OGIP Memo OGIP/93-013

Standard Strings for Mission, Instrument, Filter, Detector & Grating Names for OGIP FITS files

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SUMMARY

We give a list of standard character strings used within the OGIP for the specification of the Mission, Instrument, Filter, Detector & Grating in use.

LOG OF SIGNIFICANT CHANGES

Release Date	**Sections Changed**	**Brief Notes**
1993 Jan 13		First (internal) Draft
1994 Oct 14	All	Major revision to all strings
1994 Nov 19	All	Made compatible with `LaTeX2HTML` software
1995 Jan 17	12	Added instrument sub-strings for HEAO-1/A-4
1995 Jan 26	14	Added instrument sub-strings for OSO-8/GCXSE
1995 Feb 17	16	Added mission/instrument names
1995 Feb 27	4	Added acronyms for Expts A & F
1995 Mar 03	1.3, 9 & 10	Added Grating Definitions
1995 Mar 06	17	Revised instrument names

Contents

1 INTRODUCTION

In order to facilitate the use of FITS datasets by downstream s/w and users, the OGIP has adopted a set of standard character strings to be used to specify the Mission, Instrument and Detector to which the dataset refers, and to specify any Filter and/or Grating in use. This memo lists those currently approved for use and should be **strictly** adhered to within the OGIP. For quick reference the approved strings are summarized in Tables 2, 2, 2 & 2 (respectively).

1.1 Design Criteria

During the development of these standard strings/hierarchy, we decided **against** deriving a standard-recipe (set of rules) for specifying all the necessary information for all missions, instruments *etc.* This decision was primarily based on the great variety of instrumentation handled by the OGIP. Instead we considered it preferable to define the **minimum** number of unique strings which served the purpose, and wherever possible adopting the strings in common use by instrument teams & scientists. Values already in widespread use for the mandatory FITS keywords `TELESCOP` and `INSTRUME` also influenced our decision in some cases.

In almost all cases, the <u>Mission</u> and <u>Filter</u> strings are fairly obvious (& uncontroversial), thus are straightforward to define. It is likely that these strings will most often be used as the values of the `TELESCOP` & `FILTER` keywords in FITS files, however their use within the value of other character keywords is also allowed.

The character strings adopted for the specification of the <u>instrument/detector/grating</u> (and, where necessary, <u>sub-detector</u>) are naturally highly instrument-specific. These strings will most often be used as the values of the `INSTRUME` & `DETNAM` or `INSTRUME` & `GRATING` keywords in FITS files, however again their use within the value of other keywords is also allowed.

It should be noted that many of the strings specified in the following sections are provided solely to enable calibration datasets to be fully specify. These are however noted as such in the text.

All the strings listed in the following sections should be considered **case-sensitive**.

1.2 Specification of multiple instruments & detectors

Under certain circumstances it may be desirable to combine data from different instruments and/or different parts (sub-detectors) of a given instrument together in a single FITS dataset (eg. combining *ASCA* GIS2 and GIS3 datasets, combining the Argon layers of detector modules DET-A and DET-B for the *EXOSAT* ME). It is crucial that the `INSTRUME` and/or `DETNAM` keywords reflect such combinations, both to inform the user and (more importantly) software.

There are two ways in which such combinations are specified via the `INSTRUME` and/or`DETNAM` keywords:

1. Certain common combinations are given their own unique values
   For example:

   - For the *EXOSAT* ME
     `INSTRUME= 'ME      '`
     `DETNAM  = 'QUAD`j XX`'`
     is used to denote that quadrant j of the 8 ME modules have been combined (with j=1 representing `DET-A` + `DET-B`, j=2 representing `DET-C` + `DET-D` *etc*). See Section 10.

2. The `INSTRUME` and/or `DETNAM` keyword strings for less common combinations are constructed using the standard strings listed in this document separated by a comma (`,`).
   For example:

   - For a combination of the two *ASCA* GIS experiments
     `INSTRUME= 'GIS2,GIS3'`
     (see Section 5).

1.3 Gratings in the Optical Path

Some instrument/detector combinations can operate in conjunction with a grating inserted into the optical path. Often the usage of such a grating is optional, and observations can also be carried out using the detector without the grating in place. In the past, the instrument/grating combination has often been refered to as a 'separate' instrument. For example, data taken whilst the moveable transmission grating was in the optical path of one of the two low energy telescopes was commonly refered to as being obtained from the `'EXOSAT TGS1'` or `'EXOSAT TGS2'`. However, this procedure is strongly discouraged since if different gratings could be associated with the same or different focal plane instruments, different acronyms would need to be defined for each intrument/grating combination.

Instead, the OGIP recommends that the focal plane instrument is specified by the usual `INSTRUME` keyword, and that the grating is specified using the `GRATING` keyword. Furthermore, this pair of keywords should be used even when (in principle) there is no ambiguity as to which detector is being used along with the grating. We believe this not only makes the the instrumental configuration more obvious for the user, but also has advantages to downstream software.

Thus in the example used above (see Section 10) we have:

```
TELESCOP= 'EXOSAT   '
INSTRUME= 'CMA1     '
GRATING = 'TGS1     '
```

1.4 Contacts

Any comments or suggestions (especially if you have requirements not covered by this memo) should be e-mailed to the authors (`LHEAVX::GEORGE` and/or `LHEAVX::ANGELINI`).

2 QUICK REFERENCE TABLES

Table 1: Summary of Standard Strings for Satellite Missions & Instruments used within the OGIP

Mission (and alternatives)	**Instrument**		**Description/Notes**
all missions	INS		Instrument Non-Specific
ARIEL-V	ASM		All-Sky Monitor (Expt G)
	RMC		Rotation Modulation Collimator (Expt A)
	SSI		Sky Survey Instrument (Expt B)
	ST		Scintillation Telescope (Expt F)
ASCA (ASTRO-D)	XRT-i		X-ray Telescope module (i =1,2,3,4) (*but see Table 2*)
	GISi	†	Gas Imaging Spectrometer (i =2,3)
	SISi	†	Solid State Imaging Spectrometer (i =0,1) (*but see Table 2*)
BBXRT	XRT-a		X-ray Telescope module (a =A,B)
	Ai	†	Detector-A pixel (i =0,1,..5)
	Bi	†	Detector-B pixel (i =0,1,..5)
CGRO (GRO)	BATSE		Burst and Transient Source Expt (*but see Table 2*)
(COMPTON)	COMPTEL		Imaging Compton Telescope (*but see Table 2*)
	EGRET		Energetic Gamma-ray Experiment Telescope
	OSSE		Oriented Scintillation Spectrometer Experiment (*but see Table 2*)
COS-B	COS-B		Spark Chamber

† Focal Plane Instrument
‡ Included Grating able to be inserted in optical path (see Table 2)

Table 1: Summary of Standard Strings for Satellite Missions & Instruments used within the OGIP (*continued*)

