The Event Round Robin in IUE VICAR Image Labels

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1 Introduction

Each IUE image has with it an image label which contains useful information about the data. This paper describes the Event Round Robin, a section of the IUE VICAR label which describes how the data were obtained and can therefore be very useful to researchers. The Event Round Robin describes a time-tagged sequence of short computer programs known as procedures. Each observing-related event is stored in a cyclic buffer with 43 active slots. This buffer is recorded in lines 10 through 32 of the IUE VICAR label for each observation. Observation events all begin with the GMT time (in hhmmss format) with the oldest entries appearing below the double blank lines. Recorded events relate to the observed science data, time of exposure start and end, FES counts, previous preparation sequences on a camera, guide star location, and possibly most important non-standard observations. Note that the Round Robin can be damaged or missing due to many reasons; history replays can leave it completely blank, ground computer crashes can leave holes, or collaborative exposures with only the commands generated by the reading gound station. Checking the previous and following images may give you more information if the Round Robin for a particular image is damaged.

2 Round Robin Events

Listed below are all of the events that can be put into the Round Robin. These come from the Operations Procedure (OPSPROC) file and appear as "STORE EVENT" commands. Over time this list will need to be updated as more information about older software configurations is found and as new events are added to the procedures. Each entry in this list is made up of the text that will appear in the VICAR label in bold uppercase and variables as bold lower case for example "**SPREP cam**" will appear as "**SPREP 1**" for a standard prep on the LWP camera (the LWP, LWR, SWP, and SWR cameras are represented as 1, 2, 3, and 4 respectively). The second line of each entry lists the procedure or subroutine from the OPSPROC file, where the "STORE EVENT" command appeared. The OPSPROC file is made up of the procedures that the Telescope Operator runs during the observation. For further information about what these events are and how they effect science observations please see the *IUE Observers Guide* (Sonneborn *et al.*, 1987) and the *IUE Technical Notes* numbers **30** and **31**, the camera users guide and

camera operations manual (Coleman *et al.*, 1977 and Ward 1977). See also section 9 of the *IUE Image Processing Information Manual, Version 2.0 (new software)* (Turnrose and Thompson, 1984).

The top left entry uses a special format for the date and time of the read command associated with this image. The format is the year, day of year, hour, minute, and second GMT (yydddhhmmss*). For example "85300063501* 9 * 218 *OPS2PR05" (from Fig. 2) indicates that the read was performed at 06:35:01 GMT on day 300 of 1985.

In general the earliest images have little or no Round Robin at all. Figure 1 is an example of an early SWP image (day 303 1978) in which the time order of the Round Robin is not correct nor in the correct sequence. Because of this Event Round Robins like these require special care when extracting information from them. Compare this with a normal Round Robin, Figure 2, showing the the same first 37 lines of the VICAR label including the Event Round Robin, lines 10 through 32, for an LWP image. The oldest event recorded is the "EXPOBC" at 2:43 GMT, the last event recorded is the "READPREP" events (three events are normaly recorded for each "READPREP") for this image at 6:35 GMT. Note from the top of the left hand column that this image was read at 6:35 day 300 1985 (GMT). It should be noted that this assumes that this is "live" not a history playback. If it had been then the date and time of the top left entry would correspond to when the playback was done.

