DNA IC806.35-1/ J. C. Ulwick/ AFGL/ Chemical release/ <i>Vehicle failure, 2<sup>nd</sup> stage failed to ignite</i>
PF-NH-147 Nike-Hydac	09:29:00 26 Oct 1978	DNA IR807.57-1/ J. C. Ulwick/ AFGL/ Atomic oxygen detector, plasma frequency and DC probes, detector to observe scintillations due to energy deposition
PF-T1C-148 Talos-Castor	05:02:00 29 Oct 1978	DNA EX851.44-1-EXCEED II/ J. C. Ulwick/ AFGL/ Four electron accelerators giving total of 40 amps plus diagnostic instruments/ <i>Experiment failure</i>
PF-Sgt-149 Sergeant	12:44:30 13 Nov 1978	DNA IC830.09-1A-FWIF/ J. C. Ulwick/ AFGL/ Field widened interferometer to observe IR emissions/ <u>Recovery</u>
PF-TrM-150 Terrier- Malemute	11:01:00 26 Jan 1979	NASA 29.013UE/ Hugh Anderson/ Rice University/ Cesium vector magnetometer, vector E-field probe, electron and proton flux, plasma density probe/ <u>Recovery</u> , <i>Vehicle failure</i>
PF-HjT-151 Honest John- Tomahawk	11:04:40 24 Mar 1979	NASA 12.1003UE-PINEY WOODS- Sh.Ba+Chg/ Eugene Wescott/ U of Alaska/ Test of improved barium shaped-charge involving 5.8 kg OCTAL 75/25
PF-HjT-152 Honest John- Tomahawk	10:31:41 01 Apr 1979	NASA 12.1004UE-MOTHER SHIPTON- Sh.Ba+chg/ Eugene Wescott/ U of Alaska/ Test of improved barium shaped-charge involving 5.8 kg OCTAL 75/25
PF-NT-153 Nike- Tomahawk	09:25:00 15 Apr 1979	NASA 18.218GE-Ba.Li./ James P. Heppner/ GSFC/ Two thermite barium and two lithium releases/ Paired with PF-TrM-154
PF-TrM-154 Terrier- Malemute	09:31:01 15 Apr 1979	NASA 29.011GE/ James P. Heppner/ GSFC/ Ion mass spectrometer, energetic particle detectors, Langmuir probe, electric field probes/ Paired with PF-NT-153

PF-TrM-155 Terrier- Malemute	09:09:00 18 Apr 1979	NASA 29.012GE-Ba.Li./ James P. Heppner/ GSFC/ Three thermite barium and 4 lithium releases/ Paired with PF-NT-156
PF-NT-156 Nike- Tomahawk	09:15:00 18 Apr 1979	NASA 18.217UE/ James P. Heppner/ GSFC/ Ion mass spectrometer, energetic particle detectors, Langmuir probe, electric field probes/ Paired with PF-TrM-155
PF-TIC-157 Talos-Castor	05:46:40 19 Oct 1979	DNA A51.970-EXCEDE II Electron Gun/ R. O'Neil, A. T. Stair, and J. C. Ulwick/ AFGL/ Four 40-keV electron accelerators totaling 32 amp output, multiple nitrogen-cooled spectrometers and radiometers, TV and film cameras, current and plasma frequency probes/ Largest scientific payload (2586 kg) and largest total vehicle weight (8800 kg) ever launched from Poker and perhaps elsewhere/ <u>Recovery</u>
PF-S-158 Strypi	04:45:00 13 Nov 1979	NASA 12.037UE-ECHO V/ John R. Winckler/ U of Minnesota/ 40-keV electron accelerator, optical sensors, TV camera. Mother-multiple daughter payload
PF-TrM-159 Terrier- Malemute	09:17:00 27 Jan 1980	NASA 29.014UE/ Larry Cahill and Roger Arnoldy/ U of Minnesota and U of New Hampshire/ Instrumented to measure charged particles and electric and magnetic fields/ <u>Recovery</u>
PF-HjT-160 Honest John- Tomahawk	11:55:39 16 Mar 1980	NASA 34.003UE-MISS POLLY-Ra.Ba.Chg/ Eugene Wescott/ U of Alaska/ To study auroral perturbations from a radial barium shaped- charge
PF-HjT-161 Honest John- Tomahawk	07:59:37 19 Mar 1980	NASA 34.001UE-MISS PEGGY-Sh.Ba.Chg/ Eugene Wescott/ U of Alaska/ 13 cm by 34 cm barium shaped-charge using Comp B explosive
PF-HjT-162 Honest John- Tomahawk	11:36:37 22 Mar 1980	NASA 34.002UE-Sh.Ba.Chg/ Eugene Wescott/ U of Alaska/ 13 cm by 34 cm barium shaped- charge using Comp B explosive
PF-PT-163 Piaute- Tomahawk	20:31:00 22 Mar 1980	DNA A10.901-1-SPE/ R. Narcissi and W. Swider/ AFGL/ Quadruple mass spectrometer to measure mass distribution of large positive and negative ion clusters in the D-region during a solar proton event/ <u>Recovery</u>