Mission (and alternatives)	**Instrument**		**Description/Notes**
EINSTEIN	HRMA	‡	High Resolution Mirror Assembly
(HEAO-2)	FPCS	†	Focal Plane Crystal Spectrometer
(HEAO-B)			(*but see Table 2*)
	HRI-i	†	High Resolution Imager (i =1,2,3)
	IPC-i	†	Imaging Proportional Counter (i =1,2)
	SSS-i	†	Solid-State Spectrometer (i =1,2)
	MPC		Monitor Proportional Counter
EXOSAT	LEIT-i	‡	Low-Energy Imaging Telescope (i =1,2)
	CMA-i	†	Channel Multiplier Array (i =1,2)
	PSD-i	†	Position Sensitive Detector (i =1,2)
	GSPC		Gas-Scintillation Proportional Counter
	ME		Medium Energy Proportional Counter array
			(*but see Table 2*)
GINGA	LAC		Large Area proportional counter
(ASTRO-C)			(*but see Table 2*)
	ASM		All-Sky Monitor
	GBD		Gamma-ray Burst Detector
HEAO-1	A-1		Large Area Sky Survey Expt
(HEAO-A)	A-2		Cosmic X-ray Expt
			(*but see Table 2*)
	A-3		Scanning Modulation Collimator
	A-4		The A-4 High Energy Experiment
			(*but see Table 2*)
IUE	FES-i	†	(Optical) Fine Error Sensor ($i = 1, 2$)
	LWP	†	Long Wavelength Prime Camera
	LWR	†	Long Wavelength Redundant Camera
	SWP	†	Short Wavelength Prime Camera
	SWR	†	Short Wavelength Redundant Camera

† Focal Plane Instrument
‡ Included Grating able to be inserted in optical path (see Table 2)

Table 1: Summary of Standard Strings for Satellite Missions & Instruments used within the OGIP (*continued*)

Mission (and alternatives)	**Instrument**		**Description/Notes**
OSO-8	UVS		High-resolution UV spectromter
(OSO-I)	MUVS		Multichannel UV & visible spectrometer
	CGCS		Columbia Grating Crystal spectrometer
	CXP-i		Columbia X-ray Polarimeter (i=1,2)
	XHE		X-ray Heliometer
	WSXE		Wisconsin Soft X-ray Experiment
	GCXSE		Goddard Cosmix X-ray Spectrometer Experiment (*but see Table 2*)
	HECXE		High-energy celestial X-ray Experiment
	EUV		Extreme UV experiment
ROSAT	XRT		X-ray Telescope
	HRI	†	High Resolution Imager
	PSPCx	†	Position Sensitive Proportional Counter (x=B,C flown)
	WFC		Wide Field Camera
SAC-B	CUBIC		Diffuse Soft X-Ray Background Expt
	GXRE		Goddard X-Ray Experiment
	HXRS		the Hard X-Ray Spectrometer
SAS-2	SC		Spark Chamber
(SAS-B)	PC		Proportional Counter
SAS-3	XRT-i		X-ray Telescope i of LED experiment ($i = 1, 2$)
(SAS-C)	LED-i	†	Low Energy Detector i ($i = 1, 2$)
	RMC		Rotating Modulation Collimator experiment
	SCD-i XX		Slat Collimator Detector i, layer XX ($i = 1, 2$, XX =`AR,XE`)
VELA 5B	XC		All-sky monitor
XTE	ASM		All-sky monitor
	HEXTE		High Energy X-ray Timing Experiment (*but see Table 2*)
	PCA		Proportional Counter Array (*but see Table 2*)

† Focal Plane Instrument
‡ Included Grating able to be inserted in optical path (see Table 2)

Table 2: Summary of Standard Strings for (sub) Detector Names used within the OGIP

Mission/instrument	**Sub-Detector**	**Description/Notes**
all missions	NONE	specification of sub-instrument not appropriate (optional)
ARIEL-V/SSI	DETi XX	SSI Detector module i XX = AA or XE for Argon or Xenon layer respectively (XX not present: both layers)
ASCA/XRT	Qj	XRT Quadrant j (j =0,1,2,3)
ASCA/SIS	CCDj	SIS CCD chip (j =0,1,2,3)
CGRO/BATSE	LAD-i	Large Area Detector i ($i = 0, 1, 2, ...7$)
	LADB	Burst-selected LAD detectors
	SD-i	Spectroscopy Detector i (i as above)
	SDB	Burst-selected SDs
CGRO/COMPTEL	D1-i	Liquid scintillator Detector ($i = 1, 2, ...7$)
	D2-j	NaI crystal Detector ($j = 1, 2, ...14$)
CGRO/OSSE	OSSE-i	independently-pointable scintillator i (where $i = 1, 2, 3, 4$)
EINSTEIN/FPCS	XX	diffractor in use XX = PET for pentaerythritol XX = ADP for ammonium dihydrogen phosphate XX = TAP for thalium acid phthalate XX = RAP for rubidium acid phthalate XX = PbL for lead laurate XX = PbSt for lead sterate
EXOSAT/ME	DET-x XX	ME detector (x =A,B,C,....H) XX = AR or XE for Argon or Xenon layer respectively (XX not present: both layers)
	QUADi XX	ME quadrant ($i = 1$, DET-A + DET-B *etc*) (rules for XX as above)
	HALFi XX	ME half ($i = 1$, QUAD1 + QUAD2 *etc*) (rules for XX as above)
	CORN XX	ME corner detectors (*ie* DET-A, DET-D, DET-E & DET-G) (rules for XX as above)
	ALL XX	All eight ME detectors (DET-A + DET-B ... DET-G) (rules for XX as above)

Table 2: Summary of Standard Strings for (sub) Detector Names used within the OGIP (*continued*)

Mission/instrument	**Sub-Detector**	**Notes**
GINGA/LAC	XX	where XX = TOP or MID for Argon or Xenon layer resp^y (XX not present: both layers)
HEAO-1/A-2	LED-i x	Low Energy Detector i ($i = 1, 2,\ x = s, l$)
	MED x	Medium Energy Detector ($x = s, l$)
	HED-i x	High Energy Detector i ($i = 1, 2, 3$,$x = s, l$)
HEAO-1/A-4	LED-i	Low Energy Detector i ($i = 3, 6$)
	MED-i	Medium Energy Detector i ($i = 1, 2, 4, 5$)
	HED-7	High Energy Detector
OSO-8/GCXSE	DET-X	Detector module (X=A, B or C)
XTE/HEXTE	PWai	Detector Identifier (a =A,B; i =0,1,2,3)
XTE/PCA	PCUi	Detector Unit Identifier (i =0,1,2,3,4)

Table 3: Summary of Standard Strings for Instrument Filters used within the OGIP

Mission/instrument	Filter	Notes	
all instruments	NONE	No filter in use (or in open position)	
EINSTEIN/*(f.plane inst)*	AL	(BBFS) Aluminium	
	BE	(BBFS) Beryllium	
EXOSAT/LEIT	CLOSED	Totally opaque filter	(FW Pos 1)
	PPL	Polypropylene	(FW Pos 2)
	4Lx	Thick (400 nm) Lexan	(FW Pos 3)
	Fe Cal	Fe^{55} source	(FW Pos 5)
	Al/P	Aluminium-parylene	(FW Pos 6)
	3Lx	Thin (300 nm) Lexan	(FW Pos 7)
	Bor	Boron	(FW Pos 8)
	UV	Magnesium Fluoride	(FW Pos 9)
ROSAT/PSPC	BORON	Boron	
ROSAT/WFC	S1x	C/Lexan/Bor Survey filter (x=a,b)	
	S2x	Be/Lexan Survey filter (x=a,b)	
	P1	Al/Lexan Pointed phase filter	
	P2	Sn/Al Pointed phase filter	
SAS-3/LED	BORON	Boron	
	CHROMIUM	Chromium	
	GOLD	Gold (Foils)	
	RED_AP	Reduced Aperture filter wheel possition	