Table 1 presents expanded comments, in chronological order, for each event entry in this Event Round Robin (Fig. 2). Table 2 presents expanded comments, in best chronological order, for each event entry in the slightly damaged Event Round Robin for image SWP 3194 (Fig. 1). Note that there are several gaps between 22:36 (GMT) day 302 and 12:05 (GMT) day 303 of 1978. Examining the *IUE Merged Observing Log* for this time period helps clarify this Event Round Robin. A summary of the observations taken since the handover from VILSPA to GSFC covered by this Event Round Robin is in Table 3. It should be noted that the "MODTIME" in Table 2 modifies the second exposure for the LWR 2752 image such that the total exposure time was 435 minutes, not 480 minutes as originally requested; two exposures, for 420 and 60 minutes (from the original observing scripts and other Event Round Robins).

```
                    0001000100071204   1 2 0131 3194                    1  C
     *    *        *   *   *  1800*      *   *  * * * * * *     *  2  C
SWP3194,IC2448,30M,LGAP,LO,DAY303,PP2ED,TORRES-PEIMBERT                  3  C
                                                                         4  C
      NO LAMP-EXP TIME=1799 SECS                                         5  C
                                                                         6  C
                                                                         7  C
                                                                         8  C
                                                                         9  C
78303132043* 8    * 214 *OPSTST20*213425 CAMINIT                  * 10  C
                                 *213426   1174 2751 3190 1130    * 11  C
                                 *                                * 12  C
                                 *                                * 13  C
                                 *                                * 14  C
215422 XPREP 2                   *221040 SPREP 2                  * 15  C
131711 EXPOBCM 2 30 00 MAXG NOL *062457 MODTIME 2 15 0            * 16  C
120535 EXPOSURE END TIME         *                                * 17  C
                                 *                                * 18  C
121453 READPREP 2                *121536 SCAN 2  RDLO SS 1 G3 58  * 19  C
121537 X 56 Y 72 G1 99 HR 106    *                                * 20  C
121309 EXPOBCM 3 30 0  MAXG NOL *                                 * 21  C
124339 EXPOSURE END TIME         *                                * 22  C
                                 *                                * 23  C
132043 READPREP 3                *132124 SCAN 3  RDLO SS 1 G3 44  * 24  C
132125 X 60 Y 76 G1 82 HR 105    *                                * 25  C
223636 MODE LWL                  *                                * 26  C
223656 APERTURE OP               *                                * 27  C
                                 *                                * 28  C
                                 *                                * 29  C
                                 *131341TARGET IN LWLA            * 30  C
120649TARGET FROM LWLA           *                                * 31  C
                                 *                                * 32  C
                                                                    33  C
                                                                    34  C
                                                                    35  C
PP2ED*1*01*DALTABUIT       *   *   * *        * *0*1*              36  C
090613*-694335*   *  * *    *     *         *    *       *  0*     37  C
```

Figure 1: First 37 lines of the VICAR label for early image SWP 3194, including the Event Round Robin in line 10 through 32. This image is from day 303 1978. Note the confused order of the time stamps and empty event slots as compared to Figure 2.

```
                          1   103252048   1 1 0110 7001    #102      1  C
  6480*   7*IUESOC  *   *   *  2640*      *   *  * * * * * *     *  2  C
LWP 7001, HD 58509, 44 MIN EXPO, HI DISP, LG APERTURE                3  C
                                                                     4  C
                                                                     5  C
                                                                     6  C
OBSERVER: VAN STEENBERG,  ID: OBHJS,  DAY  300/1985 OCT 27           7  C
OPERATIONS DONE IN TWO GYRO + FSS MODE: OPS2PR05                     8  C
                                                                     9  C
85300063501* 9   * 218 *OPS2PR05*045820 TLM,FES2ROM                * 10  C
024502 SCAN READLO SS 1 G3 44   *054009 FIN 3 T 4259 S 97 U 109   * 11  C
024518 X 60 Y 76 G1 82 HT 105   *054056 TARGET FROM SWLA          * 12  C
030520 TLM,FES2ROM              *054437 TARGET IN LWLA            * 13  C
031703 FIN 1 T 2099 S 97 U 108  *054704 GDE R/S X -60  Y -186     * 14  C
031759 TARGET FROM LWLA         *054804 EXPOBC 1 44 0   MAXG NOL  * 15  C
032110 S/C MANEUVERING          *055135 TLM,SWPROM                * 16  C
032944 FESIMAGE 0 0 81          *055208 READPREP 3 IMAGE 26989    * 17  C
033431 TARGET FROM SWLA         *055246 SCAN READLO SS 1 G3 44    * 18  C
033617 FESIMAGE 0 0 81          *055312 X 60 Y 76 G1 82 HT 105    * 19  C
034239 TARGET FROM LWSA         *061405 TLM,FES2ROM               * 20  C
034410 FESIMAGE 0 0 81          *063207 FIN 1 T 2639 S 97 U 108   * 21  C
040616 S/C MANEUVERING          *063254 TARGET FROM LWLA          * 22  C
041447 FESIMAGE 0 0 81          *063358S/C READY FOR MANEUVER     * 23  C
041946 ACQ STARTED              *063422 TLM,LWPROM                * 24  C
042559 TARGET IN SWLA           *063502 READPREP 1 IMAGE 7001     * 25  C
042613 FESCT 1145 IN 7 0 0      *063537 SCAN READLO SS 1 G3 47    * 26  C
042753 GDE R/S X 138  Y -328    *063552 X 53 Y 71 G1 97 HT 106    * 27  C
042859 EXPOBC 3 71 0   MAXG NOL *063527                           * 28  C
043301 TLM,LWPROM               *063551                           * 29  C
043338 READPREP 1 IMAGE 7000    *024141 EXPOBC 1 35 0   MAXG NOL  * 30  C
043414 SCAN READLO SS 1 G3 47   *024356 TLM,SWPROM                * 31  C
043434 X 53 Y 71 G1 97 HT 106   *024426 READPREP 3 IMAGE 26988    * 32  C
                                                                    33  C
                                                                    34  C
                                                                    35  C
OBHJS*1*08*VANSTEENBERG    * 11*   *H*   58509*0*0*1* 12           36  C
 723 24-205527*999*08*5* 8.5* 0.37*        *    * 999.99*   *      37  C
```

Figure 2: First 37 lines of the VICAR label for image LWP 7001, including the event Round Robin in line 10 through 32.

