Macro commands

The macro processor is case-insensitive; you can enter commands as ALLCAPS or alllowercase, but for readability it is helpful to use MixedCase as in the table. Completing a command by typing tab or ` will convert it to MixedCase.

Macro Control Commands

Flow Control Commands	
Repeat	Place at end of macro to repeat it
Loop # [variable]	Loop the given # of times until EndLoop; optionally set variable with index
EndLoop	Marks the end of the loop
DoMacro #	Switches to given macro #
CallMacro #	Calls other macro by # and returns
Call text	Calls other macro by name. Names are case-sensitive and must match exactly, including spaces
Function name [#n] [s]	Defines a function with the given name (without embedded spaces). The optional #n indicates the number of numeric arguments and s is non-zero to indicate that a string argument occurs after the numeric

	ones. Functions must be placed at the ends of macros.
EndFunction	Required ending to a function definition.
CallFunction name [args]	Calls the function with the given name and supplies arguments for the function to receive. If the name could occur in more than one macro, it must be qualified with a macro number or name, i.e. '5::GoodFunc' or 'Func Macro::GoodFunc'.
If expression	Starts a block that is executed conditionally on the value of 'expression'
Endif	Ends a block started with If
Elseif expression	Inside of an If/Endif block, starts a block that is executed conditionally on the value of 'expression' if the expressions in the starting If statement and any preceding Elseif statements were not true.
Else	Inside of an If/Endif block, starts a block that is executed if the expression after the 'If' and any preceding 'Elseif' commands is false
Break	Stops execution of the innermost Loop containing this statement
KeyBreak [key]	If the user presses 'B', or the key given by the optional 'key' entry, the macro breaks out of the innermost Loop containing this statement. 'key' should be a letter or number; the test for the key is case-insensitive.
Continue	Skips the rest of the current iteration of the innermost Loop containing this statement
SkipTo label	Skips forward to the line starting with the given label, where the label has a colon (:) at the end of it and is the only item on the line. The colon is not included in the label in the SkipTo statement.
Return	Without executing to the end of the current macro, returns to calling macro or ends execution if this is the top-level macro
Exit	Ends execution unconditionally
Other Macro Operation Control Commands	
MacroName text	Name the macro to the given text, which can include spaces
LongName text	A longer name to appear in the Run submenu of the Macro menu; if this name is not defined, the regular MacroName appears there.
Delay # [units]	Wait for given amount of time. The optional 'units' can be 'msec', 'sec', or 'min'. If no units are given, a # <= 60 is taken to be seconds, and a # > 60 is taken to be milliseconds
Echo text	Prints the text to the log window
Pause [text]	Opens message box with optional text plus question of whether to proceed with macro
YesNoBox text	Opens a Yes-No message box with the given text, which should be a question that can be answered with yes or no. Sets ReportedValue1 to 1 or 0 for a yes or no answer.
EnterOneNumber text	Opens a dialog box for the user to enter one floating point number, with the given text as the prompt. Sets ReportedValue1 to the entered value.
EnterDefaultedNumber #V #D text	Opens a dialog box for the user to enter one floating point or integer value. Follow with the default value to show in the box, the number of decimal places to show for a float entry or -1 for an integer entry, and the prompt text on the rest of the line. Sets ReportedValue1 to the

	entered value.
FlashDisplay [#T] [#D]	Flashes between a yellow screen and normal image display several times. The first optional entry, #T, sets the number of times to flash (default 4) and the second optional entry, #D, sets the duration of each state in seconds (default 0.3). Total duration may not exceed 6 seconds.
Verbose #	Turns echoing of each macro line on or off for # 1 or 0
SuppressReports	Do not print any of these reports, just assign the values to report variables
ErrorsToLog [#]	Makes most macro error messages be duplicated in the log window. Follow with a 0 to turn off the feature again.
ClearPersistentVars	Removes all persistent variables defined with :=
IsVariableDefined Var	Reports whether a variable is defined, placing a 1 in reportedValue1 if it is and a 0 if it is not. Follow with the variable name without a $.

