ISCEV SINGLE CHANNEL ERG PROTOCOL DESIGN

This spreadsheet has been created to help design a protocol before actually entering the parameters into the Espion software. It details all the protocol parameters (limited stimulus parameters) which can be entered first into the spreadsheet and then easily transferred to the new protocol. A description and allowable range of values is listed along side each available parameter helping to make it more understandable.

How to use the spreadsheet

Each step may have totally different general, acquisition, stimulus, channel and marker parameters so you must decide whether to create new pages for each step or re-use the existing sheets. The spreadsheet has three sets of channel parameters, but if more are needed then make a copy of the channel worksheet. Similarly to the channels worksheet, the marker worksheet has three sets of marker parameters which will cover most requirements. Not all stimulus parameters are shown in the table, only the ones displayed in the protocol summary

Protocol Title

Standard ISCEV ERG protocol including dark rod, dark OP, dark maximal combine response, light single flash cone, and 30Hz flicker steps. The OP step is separated rather than using a virtual channel of the dark maximum response step so that it appears on its own graph. Because eyes are recorded sequentially, step sequence is manual so you can test both eyes for each step before advancing. Manual rejection of trials is enabled, so no automatic rejection is set. Both eyes should be wired up with DTL fiber electrodes and a ground reference placed on the forehead. The DTL connections should be input into channel 1 only with the left eye (OS) in the positive input and the right eye (OD) in the negative input. This system uses one DTL as the other's reference removing the need for two reference electrodes

	Value	Options	Notes
Test Type	ERG Test	ERG Test	ERG test only
		VEP Test	VEP test only
		VEP+ERG Test	VEP and ERG test combined
		EOG Test	EOG test only
Stimulus generator	ColorBurst	ColorBurst	Use the ColorBurst as the stimulus generator
		ColorDome	Use the ColorDome as the stimulus generator
		Maculoscope	Use the Maculoscope as the stimulus generator
		External trigger output	Use the external trigger out to 3rd party hardware
		External trigger input	No defined generator, acquisition only mode triggered from external trigger input
		Pattern generator	Use the Pattern stimulator as the stimulus generator
Total Channels	1	1..5	Max number of channels to record
Category	ISCEV	User defined	Filter for selecting protocol
Description		Text	Useful text description

Date Created 14th May 2003
Date Last mo First version
Author R Robson

GLOBAL PROTOCOL PARAMETERS

	Parameters	value	Options	Notes
	Adaptation time (secs)	1200	0-9999	Time to wait before starting the test (allows for dark adaptation etc)
	Save Trials	On	On or Off	Determines in the individual trials are saved as well as the result
	Option Code	0	"0"	Special customer software routines may be enabled by an option number
	Step Sequencing	Manual	Auto,	How the steps will be sequenced. Either manually selected or automatically
	Trial Interleaving %	100	0-100%	How the trials will be recorded for each result between steps. 100% means collect all trials before changing step
	Check Impedance before test	Off	On or Off	Display the impedance check menu before running a test.
	High Gain headbox	Off	On or Off	Enable the special high gain headbox
	Enable Stimulus on exit	Off	On or Off	Keep the stimulus background on when finishing a test and starting a new protocol
	Switch monitor input on pause	Off	On or Off	For customers with a video switch box, this will switch the video onto the monitor during test pauses
Sequential Eye Recording	**For customers with ColorBursts. Enables one eye to be recorded after the other and both results to be displayed on the same graph**			
	Enabled	On	On or Off	Enables sequential recording
	OD eye uses channel 2	Off	On or Off	OS is always channel 1, OD is connected to channel 2 input, two references
	OD eye input is inverted	On	On or Off	If OD is used as the reference for OS, then when recording from OD the signal must be inverted
Normals	**If enabled, then the program will plot horizontal or vertical bars around plotted markers showing normal deviation and also include deviation in the marker table**			
	Enabled	Off	On or Off	Enable normals
	By Sex	Off	On or Off	Choose normals by sex
	By Age	Off	On or Off	Choose normals by age
	By Pupil Size	Off	On or Off	Choose normals by pupil size (not currently implemented)
Screen display option	**These control the initial screen layout when the protocol is run**			
	Layout	Full	Full, Tile, Stac	Screen layout mode
	Grid	Off	On or Off	Display the grid on all graphs
	Table	On	On or Off	Display the marker table on the right hand side of the screen
	Cycle Colors	On	On or Off	Every result will be plotted in a different color (colors defined in Configure System)
	Overlay Mode	Results	Normal, result	Choose the initial overlay mode. E.g. overlay results, steps or channels
Printer options	**These options define the printer menu option defaults. This saves time having to set up the printer output every time you print**			
	Graphs	On	On or Off	Print the current graph
	Marker Table	On	On or Off	Print the marker table
	Summary table	Off	On or Off	Print the result summary table which includes a comment, number of trials and rejections
	Analysis table	Off	On or Off	Print the analysis table. This is only applicable to EOG tests
	Orientation	Portrait	On or Off	Print in portrait or landscape mode
	Step clip region	Off	On or Off	Print all results clipped to the step clip region
	Step parameters	On	On or Off	Print the step parameters e.g. stimulus parameters, filter settings etc
	Notes	On	On or Off	Print any user entered notes
	All steps	On	On or Off	Print all steps with valid results one step per graph (not valid if overlay steps display mode is selected)
Export options	**These options define the export menu option defaults. Export files are defined as a series of tables (a set of rows and columns) in a spreadsheet format**			
	Filename		Text	A default export filename
	Contents Table	Off	On or Off	A table defining the cell coordinates of all other tables
	Patient table	On	On or Off	The patient information table containing patient name etc
	Data Table	On	On or Off	Table containing the results and trials for each result in numerical form
	Marker Table	On	On or Off	Table containing all the marker values
	Result Summary Table	Off	On or Off	Table containing the result comments, number of trials per result, number rejected
	Analysis Table	Off	On or Off	Table containing analysis data. Only applicable currently for EOG
	Stimulus Table	Off	On or Off	Table containing stimulus parameters e.g. flash intensity. Required for A-B wav analysis
	Titles	On	On or Off	Table column titles
	All Steps	On	On or Off	Export results/trials/marker values for all steps or just the current step
	All Channels	On	On or Off	Export results/trials/marker values for all channels in each step or just the current channel
	All Results	On	On or Off	Export all results for the each channel or just the current result
	Trials Column	Off	On or Off	Export the numerical data for every trial for each result (requires Data table being enabled)
	Results Column	On	On or Off	Export the numerical data for every result (requires Data table being enabled)
	Data Contents	Off	On or Off	Table containing information about data in the Data Table. Useful for automatic macro support
	Vertical Tables	Off	On or Off	Export all tables vertically (all tables aligned to column 0) as opposed to all tables being aligned on row 0

STEP 1 ROD RESPONSE PARAMETERS

General	Parameters	value	Options	Notes
	Description	Dark Rod	Text	A step description. This can be auto-generated from differences in step parameters
	Auto description	Off	On or Off	Step description is created from different step parameters
	Results per run	2	0..999	Number of results to record automatically every run
	Time between results (secs)	2	0..9999	Minimum time that must elapse between results
	Adaptation time (secs)	0	0..9999	Time to wait before recording results
	Stimulate between results	Off	On or Off	Normally the stimulus is turned off between recording results
	Display text at step start	Off	On or Off	A text box that appears and requires user acknowledgement before recording
	Text to display		Text	Text to display in text box. Very useful when controlling manual external stimulators
Warning sounds	**For stimulators with inbuilt buzzers (ColorDomes). An audible warning may be produced**			
	Warn before start of result	Off	On or Off	Make an audible warning before starting a result
	Warn before start of trial	Off	On or Off	make an audible warning before recording a new trial (not the first trial)
Printer clip region	**Defines how much of the result is actually plotted on the graph for printouts. Enabled in the print menu**			
	Start time (ms)	0	-1000..1000	Print start time
	Range (ms)	0	0..1000	Print range time. Total result time printed is start+range