Table 4: Summary of Standard Strings for Gratings used within the OGIP

Mission/instrument	Grating	Notes
all instruments	NONE	No grating in palce
EINSTEIN/*(f.plane inst)*	OGS/Gj	Objective Grating Spectrometer (j =5,10) (used with HRI-i in f.plane)
EXOSAT/LEIT	TGSi	Transmission Grating Spectrometer (i =1,2) (used with CMAi in f.plane)

3 ALL MISSIONS

Instrument String

- `INSTRUME= 'INS     '`
  - standing for Instrument Non-specific
  Sub-Instruments
  - `DETNAM  = 'NONE    '`
    - the 'null' value for the `DETNAM` keyword (optional unless stated)

Filters

- `FILTER  = 'NONE    '`
  - the 'null' value for the `FILTER` keyword (optional unless stated)

Filters

- `GRATING = 'NONE    '`
  - the 'null' value for the `GRATING` keyword (optional unless stated)

4 ARIEL-V

The fifth UK X-ray astronomy mission (also known as UK5 prior to launch) in the UK/US collaborative space research programme, launched 1974 Oct 12. The scientific payload consist of 6 X-ray instruments, but currently only the All Sky Monitor data (ASM; 3–6 keV) are available within the HEASARC. The All Sky Monitor operated from 1974 Oct 18 until 1980 Mar 10.
Mission String

- `TELESCOP= 'ARIEL-V '`
  - the most commonly used string for the name of the spacecraft

Instrument Strings

- `INSTRUME= 'ASM     '`
  - the All Sky Monitor (also known as Experiment G)

- `INSTRUME= 'RMC     '`
  - the Rotation Modulation Collimator (also known as Experiment A)

- `INSTRUME= 'SSI     '`
  - the Sky Survey Instrument (also known as Experiment B)
  SSI Sub-Instruments
  - `DETNAM  = 'DET`$i\,XX$`'`
    - denoting the dataset refers to or was collected by Detector module i, layer XX, where $i = 1, 2, 3, 4$ and XX = `AR` or `XE` for the Argon or Xenon layer respectively.
    Note:
      * IF XX not present, then dataset refers to or collected by both layers combined.
- `INSTRUME= 'ST      '`
  - the Scintillation Telescope (also known as Experiment F)
- *strings currently undefined for all other instruments which flew on Ariel V*

5 ASCA (formerly ASTRO-D)

The Advanced Satellite for Cosmology and Astrophysics (ASCA), is the fourth Japanese astronomy mission, known as ASTRO-D prior to launch on 1993 Feb 20. The scientific payload consists of four X-ray telescopes working in conjunction with two different types of detector: gas proportional counters and front-illuminated, frame-transfer CCDs. Two of each detector were launched, each of them housed at the focal plane of an X-ray telescope. The total energy range (combining both types of detector) is 1–10 keV.

Mission Strings

- `TELESCOP= 'ASCA    '`
  - the official acronym for the spacecraft name.
- `TELESCOP= 'ASTRO-D '`
  - the pre-launch name for the mission (should no longer be used)

Instrument Strings

- `INSTRUME= 'XRT-`i`   '`
  - denoting the (calibration) dataset refers to X-ray Telescope *production number* i, where the telescopes flown are numbered $i = 1, 2, 3, 4$ with $i = 5$ as a flight spare. The relationship to the s/c telescope *module number* (Mj) is as follows: XRT-1 occupies M3, XRT-2 occupies M2, XRT-3 occupies M1, and XRT-4 occupies M0, where M0 & M1 are in positive & negative directions along the s/c X-axis respectively, and M2 & M3 are in positive & negative directions along the s/c Y-axis respectively (the positive Y-axis points towards the Sun).
  Note:

  - `INSTRUME= 'XRT     '` should be used to denote a (calibration) dataset which is valid for any/all of the 4 X-ray Telescopes flown.

XRT Sub-Instrument Strings

  - `DETNAM  = 'Q`j`     '`
    - denoting (calibration) dataset refers to quadrant j of the XRT specified by the Instrument string, where the quadrants are numbered $j = 0, 1, 2, 3$ in an anti-clockwise direction from the (positive) s/c X-axis.

- `INSTRUME= 'GIS`i`    '`
  - denoting the dataset refers to or collected by Gas Imaging Spectrometer Sensor i, where the the onboard GISs are numbered $i = 2, 3$, and are under s/c telescope *module number* Mi.
  Note:
  - `INSTRUME= 'GIS     '` should be used to denote the dataset refers to both GISs, or that the (calibration) dataset is valid for either GIS.
  - `INSTRUME= 'GIS2    '` is sufficient to imply that XRT-2 provides the focusing optics
  - `INSTRUME= 'GIS3    '` is sufficient to imply XRT-1 provides the focusing optics
- `INSTRUME= 'SIS`i`    '`
  - denoting the dataset refers to or collected by Solid state Imaging Spectrometer i, where the the onboard SISs are numbered $i = 0, 1$, and are under s/c telescope *module number* Mi.
  Note:
  - `INSTRUME= 'SIS     '` should be used to denote the dataset refers to both SISs, or that the (calibration) dataset is valid for either SIS.
  - `INSTRUME= 'SIS0    '` is sufficient to imply XRT-4 provides the focusing optics
  - `INSTRUME= 'SIS1    '` is sufficient to imply XRT-3 provides the focusing optics

SIS Sub-Instrument Strings

  - `DETNAM  = 'CCD`j`    '`
    - denoting the dataset refers to or collected by CCD chip j of the SIS specified by the instrument string, where the chips are numbered $j = 0, 1, 2, 3$ where looking down the telescopes (*ie* from the positive s/c Z-axis direction), the numbering is clockwise in the s/c X,Y coordinate plane starting in the (negative-X, negative-Y) & (positive-X, positive-Y) quadrant for SIS0 & SIS1 respectively.

6 BBXRT

The Broad Band X-Ray Telescope (BBXRT) was flown on the space shuttle Columbia (STS-35) as part of the ASTRO-1 payload (1990 Dec 02 – 11). The scientific payload consist of two X-ray telescopes each having a segmented, cryogenically-cooled lithium-drifted silicon spectrometer at the focal plane. The energy range is 0.3–12 keV.

Mission String

- `TELESCOP= 'BBXRT   '`
  - the most commonly used name within the X-ray community for the name of the mission.

