TABLE 1. Timed Exposure Parameter Block Content(Continued)

Req	Item	Description
1-30	Strip Mode: Mean Sigma Rejection/ Median Index	When a mean algorithm is selected, pixel samples whose value is greater than this value multiplied by the RMS variance are not included in the final mean computation. The value can range from 0 to 5. When the median algorithm is selected, this parameters indexes the pulse height to use for the bias out of the sorted list. In this case, the field value can range from 0 to 4095.
1-31	Raw Histogram Exposure Count	This item specifies how many exposures to use when building histograms. This field can vary from 1 to 240,000 exposures.
1-32	Bias Compression Flag	This indicates whether or not to compress pixel bias map values prior to being telemetered.
1-33	Bias Compression Selections	If bias map compression is enabled, these items specify which compression table to use for a given FEP. These selections are indexed by FEP Id.
1-34	Raw Compression Flag	This indicates whether or not to compress raw pixel data values prior to being telemetered.
1-35	Raw Compression Selection	If raw pixel data compression is enabled, this item specifies which compression table to use for all FEPs.
1-36	Initial Frames to Ignore	This specifies the number of whole exposure frames that the FEP is to ignore at the start of a bias calibration that uses this parameter block. If this value is zero, each FEP will start processing all data pixels and overclocks received after the first vsync code. Science data processing, however, always ignores the first two whole exposures.

TABLE 1. Timed Exposure Parameter Block Content(Continued)

Req	Item	Description
1-19	Event Amplitude Lower Bound and Range	These parameters are only used when the Front End Selection Algorithm is in “Event Finding Mode”. These values are not used when the Front End is processing raw pixels or histograms. These parameters select the minimum and maximum amplitudes of accepted events. Events whose total amplitude (function of the 3x3 grid around the event) is less than the lower bound value, or greater than or equal to the lower bound plus range are not telemetered. These field’s ranges are governed by the minimum and maximum corrected event amplitudes.
1-20	Re-compute Bias Flag	This item indicates if the software must re-compute the pixel bias values prior to starting data processing.
1-21	Trickle Bias Flag	This item indicates if the software must telemeter the current bias map to telemetry after it has been computed.
1-22	Bias Algorithm Mode	This specifies the type of bias computation to be performed. This field may indicate that the bias be computed using an algorithm which uses entire image frames for each of its iterations (faster, but less accurate) called “Whole Frame Mode”, or uses an algorithm which incrementally operates on sections of the bias map (slower, but more accurate), called “Strip” Mode. The remaining bias parameters depend on the selected mode. There is one set of settings for each FEP, and each set is indexed by FEP Id.
1-23	Whole Frame: Conditioning Count	This specifies the number of conditioning exposures used to determine the minimum pixel bias value. This field can vary from 0 to 200 exposures.
1-24	Whole Frame: Approximation Count	This specifies the number of approximation exposures used to locate the actual bias value above the minimum value determined during the conditioning pass. This field can vary from 0 to 200 exposures.
1-25	Whole Frame: Low Pixel Rejection Threshold	This parameter is used to discover abnormally low pixel values after the conditioning process, and is used only if it’s value is not zero. If a pixel’s value is smaller than all but 1 of its adjacent neighbors by more than this value, it is replaced with the median value of its neighbors. This field’s value can range from 0 to 4095.
1-26	Whole Frame: Event Rejection Threshold	During the approximation-to-the-mean phase, this parameter is used to discard pixel samples which potentially contain charge from an event or charged-particle. If a sample pixel’s value exceeds the current bias estimate by more than this value, it and its immediate neighbors are not used to adjust the bias estimate. This field’s value can range from 0 to 4095.
1-27	Whole Frame: Rejection Threshold for approximation-to-mean	This parameter is used when approximating the mean to prevent samples whose pulse heights are uncharacteristically high from affecting the mean estimate. Pixel samples whose pulse heights are larger than the current pulse height estimate by more than this amount are not included in the estimated mean. This field’s value can range from 0 to 4095.
1-28	Strip Mode: Exposures Count	This specifies the total number exposures to use per strip of pixels. This field can vary from 0 to 40 exposures per strip.
1-29	Strip Mode: Mean/ Median Selection	This specifies whether to base the bias value on a truncated mean or median of the pixel samples.

