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Instructions for Operation of the Model SD2 SpectraDrive Controller

Ver. 2.0

Operating the SD2 Using a Computer

The Acton Research Corporation AM or VM Monochromator can be controlled from an RS232 terminal or computer using RS232 or IEEE488. The same command set, listed below, is used for both RS232 and IEEE488.

Commands can be sent as single commands or grouped in strings of commands. All commands are single words (contain no spaces) and all commands in a string are separated by at least one space. Parameters, if needed, precede the command and are separated from the command by at least one space (e.g. 546.7 GOTO).

For RS232 operation, the port set-up is 9600 baud, 8 data bits, 1 stop bit and no parity. All commands or strings of commands must be terminated with a carriage return (0D hex). The SD2 responds to a command when the command has been completed by returning the characters **OK** followed by carriage return and line feed (hex ASCII sequence 20 6F 6B 0D 0A). The default condition is to echo each character that is sent to the SD2.

When using the IEEE488 (or GPIB) interface, the default device address is 11. The device address can be set to any value from 1 to 30 using the command **SET-ID**. The command **?ID** is used to read back the IEEE address. Each command or string of commands must be terminated with a carriage return (0D hex). When sending a command or string of commands, it is important to wait for the SD2 to complete the processing of that command string before sending another command. This is accomplished by checking the status byte. The SD2 controls bits in the IEEE488 status byte which can be read from the IEEE488 controller. The command for reading this status byte will be unique to your IEEE controller. For example, with National Instrument controllers, the command is IBRSP. With CEC controllers, the command is SPOLL.

IEEE488 Status Byte Bits:

Bit 0   0 = command is being processed
                   1 = SD2 ready for another command
Bit 1   0 = no errors
                   1 = SD2 detected an error in the command
Bit 7   0 = no response or response has been read
                   1 = SD2 generated a response which is now ready to be sent

Note that with some fast computers, it is necessary to add a few milliseconds delay in your program after sending a command and before checking the status byte to allow time for the status byte to be updated.

Monochromator Wavelength Movement Commands:

GOTO   Goes to a destination wavelength at maximum motor speed. Accepts destination wavelength in nm as a floating point number with up to 4 digits after the decimal point or whole number wavelength with no decimal point.

<GOTO>   Same as GOTO (For compatibility with software written for previous SpectraPro models.)

NM	Goes to a destination wavelength at constant nm/min rate specified by last NM/MIN command. Accepts destination wavelength in nm as a floating point number with up to 4 digits after the decimal point or whole number wavelength with no decimal point.
<NM>	Same as NM (For compatibility with software written for previous SpectraPro models.)
>NM	Similar to NM except it returns control to user immediately rather than waiting for Completion of monochromator wavelength move. Can be used with ?NM or MONO-?DONE below. This command must be terminated with MONO-STOP listed below. NOTE: Use the NM command when communication with the monochromator during the scan is not required.
?NM	Returns present wavelength in nm to 0.01nm resolution with units nm appended. e.g. ?NM 300.00 nm
MONO-?DONE	Used with >NM command to determine if monochromator has reached the destination. Returns 0 if move is not complete, 1 if move is complete.
MONO-STOP	Stops the monochromator wavelength move after use of the >NM command.
NM/MIN	Sets constant scan rate in nm/min to 0.01 nm/min resolution. e.g. 10.0 NM/MIN
?NM/MIN	Returns present scan rate in nm/min to 0.01 nm/min resolution with units nm/min appended. e.g. ?NM/MIN 100.00 nm/min

Grating Control Commands:

GRATING	Recalls parameters for the specified grating from non-volatile memory. Up to nine (9) gratings are allowed. This command takes a grating number from 1 - 9. e.g. 3 GRATING
?GRATING	Returns the number of the grating presently being used numbered 1 - 9.
?GRATINGS	Returns the list of installed gratings with position, groove density and blaze. The present grating is specified with an arrow.

The following command is used for grating installation by ARC part #:

INSTALL	Installs new grating parameters into the non-volatile memory of the AM monochromator. Uses the part # of the grating to specify the parameters. e.g. 1-120-500 5 INSTALL places a 1200 g/mm grating blazed at 500nm into the second grating position on #5.