Instrument Strings

- `INSTRUME= 'XRT-`a`   '`
  - denoting the (calibration) dataset refers to X-ray Telescope module a, where the modules flown are numbered a =`A,B` with XRT-A above detectors `'A`j`'`, and XRT-B above `'B`k`'`.
  Note:
  - `INSTRUME= 'XRT     '` should be used to denote a (calibration) dataset which is valid for either/both X-ray Telescopes flown.
- `INSTRUME= 'A`j`      '`
  - denoting the dataset refers to or collected by Detector-A, pixel j, where pixels are numbered $j = 0, 1, 2, 3, 4$ with pixel `A0` at the centre, and pixels `A1` thru `A4` numbered in an anti-clockwise on the sky (in the same direction as the s/c roll-angle) such that A4 points North for a roll-angle of zero.
  Note:
  - `INSTRUME= 'A`j`      '` is sufficient to imply XRT-A provides the focusing optics
- `INSTRUME= 'B`k`      '`
  - denoting the dataset refers to or collected by Detector-B, pixel k, where pixels are numbered $k = 0, 1, 2, 3, 4$ with pixel `B0` at the centre, and pixels `B1` thru `B4` numbered in an anti-clockwise on the sky (in the same direction as the s/c roll-angle) such that B2 points North for a roll-angle of zero. (Thus the B detector is rotated by 180° with respect to the A detector above.)
  Note:
  - `INSTRUME= 'B`i`      '` is sufficient to imply XRT-B provides the focusing optics

7 CGRO (formerly GRO)

The Compton Gamma Ray Observatory (CGRO), known prior to launch as the Gamma Ray Observatory carried four gamma-ray detectors covering energies from 30 keV to 30 GeV. The spacecraft was launched by the Space Shuttle on 1991 April 05 to a low-earth (nominally 450 km) orbit and the scientific instruments were switched on gradually over the next 40 days. The spacecraft is gyro stabilized to point stably within 5 arcmin (with attitude information to better than 1 arcmin).

At the spacecraft's altitude its orbit gradually decays and it has internal reboost capabilities. The first reboost was successfully performed in 1993 November–December raising the orbit from 360 km to the nominal 450 km.

Mission String

- `TELESCOP= 'CGRO    '`
  - official acronym for the mission
- `TELESCOP= 'GRO     '`
  - the pre-launch name for the mission (should no longer be used)
- `TELESCOP= 'COMPTON '`
  - an occasional name for the mission, but not the most frequently used (string should not be used)

Instrument Strings

- `INSTRUME= 'BATSE   '`
  - denoting the Burst Transient Source Experiment.
  BATSE Sub-Instrument Strings
  - `DETNAM  = 'LAD-`i`    '`
    - denoting the dataset refers to or collected by Large Area Detector i,
    where $i = 0, 1, 2, 3....7$
    Note:
    * `DETNAM  = 'LAD     '` should be used for datasets containing information for all LAD detectors
  - `DETNAM  = 'LADB    '`
    - refers to data collected from all of the burst-selected LAD detectors
    (normally the four LADs pointing closest to the location of a BATSE triggered event).
  - `DETNAM  = 'SD-`i`     '`
    - denoting the dataset refers to or collected by Spectroscopic Detector i,
    where $i = 0, 1, 2, 3....7$
    Note:
    * `DETNAM  = 'SD      '` should be used for datasets containing information for all Spectroscopic Detectors
  - `DETNAM  = 'SDB     '`
    - refers to data collected from all of the burst-selected SD detectors
    (normally the four SDs pointing closest to the location of a BATSE triggered event).
- `INSTRUME= 'COMPTEL '`
  - denoting the imaging Compton Telescope
  COMPTEL Sub-Instrument Strings
  - `DETNAM  = 'D1-`i`     '`
    - denoting the dataset refers to the (upper) liquid scintillator detector i,
    where $i = 1, 2, 3...7$.
  - `DETNAM  = 'D2-`j`     '`
    - denoting the dataset refers to the (lower) NaI crystal j, where $j = 1, 2, 3...14$.

- `INSTRUME= 'EGRET    '`
  - denoting the Energetic Gamma-Ray Experiment Telescope
  The EGRET instrument can be used in any of 74 modes which are selectable electronically. In a typical observation the instrument mode changes every few minutes. Datasets collected give the mode for each telescope or can use the EGRET exposure history data to determine the mode at any given time.

- `INSTRUME= 'OSSE     '`
  - denoting the Oriented Scintillation Spectrometer
  OSSE Sub-Instrument Strings
  - `DETNAM   = 'OSSE-`i`   '`
    - denoting one of the four independently-pointable OSSE scintillators, where $i = 1, 2, 3, 4$.
    Note:
    * If the `DETNAM` keyword is not present within an OSSE dataset, then the dataset is presumed to contain information for all four scintillators.

8 COS-B

The European Space Agency's second Celestial Observation Satellite, *COS-B* was dedicated to γ-ray astronomy, and carried a single spark-chamber telescope sensitive between 0.05–5 GeV. The s/c was launched into an elliptic orbit, and was spin-stabilized with the telescope axis along the spin axis. The experiment was operational between 1975 Aug 17 and 1982 Apr 25, and in that time made 65 observations mainly of sources along the galactic equator.

Mission String

- `TELESCOP= 'COS-B    '`
  - the only known name of the mission

Instrument Strings

- `INSTRUME= 'COS-B    '`
  (due to a lack of a suitable acronym for the spark chamber)

9 The Einstein Observatory (formerly HEAO-B or HEAO-2)

(in collaboration with Jonathan McDowell, CfA)

NASA's second High Energy Astrophysics Observatory, renamed to *The Einstein Observatory* after launch, was the first satellite mission to fly optics for celestial X-ray astronomy. It was launched on 1978 Nov 13 and operated until 1981 May. The main instrument cluster was located on a moveable carousel in the focal plane of a nested mirror assembly. Any one of four types of instruments could be rotated into the optical path: an Imaging Proportional Counter (IPC; 2 available, one never used), a High Resolution Imager (HRI; 3 available, only one used in GO phase), a Solid State Spectrometer (SSS; 2 available, one never used), or a Bragg Focal Plane Crystal Spectrometer (FPCS). In addition one of two Objective Grating Spectrometers (OGSs) or one of two Broad Band Filter Spectrometers (BBFSs) could be inserted into the focal path (for use with one of the focal plane detectors). *Einstein* also carried a single, non-focusing Monitor Proportional Counter (MPC) co-aligned with the main telescope. The energy range for the instruments at the focal plane of the telescope was 0.1–4 keV, whilst that of the MPC was 2–15 keV.