Table 1: Time Ordered Event Round Robin for Image LWP 7001.

Time (GMT)	Event	Discription
02:41:41	EXPOBC 1 35 0 MAXG NOL	Expose the LWP camera for 35 min and 0 sec at maximum gain with no calibration lamps on.
02:43:56	TLM,SWPROM	Switch telemetry to the SWP camera format.
02:44:26	READPREP 3 IMAGE 26988	Read and prepare the SWP camera and archive as image SWP 26988.
02:45:02	SCAN READLO SS 1 G3 44	Above read was done at LO gain with a step size of 1 and G3 set to 44.
02:45:18	X 60 Y 76 G1 82 HT 105	More engineering data for read of SWP 26988.
03:05:20	TLM,FES2ROM	Switch telemetry to the normal FES format.
03:17:03	FIN 1 T 2099 S 97 U 108	Complete a 2099 second exposure on the LWP camera, actually 2100 seconds (this number is frequently truncated), with SEC and UVC set to 97 and 108.
03:17:59	TARGET FROM LWLA	The object being observed was moved from the long wavelength large aperture to the reference point.
03:21:10	S/C MANEUVERING	The spacecraft starts maneuvering to a new attitude.
03:29:44	FESIMAGE 0 0 81	A default sized FES image is taken to identify the object.
03:34:31	TARGET FROM SWLA	The object was not seen in the FES image so the spacecraft is move slightly for a different view.
03:36:17	FESIMAGE 0 0 81	A default sized FES image is taken to identify the object.
03:42:39	TARGET FROM LWSA	The object was not seen in the FES image so the spacecraft is move slightly for a different view.
03:44:10	FESIMAGE 0 0 81	A default sized FES image is taken to identify the object.
04:06:16	S/C MANEUVERING	A new object was desired so the spacecraft starts maneuvering to a new attitude.
04:14:47	FESIMAGE 0 0 81	A default sized FES image is taken to identify the object.
04:19:46	ACQ STARTED	The object was identified and acquisition begun using a cursor.
04:25:59	TARGET IN SWLA	The object is moved to the short wavelength large aperture from the reference point.
04:26:13	FESCT 1145 IN 7 0 0	The object is observed to have 1145 FES counts out of the aperture and 7 FES counts in the aperture in overlap/fast-track mode.
04:27:53	GDE R/S X 138 Y -328	The FES is guiding on a star at FES location 138,-328 in 2-gyro mode with the roll controlled from the Fine Sun Sensor.
04:28:59	EXPOBC 3 71 0 MAXG NOL	The SWP camera is commanded to expose for 71 minutes and 0 seconds at maximum gain with no calibration lamps on.
04:33:01	TLM,LWPROM	Switch telemetry to the LWP camera format.

Table 1: (cont.)

Time (GMT)	Event	Discription
04:33:38	READPREP 1 IMAGE 7000	Read and prepare the LWP camera and archive as image LWP 7000.
04:34:14	SCAN READLO SS 1 G3 47	Above read was done at LO gain with a step size of 1 and G3 set to 47.
04:34:34	X 53 Y 71 G1 97 HT 106	More engineering data for above read of LWP 7000.
04:58:20	TLM,FES2ROM	Switch telemetry to the normal FES format.
05:40:09	FIN 3 T 4259 S 97 U 109	Complete a 4259 second exposure on the SWP camera, actually 4260 seconds (this number is frequently truncated), with SEC and UVC set to 97 and 109.
05:40:56	TARGET FROM SWLA	The object being observed was moved from the short wavelength large aperture to the reference point.
05:44:37	TARGET IN LWLA	The object is moved to the short wavelength large aperture from the reference point.
05:47:04	GDE R/S X -60 Y -186	The FES is guiding on a star at FES location -60,-186 in 2-gyro mode with the roll controlled from the Fine Sun Sensor.
05:48:04	EXPOBC 1 44 0 MAXG NOL	The LWP camera is commanded to expose for 44 minutes and 0 seconds at maximum gain with no calibration lamps on.
05:51:35	TLM,SWPROM	Switch telemetry to the SWP camera format.
05:52:08	READPREP 3 IMAGE 26989	Read and prepare the SWP camera and archive as image SWP 26989.
05:52:46	SCAN READLO SS 1 G3 44	Above read was done at LO gain with a step size of 1 and G3 set to 44.
05:53:12	X 60 Y 76 G1 82 HT 105	More engineering data for above read of SWP 26989.
06:14:05	TLM,FES2ROM	Switch telemetry to the normal FES format.
06:32:07	FIN 1 T 2639 S 97 U 108	Complete a 2639 second exposure on the LWP camera, actually 2640 seconds (this number is frequently truncated), with SEC and UVC set to 97 and 108.
06:32:54	TARGET FROM LWLA	The object being observed was moved from the short wavelength large aperture to the reference point.
06:33:58	S/C READY FOR MANEUVER	The spacecraft has been preped for a maneuver, but not yet moving.
06:34:22	TLM,LWPROM	Switch telemetry to the LWP camera format.
06:35:02	READPREP 1 IMAGE 7001	Read this image and prepare the LWP camera, archive as image LWP 7001.
06:35:37	SCAN READLO SS 1 G3 47	Above read was done at LO gain with a step size of 1 and G3 set to 47.
06:35:52	X 53 Y 71 G1 97 HT 106	More engineering data for above read of LWP 7001.
06:35:27		End of Round Robin.
06:35:51		