Acquisition	Parameters	value	Options	Notes
	Sample Frequency (Hz)	1000	100, 200, 500, 1000, 2000, 5000	Sample frequency (default is 1000Hz). Higher frequencies generate more data
	Trial pre-trigger time (ms)	20	0..30000	Time before trigger point to start recording. Useful for autozero
	Trial post-trigger time (ms)	250	0..60000	Time after trigger to record. Total recording time is pre-trigger+post-trigger
	Trials per result	4	0..999	Maximum number of trials per result before finished. You can stop before this number
	First trial delay (ms)	0	0..64000	Delay before recording first trial. Stimulus is produced during this time to allow patient to reach steady state
	Inter trial delay (ms)	2000	0..100000	Delay between trials. To allow patient to recorder from last stimulus
	Baseline removal	On	On or Off	Remove a sloping DC drift from the result by fitting a straight line through result and subtracting it
	Manual rejection of trials	On	On or Off	After each trial has been recorded, ask user whether trial should be rejected
Autozero	**Removes the DC content of the result by sampling a period of the result and subtracting this from all the result**			
	Enabled	On	On or Off	Enable autozero (DC subtraction)
	Autozero pre-trigger (ms)	20	-30000..30000	Normally same as pre-trigger time. This will remove DC mean of pre-trigger time from result
	Autozero range (ms)	20	0..30000	Normally same as pre-trigger time.. If both values are 0 then program will remove DC mean of total result

Colorburst	Parameters	value	Mode	Notes
	Flash Output	Stimulator 1	All	Stimulator to use. This should be stimulator 1 except for dual stimulator setups
	Flash Cycles	Single	All	Number of flashes per trial, or times to perform the output cycle
	Flash Mode	Pulse	All	The output mode: Pulse, Waveform or User Defined. Normally pulse (flash)
	Pulse Frequency (Hz)	1	Pulse	Flash frequency (not applicable for single flashes
	Pulse Period (ms)	4	Pulse	Flash duration (only applicable to LED flashes)
	Pulse Intensity	0.007(P)	Pulse	Intensity of flash normally in cd.s/m^2. max depends on color
	Pulse Color	White 6500K	Pulse	Color of flash, picked from the color list
	Stimulus		Maculoscope	Which LED to use for stimulus (maculoscope only)
	Waveform Frequency (Hz)		Waveform	Flash frequency (not applicable for single flashes
	Waveform Shape		Waveform	Flash duration (only applicable to LED flashes)
	Waveform Contrast		Waveform	Intensity of flash normally in cd.s/m^2. max depends on color
	User Defined Filename		User defined	User defined filename
	Variable 1		User defined	Variable 1 value if used
	Variable 2		User defined	Variable 2 value is used
	Variable 3		User defined	Variable 3 value if used
	Variable 4		User defined	Variable 4 value if used
	Background		Maculoscope	Which LED to use for background (maculoscope only)
	Background Intensity	0 (P)	Pulse/Waveform	Intensity of background in cd/m^2 max depends on color
	Background Color	White 6500K	Pulse/Waveform	Color of background picked from color list

CHANNEL 1	Parameter	Value	Options	Notes
	Name	Chan 1	Text	Channel name as displayed on the graph
	Enabled	On	On or Off	This channel will be/not be displayed on the graph for this step.
	Filter enabled	On	On or Off	If on, then the input will be filtered by the filter values specified below
	Filter low frequency cutoff (Hz)	0.15	0..30 (depends (	If the filter is enabled, then this is the low frequency cutoff point
	Filter high frequency cutoff (Hz)	300	30..1000	If the filter is enabled, then this is the high frequency cutoff point
	Filter notch enabled	Off	On or Off	Enables a 50/60Hz notch filter. You should try and avoid using this filter if possible
	Gain	1	1	Always 1 (not used on V3 software)
	Y Axis scaling (uV)	50	1..9999	The graph scaling per division e.g. 50uV would be 50uV per division
	Trial scaling divider	1	1..10	Plotting trials on the same graph as the result often requires different scaling for trials to make them fit
	Positive is up on axis	On	On or Off	Whether positive voltages are at the top of the graph or the bottom
	Invert input polarity	Off	On Or Off	Equivalent of switching the positive and negative inputs of the channel into the headbox
	Eye being tested	OS	OS, OD, Both, E	used as a label on each result and marker for this channel
	Electrode type	DTL Fiber	Text	Reference only. Denotes the electrode used to record the results
Automatic rejection	**The program can automatically reject trials as they are recorded if their amplitude exceeds a window (or fail to exceed a minimum window)**			
	Enabled	Off	On or Off	Automatic rejection enabled. The voltage of rejection is maximum voltage*Window range (%)
	maximum voltage (uV)	100	1..	Maximum voltage (bipolar value) which the trial must obtain before rejection is made
	Window range (%)	100	1..100	Percentage of maximum voltage (not normally changed as maximum voltage can be changed instead)
Virtual Channel	**Determines if the channel input is read from another actual channel rather than the equivalent input on the headbox.**			
	Enabled	Off	On or Off	Enabled reading from another input channel
	Channel to virtualize	1	1..5	Channel to record. The system normally records the same input as channel no. unless another is specified
	Subtract another channel	Off	On or Off	You can subtract the input of another channel from this input e.g. right eye - left eye inputs
	Channel to subtract	1	1..5	Channel to subtract from this one

STEP 1 ROD RESPONSE PARAMETERS

MARKER 1	Parameter	Value	Options	Notes
	Name	B	Text	Marker name as displayed on the graph and in the marker table
Display Values	**Determine whether to display the amplitude and period (time) of the marker in the marker value table**			
	Display Period	On	On or Off	Display the marker period in the marker table
	Period is relative	Off	On or Off	Marker period is calculated relative to another marker, not absolute
	Period is relative to		Marker	Marker to calculate relative period from
	Display amplitude	On	On or Off	Display amplitude measurement in the marker table
	Amplitude is relative	Off	On or Off	Marker amplitude is calculated relative to another marker, not absolute
	Amplitude is relative to		Marker	Marker to calculate relative amplitude from
	Amplitude is average (ms)	0	1..32000	Marker amplitude is an average of points around marker position (absolute values only)
	Amplitude is positive	Off	On or Off	Marker amplitude is always positive in value regardless of actual sign
	Add to marker average	Off	On or Off	Marker value is added to an average of marker valus (EOG) which is displayed in the marker table
Placement	**Determines how the marker is positioned on the result**			
	Visible on screen	On	On or Off	Determine if marker is displayed on the graph
	Automatic placement	On	On or Off	Marker should be automatically placed after the result is finished
	Placement mode	Positive	Pos, Neg Fixed	Marker placement is at a negative trough (most negative) positive peak (most positive) or at a fixed position
	Peak start time (ms)	25	-30000..30000	Start time in result to start loking for a peak or trough
	Peak range time (ms)	40	0..30000	Range over which to look for peak and trough
Apply to channels	**Which channels to apply the marker to. Sometimes it is useful to apply different markers to different channels**			
	Channel 1	On	On or Off	Apply marker to channel 1
	Channel 2	Off	On or Off	Apply marker to channel 2
	Channel 3	Off	On or Off	Apply marker to channel 3
	Channel 4	Off	On or Off	Apply marker to channel 4
	Channel 5	Off	On or Off	Apply marker to channel 5

STEP 2 DARK MAX PARAMETERS

General	Parameters	value	Options	Notes
	Description	Dark Max	Text	A step description. This can be auto-generated from differences in step parameters
	Auto description	Off	On or Off	Step description is created from different step parameters
	Results per run	2	0..999	Number of results to record automatically every run
	Time between results (secs)	15	0..9999	Minimum time that must elapse between results
	Adaptation time (secs)	0	0..9999	Time to wait before recording results
	Stimulate between results	Off	On or Off	Normally the stimulus is turned off between recording results
	Display text at step start	Off	On or Off	A text box that appears and requires user acknowledgement before recording
	Text to display		Text	Text to display in text box. Very useful when controlling manual external stimulators
Warning sounds	**For stimulators with inbuilt buzzers (ColorDomes). An audible warning may be produced**			
	Warn before start of result	Off	On or Off	Make an audible warning before starting a result
	Warn before start of trial	Off	On or Off	make an audible warning before recording a new trial (not the first trial)
Printer clip region	**Defines how much of the result is actually plotted on the graph for printouts. Enabled in the print menu**			
	Start time (ms)	0	-1000..1000	Print start time
	Range (ms)	0	0..1000	Print range time. Total result time printed is start+range