Camera Commands

Acquisition and Parameter Commands	
V or View	Acquire image with 'view' parameters
F or Focus	Acquire image with 'focus' parameters
T or Trial	Acquire image with 'trial' parameters
R or Record	Acquire image with 'record' parameters
L or Preview	Acquire image with 'preview' parameters
M or Montage	Acquire montage
PreCookMontage #	If montaging is enabled with stage movement, this command lowers the screen to expose the specimen, then moves the stage to each piece position and waits there for the number of seconds indicated by #.
Set Parameter Commands	The following 'Set...' commands change values in one of the camera parameter sets. The set 'S' can be specified as either V, F, T, R, P or 0, 1, 2, 3, 4 for view, focus, trial, record, preview, respectively. Parameters will be restored whenever the macro ends or stops or when a different camera is selected. However, if the macro is suspended, any changed parameters will be set again when the macro resumes.
SetExposure S #E [#D]	Set exposure and, optionally, drift settling for exposure set S to the given values E and D. If D is omitted, the existing drift settling will be unchanged.
SetBinning S #B	Set binning for exposure set S to B.
SetCameraArea S L R T B	Set the acquisition area for exposure set S. Follow the set specifier S with either 4 numbers for the unbinned left, right, top, and bottom coordinates (the same kind of numbers as in the camera setup dialog) or with F, H, Q, WH or WQ for full, half, quarter, wide half, or wide quarter. Values will be adjusted for a legal area.
SetCenteredSize S #B # #	Set exposure set S for acquisition from a centered area. Follow the set specifier S with 3 numbers: the binning B, the binned size in X, and the binned size in Y.

SetContinuous S #	Set the acquisition mode for exposure set S for continuous if # is non-zero, or single-frame if # is 0.
SetSTEMDetectors S #D...	Set the STEM detectors for each available channel of exposure set S. Follow the set specifier S with a detector number for each channel, numbered from 0, or -1 to select no detector for that channel. At least one actual detector must be specified.
RestoreCameraSet [S]	Restore one or all camera parameter set(s) modified with the 'Set' commands above. If S is omitted, all modified sets will be restored.

Continuous Mode Control

StopContinuous	Stops continuous acquisition if it is running.
ReportContinuous	Returns -1 if continuous acquisition is not running, or the camera parameter set number being used if it is running, numbered from 0.
UseContinuousFrames #	If # is non-zero, the macro will keep executing commands (such as stage movement and alignment) even when the camera is acquiring in continuous mode. Use 0 to return to normal operation, in which the macro will wait for continuous acquisition to be ended by the user.
WaitForNextFrame	After starting a continuous acquisition, use this command to wait until the next image becomes available. The program will wait until the exposure time has elapsed so that the image is likely to be taken after completion of previous operations. The 'UseContinuousFrames 1' command must be used before the acquisition is started.
SetLiveSettleFraction #	Set the fraction of the usual settling time to apply in continuous mode after image shift or stage movement. By default, no settling is applied in continuous mode (i.e., the fraction is 0), but some settling may be needed when a macro or other operation is using continuous frames. The fraction is reset to zero when continuous mode ends.

Other Camera Commands

CameraProperties	Report unbinned size in X and Y of current camera
SelectCamera #	Make the given camera (numbered from 1) be the active camera. Will switch in and out of EFTEM mode or STEM mode if appropriate.
RetractCamera	Retracts all retractable cameras
OppositeFocus	In low dose mode, acquire Focus image from area on opposite side of Record from the defined Focus area. Opposite areas are not available if Balance Shifts is turned on.
OppositeTrial	In low dose mode, acquire Trial image from area on opposite side of Record from the defined Trial area.
StepFocusNextShot # # [# #]	Do one or two focus changes during the next exposure. Follow with 2 or 4 numbers: the time in seconds from start of the exposure to the first focus change, the first focus change in microns, the time from start of the exposure to the second focus change if any, and the second focus change relative to the statring focus, not relative to the focus after the first change. The command will have no effect if the exposure time is less than the time to the first change, and the second change will not be done if the time for it is greater than the exposure time.
SmoothFocusNextShot # #	Change focus linearly through next exposure. Follow with 2 numbers, the starting and ending defocus relative to the current focus. This command

	and StepFocusNextShot are enabled for Gatan, Falcon, and Tietz cameras.
EarlyReturnNextShot #	Return as early as possible from the next acquisition, which must involve saving dose-fractionation frames from a K2 camera. Follow with the number of frames to be summed in the returned image, 0 to return without any summed image, or -1 to return with the full sum (the latter is available only on GMS 2.31 or higher). Single-shot and dose-fractionation images can be requested without delay in the macro. The single-shot images will be taken as soon as possible (after the end of the exposure before GMS 2.31, after the frame stack has been accessed in GMS 2.31 and higher). Another dose-fractionation shot will be delayed until saving is finished for the current shot.
DeferStackingNextShot	Do not stack Falcon intermediate frames after the next exposure. To stack frames from multiple exposures into one stack, use this command before each exposure except the last one.
OpenDECameraCover	Opens the protection cover of the Direct Electron camera for the remainder of the macro, if it is the current camera. Without this command, the cover will be opened and closed for each exposure except during tasks.
UpdateHWDarkRef #	Updates the K2 hardware dark reference if the known interval since the last update is longer than # in hours. If # is 0, the update is done unconditionally; if # is negative (-1), it simply records the current time as the time of the last update.