PF-Sgt-164 Sergeant	11:25:00 05 Feb 1981	DNA A30.072-FWIF/ N. Wheeler and J. C. Ulwick/ AFGL/ Field-widened interferometer to identify specific IR emissions in an aurora/ <u>Recovery</u>
PF-SgtH-165 Sergeant- Hydac	17:20:00 25 Feb 1981	BMD/BMO HAVE SLED Flight Diagnostics/ Perry Longaker/ MIT Lincoln Lab/ To measure signature of an aerosol producing payload using an aerosol release, CVF LWIR spectrometer, TV camera and photometer
PF-SgtH-166 Sergeant- Hydac	16:48:00 05 Mar 1981	BMD/BMO HAVE SLED Flight Diagnostics/ Perry Longaker/ MIT Lincoln Lab/ To measure signature of an aerosol producing payload using an aerosol release, CVF LWIR spectrometer, TV camera and photometer
PF-TauO-167 Taurus-Orion	08:09:00 07 Mar 1981	AFGL A13.030-AURORAL E/ Roger Van Tassel/ AFGL/ Instrumented to measure electron and proton energy spectra in range 0.5 ev to 60 kev/ PF-167 through PF-170 launched sequentially as a group
PF-TauO-168 Taurus-Orion	08:10:00 07 Mar 1981	AFGL A13.020-AURORAL E/ R. Narcissi/ AFGL/ Positive ion and neutral mass spectrometer to measure neutral and auroral plasma composition/ PF-167 through PF-170 launched sequentially as a group
PF-TauO-169 Taurus-Orion	08:26:00 07 Mar 1981	AFGL A13.031-AURORAL E/ Duane E. Paulson/ AFGL/ Instrumented to measure electron and proton energy spectra in range 0.5 ev to 60 kev PF-167 through PF-170 launched sequentially as a group
PF-PT-170 Piaute- Tomahawk	08:38:00 07 Mar 1981	AFGL A10.903-AURORAL E/ C. Russell Philbrick/ AFGL/ TMA release, Electric field and electron density probes PF-167 through PF-170 launched sequentially as a group
PF-SgtH-171 Sergeant- Hydac	04:30:00 12 Mar 1981	BMD/BMO HAVE SLED Flight Diagnostics/ Perry Longaker/ MIT Lincoln Lab/ To measure signature of an aerosol producing payload using an aerosol release, CVF LWIR spectrometer, TV camera and photometer
PF-TauT-172 Taurus- Tomahawk	08:05:16 25 Mar 1981	NASA 34.005UE-BUBBLE MAKER-Ra.Ba. Chg/ Eugene Wescott/ U of Alaska/ Radial shaped-charge barium release/ <i>Payload failure</i>

F-NO-173 Nike-Orion	05:52:55 30 Mar 1981	DNA Thermite Ba.-LADY LOU/ Eugene Wescott/ U of Alaska/ Barium shaped-charge, 5-kg explosive, 1-kg barium liner
PF-TauT-174 Taurus-Tomahawk	09:04:35 1 Apr 1981	NASA 34.004UE-HARTE BREAKER-Sh.Ba. Chg/ Eugene Wescott/ U of Alaska/ Radial shaped-charge barium/ <i>Vehicle failure</i>
PF-NO-175 Nike-Orion	06:20:55 3 Apr 1981	DNA Thermite Ba-KLONDIKE KATE/ Eugene Wescott/ U of Alaska/ Thermite barium release
PF-PT-176 Piaute-Tomahawk	21:30:00 26 Oct 1981	AFGL A10.901-2-SPE 81/ R. Narcissi and W. Swider/ AFGL/ Quadruple mass spectrometer to measure mass distribution of large positive and negative ion clusters in the D-region during a solar proton event/ <u>Recovery</u>
PF-Sgt-177 Sergeant	12:03:40 7 Nov 1981	DNA A30.175-FWIF/ N Wheeler and A. T. Stair/ AFGL/ Field-widened interferometer to study auroral IR emissions/ <u>Recovery</u> / <i>Payload failure</i>
PF-NO-178 Nike-Orion	00:30:15 20 Jan 1982	NASA 31.018GE DE Satellite/ Nelson Maynard/ GSFC/ Electric field probes/ Mother-daughter payload
Small rocket: Super Arcas	06:45:00 20 Jan 1982	NASA 15.213UE (Super Arcas)/ L. C. Hale/ Penn State U/ E-field measurement in mesosphere, coordinated with PF-NO-178
PF-NO-179 Nike-Orion	12:12:00 23 Jan 1982	NASA 31.025GE DE Satellite/ Richard Goldberg/ GSFC/ Solid-state electron detectors, Gerdian condenser, E-field probe, x-ray scintillation detector/ <u>Recovery</u>
PF-NO-180 Nike-Orion	12:13:00 23 Jan 1982	NASA 31.019GE DE Satellite/ Nelson Maynard/ GSFC/ Electric field probes/ Mother-daughter payload
PF-NO-181 Nike-Orion	12:45:00 24 Jan 1982	NASA 31.024GE DE Satellite/ Richard Goldberg/ GSFC/ Solid-state electron detectors, Gerdian condenser, E-field probe, x-ray scintillation detector/ <u>Recovery</u>
Small rocket: Super Arcas	15:22:00 24 Jan 1982	NASA 15.216UE/Super Arcas/ L. C. Hale/ Penn State U/ E-field measurement in mesosphere, coordinated with PF-NO-180