Table 2: Time Ordered Event Round Robin for Image SWP 3194.

Time (GMT)	Event	Discription
21:34:25	CAMINIT	Initialize the camera numbers, see next line for values.
21:34:26	1174 2751 3190 1130	Set camera image numbers; LWP = 1174, LWR = 2751, SWP = 3190, SWR = 1130.
21:54:22	XPREP 2	Perform an over exposure preparation for the LWR camera.
22:10:40	SPREP 2	Perform a standard preparation for the LWR camera.
22:36:36	MODE LWL	Switch long wavelength spectrograph to LO dispersion.
22:36:56	APERTURE OP	Open the large aperture.
06:24:57	MODTIME 2 15 0	Modifiy the exposure time on the currently exposing LWR camera to 15 minutes and 0 seconds.
12:05:35	EXPOSURE END TIME	Mark the end of some exposure.
12:06:49	TARGET FROM LWLA	Move the object being observed from the long wavelength large aperture to the reference point.
12:13:09	EXPOBCM 3 30 0 MAXG NOL	Start a 30 minute exposure on the SWP camera with maximum gain and no calibration lamps.
12:14:53	READPREP 2	Read and prepare the LWR camera.
12:15:36	SCAN 2 RDLO SS 1 G3 58	Record of engineering data on the above LWR camera read. LO gain, and step size of 1.
12:15:37	X 56 Y 72 G1 99 HR 106	More engineering data for the above LWR read.
12:43:39	EXPOSURE END TIME	Mark the end of the previous SWP 30 minute exposure.
13:13:41	TARGET IN LWLA	Move the object being observed to the long wavelength large aperture from the reference point.
13:17:11	EXPOBCM 2 30 00 MAXG NOL	Start a 30 minute exposure on the LWR camera with maximum gain and no calibration lamps.
13:20:43	READPREP 3	Read and prepare the SWP camera. Archive this image as SWP 3194.
13:21:24	SCAN 3 RDLO SS 1 G3 44	Record of engineering data on the above SWP camera read. LO gain, and step size of 1.
13:21:25	X 60 Y 76 G1 82 HR 105	More engineering data for the above SWP read.

Table 3: Summary of GSFC Observations on day 303 1978.

Day	Time (GMT)	observation	Exposure Time (min)
302	23:10	LWR 2752	435
303	07:21	LWR 2753	20
303	07:47	SWP 3191	20
303	08:20	LWR 2754	10
303	08:51	SWP 3192	10
303	09:52	LWR 2755	30
303	10:28	SWP 3193	30
303	11:35	LWR 2756	30
303	12:13	SWP 3194	30
303	13:17	LWR 2757	30

3 Description of Possible Events

date time * dacbv * version * name :

From: Proc OPSPRC, READ, READMON, CAMINIT, RDPREP, RDXSPREP, SETUVC

This entry, the top of the left hand column, gives the date and approximate time of this image's read command. The format is the year, day of year, hour, minute, and second GMT (yydddhhmmss*). It also gives the camera database version number *dacbv*, the camera procedure file version number *version* and *name* (for example for the two and three gyro operation mode *name* can be OPS2PR11 or OPSPROC40 respectively). SETUVC sets *dacbv* to 9 for the 5.0 kV setting for all of the cameras and 10 for the 4.5 kV setting for LWR.