TABLE 1. Timed Exposure Parameter Block Content(Continued)

Req	Item	Description
1-13	Reference to Front End Processor Code	This value allows a maintainer to override the standard code and data loaded into the Front End Processor, and provide a special load for the Science Run. This reference points directly into BEP memory. If 0, then no explicit FEP load is to be used. If not 0, then the item points to the memory block which contains the load image to use. Post-launch FEP load images are uplinked into memory by the maintainer using the Write Memory function of the instrument (see Section 3.2.8.3.2 on page 108), or via a patch. This parameter is intended to be used by the maintainer of the instrument, and should be 0 during normal operations. The format of the referenced FEP Load image will be specified in the ACIS Instrument Software Detailed Design Specification (AS-BUILT), MIT 36-53200.
1-14	Event List Packing Code	This parameter is only used when the Front End Selection Algorithm is in “Event Finding Mode”. This value is not used when the Front End is processing raw pixels or histograms. This value selects the format to use when sending processed events. Currently, the following event-list formats are supported; Faint-Mode, Faint-with-Bias, and Graded-Mode
1-15	Reference to a 2-D Window Collection	This parameter is only used when the Front End Selection Algorithm is in “Raw Mode” or “Event Finding Mode”. This value is not used when the Front End is processing histograms. An observer uses this item to specify a set of 2-dimensional event selection and processing windows to use for the Science Run. If no windows are specified, Timed Exposure Mode shall process all events from the CCDs using the processing parameters specified in this block. See Table 13, “2-Dimensional Window List Parameter Block,” on page 58.
1-16	Split Threshold Set Points	These parameters are only used when the Front End Selection Algorithm is in “Event Finding Mode”. These values are not used when the Front End is processing raw pixels or histograms. These values specify the threshold above which a neighboring pixel’s pulse height must be to be considered as part of an event. These values are used when grading events and computing the amplitude of an event. Each of these items applies to a specific CCD output node being processed from a particular FEP. These values can range from 0 to 4095, and each set is indexed by FEP Id.
1-17	Ignore Bad Pixel/ Column Map Flags	These parameters are only used when the Front End Selection Algorithm is in “Event Finding Mode”. These values are not used when the Front End is processing raw pixels or histograms. These values control whether or not to discard events on the basis of the CCD’s list of bad pixels and/or columns.
1-18	Grading Selection Bit Map	These parameters are only used when the Front End Selection Algorithm is in “Event Finding Mode”. These values are not used when the Front End is processing raw pixels or histograms. This set of values select which event grades to accept. Accepted events whose grades are indicated in this list shall be telemetered. This bitmap consists of a 256 bits, where each bit corresponds to one of the possible grade codes.

TABLE 1. Timed Exposure Parameter Block Content(Continued)