PF-TrM-182 Terrier- Malemute	08:47:00 06 Mar 1982	NASA 29.016CE/ A.B. Christensen/ Aerospace Corp./ Grazing incidence UV photometer, visible band photometers. Segmented imaging photometer/ <u>Recovery</u> / <i>Recovery failure</i>
PF-TauT-183 Taurus- Tomahawk	06:38:20 15 Mar 1982	NASA 34.008UE Ra.Ba.Chg/ Eugene Wescott and Mike Kelley/ U of Alaska, U of California at Berkeley/ Radial shaped-charge release and electric and magnetic field measuring instruments
PF-TauT-184 Taurus- Tomahawk	10:26:35 30 Mar 1982	NASA 34.007UE Std.Sh.Ba.Chg/ Eugene Wescott/ U of Alaska/ Conical shaped-charge release
PF-NT-185 Nike- Tomahawk	07:20:00 15 Apr 1982	NASA 18.1028GE Ba+Li./ James P. Heppner/ GSFC/ Four barium plus strontium and one lithium release to measure electric field and winds
PF-BbX-186 Black Brant 10	06:29:00 16 Apr 1982	NASA 35.003GE Ba+Li./ James P. Heppner/ GSFC/ 7-kg Barium and 3.15-kg lithium releases to observe high-altitude field-aligned E field, solar cells to study contamination/ <i>Vehicle failure</i>
PF-NT-187 Nike- Tomahawk	07:32:00 16 Apr 1982	NASA 18.1029GE Ba+Li./ James P. Heppner/ GSFC/ Four barium plus strontium and one lithium release to measure electric field and winds
PF-BbX-188 Black Brant 10	06:30:00 20 Apr 1982	NASA 35.004GE Ba+Li./ James P. Heppner/ GSFC/ 7-kg Barium and 3.15-kg lithium releases to observe high-altitude field-aligned E field, solar cells to study contamination
PF-TauO-189 Taurus-Orion	00:35:00 11 Aug 1982	NASA 33.029UL/SME Sat./ Charles Barth/ U of Colorado/ Measure ozone and pollution effects in conjunction with Solar Mesosphere Explorer satellite/ <u>Recovery</u>
PF-BbIX-190 Black Brant 9	07:55:15 14 Nov 1982	NASA 36.001UE/ Larry Cahill and Roger Arnoldy/ U Minnesota and U New Hampshire/ Ion acceleration and electron detectors/ <u>Recovery</u>
PF-TauO-191 Taurus-Orion	13:39:48 24 Nov 1982	NASA 33.024UE/Pul.Aur./ HughAnderson/ Science Applications, Inc./ Photometers and high-resolution electron detectors, E-field probe to study pulsating aurora/ <u>Recovery</u>

PF-TauO-192 Taurus-Orion	13:02:10 22 Jan 1983	NASA 33.023UE/Pul.Aur./ HughAnderson/ Science Applications, Inc./ Photometers and high-resolution electron detectors, E-field probe to study pulsating aurora/ <u>Recovery</u>
PF-TauO-193 Taurus-Orion	07:39:15 12 Feb 1983	NASA 33.031UL/Aurora/ Charles Barth/ U of Colorado/ UV spectrometer to observe nitric oxide emissions/ <u>Recovery</u>
PF-T1C-194 Talos-Castor	06:29:45 19 Mar 1983	DNA A51.971/ELIAS/ R. Nadille/ AFGL/ Radiometer, photometer/ TV camera to observe temporal variation in auroral and airglow emissions on earth limb/ <u>Recovery</u>
PF-BBIX-195 Black Brant 9	06:59:51 30 Mar 1983	NASA 36.002/ECHO VI/ John Winkler/ U of Minnesota/ 40-keV electron accelerator, photometer, mother and four daughter payloads with electron detectors/ <u>Recovery (in 1991)</u>
PF-Sgt-196 Sergeant	09:06:23 13 Apr 1983	DNA A30.276/ R. Straka/ AFGL/ Field- widened interferometer for observing IR emissions/ <u>Recovery</u>
PF-NH-197 Nike-Hydac	06:51:00 16 June 1983	DNA A11.074/STATE/ C. R. Philbrick/ AFGL/ Atomic Oxygen and NO detectors, photometers, DC and plasma frequency probes/ Mother-daughter payload
Small rockets: Super Arcas	14, 15 & 17 June 1983)	NASA TM1-9813(Super Arcas/S. Lokis)/ E. Hilsenrath/ GSFC/ Three rockets with payloads to measure ozone profile
PF-T1SH-198 Talos- Sergeant- Hydac	16:00:06 16 Dec 1983	USAF BMO/HAVE SLED II/ James Schuster/ MIT Lincoln Lab/ CVF LWIR spectrometer, TV camera, visible photometer, aerosol disperser/ <i>Payload failure/ Recovery failure</i>
PF-T1SgtH- 199 Talos- Sergeant- Hydac	15:52:00 26 Jan 1984	USAF BMO/HAVE SLED II/ James Schuster/ MIT Lincoln Lab/ Three optical countermeasure (OCM) aerosol cloud dispersals/ <u>Recovery</u>
PF-T1SgtH- 200 Talos- Sergeant- Hydac	15:36:00 2 Feb 1984	USAF BMO/HAVE SLED II/ James Schuster/ MIT Lincoln Lab/ Three optical countermeasure (OCM) aerosol cloud dispersals/ <u>Recovery</u>