... event :

From: Proc EVENT

Special event message with free format added by the telescope operator.

***** bad BAD SCAN STARTS :**

From: Proc READ, FPREP, RDPREP, RDXSPREP, XPREP, XSPREP

Flags the number of bad scan starts with *bad.*

***** bad BAD STARTS :**

From: Proc SPREP

Flags the number of bad scan starts with *bad.*

lwp lwr swp swr :

From: Proc CAMINIT

Second line of CAMINIT to initilize image numbers for start of shift at handover (LWP, LWR, SWP, SWR).

ACQ STARTED :

From: Proc ACQ

Ground computer program to acquire a target using cursor.

APERTURE status :

From: Proc APERTURE

The large aperture has changed *status* to either OPEN or CLOSED.

ALLOFF - EMERGENCY :

From: Proc ALLOFF

Turns power off to the entire science instument in rapid sequence; this is not desirable for routine operations. Used only in emergencies.

BAD STATIC POINTING flag :

From: Subr BDSCAN

Bad camera static pointing has been detected. Heater low scan attempts are performed until a good scan is seen. The beam is repositioned to the original correct static pointing.

CAMINIT :

From: Proc CAMINIT

Initilize image numbers for start of shift at handover. The next line in the Event Round Robin gives the image numbers for each of the cameras (LWP, LWR, SWP, SWR).

CAMLIM cam SET FOR MAXG :

From: Proc CAMLIM

Resets camera limits on all cameras after a computer warm start or for collaborative exposures and computer switches. *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4.

CAMOFF cam :

From: Proc CAMOFF

Turn camera *cam* off: *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4.

CAMON cam :

From: Proc CAMON

Turn camera *cam* on: *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4.

CSELECT cam :

From: Proc CSELECT

Select camera *cam* for use (moves mirror in or out to select prime or redundant camera): *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4.

EXPOBC cam t_{min} t_{sec} gain lamp :

From: Proc EXPOBCM, called by: EXPOBCA, WAVCAL, TRAIL, ACQ, EXPOSE

Expose camera *cam* for t_{min} minutes and t_{sec} seconds (truncated) where *cam* can be 1-4 (where LWP = 1, LWR = 2, SWP = 3, and SWR = 4) and *gain* can be MAXG, MEDG, or MING. The relative values of *gain* are: MEDG = MAXG/4 and MING = MAXG/12. Valid *lamp* values are: CPX for compensated exposure (never used), NOL for no lamps, TF1 for tungsten flood 1, TF2 for tungsten flood 2, UVF for UV flood, and WCL for wavelength calibration lamp. Normal science exposures have the *gain* set to MAXG and *lamp* set to NOL.

EXPOBCM cam t_{min} t_{sec} gain lamp :

From: Proc EXPOBCM, called by: EXPOBCA, TRAIL, ACQ, EXPOSE

In early images only, expose camera *cam* for t_{min} minutes and t_{sec} seconds (truncated) where *cam* can be 1-4 (where LWP = 1, LWR = 2, SWP = 3, and SWR = 4) and *gain* can be MAXG, MEDG, or MING. The relative values of *gain* are: MEDG = MAXG/4 and MING = MAXG/12. Valid *lamp* values are: CPX for compensated exposure (never used), NOL for no lamps, TF1 for tungsten flood 1, TF2 for tungston flood 2, UVF for UV flood, and WCL for wavelength calibration lamp. Normal science exposures have the *gain* set to MAXG and *lamp* set to NOL.

EXPOSE cam t_{min} t_{sec} gain lamp :

From: Proc EXPOSE, READMON

Expose camera *cam* for t_{min} minutes and t_{sec} seconds (truncated) where *cam* can be 1-4 (where LWP = 1, LWR = 2, SWP = 3, and SWR = 4) and *gain* can be: MAXG, MEDG, or MING. The relative values of *gain* are: MEDG = MAXG/4 and MING = MAXG/12. Valid *lamp* values are: CPX for compensated exposure (never used), NOL for no lamps, TF1 and TF2 for tungsten floods 1 and 2, UV1 and UV2 for UV floods 1 and 2, WCL for wavelength calibration lamp, and BHF for backhole and fiducial lamps. Normal science exposures have the *gain* set to MAXG and *lamp* set to NOL. During a "READMON" event the EXPOSE procedure may be recorded. This is information entered by the person performing the history replay, not a command to the camera. See also READMON.

EXPOSURE END TIME :

From: Proc EXPEND

In early images signals the end of the exposure.

FESARC IMAGE number :

From: Proc FESARC

Archive an FES image with image number *number*.

