```
PDS_VERSION_ID              = PDS3
LABEL_REVISION_NOTE         = "
  2006-12-27 SOC:Carcich  Initial version;
  2014-02-23 SOC:Carcich  Corrected quoted number of modes
  2017-02-16 SOC:Finley   Corrected typos
  2017-04-30 SOC:BrianE/C Minor changes for P3 delivery
  2017-09-19 SOC:Finley   Corrected typos
  "
RECORD_TYPE                 = STREAM

OBJECT                      = INSTRUMENT
  INSTRUMENT_HOST_ID        = "NH"
  INSTRUMENT_ID             = "SWAP"

  OBJECT                    = INSTRUMENT_INFORMATION
    INSTRUMENT_NAME         = "SOLAR WIND AROUND PLUTO"
    INSTRUMENT_TYPE         = "PLASMA INSTRUMENT"
    INSTRUMENT_DESC         = "

##############################################################################
##############################################################################
REQUIRED READING:
- McComas et al.  (2008) [MCCOMASETAL2008]
- Weaver et al.  (2008) [WEAVERETAL2008]
##############################################################################
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      The SWAP description was adapted from the New Horizons website,
      Weaver et al.  (2008) [WEAVERETAL2008], and McComas et al. (2008)
      [MCCOMASETAL2008].


Instrument Overview
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Specifications
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NAME:                     SWAP (Solar Wind Around Pluto)
DESCRIPTION:              Low energy plasma instrument
PRINCIPAL INVESTIGATOR:   Dave McComas, SwRI
ENERGY RANGE:             30 eV - 7.7 keV
FIELD OF VIEW:            270 deg x 10 deg (Note 1)
ANGULAR RESOLUTION:       N/A
ENERGY RESOLUTION:        1eV (<2keV); 9% (>2 keV)

Note 1:  deflection angles up to +15 deg additional

Description
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Solar Wind Around Pluto (SWAP) instrument is designed to measure the
properties of solar wind ions for the New Horizons mission to Pluto. The SWAP
instrument is an electrostatic instrument. The SWAP electro-optics control the
energy band pass of ions entering the instrument. The electro-optics have
three parts:  the Retarding Potential Analyzer (RPA), the Electrostatic
Analyzer (ESA), and the deflector (DFL). The RPA consists of four grids with
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external solar wind properties during the actual encounter period.

Detectors & Electronics

See the instrument description and specifications above.

Operational Modes

The SWAP instrument uses six modes: OFF; BOOT; LVENG; LVSCI; HVENG; HVSCI. For a description of these modes see Tables IV & V in the Space Science Reviews paper McComas et al. (2008) [MCCOMASETAL2008], also available as a preprint at this URL:

http://www.boulder.swri.edu/pkb/ssr/ssr-swap.pdf

Science Data Collection