PF-BbX-201 Black Brant 10	09:09:00 7 Feb 1984	NASA 35.006UE Aurora/ Forest Mozer/ U of California at Berkeley/ Ion mass spectrometer, E-field probes, Langmuir probe, electron and ion detectors/ Flown in conjunction with PF-201A from Fort Yukon
PF-TrM-201A Terrier- Malemute	09:10:40 7 Feb 1984	NASA 29.021UE (FYU) Forest Mozer/ U of California at Berkeley/ Same payload as PF-201; flown so both rockets reached field-aligned apogees simultaneously
PF-TauO-202 Taurus-Orion	17:13:00 28 Feb 1984	NASA 33.039UL/ Charles Barth/ U of Colorado/ 128-channel UV detector to observe atomic, flown in conjunction with Dynamics Explorer satellite/ <u>Recovery</u>
PF-BbX-203 Black Brant 10	11:00:00 30 Mar 1984	NASA 35.007GE Ba.Chg./ James P. Heppner/ GSFC/ Two shaped-charge barium releases to observe high-altitude E field
PF-BbX-204 Black Brant 10	07:19:00 1 Apr 1984	NASA 35.008GE Ba.Chg. / James P. Heppner/ GSFC/ Two shaped-charge barium releases to observe high-altitude E field
PF-TauNT- 205 Taurus-Nike- Tomahawk	07:15:50 2 Apr 1984	NASA 38.001UE Ra.Ba.Chg./ Eugene Wescott and Mike Kelley/ U of Alaska and Cornell U/ Use barium radial shaped-charges and e-field probes to observe plasma perturbations
PF-TauO-206 Taurus-Orion	07:17:57 2 Apr 1984	NASA 33.042UE Ra.Ba.Chg./ Eugene Wescott/ U of Alaska/ 28-cm radial barium shaped-charge release
PF-TAB-206A Tethered Aerostat Balloon	18 Jun - 24 Jun 1984	NASA Balloon/Tethered Aerostat/ Robert H. Holzworth, U of Washington/ tethered aerostat balloon
PF-O-207 Orion	20:40:00 16 Aug 1984	NASA 30.019UU Nitr.Oxide/ J. J. Horvath/ U of Michigan/ Parachute deployed detector to study NO emissions in middle and upper stratosphere/ <u>Recovery</u>
PF-0-208 Orion	22:10:00 28 Jan 1985	NASA 30.023UU Nitr.Oxide/ J. J. Horvath/ U of Michigan/ Parachute-deployed detector to study NO emissions in middle and upper stratosphere/ <u>Recovery</u>

PF-0-209 Orion	22:01:00 7 Feb 1985	NASA 30.024UU Nitr.Oxide/ J. J. Horvath/ U of Michigan/ Parachute deployed detector to study NO emissions in middle and upper stratosphere/ <u>Recovery</u>
PF-TauT-210 Taurus- Tomahawk	12:54:34 14 Mar 1985	NASA 34.011UE Std.Ba./ Eugene Wescott/ U of Alaska/ 8.5-kg barium shaped-charge with OCTAL 75/25 explosive in pulsating aurora/ <i>Payload failure</i>
PF-NO-211 Nike-Orion	17:03:20 29 Mar 1985	NASA 31.048GE MST/ Richard A. Goldberg/ GSFC/ Study middle atmosphere dynamics with simultaneous Super Arcas followed by two Super Loki dynasondes/ <u>Recovery</u>
Small rockets with PF-211	17:04:00	Super Arcas 15.232UE MST/ Leslie C. Hale/ Penn. State U/ Super Arcas and Super Loki dynasondes/ <u>Recovery/ Recovery failure</u> )
PF-NO-212 Nike-Orion	16:57:00 1 Apr 1985	NASA 31.047GE MST/ Richard A. Goldberg/ GSFC/ Study middle atmosphere dynamics with simultaneous Super Arcas followed by two Super Loki dynasondes/ <u>Recovery</u>
Small rockets with PF-212	18:22:41 1 Apr 1985	Super Arcas 15.233UE MST/ Leslie C. Hale/ Penn. State U/ Super Arcas and Super Loki dynasondes/ <u>Recovery/</u>
PF-O-213 Orion	07:21:01 2 Apr 1985	NASA 30.025UE/ Leslie C. Hale/ Penn. State U/ Middle atmosphere E-field, DC and ELF current probes/ <u>Recovery</u>
PF-BbX-214 Black Brant 10	08:17:00 1 Apr 1986	NASA 35.015GE/Std.Ba.(2)/ James P. Heppner/ GSFC/ Two shaped-charge barium releases to observe high-altitude E field
PF-TrM-215 Terrier- Malemute	10:36:00 3 Apr 1986	NASA 29.024UE/Std.Ba.(3)/ Eugene Wescott/ U of Alaska/ Three conical barium shaped- charges on ejected daughter payloads, soft- electron spectrometer
PF-T1C-216 Talos-Castor	09:42:25 8 Apr 1986	DNA A51.373/SPIRIT I/ Anthony J. Ratkowsky/ AFGL/ Cryogenically-cooled telescope Michelson interferometer (spectral infrared interferometer telescope: SPIRIT) to observe earth limb auroral emissions. TV camera, other sensors/ <u>Recovery</u>
PF-BbX-217 Black Brant 10	09:14:01 13 Apr 1986	NASA 35.016GE/Std.Ba.(2)/ James P. Heppner/ GSFC/ Two shaped-charge barium releases to observe high-altitude E-field