FES CTS cin festsr flap cout :

From: Proc RTOAPER

At the start of a maneuver from the reference point to a given aperture this event records the number of FES counts in and out of the aperture (*cin, cout*), and the FES track mode (*festsr*: fast track = 0 /slow track = 1, and *flap*: overlap = 0/underlap = 1). This event appears before the "TARGET IN ..." event.

FESCT cout IN cin flap festsr :

From: Proc EXPOSE, ACQ

At the start of an exposure using ACQ, record the number of FES counts out of and in the aperture (*cout, cin*), and the FES track mode (*flap*: overlap = 0/underlap = 1 and *festsr*: fast track = 0 /slow track = 1).

FESIMAGE xp yp size :

From: Proc FESIMAGE

Get an FES image where *xp* and *yp* are the center coordinates and *size* is the size. A default image 11 arcmin square is 0 0 81 respectively in engineering units.

FIN cam T time S sec U uvc :

From: Proc EXPFIN

Records the end of OBC controlled exposures of camera *cam* of length *time* seconds with the SEC and UVC voltages of *sec* and *uvc*. *cam* can be 1-4 (where LWP = 1, LWR = 2, SWP = 3, and SWR = 4) The exposure times are always multiples of 0.4096 seconds and *time* is trucated to an integral number of seconds. Thus a 5000 second exposure will have *time* = 4999. The LWR *uvc* voltage will be 98 and 109 for voltages set to 4.5 kV and 5.0 kV respectively. Also see the SETUVC command.

FPREP cam :

From: Proc READMON

Person performing the READMON enters flag which indicates that a FPREP was preformed before the image was taken. This is a 200% over exposure with a tungsten flood at MAXG of camera *cam* then three fast wipes. *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4. This is information entered by the person performing the history replay, not a command to the camera. See also READMON.

FPREP cam (FAST PREP) :

From: Proc FPREP

200% over exposure with a tungsten flood at MAXG of camera *cam* then three fast wipes. *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4.

GDE mode X xp Y yp :

From: Proc FESTRK

Guide on star at *xp, yp* in FES field. The *xp* and *yp* position are in engineering units. In the three gyro system only, *mode* is set to TRACK. In the two gyro system *mode* can be either R/S or R/G. For *mode* = R/S the tracking is done by the OBC using FES plus gyros for pitch and yaw, FSS (Fine Sun Sensor) for roll. For *mode* = R/G the tracking is done by the OBC using FES for pitch and yaw, gyros for roll.

HEATER WARMUP :

From: Proc CAMON

Warmup the camera, typicaly for 15 minutes, after camera has been turned on.

ITER niter TIME time :

From: Proc TRAIL

In trailed exposures indicates the number of passes in *niter* and the approximate total exposure time in *time* seconds. A better estimate of the time is *niter* $\times$ 21.4/*rate*. See also TRAIL.

LNPREP cam :

From: Proc READMON

Low Noise Prep sequence for the camera *cam*. This prep was evaluated early in the IUE mission but was not used except in testing modes. *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4. The preparation sequence is: a 200% over exposure with tungsten flood at MAXG, then an oversize defocussed read-rate erase (RRE) scan (804 x 804), followed by a 100% flood exposure at MEDG, a defocussed RRE scan (768 x 768), a 50% flood at MEDG, then lastly an defocussed RRE scan (768 x 768). During a "READMON" event the LNPREP procedure may be recorded. This is information entered by the person performing the history replay, not a command to the camera. See also READMON.

MODE mode :

From: Proc MODE

Put the spectrograph in the proper spectral dispersion *mode*; (LWH, LWL, SWH, SWL) high or low dispersion for short or long wavelength region (moves a mirror in front of echelle grating for low dispersion).

MODTIME cam t_{min} t_{sec} :

From: Proc MODTIME

Modify exposure time on the camera *cam* to the new time t_{min} minutes and t_{sec} seconds. *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4. If the camera has already been exposed for the commanded exposure time then the exposure is terminated and the FIN event reflects the actual exposure time.

MOVETARG BIAS ENTERED :

From: Proc BIAS

Moving target observed by gyro trim or FES offset guiding.

MOVETARG RATE ENTERED :

From: Proc MOVETARG

Moving target observed by gyro trim or FES offset guiding.

NO PREP FOR THIS IMAGE :

From: Proc READMON

During a "READMON" event no PREP procedure was recorded. This is information entered by the person performing the history replay, not a command to the camera. See also READMON.

NO EXPOSURE - NULL IMAGE :

From: Proc READMON

During a "READMON" event no exposure was taken on the camera being read. See also READMON.