Mission String

- `TELESCOP= 'EINSTEIN'`
  - the most commonly used string to denote the mission within OGIP FITS files
- `TELESCOP= 'HEAO-2  '`
  - the pre-launch name for the mission (should no longer be used)
- `TELESCOP= 'HEAO-B  '`
  - alternative pre-launch name for the mission (should no longer be used)

Instrument Strings

- `INSTRUME= 'HRMA    '`
  - denoting the (calibration) dataset refers to the High Resolution Mirror Assembly (the X-ray telescope).
  Note:
  – The strings listed below for the focal plane instrumentation are sufficient to imply the HRMA provided the focusing optics.
- `INSTRUME= 'FPCS    '`
  - denoting the dataset refers to or collected by the Focal Plane Crystal Spectrometer.
  FPCS Sub-Instrument Strings
  – `DETNAM  = 'PET     '`
    - denoting the penmtaerythritol crystal
  – `DETNAM  = 'ADP     '`
    - denoting the ammonium dihydrogen phosphate crystal
  – `DETNAM  = 'TAP     '`
    - denoting the thalium acid phthalate crystal
  – `DETNAM  = 'RAP     '`
    - denoting the rubidium acid phthalate crystal
  – `DETNAM  = 'PbL     '`
    - denoting the lead laurate crystal
  – `DETNAM  = 'PbSt    '`
    - denoting the lead sterate crystal

- `INSTRUME= 'HRI-`i`    '`
  - denoting the dataset refers to or collected by the focal-plane High Resolution Imager i, where $i = 1, 2, 3$.
  Note:
  - `INSTRUME= 'HRI     '` should be used to denote a (calibration) dataset which is valid for any/all HRIs
  - `INSTRUME= 'HRI     '` can also be assumed (though this is not recommended) to imply HRI-3, as HRI-1 (which had a thick window) was never used in orbit, and HRI-2 was discovered to have a high background 'splotch' during the PV phase and not used thereafter.
- `INSTRUME= 'IPC-`i`    '`
  - denoting the dataset refers to or collected by the focal-plane Imaging Proportional Counter i, where $i = 1, 2$
  Note:
  - `INSTRUME= 'IPC     '` should be used to denote a (calibration) dataset which is valid for either/both IPCs
  - `INSTRUME= 'IPC     '` can also be assumed to imply IPC-1 as IPC-2 was never used in orbit (but this is not recommended)
- `INSTRUME= 'SSS-`i`    '`
  - denoting the dataset refers to or collected by the focal-plane Solid State Spectrometer i, where $i = 1, 2$
  Note:
  - `INSTRUME= 'SSS     '` should be used to denote a (calibration) dataset which is valid for either/both SSSs
  - `INSTRUME= 'SSS     '` can also be assumed to imply SSS-1 as SSS-2 was never (or extremely seldomly) used in orbit (but this is not recommended).
- `INSTRUME= 'MPC     '`
  - denoting the dataset refers to or collected by the Monitor Proportional Counter

Filters for the focal plane instruments

- `FILTER   = 'AL      '`
  Indicating the BBFS Aluminium filter was inserted into the X-ray optical path at the exit of the HRMA.
  (This filter was used once with HRI-3, and five times with IPC-1 in the focal plane).
- `FILTER   = 'BE      '`
  Indicating the BBFS Beryllium filter was inserted into the X-ray optical path at the exit of the HRMA.
  (This filter was never used in orbit).

- `FILTER = 'NONE '`
  (Optional) indicating no BBFS filter was in place

Gratings for the focal plane instruments

- `GRATING = 'OGS/G`i` '`
  - denoting the dataset refers to or collected using the Objective Grating Spectrometer with transmission grating i placed in the X-ray optical path at the exit of the HRMA, where $i = 5, 10$ representing the 500 lines/mm and 1000 lines/mm grating respectively.
  Note:
  - the focal plane detector in use with the grating is specified by the `INSTRUME` keyword.
  - All OGS astrophysical observations were made using the HRI-3 detector
  - All calibrations were performed using the HRI-1 detector

10 EXOSAT

The European X-ray Observatory Satellite (*EXOSAT*), was operational from 1983 May 26 to 1986 Apr 06, and in that time made 1780 detailed observations of a wide variety of astronomical objects. The scientific payload consists of two low energy telescopes (LEIT) each with a moveable instrument bench at the focal plane consisting of a Channel Multiplier Array (CMA) and a Position Sensitive microchannel-plate Detector (PSD) along with a moveable Transmission Grating Spectrometer (TGS) which could be swung into the optical path, a Medium Energy proportional counter (ME) experiment consisting of 8 moveable detectors each with both Argon- & Xenon-filled cells, and a single Gas Scintillation Proportional Counter (GSPC). *EXOSAT* was the first X-ray satellite in highly eccentric orbit, with an apogee of 190 000 km, perigee 350 km and orbital period of 90 hours, allowing several days of uninterrupted viewing of a source. The energy range covered by all 3 experiments was 0.5–20 keV.

Mission String

- `TELESCOP= 'EXOSAT '`
  - the official mission name

Instrument Strings

- `INSTRUME= 'LEIT-`i` '`
  - denoting the (calibration) dataset refers to Low Energy Instrument Telescope i, where $i = 1, 2$
  Note:
  - `INSTRUME= 'LEIT '` should be used to denote a (calibration) dataset which is valid for both/either LEITs

- `INSTRUME= 'CMA`i`    '`
  - denoting the Channel Multiplier Array i was in the focal plane of LEIT-i, where $i = 1, 2$.
  Note:
  - `INSTRUME= 'CMA     '` should be used to denote the dataset refers to both CMAs, or that the (calibration) dataset is valid for either CMA.
  - `INSTRUME= 'CMA`i`    '` is sufficient to imply LEIT-i provides the focusing optics.
- `INSTRUME= 'PSD-`i`   '`
  - denoting the Position Sensitive Detector i was in the focal plane of LEIT-i, where $i = 1, 2$.
  Note:
  - `INSTRUME= 'PSD     '` should be used to denote the dataset refers to both PSDs, or that the (calibration) dataset is valid for either PSD.
  - `INSTRUME= 'PSD-`i`   '` is sufficient to imply LEIT-i provides the focusing optics.
- `INSTRUME= 'GSPC    '`
  - denoting the dataset refers to or collected by the Gas Scintillation Proportional Counter.
- `INSTRUME= 'ME      '`
  - denoting the dataset refers to or collected by the Medium Energy proportional counter experiment. This experiment consisted of an array of eight double-celled counters, giving a total of 16 sub-instruments. Each quadrant of the array (consisting of a pair of counters) was moveable along a single axis and thus could be off-set from the nominal target position in order to provide simultaneous background monitoring. Furthermore, under certain (though not all) operating modes of the on-board computer, information regarding the counter, quadrant or half in which an X-ray event occurred was included in the telemetry. These factors, along with the common practice of combining datasets from different counters within the scientific analysis process, leads to the requirement of being able to specify the counters which are included in a given dataset. The following sub-instrument strings are defined:
  ME Sub-Instrument Strings
  - `DETNAM  = 'DET-`a XX`'`
    - to denote the dataset refers to or was collected by ME module a, layer XX, where a = `A,B,C....H` and XX = `AR` or `XE` for the Argon or Xenon layer respectively.
    Note:
    * If XX is not present, then dataset refers to or collected by both layers combined.
  - `DETNAM  = 'QUAD`j XX`'`
    - to denote the dataset refers to or was collected by ME quadrant j, where $j = 1, 2, 3, 4$ with $j = 1$ representing `DET-A` + `DET-B`, $j = 2$ representing `DET-C` + `DET-D` *etc*, and XX = `AR`, `XE` (or absent) as specified above.
  - `DETNAM  = 'HALF`k XX`'`
    - to denote the dataset refers to or was collected by ME half k, where $k = 1, 2$ with $k = 1$ representing `QUAD1` + `QUAD2`, *etc*, and XX = `AR`, `XE` (or absent) as specified above.
  - `DETNAM  = 'CORN `XX` '`
    - to denote the dataset refers to or was collected by the ME corner detectors (*ie* `DET-A`, `DET-D`, `DET-E` & `DET-H`) and XX = `AR`, `XE` (or absent) as specified above.