Small rockets: Super Loki	14 Feb to 28 Apr 1986	NASA/USAF SDI/Super Loki/ C. R. Philbrick, AFGL (laser radar) (20:9 Datasondes/11 Spheres)
PF-SA-217A Small rockets: Super Arcas	27 Jul to 2 Aug 1986	NASA/AFGL/MISTI I/ J. C. Ulwick/ SRL Utah State U/ (MST/SME) Six Super Arcas 15.239-243UU) instrumented to measure absolute electron density/ <i>One Payload failure</i>
PF-BBIX-218 Black Brant 9	09:32:00 31 Jan 1987	NASA 36.004UE/ Paul Kellogg/U of Minnesota/ Electron accelerator, TV camera, mother-daughter payload involving four instrumented daughters/ <u>Recovery</u>
PF-BBX-219 Black Brant 10	06:39:20 07 Mar 1987	NASA 35.018UE/ Charles W. Carlson/ U of California at Berkeley/ Instrumented to measure charge particles and E field at high altitude for investigating auroral acceleration processes/ <i>Vehicle failure</i>
PF-BBX-220 Black Brant 10	08:40:04 19 Jan 1988	NASA 35.017UE/ Paul M. Kintner/ Cornell University/ Instrumented to observe energetic electrons and ions to study upward acceleration of positive ions in auroras
PF-BBIX-221 Black Brant 9	08:16:49 9 Feb 1988	NASA 36.015UE/ John R. Winckler/ U of Minnesota/ 40-keV, 250 ma electron accelerator, mother and four instrumented daughter payloads to observe electrons echoed from southern hemisphere
PF-BBX-222 Black Brant 10	06:55:00 4 Mar 1988	NASA 35.023UE/ Charles W. Carlson/ U of California at Berkeley/ Instrumented to measure charge particles and E field at high altitude for investigating auroral acceleration processes
PF-TauO-223 Taurus-Orion	20:30:00 20 Oct 1988	NASA 33.049UL/ Charles Barth/ U of Colorado/ Instrumented to observe altitude dependence of atomic nitrogen, nitrogen molecule UV (2100-2500Å) emissions/ <u>Recovery/ Vehicle failure</u>
PF-TauO-224 Taurus-Orion	22:00:00 7 Mar 1989	NASA 33.057UL/ Charles Barth/ U of Colorado/ Instrumented to observe altitude dependence of atomic nitrogen, nitrogen molecule UV (2100-2500Å) emissions/ <u>Recovery</u>

PF-BB8-225 Black Brant 8	08:39:59 24 Jul 1989	SDIO SP-4 (CHEER)/DRO-0401/ Steve Theriault/ Strategic Defense Initiative Organization/ 10 kg titanium oxide driven downward into atmosphere from 300 km altitude by 205 kg PBX9501 explosive with ground and airborne observation
PF-BB8-226 Black Brant 8	09:00:00 13 Aug 1989	SDIO SP-4 (CHEER)/DRO-0402/ Steve Theriault/ Strategic Defense Initiative Organization/ 10 kg titanium oxide driven downward into atmosphere from 300 km altitude by 205 kg PBX9501 explosive with ground and airborne observation
PF-BBXI-227 Black Brant 11	12:07:00 1 Feb 1990	NASA 39.002UE/ Paul Kellogg/ U of Minnesota/ Electron accelerator, TV camera, mother-daughter payload involving four instrumented daughters/ <u>Recovery</u>
PF-BBX-228 Black Brant 10	07:31:25 23 Feb 1990	NASA 35.020UE/ Roger L. Arnoldy/ U of New Hampshire/ Argon plasma gun release with E-field and electron flux and spectrum observations, mother-daughter payload
PF-BBXII-229 Black Brant 12	07:38:26 22 Mar 1990	NASA 40.002UE/ C. W. Carlson/ U of California at Berkeley/ Measure high-frequency electron flux for study of high-altitude auroral acceleration processes
PF-NO-230 Nike-Orion	10:03:23 22 Mar 1990	NASA 31.070UE/ E. A. Bering, III /U of Houston/ to flight qualify an x-ray pinhole scintillation camera/ refl of NASA 31.070/ <u>Recovery</u> / <i>Payload failure</i>
PF-TauO-231 Taurus-Orion	21:29:02 13 May 1990	NASA 33.059GE (1 S Loki)/ Dan N. Baker/ GSFC/ Measure relativistic-energy electron precipitation to see if it penetrates to middle atmosphere/ <u>Recovery</u>
PF-O-232 Orion	21:37:40 13 May 1990	NASA 30.035UE Hale/Penn State/ E-field probes, Gerdian condenser, Gerdian nose tip probe/ <u>Recovery</u>
PF-Tau0-233 Taurus-Orion	20:26:00 14 May 1990	NASA 33.060GE (2 S Loki) / Dan N. Baker/ GSFC/ Measure relativistic-energy electron precipitation to see if it penetrates to middle atmosphere/ <u>Recovery</u>