Buffer and File Commands

Buffer and Image Commands	
Copy buf1 buf2	Copy from buf1 to buf2 (e.g., Copy C A)
Show buf	Display the given buffer (e.g., Show C)
CropImage buf x0 x1 y0 y1	Crop out a subarea of the given buffer from x0 to x1 in X and from y0 to y1 in Y. Coordinates are numbered from 0 to size – 1 in each dimension and 0 in Y is at the top.
ImageProperties [buf]	Report size in X and Y, binning, exposure, pixel size, and parameter set used for the image in buffer A or in the buffer indicated by 'buf'
ImageLowDoseSet [buf]	Report the parameter set that an image was taken with and whether it was taken in Low Dose mode, for the image in buffer A or in the buffer indicated by 'buf'. For one of the 5 standard parameter sets, it will report the set name. For a montage image, it will report Record. For a tracking image, it will report View if the mag matches that of View in Low Dose; if the mag matches Record in Low Dose, it will report Record or Preview depending on which has an closest exposure time closest to that of the image.
ReportMeanCounts [buf] [#]	Report the mean counts of the A buffer, or of the buffer indicated by 'buf'; add a 1 to get unbinned counts per second
ElectronStats [buf]	Report the min, max, mean, and SD of the A buffer, or of the buffer indicated by 'buf', scaled to electrons, and also report the electrons per unbinned pixel per second. The camera must have a defined counts per electron.

SubareaMean x0 x1 y0 y1	Report the mean counts in a subarea of the A buffer from x0 to x1 in X and from y0 to y1 in Y. Coordinates are numbered from 0 to size – 1 in each dimension and 0 in Y is at the top.
QuadrantMeans [n] [f1] [f2]	Report means of strips along quadrant boundaries. Optional entries are 'n' for the number of pixels between strip and boundary (default 2), 'f1' for the strip width as a fraction of quadrant extent (default 0.1), and 'f2' for the fraction of quadrant extent to trim off the length of the strip (default 0.1). Output is labeled by quadrant number (1 to 4) and 'h' for horizontal strips or 'v' for vertical strips.
File and Directory Commands	
S or Save [buf] [file #]	Save image in A or in buf to current open file, or to the given file number
SetDirectory dir	Change the working directory to 'dir', which can contain spaces.
UserSetDirectory [prompt]	Open a directory chooser dialog to allow user to select or make a directory, and change the working directory to it. If the optional prompt string is not supplied, the dialog title is 'Choose a new current working directory'. The chosen directory is stored in ReportedValue1.
MakeDirectory dir	Create the directory 'dir' if it does not already exist. 'dir' can contain spaces. The parent directory must already exist.
MakeDateTimeDir	Create a directory named by the date and time (e.g., Aug15_12.23.15) under the current directory and change to this as the new working directory.
SetNewFileType # [#]	Set to 0 to open files as MRC, or 1 to open files as a TIFF series described in an image autodoc file. The optional second value sets whether to open montaged files as MRC or as a TIFF series, but only if the property MontageAutodocOptions is set.
OpenNewFile file	Open a file with the given name, which can contain spaces. The file properties dialog will be bypassed. Since the current working directory can be unpredictable, depending on whether the user has opened a file with the file chooser, it is advisable either to specify an absolute path for the filename, or use a 'SetDirectory' with an absolute path.
OpenNewMontage #x #y file	Open a file with the given name for montaging, with the number of frames in X and Y given by '#x' and '#y'. If either #x or #y is 0, the number of frames will be taken from the last montage that was open. The file properties and montage setup dialogs will be bypassed, and some properties like overlap and whether to do a stage montage will be taken from the last montage that was open.
SetupWaffleMontage #B file	Open a montage file or adjust the current file's properties so that it will hold an image of the cross-line (waffle) replica grating with at least #B blocks in X and Y at the current magnification. Follow with the minimum # of blocks and the name of the file to be opened if necessary. If montaging is not needed, no changes are made. If there is an existing montage that is adequate, its properties will be adjusted to work at the current mag. If a new montage is needed, it will close the current file if it is a montage and open a new one with the given name. Variables will be substituted, so the name can contain the mag index, for example. It sets reportedValue1 to 1 or 0 depending on whether montaging is needed or not.
	Get a filename through a dialog with a simple text box and open it as a