Acquisition	Parameters	value	Options	Notes
	Sample Frequency (Hz)	1000	100, 200, 500, 1000, 2000, 5000	Sample frequency (default is 1000Hz). Higher frequencies generate more data
	Trial pre-trigger time (ms)	20	0..30000	Time before trigger point to start recording. Useful for autozero
	Trial post-trigger time (ms)	250	0..60000	Time after trigger to record. Total recording time is pre-trigger+post-trigger
	Trials per result	4	0..999	Maximum number of trials per result before finished. You can stop before this number
	First trial delay (ms)	0	0..64000	Delay before recording first trial. Stimulus is produced during this time to allow patient to reach steady state
	Inter trial delay (ms)	15000	0..100000	Delay between trials. To allow patient to recorder from last stimulus
	Baseline removal	On	On or Off	Remove a sloping DC drift from the result by fitting a straight line through result and subtracting it
	Manual rejection of trials	On	On or Off	After each trial has been recorded, ask user whether trial should be rejected
Autozero	**Removes the DC content of the result by sampling a period of the result and subtracting this from all the result**			
	Enabled	On	On or Off	Enable autozero (DC subtraction)
	Autozero pre-trigger (ms)	20	-30000..30000	Normally same as pre-trigger time. This will remove DC mean of pre-trigger time from result
	Autozero range (ms)	20	0..30000	Normally same as pre-trigger time.. If both values are 0 then program will remove DC mean of total result

Colorburst	Parameters	value	Mode	Notes
	Flash Output	Stimulator 1	All	Stimulator to use. This should be stimulator 1 except for dual stimulator setups
	Flash Cycles	Single	All	Number of flashes per trial, or times to perform the output cycle
	Flash Mode	Pulse	All	The output mode: Pulse, Waveform or User Defined. Normally pulse (flash)
	Pulse Frequency (Hz)	1	Pulse	Flash frequency (not applicable for single flashes
	Pulse Period (ms)	4	Pulse	Flash duration (only applicable to LED flashes)
	Pulse Intensity	2.25(P)	Pulse	Intensity of flash normally in cd.s/m^2. max depends on color
	Pulse Color	White 6500K	Pulse	Color of flash, picked from the color list
	Stimulus		Maculoscope	Which LED to use for stimulus (maculoscope only)
	Waveform Frequency (Hz)		Waveform	Flash frequency (not applicable for single flashes
	Waveform Shape		Waveform	Flash duration (only applicable to LED flashes)
	Waveform Contrast		Waveform	Intensity of flash normally in cd.s/m^2. max depends on color
	User Defined Filename		User defined	User defined filename
	Variable 1		User defined	Variable 1 value if used
	Variable 2		User defined	Variable 2 value is used
	Variable 3		User defined	Variable 3 value if used
	Variable 4		User defined	Variable 4 value if used
	Background		Maculoscope	Which LED to use for background (maculoscope only)
	Background Intensity	0 (P)	Pulse/Waveform	Intensity of background in cd/m^2 max depends on color
	Background Color	White 6500K	Pulse/Waveform	Color of background picked from color list

CHANNEL 1	Parameter	Value	Options	Notes
	Name	Chan 1	Text	Channel name as displayed on the graph
	Enabled	On	On or Off	This channel will be/not be displayed on the graph for this step.
	Filter enabled	On	On or Off	If on, then the input will be filtered by the filter values specified below
	Filter low frequency cutoff (Hz)	0.15	0..30 (depends (	If the filter is enabled, then this is the low frequency cutoff point
	Filter high frequency cutoff (Hz)	300	30..1000	If the filter is enabled, then this is the high frequency cutoff point
	Filter notch enabled	Off	On or Off	Enables a 50/60Hz notch filter. You should try and avoid using this filter if possible
	Gain	1	1	Always 1 (not used on V3 software)
	Y Axis scaling (uV)	10	1..9999	The graph scaling per division e.g. 50uV would be 50uV per division
	Trial scaling divider	1	1..10	Plotting trials on the same graph as the result often requires different scaling for trials to make them fit
	Positive is up on axis	On	On or Off	Whether positive voltages are at the top of the graph or the bottom
	Invert input polarity	Off	On Or Off	Equivalent of switching the positive and negative inputs of the channel into the headbox
	Eye being tested	OS	OS, OD, Both, E	used as a label on each result and marker for this channel
	Electrode type	DTL Fiber	Text	Reference only. Denotes the electrode used to record the results
Automatic rejection	**The program can automatically reject trials as they are recorded if their amplitude exceeds a window (or fail to exceed a minimum window)**			
	Enabled	Off	On or Off	Automatic rejection enabled. The voltage of rejection is maximum voltage*Window range (%)
	maximum voltage (uV)	100	1..	Maximum voltage (bipolar value) which the trial must obtain before rejection is made
	Window range (%)	100	1..100	Percentage of maximum voltage (not normally changed as maximum voltage can be changed instead)
Virtual Channel	**Determines if the channel input is read from another actual channel rather than the equivalent input on the headbox.**			
	Enabled	Off	On or Off	Enabled reading from another input channel
	Channel to virtualize	1	1..5	Channel to record. The system normally records the same input as channel no. unless another is specified
	Subtract another channel	Off	On or Off	You can subtract the input of another channel from this input e.g. right eye - left eye inputs
	Channel to subtract	1	1..5	Channel to subtract from this one

STEP 2 DARK MAX PARAMETERS

MARKER 1	Parameter	Value	Options	Notes
	Name	A	Text	Marker name as displayed on the graph and in the marker table
Display Values	**Determine whether to display the amplitude and period (time) of the marker in the marker value table**			
	Display Period	On	On or Off	Display the marker period in the marker table
	Period is relative	Off	On or Off	Marker period is calculated relative to another marker, not absolute
	Period is relative to		Marker	Marker to calculate relative period from
	Display amplitude	On	On or Off	Display amplitude measurement in the marker table
	Amplitude is relative	Off	On or Off	Marker amplitude is calculated relative to another marker, not absolute
	Amplitude is relative to		Marker	Marker to calculate relative amplitude from
	Amplitude is average (ms)	0	1..32000	Marker amplitude is an average of points around marker position (absolute values only)
	Amplitude is positive	Off	On or Off	Marker amplitude is always positive in value regardless of actual sign
	Add to marker average	Off	On or Off	Marker value is added to an average of marker valus (EOG) which is displayed in the marker table
Placement	**Determines how the marker is positioned on the result**			
	Visible on screen	On	On or Off	Determine if marker is displayed on the graph
	Automatic placement	On	On or Off	Marker should be automatically placed after the result is finished
	Placement mode	Negative	Pos, Neg Fixed	Marker placement is at a negative trough (most negative) positive peak (most positive) or at a fixed position
	Peak start time (ms)	0	-30000..30000	Start time in result to start loking for a peak or trough
	Peak range time (ms)	25	0..30000	Range over which to look for peak and trough
Apply to channels	**Which channels to apply the marker to. Sometimes it is useful to apply different markers to different channels**			
	Channel 1	On	On or Off	Apply marker to channel 1
	Channel 2	Off	On or Off	Apply marker to channel 2
	Channel 3	Off	On or Off	Apply marker to channel 3
	Channel 4	Off	On or Off	Apply marker to channel 4
	Channel 5	Off	On or Off	Apply marker to channel 5

MARKER 2	Parameter	Value	Options	Notes
	Name	B	Text	Marker name as displayed on the graph and in the marker table
Display Values	**Determine whether to display the amplitude and period (time) of the marker in the marker value table**			
	Display Period	On	On or Off	Display the marker period in the marker table
	Period is relative	Off	On or Off	Marker period is calculated relative to another marker, not absolute
	Period is relative to		Marker	Marker to calculate relative period from
	Display amplitude	On	On or Off	Display amplitude measurement in the marker table
	Amplitude is relative	On	On or Off	Marker amplitude is calculated relative to another marker, not absolute
	Amplitude is relative to	A	Marker	Marker to calculate relative amplitude from
	Amplitude is average (ms)	0	1..32000	Marker amplitude is an average of points around marker position (absolute values only)
	Amplitude is positive	Off	On or Off	Marker amplitude is always positive in value regardless of actual sign
	Add to marker average	Off	On or Off	Marker value is added to an average of marker valus (EOG) which is displayed in the marker table
Placement	**Determines how the marker is positioned on the result**			
	Visible on screen	On	On or Off	Determine if marker is displayed on the graph
	Automatic placement	On	On or Off	Marker should be automatically placed after the result is finished
	Placement mode	Positive	Pos, Neg Fixed	Marker placement is at a negative trough (most negative) positive peak (most positive) or at a fixed position
	Peak start time (ms)	25	-30000..30000	Start time in result to start loking for a peak or trough
	Peak range time (ms)	20	0..30000	Range over which to look for peak and trough
Apply to channels	**Which channels to apply the marker to. Sometimes it is useful to apply different markers to different channels**			
	Channel 1	On	On or Off	Apply marker to channel 1
	Channel 2	Off	On or Off	Apply marker to channel 2
	Channel 3	Off	On or Off	Apply marker to channel 3
	Channel 4	Off	On or Off	Apply marker to channel 4
	Channel 5	Off	On or Off	Apply marker to channel 5