PF-BBXII-234 Black Brant 12	09:11:54 12 Feb 1991	NASA 40.001UE/ Paul M. Kintner/ Cornell University/ Instrumented to investigate electron acceleration by double-layer and also transverse ion accelerations
PF-NO-235 Nike-Orion	18:00:00 25 Apr 1991	NASA 31.079UU/ Edward C. Zipf/ U. of Pittsburgh/ Measurement of abundance of N <sub>2</sub> O, CO <sub>2</sub> and CH <sub>4</sub> in three samplers in range 30 to 60 km/ <u>Recovery</u>
PF-NO-236 Nike-Orion	18:19:00 30 Apr 1991	NASA 31.080UU/ Edward C. Zipf/ U. of Pittsburgh/ Measurement of abundance of N <sub>2</sub> O, CO <sub>2</sub> and CH <sub>4</sub> in three samplers in range 30 to 60 km/ <u>Recovery/ Vehicle failure</u>
PF-NT-237 Nike-Tomahawk	13:57:30 2 Mar 1992	NASA 18.221/ M. Larsen/ Clemson University/ TMA/TEA (80%-20%) dispersed over range 80 to 180 km
PF-BBVC-238 Black Brant VC	14:06:48 2 Mar 1992	NASA 27.130 CE/ David Kayser/ Aerospace Corp./ 15 instruments to measure neutral composition and E-field, flown in conjunction with PF-237/ <u>Recovery</u>
PF-NT-239 Nike-Tomahawk	14:57:00 2 Mar 1992	NASA 18.222/ M. Larsen/ Clemson University/ TMA/TEA (80%-20%) to be dispersed over range 80 to 180 km/ <i>Payload failure</i>
PF-NT-240 Nike-Tomahawk	13:57:30 6 Mar 1992	NASA 18.223/ M. Larsen/ Clemson University/ TMA/TEA (80%-20%) dispersed over range 80 to 180 km
PF-BBXI-241 Black Brant 11	07:27:00 29 Mar 1992	NASA 39.003/ W. J. Raitt/ Utah State University/ Stimulate and observe VLF waves by modulating a 3-keV, 3-amp beam, Mother plus one free and one tethered daughter/ <u>Recovery</u>
PF-TA-242 Tomahawk-Apache	08:07:45 29 Mar 1992	SDIO/M56A1 (SPIRIT II)/ Vernon Baker/ AFGL/ Interference telescope, radiometer, photometer, TV camera for earth limb observations/ <u>Recovery</u>
PF-VULC-243 Vulcan	11:39:00 17 Jul 1992	Alaska SRP-1 Student Rocket Program/ Joseph Hawkins/ U of Alaska/ Student-built payload to test use of GPS for rocket tracking/ <u>Recovery/ Vehicle failure</u>
PF-VIPER-244 Viper	13:01:20 24 Jul 1992	NASA NRO 1368/ J. C. Ulwick/ Utah State University/ Payload not specified

PF-BBVII-245 Black Brant 7	13:36:00 24 Jul 1992	NASA 27.133/ W. E. Sharp/ U of Michigan/ IR spectrometer, Langmuir probe, UV photometer, UV interferometer to investigate abundance and temperature of O, O <sub>2</sub> , O <sub>3</sub> , H, and OH in mesosphere and lower thermosphere/ <u>Recovery</u>
PF-VIPER-246 Viper	12:46:00 25 Jul 1992	NASA NRO 1370/ J. C. Ulwick/ Utah State University/ Payload not specified
PF-BBXII-247 Black Brant 7	10:43:41 27 Jan 1993	NASA 40.003/ Roger Arnoldy/ U of New Hampshire/ Instrumented to observe energization of auroral electrons and production of waves and instabilities/ <i>Vehicle failure</i>
PF-BBXII-248 Black Brant 7	10:09:00 02 Apr 1993	NASA 40.004 Carlson/ C. W. Carlson/ U of California at Berkeley/ Measure high-frequency electron flux for study of high-altitude auroral acceleration processes
PF-NBB-249 Nike-Black Brant	15:38.00 6 May 1993	NASA 27.136/ George K. Parks/ U of Washington/ Double payload to observe high-energy auroral electron microbursts using solid-state telescopes and VLF detectors/ <u>Recovery</u>
PF-BBVIII-250 Black Brant 8	10:00:00 1 Jan 1994	NASA 27.137/ W. E. Sharp/ U of Michigan/ IR spectrometer, Langmuir probe, UV photometer, UV interferometer to investigate abundance and temperature of O, O <sub>2</sub> , O <sub>3</sub> , H, and OH in mesosphere and lower thermosphere/ <u>Recovery</u>
PF-NT-251 Nike-Tomahawk	13:08:00 2 Feb 1994	NASA 18.232/ M. Larsen/ Clemson University/ TMA/TEA (80%-20%)
PF-NT-252 Nike-Tomahawk	13:12:00 2 Feb 1994	NASA 18.233/ M. Larsen/ Clemson University/ TMA/TEA (80%-20%)
PF-BBVIII-253 Black Brant 8	13:16:00 2 Feb 1994	NASA 27.131/ David Kayser and Andrew B. Christensen/ Aerospace Corp./ Heavily instrumented to measure neutral composition and E-field, flown in conjunction with PF-251 and PF-252/ <u>Recovery</u>

PF-BBXII-254 Black Brant 7	08:21:00 6 Mar 1994	NASA 40.005/ Roy Torbert/ U of New Hampshire/ Mother plus three ejected daughter payloads to measure particle precipitation, plasma frequency, each carrying a light beacon/ <i>Payload failure</i>
PF-NO-255 Nike-Orion	09:11:47 7 Mar 1994	NASA 31.071/ E. A. Bering, III / U of Houston/ Intended to flight qualify an x-ray pinhole scintillation camera, re-fly of NASA 31.070 (PF-230)/ <u>Recovery</u> / <i>Vehicle failure</i>
PF-BBIX-256 Black Brant 9	06:50:42 11 Mar 1994	NASA 36.114/ R. McCoy/ Naval Research Laboratory/ HIRASS (high-resolution airglow and aurora spectrograph) and MUSTANG (middle-UV spectrograph for analysis of nitrogen gases)/ <u>Recovery</u>
PF-BBVIII-257 Black Brant 8	22:05:00 27 June 1994	NASA 33.063/ Charles Barth/ U of Colorado/ to make density measurement of NO in thermosphere and compare to soft x-ray flux using XUV photometers, ion mass spectrometer/ <u>Recovery</u>
PF-BBVII-258 Black Brant 7	15:27:20 2 Feb 1995	NASA 27.138/ Andrew B. Christensen/ Aerospace Corp./ Heavily instrumented to measure neutral composition and E-field, flown in conjunction with PF-259/ <u>Recovery</u>
PF-NT-259 Nike-Tomahawk	15:51:41 2 Feb 1995	NASA 18.229/ M. Larsen/ Clemson University/ TMA release trail upleg and downleg
PF-BBXII-260 Black Brant 12	10:21:46 24 Feb 1995	NASA 40.007/ Roger Arnoldy/ U of New Hampshire/ Mother-daughter payload placed above 900 km with electron and ion detectors and VLF wave detectors
PF-Mark XII-261 Mark 12	08:55:01 25 Mar 1995	NASA 35.031/ Eugene M. Wescott/ U of Alaska/ Simultaneous barium and cesium shaped-charge detonations to investigate mass dependence of upward accelerated positive ions above aurora
PF-VULC-262 Vulcan	22:24:59 31 May 1995	Alaska SRP 2 - Student Rocket Program/ Joseph Hawkins/ U of Alaska/ Student-built payload to study GPS sounding rocket tracking/ <u>Recovery</u>