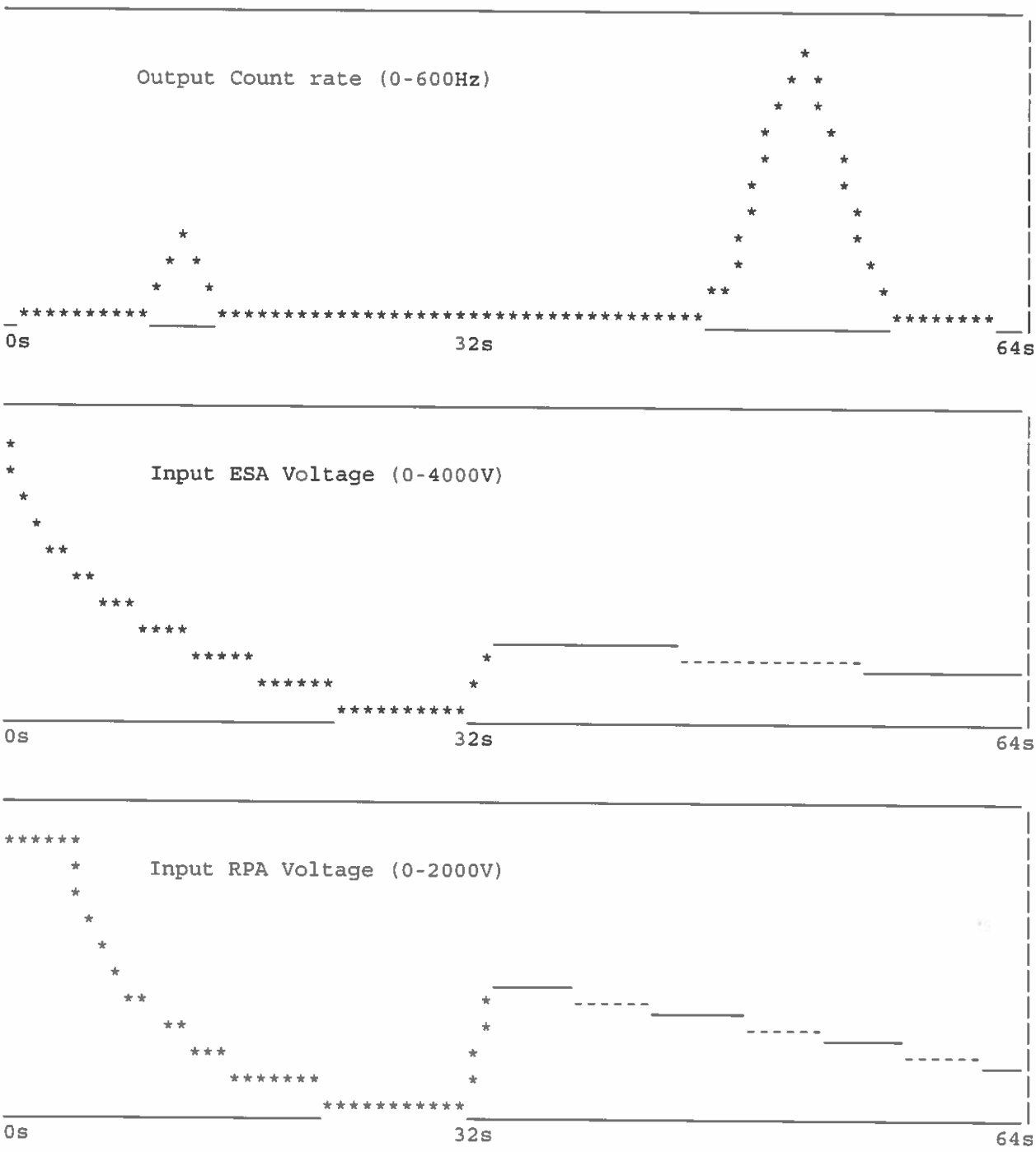
Science data are collected in the HVENG and HVSCI modes. HVENG was used extensively during commissioning for initial HV ramp-up. HVSCI is the primary SWAP science mode. In HVSCI, the optical power supply voltages are stepped every 0.5 seconds. During each 0.5-second period at a single pair of RPA/EPA voltage settings, approximately 100 milliseconds are allowed for the optical power supply settling time and 390 milliseconds are allocated to counting events. An overall cadence comprising 128 0.5-second steps defines the 64-second science-acquisition frames and hence all science activities.

Two methods of sweeping during each 64 second period, called the coarse-fine and coarse-coarse sweeps, are user selectable. A typical coarse-fine sweep comprises a 32-second coarse sweep which covers the entire energy range with 64 logarithmically-spaced optical power supply voltages, followed by a 32-second (also 64 0.5-second steps) fine sweep. A coarse-coarse sweep comprises two 32-second coarse sweeps performed in one 64-second period.

For both sweep types, the optical power supply voltages are set from one of several user-selectable tables. For the coarse-fine sweep, the peak value of the event counter during the coarse sweep is located to set the center voltages of the fine sweep so that a finer resolution sweep around that peak response can be performed.

The following graphics describe very roughly what happens during a typical coarse-fine sweep; more detailed plots are available in the documents referred to earlier. In all three graphics, the abscissa is time covering one 64-second coarse-fine sweep. The legend inside each plot gives a description, the range, and the units of the ordinate.

In the first 32 seconds on the left of the plots, the ESA and RPA voltages go rapidly through a large range in a coarse sweep that covers the entire energy range of the instrument. At around ten to fifteen seconds into that coarse sweep, there is a rise in count rate indicated by the peak. Based on the timing and voltages corresponding to that peak, the SWAP instrument sets the ESA and RPA voltages and changes them more slowly through the fine sweep during the second 32 seconds on the right of the plots, and there is a peak observed at much higher resolution during that time.



One result of this is that there will be gaps in the apparent energy resolution when the data from coarse and fine sweeps are compared against each other.

Measured Parameters
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SWAP counts events ~~which~~ represent the interactions between the SWAP electro-optics and solar wind particles. The energy of any detected event is determined by the energy bandpass in effect at the time of that event, which