EnterNameOpenFile [prompt]	new file. If the optional prompt string is not supplied, the prompt is "Enter name for new file:".
OpenFrameSumFile suffix	Open a file whose name starts with the last name used for saving frames from a K2 or Falcon camera, and ends with the string given in the command. The string can contain spaces and variables.
AllowFileOverwrite #	Allow 'OpenNewFile' and 'OpenNewMontage' to overwrite an existing file if # is 1, or disallow it again if # is 0.
OpenOldFile file	Open an existing MRC or ADOC file with the given name, which can contain spaces.
ReadFile # [buf]	Reads the given section # (numbered from 0) from the current open file into the standard Read buffer, or into the buffer indicated by the optional 'buf'
CloseFile [e]	Close the current file. Enter optional 'e' to stop macro if no file is open.
SwitchToFile #	Make the given file number be the current open file.
ReportFileZsize	Report the number of frames in currently open file
SetMontageParams # [# # # # #]	Sets up to 6 montage parameters; enter a value or -1 to leave the parameter unchanged. The entries are: 1 to use stage movement or 0 not to; overlap in X; overlap in Y; frame size in X; frame size in Y, 1 to skip correlations or 0 not to.
AddToAutodoc key value	Adds a key-value pair to the last section of the autodoc associated with the current open file, if any. The next word after the command is the key, and the remainder of the text on the line is taken as the value. Variables are substituted before using the text. After one or more additions to a section of the autodoc, a WriteAutodoc command must be used to save the values before closing the file or saving another image to it.
WriteAutodoc	Writes the autodoc associated with the current open file. Use this command once after adding one or more values to a section of the autodoc.
SaveLogOpenNew	Closes the log window and opens a new one. If a log file has been saved, the log is automatically saved to it before closing. If there is no log file and the log has new contents since program startup, the program will ask the user whether to save to log first; if the user cancels, the macro is aborted.

Microscope and Filter Control Commands

Stage-Related Commands	
U or TiltUp	Tilt up by preset increment
D or TiltDown	Tilt down by preset increment
TiltTo #	Tilt to given angle
TiltBy #	Change tilt by the given amount
ReportTiltAngle	Report current tilt angle
MoveStage #X #Y #Z	Move stage by micron increments in X, Y, Z (Z optional)
MoveStageTo #X #Y #Z	Move stage to given position in microns. Z is optional and Z will not be

	changed if it is omitted.
ReportStageXYZ	Report current stage position

Focus-Related Commands

ChangeFocus #	Change defocus by the given value in microns
SetDefocus #	Set the defocus to the given value in microns
SetAbsoluteFocus #	Set focus to a an absolute (standardized) value as reported earlier by ReportAbsoluteFocus or ReportFocus
SetStandardFocus #	Same as 'SetAbsoluteFocus', which is preferred to avoid confusion with the calibrated standard or eucentric focus value
SetObjFocus #	Calls SetObjFocus on JEOL with the given #, an integer increment, and reports change in focus
ReportDefocus	Report current defocus readout in microns
ReportAbsoluteFocus	Report an absolute (standardized) value for the current focus setting
ReportFocus	Same as 'ReportAbsoluteFocus', which is a better description of the operation
SetEucentricFocus	If in low mag, sets to the standard focus for the current mag or nearest LM mag if one has been set; otherwise on FEI it assumes standard focus is 0 and on JEOL it stops with an error. If not in LM, sets to the standard focus for the nearest nonLM mag if one has been set or stops with an an error if none were set. On FEI scopes, it issues a warning if it is using a calibrated value from a different mag.
CalEucentricFocus	Stores the current standardized focus value as the standard focus for the current mag, just as the Calibrate menu item [Standard Focus](#) does.
SaveFocus	Saves the current focus; the focus will be restored to this value either by RestoreFocus or when the macro stops or exits. The macro will not be resumable if it stops.
RestoreFocus	Restores the focus value when SaveFocus was run. After this is run, the focus will not be restored again when the macro ends.
ResetDefocus	Sets the defocus readout to 0, just as [Reset Defocus](#) in Focus menu does.