The following commands are used for grating installation by grating parameters:

SELECT-GRATING	Specifies the grating number to be installed 1 - 9.
G/MM	Specifies groove density of grating to be installed in g/mm. e.g. 1200 G/MM
BLAZE	Specifies the blaze wavelength and units of the grating to be installed with 7 characters of the user's choice. Unlike other commands, this command is issued before the parameters. After the command is issued, the SD2 responds with " " . Seven characters are then entered (these may be numbers, letters, spaces or special characters).

UNINSTALL	Used to remove a grating and its parameters from the SD2 non-volatile memory e.g. 3 UNINSTALL

Diverter Control Commands:

EXIT-MIRROR	Designates the exit diverter mirror to receive the diverter control commands. This command is for AM monochromators which can accept two diverter mirrors. The AM monochromators will accept this command but it is not required in these monochromators.
ENT-MIRROR	Designates the entrance diverter mirror to receive the diverter control commands. This command is for AM monochromators which can accept two diverter mirrors.
FRONT	Moves the designated diverter mirror to position the beam to the front port position.
SIDE	Moves the designated diverter mirror to position the beam to the side port position.
?MIRROR	Returns the position of the designated diverter mirror with the responses "front" and "side".
?MIR	Returns the position of the designated diverter mirror with the responses 0 for front and 1 for side.

CALIBRATION COMMANDS:

INIT-OFFSET	Sets the offset value for the designated grating. Default values are 25600 for all gratings. The grating designator used with this command is grating# - 1. e.g. 25590. 0 INIT-OFFSET for setting offset on grating #1. NOTE: This command requires a decimal point after the offset value. For the new parameters of this command to take effect, the monochromator must be initialized with the MONO-RESET command or by turning the power off and back on.
INIT-GADJUST	Sets grating adjustment value for the designated grating. Default values are 10000 for all gratings. The limits on the parameter for this command are +/- 1000 for all gratings. The grating designator used with this command is the grating # - 1. e.g. 9993 1 INIT-GADJUST for setting gadjust on the second grating. NOTE: This command is to maintain compatibility with previous SpectraPro applications. For new applications, use the INIT-SP300-GADJUST command below. No decimal point is used with this command. For the new parameters of this command to take effect, the monochromator must be initialized with the MONO-RESET command or by turning the power off and back on.

INIT-SP300-GADJUST	Sets grating adjustment value for the designated grating. Default values are 1000000 for all gratings. The limits on the parameter for this command are +/-100000 for all gratings. The grating designator used with this command is the grating# - 1. e.g. 999322 4 INIT-SP300-GADJUST for setting gadjust on the fifth grating. NOTE: No decimal point is used with this command. For the new parameters of this command to take effect, the monochromator must be initialized with the MONO-RESET command or by turning the power off and back on.
MONO-EESTATUS	Returns setup and grating calibration parameters for all gratings.
RESTORE FACTORY SETTINGS	Returns all parameters including grating calibration parameters to the original factory calibrated settings. NOTE: This command will overwrite any calibration parameters set by the user.
MONO-RESET	Initializes AM monochromator. Necessary after using INIT-OFFSET, INIT-GADJUST or INIT-SP300-GADJUST.
HELLO	Same as MONO-RESET. Used to maintain compatibility with existing applications.
MODEL	Returns model number of AM or VM monochromator. e.g. MODEL AM-505
SERIAL	Returns serial number of AM or VM monochromator. e.g. SERIAL 27480263

The following are the Start-Up parameters and their default values:

Default Values:

GRATING	#1
WAVELENGTH	0.0 nm
SCAN SPEED	200.0 nm/min

INIT-GRATING	Selects which of the three gratings on the installed in the AM monochromator will go to after finding 0.0 nm on the first grating of the installed turret. e.g. 2 INIT-GRATING selects the second grating as the default. Accepts values 1 - 9.
INIT-WAVELENGTH	Sets an initial wavelength for the SD2 after initialization. E.G. 435.84 INIT-WAVELENGTH
INIT-SRATE	Sets an initial scan rate for the SD2. E.G. 200.0 INIT-SRATE