STEP 3 DARK OP PARAMETERS

General	Parameters	value	Options	Notes
	Description	Dark OP	Text	A step description. This can be auto-generated from differences in step parameters
	Auto description	Off	On or Off	Step description is created from different step parameters
	Results per run	2	0..999	Number of results to record automatically every run
	Time between results (secs)	15	0..9999	Minimum time that must elapse between results
	Adaptation time (secs)	0	0..9999	Time to wait before recording results
	Stimulate between results	Off	On or Off	Normally the stimulus is turned off between recording results
	Display text at step start	Off	On or Off	A text box that appears and requires user acknowledgement before recording
	Text to display		Text	Text to display in text box. Very useful when controlling manual external stimulators
Warning sounds	**For stimulators with inbuilt buzzers (ColorDomes). An audible warning may be produced**			
	Warn before start of result	Off	On or Off	Make an audible warning before starting a result
	Warn before start of trial	Off	On or Off	make an audible warning before recording a new trial (not the first trial)
Printer clip region	**Defines how much of the result is actually plotted on the graph for printouts. Enabled in the print menu**			
	Start time (ms)	0	-1000..1000	Print start time
	Range (ms)	0	0..1000	Print range time. Total result time printed is start+range

Acquisition	Parameters	value	Options	Notes
	Sample Frequency (Hz)	1000	100, 200, 500, 1000, 2000, 5000	Sample frequency (default is 1000Hz). Higher frequencies generate more data
	Trial pre-trigger time (ms)	20	0..30000	Time before trigger point to start recording. Useful for autozero
	Trial post-trigger time (ms)	250	0..60000	Time after trigger to record. Total recording time is pre-trigger+post-trigger
	Trials per result	2	0..999	Maximum number of trials per result before finished. You can stop before this number
	First trial delay (ms)	0	0..64000	Delay before recording first trial. Stimulus is produced during this time to allow patient to reach steady state
	Inter trial delay (ms)	15000	0..100000	Delay between trials. To allow patient to recorder from last stimulus
	Baseline removal	On	On or Off	Remove a sloping DC drift from the result by fitting a straight line through result and subtracting it
	Manual rejection of trials	On	On or Off	After each trial has been recorded, ask user whether trial should be rejected
Autozero	**Removes the DC content of the result by sampling a period of the result and subtracting this from all the result**			
	Enabled	On	On or Off	Enable autozero (DC subtraction)
	Autozero pre-trigger (ms)	20	-30000..30000	Normally same as pre-trigger time. This will remove DC mean of pre-trigger time from result
	Autozero range (ms)	20	0..30000	Normally same as pre-trigger time.. If both values are 0 then program will remove DC mean of total result

Colorburst	Parameters	value	Mode	Notes
	Flash Output	Stimulator 1	All	Stimulator to use. This should be stimulator 1 except for dual stimulator setups
	Flash Cycles	Single	All	Number of flashes per trial, or times to perform the output cycle
	Flash Mode	Pulse	All	The output mode: Pulse, Waveform or User Defined. Normally pulse (flash)
	Pulse Frequency (Hz)	1	Pulse	Flash frequency (not applicable for single flashes
	Pulse Period (ms)	4	Pulse	Flash duration (only applicable to LED flashes)
	Pulse Intensity	2.25(P)	Pulse	Intensity of flash normally in cd.s/m^2 max depends on color
	Pulse Color	White 6500K	Pulse	Color of flash, picked from the color list
	Stimulus		Maculoscope	Which LED to use for stimulus (maculoscope only)
	Waveform Frequency (Hz)		Waveform	Flash frequency (not applicable for single flashes
	Waveform Shape		Waveform	Flash duration (only applicable to LED flashes)
	Waveform Contrast		Waveform	Intensity of flash normally in cd.s/m^2 max depends on color
	User Defined Filename		User defined	User defined filename
	Variable 1		User defined	Variable 1 value if used
	Variable 2		User defined	Variable 2 value is used
	Variable 3		User defined	Variable 3 value if used
	Variable 4		User defined	Variable 4 value if used
	Background		Maculoscope	Which LED to use for background (maculoscope only)
	Background Intensity	0 (P)	Pulse/Waveform	Intensity of background in cd/m^2 max depends on color
	Background Color	White 6500K	Pulse/Waveform	Color of background picked from color list

CHANNEL 1	Parameter	Value	Options	Notes
	Name	Chan 1	Text	Channel name as displayed on the graph
	Enabled	On	On or Off	This channel will be/not be displayed on the graph for this step.
	Filter enabled	On	On or Off	If on, then the input will be filtered by the filter values specified below
	Filter low frequency cutoff (Hz)	100	0..30 (depends o	If the filter is enabled, then this is the low frequency cutoff point
	Filter high frequency cutoff (Hz)	300	30..1000	If the filter is enabled, then this is the high frequency cutoff point
	Filter notch enabled	Off	On or Off	Enables a 50/60Hz notch filter. You should try and avoid using this filter if possible
	Gain	1	1	Always 1 (not used on V3 software)
	Y Axis scaling (uV)	10	1..9999	The graph scaling per division e.g. 50uV would be 50uV per division
	Trial scaling divider	1	1..10	Plotting trials on the same graph as the result often requires different scaling for trials to make them fit
	Positive is up on axis	On	On or Off	Whether positive voltages are at the top of the graph or the bottom
	Invert input polarity	Off	On Or Off	Equivalent of switching the positive and negative inputs of the channel into the headbox
	Eye being tested	OS	OS, OD, Both, B	used as a label on each result and marker for this channel
	Electrode type	DTL Fiber	Text	Reference only. Denotes the electrode used to record the results
Automatic rejection	**The program can automatically reject trials as they are recorded if their amplitude exceeds a window (or fail to exceed a minimum window)**			
	Enabled	Off	On or Off	Automatic rejection enabled. The voltage of rejection is maximum voltage*Window range (%)
	maximum voltage (uV)	100	1..	Maximum voltage (bipolar value) which the trial must obtain before rejection is made
	Window range (%)	100	1..100	Percentage of maximum voltage (not normally changed as maximum voltage can be changed instead)
Virtual Channel	**Determines if the channel input is read from another actual channel rather than the equivalent input on the headbox.**			
	Enabled	Off	On or Off	Enabled reading from another input channel
	Channel to virtualize	1	1..5	Channel to record. The system normally records the same input as channel no. unless another is specified
	Subtract another channel	Off	On or Off	You can subtract the input of another channel from this input e.g. right eye - left eye inputs
	Channel to subtract	1	1..5	Channel to subtract from this one

STEP 3 DARK OP PARAMETERS

MARKER 1	Parameter	Value	Options	Notes
	Name	A	Text	Marker name as displayed on the graph and in the marker table
Display Values	**Determine whether to display the amplitude and period (time) of the marker in the marker value table**			
	Display Period	On	On or Off	Display the marker period in the marker table
	Period is relative	Off	On or Off	Marker period is calculated relative to another marker, not absolute
	Period is relative to		Marker	Marker to calculate relative period from
	Display amplitude	On	On or Off	Display amplitude measurement in the marker table
	Amplitude is relative	Off	On or Off	Marker amplitude is calculated relative to another marker, not absolute
	Amplitude is relative to		Marker	Marker to calculate relative amplitude from
	Amplitude is average (ms)	0	1..32000	Marker amplitude is an average of points around marker position (absolute values only)
	Amplitude is positive	Off	On or Off	Marker amplitude is always positive in value regardless of actual sign
	Add to marker average	Off	On or Off	Marker value is added to an average of marker valus (EOG) which is displayed in the marker table
Placement	**Determines how the marker is positioned on the result**			
	Visible on screen	On	On or Off	Determine if marker is displayed on the graph
	Automatic placement	On	On or Off	Marker should be automatically placed after the result is finished
	Placement mode	Negative	Pos, Neg Fixed	Marker placement is at a negative trough (most negative) positive peak (most positive) or at a fixed position
	Peak start time (ms)	0	-30000..30000	Start time in result to start loking for a peak or trough
	Peak range time (ms)	25	0..30000	Range over which to look for peak and trough
Apply to channels	**Which channels to apply the marker to. Sometimes it is useful to apply different markers to different channels**			
	Channel 1	On	On or Off	Apply marker to channel 1
	Channel 2	Off	On or Off	Apply marker to channel 2
	Channel 3	Off	On or Off	Apply marker to channel 3
	Channel 4	Off	On or Off	Apply marker to channel 4
	Channel 5	Off	On or Off	Apply marker to channel 5