PF-TauO-263 Taurus-Orion	22:00:00 6 June 1995	NASA 33.064/ Charles Barth/ U of Colorado/ To make density measurement of NO in thermosphere and compare to soft x-ray flux using XUV photometers, ion mass spectrometer/ <u>Recovery</u>
PF-NO-264 Nike-Orion	09:33:31 26 Jul 1995	NASA 31.109/ Patrick J. Espy/ Utah State University/ Instrumented to examine effects of mesospheric aerosols on altitude distribution of O, O <sub>2</sub> , O <sub>3</sub> and OH in noctilucent cloud region (82-84 km)/ <u>Recovery/ Payload failure</u>
PF-SL-265 Super Loki	10:41:00 25 Jul 1995	NASA/ Patrick J. Espy/ Utah State University/ Payload not specified, probably parachuted
PF-NO-266 Nike-Orion	08:20:35 8 Aug 1995	NASA 31.110/ Patrick J. Espy/ Utah State University/ Instrumented to examine effects of mesospheric aerosols on altitude distribution of O, O <sub>2</sub> , O <sub>3</sub> and OH in noctilucent cloud region (82-84 km)/ <u>Recovery</u>
PF-SL-267 Super Loki	09:10:00 8 Aug 1995	NASA/ Patrick J. Espy/ Utah State University/ Payload not specified, probably parachuted/ <i>No Deployment</i>
PF-BBXII- 268 Black Brant 12	06:38:18 6 Nov 1995	NASA/CSA 40.009/ Gordon James/ Canadian Space Agency/ OEDIPUS C, a mother-tethered daughter payload tethered at 1 km to test tether and study E-field distribution and natural and artificial waves in the ionosphere
PF-NT-269 Nike- Tomahawk	14:00:00 24 Nov 1995	NASA 18.231/ M. Larsen/ Clemson University/ TMA release trail upleg and downleg
PF-NT-270 Nike- Tomahawk	08:03:00 27 Nov 1995	NASA 18.229/ M. Larsen/ Clemson University/ TMA release trail up-leg and down-leg
PF-NBB-271 Nike-Black Brant	08:07:24 27 Nov 1995	NASA 27.139/ Andrew B. Christensen/ Aerospace Corp./ Heavily instrumented to measure neutral composition and E-field, flown in conjunction with PF-270/ <u>Recovery</u>
PF-BBXII- 272 Black Brant 8	05:07:15 10 Feb 1997	NASA 40.010/ Roger Arnoldy/ U of New Hampshire/ Instrumented to observe energization of auroral electrons and production of waves and instabilities

PF-BBXII-273 Black Brant 7	08:36:41 11 Feb 1997	NASA 40.011/ Roy Torbert/ U of New Hampshire/ Mother and four daughter payloads each with E-field probe and particle density detectors, re-fly of PF-BBXII-254
PF-TBB-274 Tomahawk-Black Brant	10:20:31 13 Mar 1997	NASA 36.139UE/ George Parks/ U of Washington/ To study pulsating aurora with electrostatic analyzer, solid-state telescopes, electric current and E-field probes
PF-BBXII-275 Black Brant 12	13:57:03 22 Jan 1999	NASA 40.013DP/ Ching-I Meng/ John Hopkins Applied Physics Lab/ (APEX) employing four payloads with optical sensors and plasma diagnostics, two carrying explosive plasma generators
PF-BBVB-276 Black Brant 5B	15:20:17 22 Jan 1999	NASA 21.121CE/ Andrew B. Christensen/ Aerospace Corp./ Atomic oxygen fluorescence resonance detector (ATOX), neutral mass spectrograph, photometers, ionization gauge to measure turbulent diffusion, flown in conjunction with PF-TauO-277/ <u>Recovery</u>
PF-TauO-277 Taurus-Orion	15:31:00 22 Jan 1999	NASA 33.068UE/ M. Larsen/ Clemson University/ TMA trail in altitude region 80-130 km puffed on up-leg, plus down-leg trail
PF-BBX-278 Black Brant 10	06:45:31 11 Feb 1999	NASA 35.032UE/ Kristina Lynch/ U of New Hampshire/ Mother with current density, electron and ion detectors plus four free-flying daughter payloads carrying magnetometers
PF-O-279 Orion	10:25:01 30 Jan 2000	NASA 30.044 SRP-3 University of Alaska/ Joseph Hawkins/ U of Alaska/ Student-built payload to study tropospheric turbulence, parachuted instrument section with GPS
PF-BBXII-280 Black Brant 12	07:45:10 25 Feb 2000	NASA 40.008/ Charles W. Carlson/ U of California at Berkeley/ Mother-daughter payload to measure particle acceleration and plasma generation processes
PF-BBXII-281 Black Brant 12	09:19:11 26 Feb 2000	NASA 40.015 (Canadian Space Agency)/ David Knudsen/ U of Calgary/ Measure E-field, magnetic field and particles to explore energetics of thermal auroral plasma