Magnification-Related Commands

SetMag #	Set the mag to an actual film mag value
ChangeMag #	Change mag by given number of mag steps
ReportMag	Report the current mag; also set ReportedValue2 to 1 if low mag mode, 0 if not
ReportMagIndex	Report the current mag index; also set ReportedValue2 to 1 if low mag mode, 0 if not
SetCamLenIndex #	Set the camera length index to the given number; on the Tecnai, values higher than 30 set the index to (# - 30) in LAD mode
SetMagAndIntensity #	Set the mag to the actual film mag value and change the beam to maintain the same brightness. Two values are reported: the initial percent C2 value and the remaining factor of intensity change needed if it was not possible to change the intensity by the full amount needed. The C2 value should be used to restore intensity when the mag is restored. The remaining intensity change could be applied to the exposure time if necessary. The macro will stop if there is an error in the intensity change.

ChangeMagAndIntensity #	Change mag by the given number of mag steps and change the beam to maintain the same brightness. Behaves same as SetMagAndIntensity.
IncMagIfFoundPixel #	Increase or decrease mag by one step if the pixel size has been found at the current mag with the **Find Pixel Size** routine, depending on whether # is positive or negative. Sets reportedValue1 to 1 if the mag is changed, 0 otherwise.

Beam-Related Commands

SetSpotSize #	Set the spot size to the given number
ReportSpotSize	Report the current spot size
SetPercentC2 #	Set the C2/C3 lens strength to the given percentage, or illuminated area on Titan to given value in microns.
IncPercentC2 #	Change the C2/C3 lens strength percentage or illuminated area in microns by the given amount
ReportPercentC2	Report the percent C2/C3 (on the Tecnai, this number matches the value in TUI) and the fractional lens strength. On a Titan, if illuminated area is being used for intensity, this reports the illuminated area value.
ReportIlluminatedArea	Report the illuminated area on a Titan
SetIntensityForMean #	Adjust beam intensity to yield the given number of counts, based on counts in the tilt-foreshortened area of the image in A. In low dose mode, this operates only on Record images and will change the intensity only of the Record area.
SetIntensityByLastTilt	Adjust beam intensity by the change in cosine of the tilt angle from the last tilt change. In low dose mode, this changes the intensity only of the Record area.
ChangeIntensityBy #	Change beam intensity by the given factor using calibrations. In low dose mode this changes the intensity of the current area.
SetAlpha #	Sets alpha value on JEOL.
ReportAlpha	Reports alpha value on JEOL.
SetBeamShift #X #Y	Set the beam shift to the given values (nominal micron units)
ReportBeamShift	Report the beam shift in nominal micron units
ReportBeamTilt	Reports the beam tilt in milliradians for FEI, % of full-scale value for JEOL
SetProbeMode #	Sets the mode to microprobe or nanoprobe on an FEI scope. Follow with 0 or "nano" for nanoprobe, or 1 or "micro" for microprobe.
ReportProbeMode	Reports whether an FEI scope is in nanoprobe or microprobe mode; sets first reported value to 0 or 1, respectively.

Image Shift-Related Commands

SetImageShift #X #Y	Set the image shift to the given values (image shift units). The values correspond to the ones give by ReportImageShift, which are adjusted for tilt axis offset, image shift offset, and low dose area shift
ImageShiftByPixels #X #Y	Change image shift by given # of pixels in camera X and Y
ImageShiftByUnits #X #Y	Change image shift by given # of IS units in X & Y
ImageShiftByMicrons #X #Y	Change image shift by given distance on specimen (X is tilt axis)
ReportImageShift	Report the image shift in IS units, adjusted for tilt axis offset, image shift offset, and low dose area shift