MARKER 2	Parameter	Value	Options	Notes
	Name	B	Text	Marker name as displayed on the graph and in the marker table
Display Values	**Determine whether to display the amplitude and period (time) of the marker in the marker value table**			
	Display Period	On	On or Off	Display the marker period in the marker table
	Period is relative	Off	On or Off	Marker period is calculated relative to another marker, not absolute
	Period is relative to		Marker	Marker to calculate relative period from
	Display amplitude	On	On or Off	Display amplitude measurement in the marker table
	Amplitude is relative	On	On or Off	Marker amplitude is calculated relative to another marker, not absolute
	Amplitude is relative to	A	Marker	Marker to calculate relative amplitude from
	Amplitude is average (ms)	0	1..32000	Marker amplitude is an average of points around marker position (absolute values only)
	Amplitude is positive	Off	On or Off	Marker amplitude is always positive in value regardless of actual sign
	Add to marker average	Off	On or Off	Marker value is added to an average of marker valus (EOG) which is displayed in the marker table
Placement	**Determines how the marker is positioned on the result**			
	Visible on screen	On	On or Off	Determine if marker is displayed on the graph
	Automatic placement	On	On or Off	Marker should be automatically placed after the result is finished
	Placement mode	Positive	Pos, Neg Fixed	Marker placement is at a negative trough (most negative) positive peak (most positive) or at a fixed position
	Peak start time (ms)	0	-30000..30000	Start time in result to start loking for a peak or trough
	Peak range time (ms)	25	0..30000	Range over which to look for peak and trough
Apply to channels	**Which channels to apply the marker to. Sometimes it is useful to apply different markers to different channels**			
	Channel 1	On	On or Off	Apply marker to channel 1
	Channel 2	Off	On or Off	Apply marker to channel 2
	Channel 3	Off	On or Off	Apply marker to channel 3
	Channel 4	Off	On or Off	Apply marker to channel 4
	Channel 5	Off	On or Off	Apply marker to channel 5

STEP 4 SINGLE FLASH CONE PARAMETERS

General	Parameters	value	Options	Notes
	Description	Single Flash Cone	Text	A step description. This can be auto-generated from differences in step parameters
	Auto description	Off	On or Off	Step description is created from different step parameters
	Results per run	2	0..999	Number of results to record automatically every run
	Time between results (secs)	1	0..9999	Minimum time that must elapse between results
	Adaptation time (secs)	600	0..9999	Time to wait before recording results
	Stimulate between results	Off	On or Off	Normally the stimulus is turned off between recording results
	Display text at step start	Off	On or Off	A text box that appears and requires user acknowledgement before recording
	Text to display		Text	Text to display in text box. Very useful when controlling manual external stimulators
Warning sounds	**For stimulators with inbuilt buzzers (ColorDomes). An audible warning may be produced**			
	Warn before start of result	Off	On or Off	Make an audible warning before starting a result
	Warn before start of trial	Off	On or Off	make an audible warning before recording a new trial (not the first trial)
Printer clip region	**Defines how much of the result is actually plotted on the graph for printouts. Enabled in the print menu**			
	Start time (ms)	0	-1000..1000	Print start time
	Range (ms)	0	0..1000	Print range time. Total result time printed is start+range

Acquisition	Parameters	value	Options	Notes
	Sample Frequency (Hz)	1000	100, 200, 500, 1000, 2000, 5000	Sample frequency (default is 1000Hz). Higher frequencies generate more data
	Trial pre-trigger time (ms)	20	0..30000	Time before trigger point to start recording. Useful for autozero
	Trial post-trigger time (ms)	250	0..60000	Time after trigger to record. Total recording time is pre-trigger+post-trigger
	Trials per result	4	0..999	Maximum number of trials per result before finished. You can stop before this number
	First trial delay (ms)	0	0..64000	Delay before recording first trial. Stimulus is produced during this time to allow patient to reach steady state
	Inter trial delay (ms)	1000	0..100000	Delay between trials. To allow patient to recorder from last stimulus
	Baseline removal	On	On or Off	Remove a sloping DC drift from the result by fitting a straight line through result and subtracting it
	Manual rejection of trials	On	On or Off	After each trial has been recorded, ask user whether trial should be rejected
Autozero	**Removes the DC content of the result by sampling a period of the result and subtracting this from all the result**			
	Enabled	On	On or Off	Enable autozero (DC subtraction)
	Autozero pre-trigger (ms)	20	-30000..30000	Normally same as pre-trigger time. This will remove DC mean of pre-trigger time from result
	Autozero range (ms)	20	0..30000	Normally same as pre-trigger time.. If both values are 0 then program will remove DC mean of total result

Colorburst	Parameters	value	Mode	Notes
	Flash Output	Stimulator 1	All	Stimulator to use. This should be stimulator 1 except for dual stimulator setups
	Flash Cycles	Single	All	Number of flashes per trial, or times to perform the output cycle
	Flash Mode	Pulse	All	The output mode: Pulse, Waveform or User Defined. Normally pulse (flash)
	Pulse Frequency (Hz)	1	Pulse	Flash frequency (not applicable for single flashes
	Pulse Period (ms)	4	Pulse	Flash duration (only applicable to LED flashes)
	Pulse Intensity	2.25(P)	Pulse	Intensity of flash normally in cd.s/m^2. max depends on color
	Pulse Color	White 6500K	Pulse	Color of flash, picked from the color list
	Stimulus		Maculoscope	Which LED to use for stimulus (maculoscope only)
	Waveform Frequency (Hz)		Waveform	Flash frequency (not applicable for single flashes
	Waveform Shape		Waveform	Flash duration (only applicable to LED flashes)
	Waveform Contrast		Waveform	Intensity of flash normally in cd.s/m^2. max depends on color
	User Defined Filename		User defined	User defined filename
	Variable 1		User defined	Variable 1 value if used
	Variable 2		User defined	Variable 2 value is used
	Variable 3		User defined	Variable 3 value if used
	Variable 4		User defined	Variable 4 value if used
	Background		Maculoscope	Which LED to use for background (maculoscope only)
	Background Intensity	25.5(P)	Pulse/Waveform	Intensity of background in cd/m^2 max depends on color
	Background Color	White 6500K	Pulse/Waveform	Color of background picked from color list

CHANNEL 1	Parameter	Value	Options	Notes
	Name	Chan 1	Text	Channel name as displayed on the graph
	Enabled	On	On or Off	This channel will be/not be displayed on the graph for this step.
	Filter enabled	On	On or Off	If on, then the input will be filtered by the filter values specified below
	Filter low frequency cutoff (Hz)	0.15	0..30 (depends (	If the filter is enabled, then this is the low frequency cutoff point
	Filter high frequency cutoff (Hz)	300	30..1000	If the filter is enabled, then this is the high frequency cutoff point
	Filter notch enabled	Off	On or Off	Enables a 50/60Hz notch filter. You should try and avoid using this filter if possible
	Gain	1	1	Always 1 (not used on V3 software)
	Y Axis scaling (uV)	20	1..9999	The graph scaling per division e.g. 50uV would be 50uV per division
	Trial scaling divider	1	1..10	Plotting trials on the same graph as the result often requires different scaling for trials to make them fit
	Positive is up on axis	On	On or Off	Whether positive voltages are at the top of the graph or the bottom
	Invert input polarity	Off	On Or Off	Equivalent of switching the positive and negative inputs of the channel into the headbox
	Eye being tested	OS	OS, OD, Both, E	used as a label on each result and marker for this channel
	Electrode type	DTL Fiber	Text	Reference only. Denotes the electrode used to record the results
Automatic rejection	**The program can automatically reject trials as they are recorded if their amplitude exceeds a window (or fail to exceed a minimum window)**			
	Enabled	Off	On or Off	Automatic rejection enabled. The voltage of rejection is maximum voltage*Window range (%)
	maximum voltage (uV)	100	1..	Maximum voltage (bipolar value) which the trial must obtain before rejection is made
	Window range (%)	100	1..100	Percentage of maximum voltage (not normally changed as maximum voltage can be changed instead)
Virtual Channel	**Determines if the channel input is read from another actual channel rather than the equivalent input on the headbox.**			
	Enabled	Off	On or Off	Enabled reading from another input channel
	Channel to virtualize	1	1..5	Channel to record. The system normally records the same input as channel no. unless another is specified
	Subtract another channel	Off	On or Off	You can subtract the input of another channel from this input e.g. right eye - left eye inputs
	Channel to subtract	1	1..5	Channel to subtract from this one