- `DETNAM = 'ALL` XX `'`
  - to denote the dataset refers to or was collected by all eight ME detectors (*ie* `DET-A`, `DET-B`, `DET-C`, ... `DET-H`) and XX = `AR`, `XE` (or absent) as specified above.

The corresponding string for counter combinations not included above should be constructed from those listed, preferably by using the minimum number of strings.
Examples:
`DETNAM = 'HALF1,QUAD3,DET-G` XX`'`
- denoting all detectors except DET-H.
`DETNAM = 'DET-A,DET-C,DET-E,DET-G` XX`'`
- denoting the 'odd-numbered' detectors.

Filters for the CMA Instrument

- `FILTER = 'CLOSED '`
  - to denote the totally opaque filter (filter wheel position 1)
- `FILTER = 'PPL '`
  - to denote the polypropylene filter (filter wheel position 2)
- `FILTER = '4Lx '`
  - to denote the thick (400 nm) Lexan filter (filter wheel position 3)
- `FILTER = 'Fe Cal '`
  - to denote the Fe^{55} source (filter wheel position 5)
- `FILTER = 'Al/P '`
  - to denote the aluminium-parylene filter (filter wheel position 6)
- `FILTER = '3Lx '`
  - to denote the thin (300 nm) Lexan filter (filter wheel position 7)
- `FILTER = 'Bor '`
  - to denote the Boron filter (filter wheel position 8)
- `FILTER = 'UV '`
  - to denote the magnesium flouride filter (filter wheel position 9)

Gratings for the CMA Instrument

- `GRATING = 'TGS1 '` - to denote that the dataset refers to or was collected using the Transmission Grating 1 in conjunction with the X-ray detector CMA1 (which should be specified by the `INSTRUME` keyword) The TGS1 has 1000 lines/mm.
- `GRATING = 'TGS2 '` - to denote that the dataset refers to or was collected using the Transmission Grating 2 in conjunction with the X-ray detector CMA2. (which should be specified by the `INSTRUME` keyword) The TGS2 has 500 lines/mm.

11 GINGA (formerly ASTRO-C)

The third Japanese astronomy mission, renamed *Ginga* (meaning 'Swan' or 'Galaxy') after launch into a low Earth orbit on 1987 Feb 05. The scientific payload consisted of 3 instruments: a Large Array proportional Counter (LAC), an All-Sky Monitor (ASM) and a Gamma-ray Burst Detector (GBD). The energy band covered by all 3 instruments combined was 1.5–400 keV. *Ginga* re-entered on 1991 Nov 01.

Mission String

- `TELESCOP= 'GINGA    '`
  - the official post-launch name of the spacecraft
- `TELESCOP= 'ASTRO-C '`
  - the pre-launch name for the mission (should no longer be used)

Instrument Strings

- `INSTRUME= 'LAC      '`
  - denoting the Large Area proportional Counter

  LAC Sub-Instrument Strings

  – `DETNAM   = 'TOP     '`
    - denoting the top layer (only) was used
  – `DETNAM   = 'MID     '`
    -denoting the mid layer (only) was used

  Note:

  – The specification of no sub-instrument string implies the dataset refers to both layers
- `INSTRUME= 'ASM      '`
  - denoting the All-Sky Monitor
- `INSTRUME= 'GBD      '`
  - denoting the Gamma-ray Burst Detector

12 HEAO-1 (a.k.a. HEAO-A)

The High Energy Astronomy Observatories 1, launched in 1977 Aug 12 and lost attitude control on 1979 Jan 09, carried four major experiments: 1) a Large Area Sky Survey (LASS), energy range 1–20 kev and also known as A-1, 2) a smaller proportional counter array, the Cosmic X-ray Experiment (CXE), energy range 0.2–60 keV known also as A-2, 3) a Modulation Collimator (MC), energy range 1–20 keV known also as A-3, and 4) a high-energy experiment, energy range 15–100 keV and know only as A-4. HEAO-1 was primarily a scanning mission.

Mission String

- `TELESCOP= 'HEAO-1   '`
  - the most commonly used acronym for the mission
- `TELESCOP= 'HEAO-A   '`
  - the alternate name for the mission (should not be used)

Instrument Strings

- `INSTRUME= 'A-1      '`
  - denoting the dataset refers to or collected by the Large Area Survey Survey Experiment
- `INSTRUME= 'A-2      '`
  - denoting the dataset refers to or collected by the Cosmic X-ray Experiment. This experiment consisted of 6 multi-anode gas proportional counter modules (two LEDs, a single MED, and three HEDs). Each module contained a dual collimator assembly consisting of strips of large and small collimator cell sizes (the sizes of which varies between modules – see below):

  A-2 Sub-Instrument Strings

  – `DETNAM   = 'LED-`*i x*` '`
    - to denote the dataset refers to or was collected by the Low Energy Detector module i, collimator x, where $i = 1, 2$ and x =`s,l` for the small and large collimator cell sizes. The (FWHM) fields of view of the small & large collimator cells for LED-1 are $1.55° \times 2.55°$ & $2.80° \times 2.55°$, whilst those for LED-2 are $2.70° \times 2.75°$ & $4.15° \times 2.80°$.

    Note:

    ∗ If x is not present, then the dataset refers to or collected by both sets of collimator cells combined.

    ∗ `DETNAM   = 'LED      '` should be used to denote (calibration) datasets applicable to either LED module.

  – `DETNAM   = 'MED`*x*`     '`
    - denoting the dataset refers to the Medium Energy Detector module, collimator x, where x =`s,l` for the small and large collimator cell sizes ($1.40°\times2.90°$ and $2.94°\times2.90°$ FWHM fields of view respectively).

    Note:

    ∗ If x is not present, then the dataset refers to or collected by both sets of collimator cells combined.

  – `DETNAM   = 'HED-`*i x*` '`
    - denoting the dataset refers to the High Energy Detector module i, collimator x, where $i = 1, 2, 3$ and x =`s,l` for the small and large collimator cell sizes. The (FWHM) fields of view of the small & large collimator cells for both HED-1 & HED-2 are $5.92° \times 2.81°$ & $2.91° \times 2.81°$, whilst those for HED-3 are $2.91° \times 2.81°$ & $1.44° \times 2.81°$.

    Note:

    * If x is not present, then the dataset refers to or collected by both sets of collimator cells combined.
    * `DETNAM = 'HED     '` should be used to denote (calibration) datasets applicable to any HED module.