NPREP cam :

From: Proc READMON

Prep for the camera *cam* which was evaluated early in the IUE mission but generally not used except in testing modes. *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4. The preparation sequence is: a 200% over exposure with tungsten flood at MAXG, then three fast scans followed by 20% tungsten flood exposure at MAXG, then lastly a focussed RRE scan (768 x 768). During a "READMON" event the NPREP procedure may be recorded. This is information entered by the person performing the history replay, not a command to the camera. See also READMON.

PYSLW P ip Y iy :

From: Proc PYSLEW

Fixed rate Pitch-Yaw slew from offset star to target; *ip* and *iy* are in hundredths of arcseconds for the slew.

READ cam gain note :

From: Proc READMON

Records that the the camera *cam* was read with *gain* set to HI or LO. *note* can be: NORMAL SCAN, UNUSUAL SCAN, G1 CUTOFF, HEATER LOW, or, REOPT OPS. *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4. This is information entered by the person performing the history replay, not a command to the camera. See also READMON.

READ cam gain SS size note :

From: Proc READ

In early images indicating a read on camera *cam* with *gain* set to HI or LO. The scanning step size is indicated by *size*, can be 1-4. *note* can be: NORMAL SCAN, UNUSUAL SCAN, G1 CUTOFF, HEATER LOW, or REOPT OPS. Note the image number is not recorded here. *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4. See event "SCAN cam RDxx".

READ cam IMAGE number :

From: Proc READ

Calls RDSCAN to read science data from camera *cam* as image number *number*. *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4. See event SCAN READxx.

READMON cam IMAGE number :

From: Proc READMON

Special routine that monitors telemetry stream of read of camera *cam* for image number *number*, in passive mode. *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4. This is used during the "History Replay" of the telemetry tapes so as to recover the science data. This is information entered by the person performing the history replay, not a command to the camera.

READPREP cam IMAGE number :

From: Proc RDPREP

Calls RDSCAN to read science data from camera *cam* as image number *number*. Then performs a SPREP. *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4. See events SCAN READxx and SPREP.

RDXSPREP cam IMAGE number :

From: Proc RDXSPREP

Calls RDSCAN to read science data from camera *cam* as image number *number*. Then performs an XSPREP. *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4. See SCAN READLO and XSPREP events.

REST TRIM RESTORED :

From: Proc BIAS

Rest (non-moving) trim restored after conclusion of moving target observations.

S/C MANEUVERING :

From: Proc PODMAN, UPLINK

Spacecraft starts a slew to new target.

S/C READY FOR MANEUVER :

From: Proc UPLINK

The spacecraft is prepared for maneuvering in slew mode and FES in safe mode.

S/C ROLL SLEW :

From: Proc ROLLMAN

Preform a roll slew.

SCAN cam RDxx SS size G3 g3 :

From: Subr RDSCAN

In early images only, indicating engineering data on camera *cam* prep and read. *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4. The read gain *xx* set to either HI or LO. The scan step size is given by *size* with allowed values of 1-4. Normal science data is read at LO gain and *size* of 1. The next Round Robin line gives more engineering data; see the "X ... Y ..." events.

SCAN READxx SS size G3 g3 :

From: Subr RDSCAN

Engineering data on camera prep and read with the read gain *xx* set to either HI or LO. The scan step size is given by *size* with allowed values of 1-4. Normal science data is read at LO gain and *size* of 1. The next Round Robin line gives more engineering data; see the "X ... Y ..." events.

SETUVC - CAMERA cam uvc KV :

From: Proc SETUVC

Reconfigure camera *cam* UVC voltage to *uvc* kV. Currently only the LWR camera may be varied from the initial value of 5.0 kV to 4.5 kV, which is used to avoid the LWR flare. *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4. If the LWR camera has been set to 4.5 kV, the FIN event will show U98 (U109 for 5.0 kV).

SHUTTER status :

From: Proc SHUTTER

Sun shutter configuration change. The *status* can be: ON or OFF to turn on/off the shutter electronices, OP or CL for the shutter to be commanded open/closed, DDOPEN or DDCLOSE for direct drive shutter open/close, and RDOPEN or RDCLOSE for reduced drive shutter open/closed.

SPREP cam :

From: Proc SPREP, READMON

Standard prep for the camera *cam*. *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4. The preparation sequence is a 200% over exposure with tungsten flood at MAXG, then a defocussed read-rate erase (RRE) scan followed by 50% tungsten flood exposure at MEDG, then lastly an oversized defocussed RRE scan (804 x 804) in place of normal scan (768 x 768). Note MEDG = MAXG/4. During a "READMON" event the SPREP procedure may be recorded. This is information entered by the person performing the history replay, not a command to the camera. See also READMON.