Req	Item	Description
1-6	Output Register Clocking Mode	This item controls the clocking mode of all of the CCD's Serial Output Shift Registers. This item can specify either; Full-Mode, AC-Mode, BD-Mode or Diagnostic-Mode. See Section 2.2.2 on page 20 for a description of these modes.
1-7	Number of Over-clock Pairs	This item specifies the number of extra pixel pairs to clock out of each of the Serial Output Shift Registers. Timed Exposure Mode uses these pixels to determine the bias introduced to the CCDs pixel pulse height by the analog electronics. This item can specify 0 to 15 pairs of pixels.
1-8	Video Chain Responses	These items control the response of the Video Subsection in the Detector Electronics Assembly for each CCD. This item selects 1 or 4 electrons per Analog-to-Digital Unit (ADU). These items are indexed by FEP Id. If a single CCD is specified by more than 1 FEP entry, then the last corresponding chain response entry is used for the listed CCD.
1-9	On-chip Summing Select	This item controls whether or not 2x2 on-chip summing is performed. If disabled, no pixel summing is performed on the CCD. If this is enabled, then the charge from pairs of adjacent columns and rows are summed on the CCD. Each measured pixel output from the CCD is the sum of a 2x2 pixel array from the chip.
1-10	Reference to an explicit DEA Load	This is an optional item which allows a maintainer to by-pass the on-board SRAM/PRAM load builder, and load these areas directly. This reference points directly into BEP memory. If 0, then no explicit DEA load is to be used. If not 0, then the item points to the memory block which contains the load image to use. Post-launch DEA load images are uplinked into memory by the maintainer using the Write Memory function of the instrument (see Section 3.2.8.3.2 on page 108), or via a patch. This parameter is intended to be used by the maintainer of the instrument, and should be 0 during normal operations. The format of the referenced SRAM/PRAM load will be specified in the ACIS Instrument Software Detailed Design Specification (AS-BUILT), MIT 36-53200, and shall support different loads into different DEA boards.
1-11	Front End Selection Algorithm	This item specifies whether or not the Front End Processor should supply all pixels to the Back End (Raw Mode), compute histograms of raw pixel data (Histogram Mode), or supply pixels to the Back End whose center is above the current threshold (Event-finding Mode) and whose pulse height is greater (or sometimes equal) to its immediate neighbors (3x3 local maxima).
1-12	Threshold Set Points	These items control minimum pulse-height above or below bias a pixel should have to be considered as an event candidate by a given FEP. Each of these items applies to a specific CCD output node being processed by a FEP. These values can range from -4096 to 4095. These values are not used when the FEPs are processing raw pixels or histograms. One set of four values is specified for each FEP.

TABLE 1. Timed Exposure Parameter Block Content

Req	Item	Description
1-1	Parameter Block Identifier	This item is a ground-supplied identifier which is echoed by the instrument software in key portions of the science telemetry.
1-2	FEP CCD Selection	These items specify which CCD a given FEP should process. The items are indexed by FEP Id. Any given CCD may be specified more than once in the set, at the cost of reducing the total number of CCDs being used. CCDs or FEPs which are not powered on (see Section 3.2.7 on page 99) are ignored and will not be used for the run. If there are no powered CCD being processed by a powered FEP, the science run will be aborted.
1-3	Subarray Readout Start Row and Row Count	An observer uses the start row and row count values to effectively shorten the time it takes to transfer an image from the CCDs to the Front End Processors by sacrificing some of the imaging area. The start row and row count specifies which contiguous horizontal swath of CCD rows are transferred from the Framestore back to the FEPs. These two parameters apply to all selected CCDs. The Start Row parameter can range from 0 to 1023, where 0 corresponds to image area row 2, 1 to image area row 3, and so on. (NOTE: Image area rows 0 and 1 are never used), and the Row Count parameter can range from 1 to 1024. If Start Row plus Row Count extends beyond the image area, the software truncates the subarray row count to fit.
1-4	Primary and Secondary Exposure Times	These items control the amount of time that the Image Area of each CCD is integrating data. This does not include the time taken to transfer the Image Area into the Framestore. These values can range from 0 to 10 seconds in 0.1 second increments, and apply to all of the selected CCDs. They are accurate to within one SRAM Major Cycle (~10μs). The CCDs are clocked using the primary exposure time for 1 exposure, followed by the secondary exposure time for "N" exposures. "N" is determined by the Exposure Duty Cycle parameter. If "N" is 0, the secondary exposure time is not used. If both exposure times are used, the bias computation algorithms only use data from exposures integrated over the Secondary Exposure time. NOTE: If Image Area to Framestore transfers need to be performed at different times on each CCD, and the specified exposure time is shorter than can be supported by the number of selected CCDs, the shortest possible exposure time will be used instead of the specified time (i.e. the Image to Frame transfer time multiplied by one less than the number of selected CCDs).
1-5	Exposure Duty Cycle	This parameter controls how many secondary exposures separate primary exposures. If this parameter is 0, all exposures use the Primary Exposure Time (i.e. the Secondary Exposure Time is ignored). If 1, there is one Secondary Exposure between each Primary Exposure, if 2, there are two Secondaries for each Primary, and so on. This parameter can range from 0 to 15.