Miscellaneous Scope Commands

SetObjectiveStigmator #X #Y	Set the objective lens stigmator to the given values (between -1 and 1)
ReportObjectiveStigmator	Report the X and Y values of the objective stigmator, between -1 and 1
SetBeamBlank #	Blank beam if # is 1, unblank if # is 0
NormalizeLenses #	Normalize selected lenses on an FEI or Hitachi scope; # is the sum of 1 for projector, 2 for objective, 4 for condenser lenses
NormalizeAllLenses [#]	Normalize all lenses, or in a lens group, on an FEI scope. With # 0 or not present, it normalizes all lenses in one call. Otherwise, # can be the sum of 1 to normalize the illumination group (which includes condenser, minicondenser, and objective lenses) and 2 to normalize the projection group (which includes objective and projector lenses) in a separate call.
SetColumnOrGunValve #	Close column/gun valve or turn off filament if # is 0; open valve or turn on filament if # is 1
ScreenUp	Raise the main screen
ScreenDown	Lower the main screen
ManualFilmExposure #	Film exposure time in seconds for manual exposures, or 0 for automatic exposure (the default)
ExposeFilm	Take a film exposure
SpecialExposeFilm # [#] [#]	Expose film with special handling: the first # specifies a delay in seconds after loading the plate; the second # specifies a pre-exposure of the specimen before exposing the plate, in seconds. The third # suppresses dimming of the screen if it is nonzero. This command command does not raise the screen if it is down. It requires the adaexp server to be installed.
Energy Filter Commands	
SetSlitWidth #	Set energy filter slit width in eV
SetSlitIn [#]	Insert the slit; or if # is entered, insert if 1 or retract if 0
SetEnergyLoss #	Set the energy loss to the #
ChangeEnergyLoss #	Change the energy loss by the #
ReportEnergyFilter	Report the slit width, energy loss, and whether the slit is in or out (the latter is placed in ReportedValue3 as a 1 or 0)
Autoloader, Refrigerant, and Vacuum Commands	
LoadCartridge #	Loads the cartridge from the given slot # (numbered from 1) if there is an autoloader.
UnloadCartridge	If there is an autoloader, unloads the cartridge.
ReportSlotStatus #	Report the status of the cartridge slot given by # (numbered from 1) if there is an autoloader. Status is -1 for an error, 0 for empty, and 1 for occupied.
AreDewarsFilling	Report whether any of the dewars in a temperature control system are busy filling (reported value 1 is set to 0 or 1)
DewarsRemainingTime	Report the time remaining for until next automatic dewar filling, or -1 if none is scheduled
RefrigerantLevel #	Report the refrigerant level of the given dewar: 1 for autoloader, 2 for column, 3 for liquid helium
IsPVPRunning	Report whether the PVP is running on an FEI scope.

LongOperation Op # [Op #...]	Starts one or more time-consuming operations: Buffer cycle (Bu), Refill refrigerant (Re), Inventory cassettes (In), Loader buffer cycle (Lo), Dark reference update for K2 (Da). Operations are identified by the first two letters of whatever full word you use (case insensitive). Each operation except Inventory must be followed by an interval in hours (#). If # is > 0, the operation is done only if the time since the last such operation is greater than #; if # is 0, the operation is done unconditionally; if # is < 0, it simply records the current time as the time of the last operation. The scope operations will occur sequentially and be started in the order that they are listed. The dark reference update will be done simultaneously with scope operations. If an error occurs in a scope operation, other operations will be finished and the error reported at the end. Errors other than in refilling refrigerant will cause the macro to stop. The user interface should not hang during long operations, and users will be asked to confirm that they want to kill the operation threads if they press STOP or try to exit the program. The consequences of killing these threads are uncertain.

Piezo Drive Commands

SelectPiezo # #	Select a piezo drive for reports or movements, follow with the plugin number (numbered from 0, enter 0 if there is only one plugin controlling piezos) and the piezo number (numbered from 0).
ReportPiezoXY	Reports the X and Y position of the currently selected piezo
ReportPiezoZ	Reports the Z position, or the position of the only axis for a single-axis piezo, of the currently selected piezo
MovePiezoXY #X #Y [#]	Sets the X and Y position of the currently selected piezo to #X, #Y, or if the optional third # is non-zero, moves the piezo by #X, #Y
MovePiezoZ #Z [#]	Sets the Z position, or position of a single-axis piezo, to #Z for the currently selected piezo, or if the optional second # is non-zero, moves the piezo by #Z

Higher Level Operations and Tasks

Autoalign-Related Commands

A or Autoalign	Align buffer A to autoalign buffer
AlignTo buffer_letter [noIS]	Align buffer A to given buffer (e.g. B). Optionally, enter 1 for 'noIS' to avoid changing microscope image shift
ClearAlignment	Clear the alignment shift of the image in buffer A
ConicalAlignTo buf # [show]	Align buffer A to the given buffer 'buf' assuming a specimen rotation given by #. Optionally, enter 1 for 'show' to show the cross-correlation.
ReportAlignTrimming	Report the sum of left and right borders and the sum of top and bottom borders in the last autoalign for the image in A and for the reference image. The numbers are in pixels of the respective images before the additional binning applied for correlation, and will thus differ from the binned values reported by the autoalign routine.
ReportAlignShift	Report the X and Y alignment shift of the current image in A in unbinned pixels on image, in nanometers along the image shift axes, and in nanometers on the specimen, where the tilt axis is along X.
ReportShiftDiffFrom #	Report the difference between the alignment shift of the current image and the