PF-BBXII-282 Black Brant 12	08:23:05 14 Jan 2002	NASA 40.014/Paul M. Kintner/ Cornell University/ SIERRA involving mother and two daughter payloads in plane perpendicular to Magnetic field to measure particles and E-field and thermal electron distribution
PF-BBXII-283 Black Brant 12	09:38:51 6 Feb 2002	NASA 40.016/ Craig Kletzing/ U of Iowa/ Instrumented to examine relation between high-frequency waves and auroral electrons
PF-BBV-284 Black Brant 5	09:55:01 21 Feb 2002	NASA 21.128/ Andrew B. Christensen/ Aerospace Corp./ Neutral mass spectrometer, photometer, ionization gauge, atomic oxygen resonance fluorescence detector to examine relation between atmospheric composition and winds in lower E-region/ <u>Recovery</u>
PF-TauO-285 Taurus-Orion	09:57:01 21 Feb 2002	NASA 33.069/ M. Larson/ Clemson University/ Puffed trail TMA releases on up-leg and down-leg, flown in conjunction with PF-TauO-285
PF-TauO-286 Taurus-Orion	09:59:01 21 Feb 2002	NASA 33.070/ M. Larson/ Clemson University/ Puffed trail TMA releases on up-leg and down-leg, flown in conjunction with PF-TauO-285
PF-TauO-287 Taurus-Orion	10:01:01 21 Feb 2002	NASA 33.073/ M. Larson/ Clemson University/ Puffed trail TMA releases on up-leg and down-leg, flown in conjunction with PF-TauO-285
PF-ImpO-288 Improved Orion	09:07:51 7 Mar 2002	NASA 30.049/ Kristina Lynch/U of New Hampshire/ Faraday cup dust collectors, Langmuir probe, RF capacitance probe, plasma wave to investigate meteoric dust near 90 km
PF-ImpO-289 Improved Orion	11:15:41 15 Mar 2002	NASA 30.052/ Kristina Lynch/ U of New Hampshire/ Faraday cup dust collectors, Langmuir probe, RF capacitance probe, plasma wave to investigate meteoric dust near 90 km
PF-ImpO-290 Improved Orion	13:03:51 15 Mar 2002	NASA 30.050/ Kristina Lynch/ U of New Hampshire/ Faraday cup dust collectors, Langmuir probe, RF capacitance probe, plasma wave to investigate meteoric dust near 90 km

PF-ImpO-291 Improved Orion	13:42:31 15 Mar 2002	NASA 30.051/ Kristina Lynch/ U of New Hampshire/ Faraday cup dust collectors, Langmuir probe, RF capacitance probe, plasma wave to investigate meteoric dust near 90 km
PF-ImpO-292 Improved Orion	21:07:01 18 Mar 2002	NASA 30h.047/ Joseph Hawkins/ U of Alaska/ Student-built payload containing ion and electron density probes and GPS receiver
PF-TrImpO-293 Terrier-Improved Orion	07:50:02 27 Jan 2003	NASA 36.200/ James LaBelle/U of Iowa/ (HIBAR payload) to measure high-frequency standing waves with radio-wave receivers, E-field probe, electron electrostatic analyzer
PF-BBX-294 Black Brant 10	09:50:01 25 Mar 2003	NASA 35.034/ Mark Conde /U of Alaska/ Two 100-km long TMA releases to map height variation of E-region winds
PF-TrO-295 Terrier-Orion	10:09:01 25 Mar 2003	NASA 41.034/ Mark Conde /U of Alaska/ Two 100-km long TMA releases to map height variation of E-region winds
PF-TrBB-296 Terrier Black Brant	12:09:01 27 Mar 2003	NASA 36.206/ M. Larsen/ Clemson University/ Two TMA trail releases
PF-TrO-297 Terrier Orion	12:10:01 27 Mar 2003	NASA 41.028/ M. Larsen/ Clemson University/ Two TMA trail releases, to be flown with PF-BBV-296/ <i>Vehicle failure</i>
PF-BBV-298 Black Brant 5	12:12:01 27 Mar 2003	NASA 21.131/ M. Larsen/ Clemson University/ Two TMA trail releases, flown with PF-BBV-296
PF-TrO-299 Terrier-Orion	12:13:01 27 Mar 2003	NASA 41.029 M. Larsen/ Clemson University/ Two TMA trail releases, flown with PF-BBV-296
PF-BBXII-300 Black Brant 12	10:31:00 6 Mar 2005	NASA 40.017UE/ Kristina Lynch/ Dartmouth College/ Mother plus four daughter payloads to with E-field and particle detectors to measure motion and structure of electron precipitation/ <u>Recovery</u> / <i>Vehicle failure</i>
PF-ImpO-301 Improved Orion	05:45:00 15 Mar 2005	NASA 30.058UE/ Kristina Lynch/ Dartmouth College/ Faraday cup dust collector and Langmuir probe to observe behavior of mesospheric dust layers

PF-ImpO-302 Improved Orion	07:45:00 15 Mar 2005	NASA 30.059UE/ Kristina Lynch/ Dartmouth College/ Faraday cup dust collector and Langmuir probe to observe behavior of mesospheric dust layers
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