STEP 4 SINGLE FLASH CONE PARAMETERS

MARKER 1	Parameter	Value	Options	Notes
	Name	A	Text	Marker name as displayed on the graph and in the marker table
Display Values	**Determine whether to display the amplitude and period (time) of the marker in the marker value table**			
	Display Period	On	On or Off	Display the marker period in the marker table
	Period is relative	Off	On or Off	Marker period is calculated relative to another marker, not absolute
	Period is relative to		Marker	Marker to calculate relative period from
	Display amplitude	On	On or Off	Display amplitude measurement in the marker table
	Amplitude is relative	Off	On or Off	Marker amplitude is calculated relative to another marker, not absolute
	Amplitude is relative to		Marker	Marker to calculate relative amplitude from
	Amplitude is average (ms)	0	1..32000	Marker amplitude is an average of points around marker position (absolute values only)
	Amplitude is positive	Off	On or Off	Marker amplitude is always positive in value regardless of actual sign
	Add to marker average	Off	On or Off	Marker value is added to an average of marker valus (EOG) which is displayed in the marker table
Placement	**Determines how the marker is positioned on the result**			
	Visible on screen	On	On or Off	Determine if marker is displayed on the graph
	Automatic placement	On	On or Off	Marker should be automatically placed after the result is finished
	Placement mode	Negative	Pos, Neg Fixed	Marker placement is at a negative trough (most negative) positive peak (most positive) or at a fixed position
	Peak start time (ms)	0	-30000..30000	Start time in result to start loking for a peak or trough
	Peak range time (ms)	40	0..30000	Range over which to look for peak and trough
Apply to channels	**Which channels to apply the marker to. Sometimes it is useful to apply different markers to different channels**			
	Channel 1	On	On or Off	Apply marker to channel 1
	Channel 2	Off	On or Off	Apply marker to channel 2
	Channel 3	Off	On or Off	Apply marker to channel 3
	Channel 4	Off	On or Off	Apply marker to channel 4
	Channel 5	Off	On or Off	Apply marker to channel 5

MARKER 2	Parameter	Value	Options	Notes
	Name	B	Text	Marker name as displayed on the graph and in the marker table
Display Values	**Determine whether to display the amplitude and period (time) of the marker in the marker value table**			
	Display Period	On	On or Off	Display the marker period in the marker table
	Period is relative	Off	On or Off	Marker period is calculated relative to another marker, not absolute
	Period is relative to		Marker	Marker to calculate relative period from
	Display amplitude	On	On or Off	Display amplitude measurement in the marker table
	Amplitude is relative	On	On or Off	Marker amplitude is calculated relative to another marker, not absolute
	Amplitude is relative to	A	Marker	Marker to calculate relative amplitude from
	Amplitude is average (ms)	0	1..32000	Marker amplitude is an average of points around marker position (absolute values only)
	Amplitude is positive	Off	On or Off	Marker amplitude is always positive in value regardless of actual sign
	Add to marker average	Off	On or Off	Marker value is added to an average of marker valus (EOG) which is displayed in the marker table
Placement	**Determines how the marker is positioned on the result**			
	Visible on screen	On	On or Off	Determine if marker is displayed on the graph
	Automatic placement	On	On or Off	Marker should be automatically placed after the result is finished
	Placement mode	Positive	Pos, Neg Fixed	Marker placement is at a negative trough (most negative) positive peak (most positive) or at a fixed position
	Peak start time (ms)	0	-30000..30000	Start time in result to start loking for a peak or trough
	Peak range time (ms)	40	0..30000	Range over which to look for peak and trough
Apply to channels	**Which channels to apply the marker to. Sometimes it is useful to apply different markers to different channels**			
	Channel 1	On	On or Off	Apply marker to channel 1
	Channel 2	Off	On or Off	Apply marker to channel 2
	Channel 3	Off	On or Off	Apply marker to channel 3
	Channel 4	Off	On or Off	Apply marker to channel 4
	Channel 5	Off	On or Off	Apply marker to channel 5

STEP 5 30Hz FLICKER PARAMETERS

General	Parameters	value	Options	Notes
	Description	30Hz Flicker	Text	A step description. This can be auto-generated from differences in step parameters
	Auto description	Off	On or Off	Step description is created from different step parameters
	Results per run	2	0..999	Number of results to record automatically every run
	Time between results (secs)	15	0..9999	Minimum time that must elapse between results
	Adaptation time (secs)	0	0..9999	Time to wait before recording results
	Stimulate between results	Off	On or Off	Normally the stimulus is turned off between recording results
	Display text at step start	Off	On or Off	A text box that appears and requires user acknowledgement before recording
	Text to display		Text	Text to display in text box. Very useful when controlling manual external stimulators
Warning sounds	**For stimulators with inbuilt buzzers (ColorDomes). An audible warning may be produced**			
	Warn before start of result	Off	On or Off	Make an audible warning before starting a result
	Warn before start of trial	Off	On or Off	make an audible warning before recording a new trial (not the first trial)
Printer clip region	**Defines how much of the result is actually plotted on the graph for printouts. Enabled in the print menu**			
	Start time (ms)	0	-1000..1000	Print start time
	Range (ms)	0	0..1000	Print range time. Total result time printed is start+range

Acquisition	Parameters	value	Options	Notes
	Sample Frequency (Hz)	1000	100, 200, 500, 1000, 2000, 5000	Sample frequency (default is 1000Hz). Higher frequencies generate more data
	Trial pre-trigger time (ms)	20	0..30000	Time before trigger point to start recording. Useful for autozero
	Trial post-trigger time (ms)	200	0..60000	Time after trigger to record. Total recording time is pre-trigger+post-trigger
	Trials per result	50	0..999	Maximum number of trials per result before finished. You can stop before this number
	First trial delay (ms)	500	0..64000	Delay before recording first trial. Stimulus is produced during this time to allow patient to reach steady state
	Inter trial delay (ms)	0	0..100000	Delay between trials. To allow patient to recorder from last stimulus
	Baseline removal	On	On or Off	Remove a sloping DC drift from the result by fitting a straight line through result and subtracting it
	Manual rejection of trials	Off	On or Off	After each trial has been recorded, ask user whether trial should be rejected
Autozero	**Removes the DC content of the result by sampling a period of the result and subtracting this from all the result**			
	Enabled	On	On or Off	Enable autozero (DC subtraction)
	Autozero pre-trigger (ms)	20	-30000..30000	Normally same as pre-trigger time. This will remove DC mean of pre-trigger time from result
	Autozero range (ms)	20	0..30000	Normally same as pre-trigger time.. If both values are 0 then program will remove DC mean of total result

Colorburst	Parameters	value	Mode	Notes
	Flash Output	Stimulator 1	All	Stimulator to use. This should be stimulator 1 except for dual stimulator setups
	Flash Cycles	Continuous	All	Number of flashes per trial, or times to perform the output cycle
	Flash Mode	Pulse	All	The output mode: Pulse, Waveform or User Defined. Normally pulse (flash)
	Pulse Frequency (Hz)	30	Pulse	Flash frequency (not applicable for single flashes
	Pulse Period (ms)	4	Pulse	Flash duration (only applicable to LED flashes)
	Pulse Intensity	2.25(P)	Pulse	Intensity of flash normally in cd.s/m^2. max depends on color
	Pulse Color	White 6500K	Pulse	Color of flash, picked from the color list
	Stimulus		Maculoscope	Which LED to use for stimulus (maculoscope only)
	Waveform Frequency (Hz)		Waveform	Flash frequency (not applicable for single flashes
	Waveform Shape		Waveform	Flash duration (only applicable to LED flashes)
	Waveform Contrast		Waveform	Intensity of flash normally in cd.s/m^2. max depends on color
	User Defined Filename		User defined	User defined filename
	Variable 1		User defined	Variable 1 value if used
	Variable 2		User defined	Variable 2 value is used
	Variable 3		User defined	Variable 3 value if used
	Variable 4		User defined	Variable 4 value if used
	Background		Maculoscope	Which LED to use for background (maculoscope only)
	Background Intensity	25.5(P)	Pulse/Waveform	Intensity of background in cd/m^2 max depends on color
	Background Color	White 6500K	Pulse/Waveform	Color of background picked from color list