- `INSTRUME= 'A-3     '`
  - denoting the dataset refers to or collected by the Scanning Modulation Collimator

- `INSTRUME= 'A-4'`
  - denoting the dataset refers to or collected by the A-4 experiment A-4 Sub-Instrument Strings

  - `DETNAM = 'LED-`i`'`
    - denoting the dataset refers to the Low Energy Detector, where the possible i values are 3 and 6 (energy range 13–180 keV).
  - `DETNAM = 'MED-`i`'`
    - denoting the dataset refers to the Medium Energy Detector,where the possible i values are 1,2,4,5 (energy range 80 keV – 10 MeV).
  - `DETNAM = 'HED-7'`
    - denoting the dataset refers to the High Energy Detector (energy range 120 kev – 10 MeV)

13 IUE

The *International Ultraviolet Explorer* is a joint undertaking between NASA, ESA, and the SERC. The 3-axis stabilized spacecraft was lauched on 1978 Jan 26, into an almost geosynchronous elliptical orbit over the Atlantic Ocean. The scientific payload consists of a 0.45 m Cassegrain telescope with a focal length of 6.75 m, echelle gratings (sensitive over the wavelength ranges (115–195 nm, or 190–320 nm), and a total of 4 vidicon cameras (one prime, one redundant for each of the two wavelength ranges). A pair of optical (FES) cameras, primarily used for fine attitude control, can also be used for psuedo-simultaneous photometry. The spacecraft has operated essentially uninterrupted since launch.

Mission String

- `TELESCOP= 'IUE     '`
  - the official acronym for the mission

Instrument Strings

- `INSTRUME= 'FES-`i`     '`
  - denoting the dataset refers to or collected by the Fine Error Sensor ($i = 1, 2$).

- `INSTRUME= 'LWP     '`
  - denoting the dataset refers to or collected by the Long Wavelength Prime camera.

- `INSTRUME= 'LWR     '`
  - denoting the dataset refers to or collected by the Long Wavelength Redundant camera.
- `INSTRUME= 'SWP     '`
  - denoting the dataset refers to or collected by the Short Wavelength Prime camera.
- `INSTRUME= 'SWR     '`
  - denoting the dataset refers to or collected by the Short Wavelength Redundant camera.

14 OSO-8

The primary objective of the OSO-8 mission (denoted OSO-I prior to launch) was to investigate the Sun's lower corona, the chromosphere, and their interface in the ultraviolet spectral region for a better understanding of the transport of energy from the solar photosphere into the corona. The secondary objectives were to study solar X-rays and the Earth/Sun relationships, and to investigate the background component of cosmic X-rays. The spacecraft was spin-stabilized, launched in 1975, and operated until 1978. The scientific payload consisted on 2 'pointed' experiments (UVS & MUVS), and 6 'scanning' experiments (CSP, XHE, SXB, CXS, HECX & EUV) mounted on the rotating base (also known as the 'wheel') of the spacecraft.

Mission String

- `TELESCOP= 'OSO-8   '`
  - the official acronym for the mission
- `TELESCOP= 'OSO-I   '`
  - the pre-launch name for the mission (should not be used)

Instrument Strings

- `INSTRUME= 'UVS     '`
  - denoting the dataset refers to or collected by the High-resolution UV spectromter (PI: Brunner, Univ. Colorado)
- `INSTRUME= 'MUVS    '`
  - denoting the dataset refers to or collected by the Multichannel UV & visible spectrometer (PI: Bonnet, Paris)
- `INSTRUME= 'CGCS     '`
  - denoting the dataset refers to or collected by the Columbia Grating Crystal Spectrometer (PI: Novick, Columbia Univ)
- INSTRUME= 'CXP-i '
  - denoting the dataset refers to or collected by the Columbia X-ray Polarimeter i, where $i = 1$ for the 2.6 keV polarimeter, and $i = 2$ for the 5.2 keV polarimeter.

- `INSTRUME= 'XHE     '`
  - denoting the dataset refers to or collected by the mapping X-ray Heliometer (PI: Acton, Lockheed Missiles & Space Co, Palo Alto)
- `INSTRUME= 'WSXE    '`
  - denoting the dataset refers to or collected by the Wisconsin Soft X-ray Experiment (PI: Kraushaar, Univ. Wisconsin)
- `INSTRUME= 'GCXSE   '`
  - denoting the dataset refers to or collected by the Goddard Cosmic X-ray Spectrometer Experiment (PI: Serlemitsos, NASA/GSFC), consisted of 3 separate detector systems. All three were proportional counters, sensitive to 2-60 keV photons. Sub-Instrument Strings:
  - `DETNAM = 'DET-A'`
    - denoting the dataset refers to the detector A which has a 5 degree circular field of view, centered 5 degree offset from the spin axis. DET-A had a total area of 271 cm^2.
  - `DETNAM = 'DET-B'`
    - denoting the dataset refers to the detector B which has a 3 degree circular field of view, centered directly along the spin axis, in the same hemisphere as detector A. Det-B had a total area of 76 cm^2.
  - `DETNAM = 'DET-C'`
    - denoting the dataset refers to the detector C which has a 5 degree circular field of view, centered along the spin axis, into the opposite hemisphere relative to Det-A and Det-B. DET-C had a total area of 244 cm^2.
- `INSTRUME= 'HECXE   '`
  - denoting the dataset refers to or collected by the High-energy Celestial X-ray Experiment (PI: Frost, NASA/GSFC)
- `INSTRUME= 'EUV     '`
  - denoting the dataset refers to or collected by the Extreme UV experiment (PI: Weller, NRL)

15 ROSAT

ROSAT, the acronym for the german Röntgensatellit, is a joint German, US and UK space project launched on 1990 Jun 01. *ROSAT* is a three-axis stabilized satellite in low Earth orbit carrying an imaging X-ray telescope (XRT) and a co-aligned (but independent) XUV instrument known as the Wide Field Camera (WFC). At the focal plane of XRT three detectors are mounted on a carousel: two Position Sensitive Proportional Counters (PSPC)s and a single High Resolution Imager (HRI). A single microchannel-plate is at the focus of the WFC. The total energy range covered by all instruments is from 700 to 6 Å. The initial 6 months of the mission were spent conducting an all-sky survey (performed with one of the PSPC at the focal plane of the XRT), but thereafter the mission entered a Guest Investigator, pointed operational mode.

$\boxed{\text{Mission String}}$

- `TELESCOP= 'ROSAT   '`
  - the official acronym for the mission

Instrument Strings

- `INSTRUME= 'XRT     '`
  - denoting the (calibration) dataset refers to the X-ray Telescope.
- `INSTRUME= 'HRI     '`
  - denoting the dataset refers to or collected by High Resolution Imager.
  Note:
  - `INSTRUME= 'HRI     '` is sufficient to imply that the XRT provided the focusing optics
- `INSTRUME= 'PSPC`a`   '`
  - denoting the dataset refers to or collected by Position Sensitive Proportional Counter a, where $a =$ `B,C`.
  Note:
  - PSPCC was used during the Performance Verification & Calibration (PVC) phase of the mission, as well as all but the last week of the all-sky survey. Following its destruction on 1991 Jan 25 all further (including all AO) observations were carried using PSPCB
  - `INSTRUME= 'PSPC`a`   '` is sufficient to imply that the XRT provided the focusing optics
  - `INSTRUME= 'PSPC    '` should be used to denote the dataset refers to both PSPCs, or that the (calibration) dataset is valid for either/both PSPCs

PSPC Filters

  - `FILTER   = 'BORON   '`
    to denote the Boron filter

`INSTRUME= 'WFC     '`
-denoting the dataset refers to or collected by the Wild-Field Camera.

