VIRUS Controller Commands

Exposure and readout control

SET arg — Set exposure time in non-VIRUS mode in milliseconds, to be counted by the controller.

RET — Read the elapsed exposure time, in milliseconds.

SEX — Start the exposure sequence in non-VIRUS mode, including shutter control, exposure timing and readout.

AES — The controller will wait for the VMUX to assert the SYNC line from low to high to begin the exposure. The controller will begin readout when it senses this line going from high to low. This is used in HET mode and supersedes "SEX".

ABR — Immediately abort the exposure or readout

PEX — Pause the exposure by closing the shutter and stopping the exposure timer.

REX — Resume the exposure by opening the shutter (if its not a dark exposure) and resuming the exposure timer.

IDL — Operate the CCD clocks without transmitting image data when the controller is neither exposing nor reading out.

STP — Don't operate the CCD clocks when the controller is neither exposing nor reading out.

SBP ncols nrows — The columns can be read out unbinned (ncols = 1) or twice binned (ncols = 2). The rows can be binned by any number. The default HET readout mode is binned 2x1.

SPS arg — An argument of 1 has the controller reading out the CCD in fast mode, about twice as fast as the slow mode (arg = 0). The slow mode is appropriate for HET observations and will produce an image readout time in a bit less than twenty seconds in 2x1 binning.

SOS arg — The combination of four readouts per controller may be selected for readout:

arg = 'ALL'	Read out all four amplifiers
arg = '__A'	Both amplifiers from side A
arg = '__B'	Both amplifiers from side B
arg = 0	Side A, bottom amplifier only
arg = 1	Side A, top amplifier only
arg = 2	Side B, bottom amplifier only
arg = 3	Side B, bottom amplifier only

SIM arg — Generate synthetic images for testing.

arg = 0	Turn off synthetic image
arg = 2 #ch value	Send a fixed value from the indicated channel number
arg = 3	Increment pixel values by one
arg = 4	Reset the incrementing counter

General Support

RCC Read the controller configuration word. The following bits are defined:

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ARC14           EQU  $000006    ; Four channel CCD video board
VIRUS           EQU  $000001    ; VIRUS controller
SHUTTER_CC      EQU  $000080    ; Shutter supported
BINNING         EQU  $000800    ; Binning supported
SPLIT_SERIAL    EQU  $001000    ; Split serial supported
SPLIT_PARALLEL  EQU  $002000    ; Split parallel supported
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TVL arg Reply with "arg" as a simple test of the controller data link.

RDM addr Read the DSP memory from the indicated address. The most significant nibble of the address is encoded as follows:

- 1 read the P: memory space
- 2 read the X: memory space
- 4 read the Y: memory space

WRM addr value Write "value" to the indicated address. The address is encoded the same as the read memory command.

PON Turn the analog supplies on.
POF Turn the analog supplies off.
POK Reply with a 1 if the power has been turned on successfully.
OSH Open the shutter
CSH Close the shutter

SBN arg #DAC value
Write the "value" to the indicated DAC number on either the clock driver (arg = 'CLK') or video board (arg = 'VID').

CCD temperature control

RDT arg Read the CCD temperature from arg = 0 to 3. The reply is a 14-bit integer.
CDT arg value Control the indicated heater (arg = 0 or 1) to the indicated 16-bit value. Enter a value of 0xFFFFFF to turn off the regulation.
SHV arg value Manually set the voltage of the indicated heater (arg = 0 or 1) to the 16-bit value.
RHV arg Read the 16-bit value of the heater voltage from the indicated heater (arg = 0 or 1).

Serial ID

FAD Find all the 1-Wire serial ID devices in the controller and Flex cable. Each device's unique 8-byte ROM contents will be stored in a table in the controller memory, indexed from 0 to n by the order in which the devices were found. The number of devices n+1 that were found is returned as a reply.

SDN arg The device to be read from or written to is selected with this command, where the "arg" is the number assigned to each device by the "FAD" routine.

ROR Successive bytes of the 8-byte ROM contents of the device selected by the "SDN" command will be returned as a reply with each command.

ROM Successive bytes of the 128-bit EEPROM contents of the device selected by the "SDN" command will be returned as a reply with each command. The "SDN" command restarts the pointer to the beginning of the EEPROM.

WOM arg b0b1b2 b3b4b5 b6b7xx__

Eight-byte blocks b0 to b7 are written to the EEPROM of the device previously selected by the "SDN" command. "arg" runs from 0 to 15 and selects the starting address to be written to.

Controller tester

ACT DC bias voltages suitable for operating the controller tester are loaded, along with waveforms to exercise the clock driver and video boards. In a properly functioning controller the two rows of green LEDs will all light up with this command, and the STC command below will be operational.

STC arg To test the clock driver signals four clock signals at a time are selected for connecting to the four video processing inputs. Their voltage levels and timing are selected to mimic the CCD video signal to produce a range of image counts. Four sets of clock signals selected by the argument sample all 16 clocks signals used in the controller. The controller software is set up so the image counts increase from the lower left quadrant going counter-clockwise, and as the channel number increases from 0 to 3. The de-interlacing should be selected as CCD quad.

Multiple controller commands

SMC arg arg = 1 sets the controller in multiple controller mode, wherein it will process and reply to controller numbers embedded in the command header.

SRS arg arg = 1 designates this controller to reply to commands. If the controller is not in multiple controller mode it will reply with a '020002' header. If it is in multiple controller mode it will reply with a 'mm000n' header.

RRS The reply will be = 1 if this controller is enabled for replies.

GID The reply will be the controller ID read as the serial number of the 1-Wire device whose name is 'SPECADDR' = spectrograph slot address.

Diagnostic

WRW Write the complete waveforms table from DSP Y: memory to the FPGA

RDW Read the waveforms from FPGA. These values are discarded, as the command is used to generate signals on the SHI pins for examination.

TVD Write from the waveforms table in DSP Y: memory to the DACs on the video board. This command is executed by the power on command.

TCK Write from the waveforms table in DSP Y: memory to the DACs on the clock driver board. This command is executed by the power on command.

RDS arg Read the state of the writeable control store command FIFO.
- arg = 0 if the reply is 1 then it is at least half full
- arg = 1 if the reply is 1 then its next command register is full
- arg = 2 if the reply is 1 then the WCS is active

SST arg1 arg2 Write a 32-bit word to the system serial bus. arg1 is written to the most significant byte, and arg2 to the least significant three bytes.

WRS arg Write 24 bits of the argument to the serial link.

CVD Clear the contents of the video board DAC.

IRQ arg Turn the temperature control interrupts on (arg=1) or off (arg=0).

RSM Reset the master chip of the 1-Wire serial ID system.

SFD Search for the first device of the 1-Wire serial ID chain.

SND Search for the next device in the 1-Wire serial ID chain.

IOW Initialize the 1-Wire devices.

RAD arg Read one of the four (arg = 0 to 3) A/D values without accumulation.