CHANNEL 1	Parameter	Value	Options	Notes
	Name	Chan 1	Text	Channel name as displayed on the graph
	Enabled	On	On or Off	This channel will be/not be displayed on the graph for this step.
	Filter enabled	On	On or Off	If on, then the input will be filtered by the filter values specified below
	Filter low frequency cutoff (Hz)	0.15	0..30 (depends (	If the filter is enabled, then this is the low frequency cutoff point
	Filter high frequency cutoff (Hz)	300	30..1000	If the filter is enabled, then this is the high frequency cutoff point
	Filter notch enabled	Off	On or Off	Enables a 50/60Hz notch filter. You should try and avoid using this filter if possible
	Gain	1	1	Always 1 (not used on V3 software)
	Y Axis scaling (uV)	20	1..9999	The graph scaling per division e.g. 50uV would be 50uV per division
	Trial scaling divider	1	1..10	Plotting trials on the same graph as the result often requires different scaling for trials to make them fit
	Positive is up on axis	On	On or Off	Whether positive voltages are at the top of the graph or the bottom
	Invert input polarity	Off	On Or Off	Equivalent of switching the positive and negative inputs of the channel into the headbox
	Eye being tested	OS	OS, OD, Both, E	used as a label on each result and marker for this channel
	Electrode type	DTL Fiber	Text	Reference only. Denotes the electrode used to record the results
Automatic rejection	**The program can automatically reject trials as they are recorded if their amplitude exceeds a window (or fail to exceed a minimum window)**			
	Enabled	Off	On or Off	Automatic rejection enabled. The voltage of rejection is maximum voltage*Window range (%)
	maximum voltage (uV)	100	1..	Maximum voltage (bipolar value) which the trial must obtain before rejection is made
	Window range (%)	100	1..100	Percentage of maximum voltage (not normally changed as maximum voltage can be changed instead)
Virtual Channel	**Determines if the channel input is read from another actual channel rather than the equivalent input on the headbox.**			
	Enabled	Off	On or Off	Enabled reading from another input channel
	Channel to virtualize	1	1..5	Channel to record. The system normally records the same input as channel no. unless another is specified
	Subtract another channel	Off	On or Off	You can subtract the input of another channel from this input e.g. right eye - left eye inputs
	Channel to subtract	1	1..5	Channel to subtract from this one

STEP 5 30Hz FLICKER PARAMETERS

MARKER 1	Parameter	Value	Options	Notes
	Name	A	Text	Marker name as displayed on the graph and in the marker table
Display Values	**Determine whether to display the amplitude and period (time) of the marker in the marker value table**			
	Display Period	On	On or Off	Display the marker period in the marker table
	Period is relative	Off	On or Off	Marker period is calculated relative to another marker, not absolute
	Period is relative to		Marker	Marker to calculate relative period from
	Display amplitude	On	On or Off	Display amplitude measurement in the marker table
	Amplitude is relative	Off	On or Off	Marker amplitude is calculated relative to another marker, not absolute
	Amplitude is relative to		Marker	Marker to calculate relative amplitude from
	Amplitude is average (ms)	0	1..32000	Marker amplitude is an average of points around marker position (absolute values only)
	Amplitude is positive	Off	On or Off	Marker amplitude is always positive in value regardless of actual sign
	Add to marker average	Off	On or Off	Marker value is added to an average of marker valus (EOG) which is displayed in the marker table
Placement	**Determines how the marker is positioned on the result**			
	Visible on screen	On	On or Off	Determine if marker is displayed on the graph
	Automatic placement	On	On or Off	Marker should be automatically placed after the result is finished
	Placement mode	Negative	Pos, Neg Fixed	Marker placement is at a negative trough (most negative) positive peak (most positive) or at a fixed position
	Peak start time (ms)	0	-30000..30000	Start time in result to start loking for a peak or trough
	Peak range time (ms)	30	0..30000	Range over which to look for peak and trough
Apply to channels	**Which channels to apply the marker to. Sometimes it is useful to apply different markers to different channels**			
	Channel 1	On	On or Off	Apply marker to channel 1
	Channel 2	Off	On or Off	Apply marker to channel 2
	Channel 3	Off	On or Off	Apply marker to channel 3
	Channel 4	Off	On or Off	Apply marker to channel 4
	Channel 5	Off	On or Off	Apply marker to channel 5

MARKER 2	Parameter	Value	Options	Notes
	Name	B	Text	Marker name as displayed on the graph and in the marker table
Display Values	**Determine whether to display the amplitude and period (time) of the marker in the marker value table**			
	Display Period	On	On or Off	Display the marker period in the marker table
	Period is relative	Off	On or Off	Marker period is calculated relative to another marker, not absolute
	Period is relative to		Marker	Marker to calculate relative period from
	Display amplitude	On	On or Off	Display amplitude measurement in the marker table
	Amplitude is relative	On	On or Off	Marker amplitude is calculated relative to another marker, not absolute
	Amplitude is relative to	A	Marker	Marker to calculate relative amplitude from
	Amplitude is average (ms)	0	1..32000	Marker amplitude is an average of points around marker position (absolute values only)
	Amplitude is positive	Off	On or Off	Marker amplitude is always positive in value regardless of actual sign
	Add to marker average	Off	On or Off	Marker value is added to an average of marker valus (EOG) which is displayed in the marker table
Placement	**Determines how the marker is positioned on the result**			
	Visible on screen	On	On or Off	Determine if marker is displayed on the graph
	Automatic placement	On	On or Off	Marker should be automatically placed after the result is finished
	Placement mode	Positive	Pos, Neg Fixed	Marker placement is at a negative trough (most negative) positive peak (most positive) or at a fixed position
	Peak start time (ms)	25	-30000..30000	Start time in result to start loking for a peak or trough
	Peak range time (ms)	30	0..30000	Range over which to look for peak and trough
Apply to channels	**Which channels to apply the marker to. Sometimes it is useful to apply different markers to different channels**			
	Channel 1	On	On or Off	Apply marker to channel 1
	Channel 2	Off	On or Off	Apply marker to channel 2
	Channel 3	Off	On or Off	Apply marker to channel 3
	Channel 4	Off	On or Off	Apply marker to channel 4
	Channel 5	Off	On or Off	Apply marker to channel 5

STEP 6 LIGHT OP PARAMETERS

General	Parameters	value	Options	Notes
	Description	Light OP	Text	A step description. This can be auto-generated from differences in step parameters
	Auto description	Off	On or Off	Step description is created from different step parameters
	Results per run	2	0..999	Number of results to record automatically every run
	Time between results (secs)	2	0..9999	Minimum time that must elapse between results
	Adaptation time (secs)	0	0..9999	Time to wait before recording results
	Stimulate between results	Off	On or Off	Normally the stimulus is turned off between recording results
	Display text at step start	Off	On or Off	A text box that appears and requires user acknowledgement before recording
	Text to display		Text	Text to display in text box. Very useful when controlling manual external stimulators
Warning sounds	**For stimulators with inbuilt buzzers (ColorDomes). An audible warning may be produced**			
	Warn before start of result	Off	On or Off	Make an audible warning before starting a result
	Warn before start of trial	Off	On or Off	make an audible warning before recording a new trial (not the first trial)
Printer clip region	**Defines how much of the result is actually plotted on the graph for printouts. Enabled in the print menu**			
	Start time (ms)	0	-1000..1000	Print start time
	Range (ms)	0	0..1000	Print range time. Total result time printed is start+range

Acquisition	Parameters	value	Options	Notes
	Sample Frequency (Hz)	1000	100, 200, 500, 1000, 2000, 5000	Sample frequency (default is 1000Hz). Higher frequencies generate more data
	Trial pre-trigger time (ms)	20	0..30000	Time before trigger point to start recording. Useful for autozero
	Trial post-trigger time (ms)	250	0..60000	Time after trigger to record. Total recording time is pre-trigger+post-trigger
	Trials per result	4	0..999	Maximum number of trials per result before finished. You can stop before this number
	First trial delay (ms)	0	0..64000	Delay before recording first trial. Stimulus is produced during this time to allow patient to reach steady state
	Inter trial delay (ms)	2000	0..100000	Delay between trials. To allow patient to recorder from last stimulus
	Baseline removal	On	On or Off	Remove a sloping DC drift from the result by fitting a straight line through result and subtracting it
	Manual rejection of trials	On	On or Off	After each trial has been recorded, ask user whether trial should be rejected
Autozero	**Removes the DC content of the result by sampling a period of the result and subtracting this from all the result**			
	Enabled	On	On or Off	Enable autozero (DC subtraction)
	Autozero pre-trigger (ms)	20	-30000..30000	Normally same as pre-trigger time. This will remove DC mean of pre-trigger time from result
	Autozero range (ms)	20	0..30000	Normally same as pre-trigger time.. If both values are 0 then program will remove DC mean of total result