	given value in microns, as percentage of the value; the cumulative sum of differences in microns, and the total sum of shifts in microns. For monitoring variability in successive stage movements.
ReportAccumShift	Report sum of shifts given by ReportAlignShift or ReportShiftDiffFrom
ResetAccumShift	Reset the sum of shifts given by ReportAlignShift to 0 or ReportShiftDiffFrom

Autofocus-Related Commands

G or Autofocus [#] [#]	Autofocus; set optional first # to -1 to just measure defocus without changing or 1 for normal autofocus that changes focus to target; set optional second # to 1 to focus with View area in Low Dose mode.
IncTargetDefocus #	Change the defocus target by #
SetTargetDefocus #	Set the defocus target to #
BeamTiltDirection #	Set beam tilt direction for autofocusing to # (a value from 0 to 3)
OppositeAutofocus [#]	In low dose mode, autofocus in area on opposite side of Record from the defined Focus area; if optional # is -1, just measure defocus without changing. Not available if Balance Shifts is on.
FocusChangeLimits # #	Set limits on the focus change during autofocus runs for the remainder of the macro; follow with a negative and a positive number for the limits in microns. When an autofocus run exceeds a limit, it will abort and return to the starting defocus. Enter with 0 0 to cancel these limits.
AbsoluteFocusLimits # #	Set limits on the absolute focus reached during autofocus runs. Follow with a lower and a upper limit as given by ReportAbsoluteFocus, or 0 0 to cancel these limits. Autofocus will abort when a limit is exceeded.
ReportFocusDrift	Report the drift estimate from the last autofocus, if available
ReportAutofocus	Report measured defocus from last autofocus
ReportTargetDefocus	Report the defocus target

Low Dose Commands

GoToLowDoseArea area	Switches to the low dose area given by 'area', which must be one of V, F, T, R, or S. This will not work if the screen is down.
SetLowDoseMode #	Turns low dose mode on for # nonzero or off for # 0; the previous state of low dose is saved in ReportedValue1 as a 0 or 1.
ReportLowDose	Report whether low dose is on or not and the current area, if it is defined. The number of the area (0 for V, etc.) is placed in ReportedValue2.

Task-Related Commands

ResetImageShift	Reset image shift and move stage to compensate
ResetShiftIfAbove #	Reset image shift and realign image if image shift is greater than the given # in microns
Eucentricity [#]	Refine eucentricity, or if optional # is entered, do rough eucentricity only (1), refine only (2), both steps (3), or refine and realign (6)
WalkUpTo #	Tilt up to given angle in steps and track image position
ReverseTilt [#]	Work out backlash and realign image after reversing tilt direction; enter optional 1 or -1 to specify a specific direction for further tilts
RefineZLP	Report time of day and run Refine Zero Loss Peak procedure
AutocenterBeam	Start the Beam Autocenter routine