STOP cam lamp :

From: Proc STOP

Used to safely configure the camera *cam* to standby mode with a defined lamp configuration, perhaps after a ground computer crash. Another use is to turn lamps on and off. *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4. Possible values of *lamp* are: CALWL for the wavelength calibration lamp, CALUV for the

UV flood lamp, TFLOOD(1) or TFLOOD(2) for the tungsten flood lamps, BHFID for the backhole and fiducial lamps, and NOCAL for no lamps on (turns all lamps off). If *lamp* = EMERGENCY then the camera is put in standby mode immediately with no ground system checking as to whether this is a safe or desirable thing to do. This is usually done under emergency conditions (ie. after a computer crash); thus returning the camera to the standby state.

SWITCHED TO SIGMA sys :

From: PROC SWITCH

Gound computer has been changed to the SIGMA *sys* where *sys* is either 5 or 9.

TARGET direction aper :

From: Proc RTOAPER

The target has been moved IN to or FROM one of the apertures (SWSA, SWLA, LWSA, LWLA) from or to the reference point indicated by *direction* and *aper* respectively.

TLM, format bitrate :

From: Proc TLM

Set the telemetry to include particular data; camera, FES, or OBC data. Possible values of *format* are: LWPROM, LWRROM, SWPROM, SWRROM, FES1ROM, FES2ROM, XFERROM, OBC1ROM, and OBC2ROM. If the optional *bitrate* value is present it indicates a change of the communication bitrate to the the indicated value (20, 10, 5, or 1.25 kb/s, 20 is normal). FES1ROM format is for longer FES integrations for deep FES images with one FES sample per minor frame. FES2ROM format is for normal images with eight FES samples per minor frame. This is the normal telemetry format when not in read or prep, since it has a full complement of spacecraft status information.

TPREP cam :

From: Proc READMON

Prep for the camera *cam* evaluated early in the IUE mission generally not used except in testing modes. *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4. The preparation sequence is a 200% over exposure with tungsten flood at MAXG, then a focussed read-rate erase (RRE) scan followed by 20% exposure at MAXG, then lastly an oversized focussed RRE scan (804 x 804) in place of normal scan (768 x 768). During a "READMON" event the TPREP procedure may be recorded. This is information entered by the person performing the history replay, not a command to the camera. See also READMON.

TRAIL cam rate :

From: Proc TRAIL

Trailed exposures on camera *cam* at *rate* arcseconds per second (allowed range of 0.3 to 120.0). If *rate* is greater than or equal to 25.0 then the "fast trail technique" is used; only one pass is permitted for fast trails. *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4.

WEIRD isa ila ssr lsr :

From: Proc READ

Indicates that the last camera read was for an unusual portion of the camera. *isa* and *ila* give the initial sample and line addresses and *ssr* and *lsr* give the scan sample and line range (size). The default values for normal reads and low dispersion partial reads are:

dispersion	*cam*	*isa*	*ila*	*ssr*	*lsr*
Normal	all	895,	895,	768,	768
Lo	LWP	865,	797,	576,	528
Lo	LWR	773,	823,	624,	528
Lo	SWP	863,	860,	528,	528
Lo	SWR	721,	761,	576,	480

Partial reads are very rarely done; the normal read is done 99% of the time. To convert the *isa* and *ila* address to the normal SIPS values (768 x 768) subtract them from 896, this results in 1 for normal reads. The default values in SIPS units for the low dispersion partial reads are given in the SIPS version 2.0 manual on page 3-7.

X xal Y yal G1 g1 HR htr :

From: Subr RDSCAN

In early images gives engineering data on camera prep and read. See also SCAN events.

X xal Y yal G1 g1 HT htr :

From: Subr RDSCAN

Engineering data on camera prep and read. See also SCAN event.

XPREP cam :

From: Proc XPREP, READMON

First portion of the over exposure prep for the camera *cam*. *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4. The preparation sequence is a 800% over exposure with tungsten flood at MAXG then three fast wipes. If during a "READMON" event than the XPREP procedure was recorded. This is information entered by the person performing the history replay, not a command to the camera. See also XSPREP and READMON.

XSPREP cam :

From: Proc XSPREP, READMON

Over exposure prep (XPREP) for the camera *cam* followed by a standard prep (SPREP). *cam* can be 1-4 where LWP = 1, LWR = 2, SWP = 3, and SWR = 4. If during a "READMON" event than the XSPREP procedure was recorded. During a "READMON" event the TPREP procedure may be recorded. This is information entered by the person performing the history replay, not a command to the camera. See also the SPREP, XPREP, and READMON events.

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