Colorburst	Parameters	value	Mode	Notes
	Flash Output	Stimulator 1	All	Stimulator to use. This should be stimulator 1 except for dual stimulator setups
	Flash Cycles	Single	All	Number of flashes per trial, or times to perform the output cycle
	Flash Mode	Pulse	All	The output mode: Pulse, Waveform or User Defined. Normally pulse (flash)
	Pulse Frequency (Hz)	1	Pulse	Flash frequency (not applicable for single flashes
	Pulse Period (ms)	4	Pulse	Flash duration (only applicable to LED flashes)
	Pulse Intensity	2.25(P)	Pulse	Intensity of flash normally in cd.s/m^2. max depends on color
	Pulse Color	White 6500K	Pulse	Color of flash, picked from the color list
	Stimulus		Maculoscope	Which LED to use for stimulus (maculoscope only)
	Waveform Frequency (Hz)		Waveform	Flash frequency (not applicable for single flashes
	Waveform Shape		Waveform	Flash duration (only applicable to LED flashes)
	Waveform Contrast		Waveform	Intensity of flash normally in cd.s/m^2. max depends on color
	User Defined Filename		User defined	User defined filename
	Variable 1		User defined	Variable 1 value if used
	Variable 2		User defined	Variable 2 value is used
	Variable 3		User defined	Variable 3 value if used
	Variable 4		User defined	Variable 4 value if used
	Background		Maculoscope	Which LED to use for background (maculoscope only)
	Background Intensity	25.5(P)	Pulse/Waveform	Intensity of background in cd/m^2 max depends on color
	Background Color	White 6500K	Pulse/Waveform	Color of background picked from color list

CHANNEL 1	Parameter	Value	Options	Notes
	Name	Chan 1	Text	Channel name as displayed on the graph
	Enabled	On	On or Off	This channel will be/not be displayed on the graph for this step.
	Filter enabled	On	On or Off	If on, then the input will be filtered by the filter values specified below
	Filter low frequency cutoff (Hz)	100	0..30 (depends (	If the filter is enabled, then this is the low frequency cutoff point
	Filter high frequency cutoff (Hz)	300	30..1000	If the filter is enabled, then this is the high frequency cutoff point
	Filter notch enabled	Off	On or Off	Enables a 50/60Hz notch filter. You should try and avoid using this filter if possible
	Gain	1	1	Always 1 (not used on V3 software)
	Y Axis scaling (uV)	20	1..9999	The graph scaling per division e.g. 50uV would be 50uV per division
	Trial scaling divider	1	1..10	Plotting trials on the same graph as the result often requires different scaling for trials to make them fit
	Positive is up on axis	On	On or Off	Whether positive voltages are at the top of the graph or the bottom
	Invert input polarity	Off	On Or Off	Equivalent of switching the positive and negative inputs of the channel into the headbox
	Eye being tested	OS	OS, OD, Both, E	used as a label on each result and marker for this channel
	Electrode type	DTL Fiber	Text	Reference only. Denotes the electrode used to record the results
Automatic rejection	**The program can automatically reject trials as they are recorded if their amplitude exceeds a window (or fail to exceed a minimum window)**			
	Enabled	Off	On or Off	Automatic rejection enabled. The voltage of rejection is maximum voltage*Window range (%)
	maximum voltage (uV)	100	1..	Maximum voltage (bipolar value) which the trial must obtain before rejection is made
	Window range (%)	100	1..100	Percentage of maximum voltage (not normally changed as maximum voltage can be changed instead)
Virtual Channel	**Determines if the channel input is read from another actual channel rather than the equivalent input on the headbox.**			
	Enabled	Off	On or Off	Enabled reading from another input channel
	Channel to virtualize	1	1..5	Channel to record. The system normally records the same input as channel no. unless another is specified
	Subtract another channel	Off	On or Off	You can subtract the input of another channel from this input e.g. right eye - left eye inputs
	Channel to subtract	1	1..5	Channel to subtract from this one

STEP 6 LIGHT OP PARAMETERS

MARKER 1	Parameter	Value	Options	Notes
	Name	A	Text	Marker name as displayed on the graph and in the marker table
Display Values	**Determine whether to display the amplitude and period (time) of the marker in the marker value table**			
	Display Period	On	On or Off	Display the marker period in the marker table
	Period is relative	Off	On or Off	Marker period is calculated relative to another marker, not absolute
	Period is relative to		Marker	Marker to calculate relative period from
	Display amplitude	On	On or Off	Display amplitude measurement in the marker table
	Amplitude is relative	Off	On or Off	Marker amplitude is calculated relative to another marker, not absolute
	Amplitude is relative to		Marker	Marker to calculate relative amplitude from
	Amplitude is average (ms)	0	1..32000	Marker amplitude is an average of points around marker position (absolute values only)
	Amplitude is positive	Off	On or Off	Marker amplitude is always positive in value regardless of actual sign
	Add to marker average	Off	On or Off	Marker value is added to an average of marker valus (EOG) which is displayed in the marker table
Placement	**Determines how the marker is positioned on the result**			
	Visible on screen	On	On or Off	Determine if marker is displayed on the graph
	Automatic placement	On	On or Off	Marker should be automatically placed after the result is finished
	Placement mode	Negative	Pos, Neg Fixed	Marker placement is at a negative trough (most negative) positive peak (most positive) or at a fixed position
	Peak start time (ms)	0	-30000..30000	Start time in result to start loking for a peak or trough
	Peak range time (ms)	40	0..30000	Range over which to look for peak and trough
Apply to channels	**Which channels to apply the marker to. Sometimes it is useful to apply different markers to different channels**			
	Channel 1	On	On or Off	Apply marker to channel 1
	Channel 2	Off	On or Off	Apply marker to channel 2
	Channel 3	Off	On or Off	Apply marker to channel 3
	Channel 4	Off	On or Off	Apply marker to channel 4
	Channel 5	Off	On or Off	Apply marker to channel 5

MARKER 2	Parameter	Value	Options	Notes
	Name	B	Text	Marker name as displayed on the graph and in the marker table
Display Values	**Determine whether to display the amplitude and period (time) of the marker in the marker value table**			
	Display Period	On	On or Off	Display the marker period in the marker table
	Period is relative	Off	On or Off	Marker period is calculated relative to another marker, not absolute
	Period is relative to		Marker	Marker to calculate relative period from
	Display amplitude	On	On or Off	Display amplitude measurement in the marker table
	Amplitude is relative	On	On or Off	Marker amplitude is calculated relative to another marker, not absolute
	Amplitude is relative to	A	Marker	Marker to calculate relative amplitude from
	Amplitude is average (ms)	0	1..32000	Marker amplitude is an average of points around marker position (absolute values only)
	Amplitude is positive	Off	On or Off	Marker amplitude is always positive in value regardless of actual sign
	Add to marker average	Off	On or Off	Marker value is added to an average of marker valus (EOG) which is displayed in the marker table
Placement	**Determines how the marker is positioned on the result**			
	Visible on screen	On	On or Off	Determine if marker is displayed on the graph
	Automatic placement	On	On or Off	Marker should be automatically placed after the result is finished
	Placement mode	Positive	Pos, Neg Fixed	Marker placement is at a negative trough (most negative) positive peak (most positive) or at a fixed position
	Peak start time (ms)	0	-30000..30000	Start time in result to start loking for a peak or trough
	Peak range time (ms)	40	0..30000	Range over which to look for peak and trough
Apply to channels	**Which channels to apply the marker to. Sometimes it is useful to apply different markers to different channels**			
	Channel 1	On	On or Off	Apply marker to channel 1
	Channel 2	Off	On or Off	Apply marker to channel 2
	Channel 3	Off	On or Off	Apply marker to channel 3
	Channel 4	Off	On or Off	Apply marker to channel 4
	Channel 5	Off	On or Off	Apply marker to channel 5