CookSpecimen	Run the Specimen Cooker routine
WaitForDose #d [#r]	Start accumulating dose and wait until it reaches the given #d in electrons per square Angstrom. Enter the optional #r to set how many times it reports progress while waiting (default is 10). Be sure that the screen is down and, if in low dose, that the beam is unblanked.
CenterBeamFromImage [#]	Center beam using the existing image in the active buffer by detecting the edges of the beam, or from the centroid of the image intensities if # is nonzero. In the latter case the beam should be completely within the camera field.
CalibrateImageShift [#]	Calibrate image shift at the current mag. Do the calibration from scratch if the optional # is nonzero.
FindPixelSize	Run the routine to find the pixel size in an image of a cross-line grating.
QuickFlyback set# #e	Run the camera timing calibration routine in quick flyback mode for an FEI STEM camera, where 'set#' specifies the camera parameter set and must be V, F, T, R, or P, and #e is the exposure time to use. The routine will not ask for confirmation before saving the resulting flyback time and startup delay in the master list of flyback times.
ShiftImageForDrift # # #	Apply image shift during the next exposure to compensate for a drift in X and Y given by the first and second numbers; the third number should be 0 if the drift is in unbinned pixels/sec and 1 if it is in nm/sec
Navigator-Related Commands	
NewMap	Make the current image or montage a new Navigator map
MoveToNavItem [#]	Move the stage to a Navigator item; if no # is entered, move to the current Navigator item or to the item that this macro is being run on, otherwise move to the item whose index in the table is # (numbered from 1)
RealignToNavItem #r [#c]	Realign to the current Navigator item, or to the item that this macro is being run on. For #r, enter 1 to restore the microscope state to the current state after the procedure, or 0 not to. For optional #c, enter 1 to use continuous acquisition mode and end it at end of procedure, or 2 to leave it running if possible.
RealignToOtherItem #i #r [#c]	Realign to the Navigator item whose index in the table is #i, numbered from 1. For #r, enter 1 to restore the microscope state to the current state after the procedure, or 0 not to. For optional #c, enter 1 to use continuous acquisition mode and end it at end of procedure, or 2 to leave it running if possible.
ForceCenterRealign	Makes Realign to Item align to the map center instead of skipping the first round because it was aligned to recently
ShiftItemsByAlignment	Shift items at the current registration by the alignment shift of the image in buffer A. If rerun on the same image, it applied the change in shift between the current and previous run.
UpdateItemZ	Assign current stage Z value to the current Navigator item, or item that this macro is being run on.
UpdateGroupZ	Assign current stage Z value to the whole group that the current Navigator item, or item that this macro is being run on, belongs to. The item must have a non-zero group ID. If the group would show up on more than one line with 'Collapse groups' on, items on all lines will be updated, unlike with the 'Update Z' button.
ReportNavItem	Report the index, stage X, Y, Z, label, and note string for the current Navigator item, or the item this macro is being run on. The index and stage coordinates

	are placed in 'reportedValue' variables as usual, and the item type is placed in 'reportedValue5' (0 for point, 1 for polygon, 2 for map). In addition, variables 'navLabel', and 'navNote' are set with the label and note strings, and variables 'navIndex' and 'navIntLabel' are set with integer values of the item index (numbered from 1) and of the label (up to any non-numeric characters). If the Navigator is currently acquiring at points, a variable 'navAcqIndex' is set with the number of items already acquired plus 1. Any of these variables can then be used to make filenames, and the latter two can be used in arithmetic and IF statements.
ReportOtherItem #	Report similarly on the Navigator item whose index in the table is #, numbered from 1.
ReportGroupStatus	For the current Navigator item or the item this macro is being run on, reports a code for whether the item is first to be acquired in a group: -1 if Navigator not acquiring, 0 if not in a group, 1 if first to be acquired in a group, 2 if later in the group. If the group would show up on more than one line with 'Collapse groups' on, a value of 1 is returned for the first item to be acquired in each subgroup. It also reports the group ID of the item (ID is 0 for an item not in a group).
ItemForSuperCoord #	Set the item number that Navigator supplies supermontage coordinates from when a montage image is acquired. Set the number to 0 to restore Navigator to using coordinates from the item currently being acquired.
SkipPiecesOutsideItem #	Sets the current montage to skip pieces outside the Navigator item whose position in the table is # (numbered from 1). If # is 0, uses the current item. If # is < 0, disables the skipping of pieces.

Miscellaneous Commands

CircleFromPoints x y x y x y	Report the X and Y center coordinate and the radius in microns for the circle through three points whose coordinates are given on the line as x1 y1 x2 y2 x3 y3.
ReportClock	Report seconds elapsed since last ResetClock command
ResetClock	Reset the time reported by ReportClock to 0
ProgramTimeStamps	Prints the program version and build date, and the current date and time.
Plugin name func [args]	Call the function 'func' in the plugin named 'name' with appropriate list of arguments for that function. Arguments are entered as items separated by spaces, except that a string argument at the end may consist of multiple words. The return value of the function is reported and placed into reportedValue1.
ListPluginCalls	List the names of macro-callable functions in all loaded plugins along with the arguments that they expect, in parentheses. For each argument, there should be one item provided on the command line calling the function, with all items separated by spaces as usual. Two exceptions to this are: a string argument at the end can include spaces; an argument listed as [out]double is a returned value, assigned to reportedValue2 or higher.
MailSubject text	Subject line for an email message (default is 'Message from SerialEM macro'). The text can include variables to be substituted.
SendEmail text	Send an email containing the given text, which can include variables to be

		substituted. An SMTP server and address to send from must be defined in the properties file, and recipient(s) must be defined using 'Set Email Address' in the Tilt Series Menu.