WFC Filters

  - `FILTER   = 'S1`x`     '`
    to denote the C/Lexan/Boron survey filter x (x =a,b)
  - `FILTER   = 'S2`x`     '`
    to denote the Be/Lexan survey filter x (x =a,b)
  - `FILTER   = 'P1      '`
    to denote the Al/Lexan pointed-phase filter
  - `FILTER   = 'P2      '`
    to denote the Sn/Al pointed-phase filter

16 SAC-B

Note: *This section should be considered provisional*

The second Satelite de Aplicaciones Cientificas (SAC, English translation: Scientific Applications Satellite), an Argentine-US venture supported by CONAE (the Argentine National Commission of Space Activities) and NASA. SAC-B is a 3-axis stabilized satellite, scheduled to be placed in orbit in 1995 April by a Pegasus launch vehicle. There are three instruments on board: HXRS is primarily a solar instrument with non-solar γ-ray bursts as a secondary goal; GXRE is 50/50 solar and non-solar. with the non-solar science again being γ-ray bursts; CUBIC is the Penn State instrument.

Mission String

- `TELESCOP= 'SAC-B    '`
  - the pre-launch name for the mission

Instrument Strings

- `INSTRUME= 'HXRS    '`
  - denoting the dataset refers to or collected by the Hard X-Ray Spectrometer
- `INSTRUME= 'GXRE    '`
  - denoting the dataset refers to or collected by the Goddard X-Ray Experiment
- `INSTRUME= 'CUBIC   '`
  - denoting the dataset refers to or collected by the (Penn State) Diffuse Soft X-Ray Background Experiment

17 SAS-2

The second of NASA's Small Astronomy Satellites, *SAS-2* was launched on 1972 Nov 15 and dedicated to γ-ray astronomy above 35 MeV. (The mission was also known as SAS-B prior to launch, and Explorer 48 after launch). The s/c was spin stabilized and carried a spark chamber (SC) (the main instrument, with a f.o.v. of $\sim 35°$) and proportional counter (PC), both co-aligned along the spin axis. A failure of the low-voltage supply ended data collection on 1973 Jun 08 by which time *SAS-2* had made 27 pointed observations covering $\sim 55\%$ of the sky.

Mission String

- `TELESCOP= 'SAS-2    '`
  - the official post-launch name of the mission

- `TELESCOP= 'SAS-B    '`
  - the pre-launch name for the mission (should not be used)

Instrument Strings

- `INSTRUME= 'SC       '`
  - denoting the dataset refers to or collected by the Spark Chamber instrument.
- `INSTRUME= 'PC       '`
  - denoting the dataset refers to or collected by the Proportional Counter.

18 SAS-3

The third of NASA's Small Astronomy Satellites, *SAS-3* was launched on 1975 May 07 and carried 3 scientific instrument clusters: Slat Collimator Detector array (SCD) consisting of 2 single-celled (Argon) proportional counters, and one double-celled (Argon, Xenon) proportional counter; a pair of low-energy X-ray telescopes, each with a series of focal-plane filters and independent proportional counter detectors (LEDs); and a 300 cm^2 Rotation Modulation Collimator (RMC) system. The spacecraft was designed as a spinning satellite, but its spin rate was controlled by a gyroscope that could be commanded to stop. Thus all its instruments could be pointed, albeit with a modest drift, providing $\sim$30 min continuous trains of data from pulsars, bursters and transient sources. The mission ceased operation in 1979.

Mission String

- `TELESCOP= 'SAS-3    '`
  - the official post-launch name of the mission
- `TELESCOP= 'SAS-C    '`
  - the pre-launch name for the mission (should not be used)

Instrument Strings

- `INSTRUME= 'XRT-`i`      '`
  - denoting the (calibration) dataset refers to the X-ray Telescope i of the LED experiment, where $i = 1, 2$.
- `INSTRUME= 'LED-`i`      '`
  - denoting the data refers to, or collected by, the Low Energy Detector i (where $i = 1, 2$)

  Note:
  - `INSTRUME= 'LED-`i`      '` is sufficient to imply that XRT-i provided the focusing optics.

LED Filters

  - `FILTER = 'BORON '`
    - denoting the Boron filter
  - `FILTER = 'CHROMIUM '`
    - denoting the Chromium filter
  - `FILTER = 'GOLD '`
    - denoting the Gold (foils) filter
  - `FILTER = 'RED_AP'`
    - denoting that the filter wheel was in the position such that the aperture was reduced to 1.0° FWHM.
  - `FILTER = 'NONE '`
    (Optional) indicating data were obtained without out a filter in the optical path (ie with the filter wheel in the 'open' position)

- `INSTRUME= 'RMC '`
  - denoting the data refers to, or collected by, the Rotating Modulation Collimator experiment.
- `INSTRUME= 'SCD-`iXX` '`
  - denoting the data refers to, or collected by, the Slat Collimator Detector i, layer XX, where $i = 1, 2, 3$ and XX = `AR` or `XE` for the Argon or Xenon layers respectively.
  Note:
  - The slat collimators define 3 long, narrow fields of view which intersect on the +ve Y-axis of the spacecraft coordinate system at angles of $-30°$ (SCD-1), $0°$ (SCD-2), and $+30°$ (SCD-3).
  - Specification of XX is only necessary in the case of SCD-2 since SCD-1 & SCD-3 only consist of Argon cells. If XX is not present for SCD-2, then the dataset refers to both layers combined.

19 Vela 5B

The (classified) Vela nuclear test detection satellites were part of a program run jointly by the Advanced Research Projects Agency (ARPA) of the U.S. Department of Defence and the U.S. Atomic Energy Commission, and managed by the U.S. Air Force. Six pairs of Vela satellites were launched, with Vela 5B entering orbit on 1969 May 23 and operating until 1979 Jun 19.

Mission String

- `TELESCOP= 'VELA 5B '`
  - the most commonly used name for the mission

Instrument Strings

- `INSTRUME= 'XC '`
  - denoting the dataset refers to or collected by the All-Sky Monitor.

20 XTE

The X-ray Timing Explorer, *XTE*, is scheduled for launch in late 1995. The instrument package will consist of 3 experiments: an All-Sky Monitor (ASM), a High Energy X-ray Timing Experiment and a Proportional Counter Array (PCA).

Note: *This section is under development in conjunction with the XTE GOF at NASA/GSFC. Several changes, particularly regarding the syntax used to specify the sub-instruments, are likely in the near future*

Mission String

- `TELESCOP= 'XTE     '`
  - the official acronym of the mission

Instrument Strings

- `INSTRUME= 'ASM     '`
  - denoting the dataset refers to or collected by the All-Sky Monitor.
- `INSTRUME= 'HEXTE   '`
  - denoting the dataset refers to or collected by the High Energy X-ray Timing Experiment.

  HEXTE Sub-Instrument Strings

  – `DETNAM  = 'PW`ai`     '`
    - denoting the detector identifier, where a =`A` or `B`, and i =0,1,2,3.
- `INSTRUME= 'PCA     '`
  - denoting the dataset refers to or collected by the Proportional Counter Array.

  PCA Sub-Instrument Strings

  – `DETNAM  = 'PCU`i`     '`
    - denoting the detector unit identifier, where i =0,1,2,3,4.

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