LASER TECHNIQUE

User Instructions for

DMX GRAPHIC SCAN

50mW to 600mW Green DPSS Laser Systems

CE

NU LIGHT SYSTEMS LIMITED

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SAFETY, OPERATING ENVIRONMENT AND USER MAINTENANCE:

1. **Before attempting to use the laser it is important that you read the operating instructions and become familiar with all functions and special considerations when using the laser. Failure to do so may cause a hazard or accident to the operators and the audience. Damage may also occur which will not be covered by the warranty.**

2. These instructions supplied with this product supersede any other versions.

3. The laser energy that is used in this system is powerful. Care must be exercised to avoid direct exposure to the laser beam or its reflections, it is important that the following safety precautions are observed at all times:

   - Do not look directly into a stationary laser beam. Your eye sight may be permanently damaged or lost.
   - Do not operate the laser system when fatigued or under the influence of alcohol.
   - Avoid wearing rings, metallic watchbands, or other metallic and or reflective objects, when near the output of the laser beam.
   - Never leave the laser system unattended while in operation.
   - Limit access to the laser system when in operation.
   - Do not allow persons near the laser system who are not trained in the operation and safety aspects of the laser system when there is no supervision.
   - Any alignment of the optical systems must be carried out with suitable eye protection. Insure that the eye protection is for the proper laser wavelength and optical density.

4. To comply with the HS(G)95 health and safety guidelines the following must be observed:

   To meet with the maximum permissible exposure levels the laser beam projections if being used in audience scanning must have a minimum distance between the laser source and audience listed in the table below.

   If the laser projections are being used in conditions where there is smoke in the atmosphere the laser power is reduced significantly, and the audience scanning distances can be reduced. Please see the Safety and Conformity section under DMX GRAPHIC SCAN HEAD SPECIFICATIONS of the user manual for full details of MPE levels and distances.

   If the laser is not being used for audience scanning the projections should be 3m above the floor level.

   When the laser is being used in situations where the distance between the audience and projections is less than the specified safety distance, it is important for a mask to be positioned so that the laser projections will be masked off (blocked) should the laser malfunction or the user attempt to scan the audience.

Laser Power	Minimum Recommended Viewing Distance
50mW	12.5m
100mW	18.1m
150mW	22.3m
200mW	25.9m
400mW	37.1m
600mW	45.6m

5. If a Risk Assessment has been provided for the installation of the laser system, it is the users responsibility to insure that the details in that assessment are adhered to.

6. Before operation the laser must be connected to a suitable mains plug. **THE UNIT MUST BE EARTHED, AND PROTECTED BY A 3 AMP FUSE.**

7. The laser must only be repaired by qualified personal, any unauthorised modifications or attempts at repair will invalidate the warranty. If there are any problems with the laser contact Nu Light Systems Ltd for advice.

8. The laser cannot be connected to a dimmer system, damage may occur if it is.

9. The laser is designed for inside use. Outside use is permitted providing it is not used in extreme weather conditions and that it is provided with adequate cover from rain and similar precipitation's Failure to do so may cause an electrocution hazard or damage and will invalidate the warranty.

10. The laser must not be operated for more than 6 hours in any one time.

11. The front laser output window and pan and tilt mirror should be cleaned with lens tissues frequently (at least once a week if it is used frequently) to remove dust and smoke particles. Use camera lens tissues and cleaning buds with pure methanol for cleaning purposes. These are available from all good camera shops.

12. Care must be exercised when handling the laser. It contains fragile components which may be damaged by knocks or excessive force.

13. The laser must always be secured to a stable mounting fixture.

14. The fan intake and output ducts must not be obstructed or placed near any object closer than 150mm.

15. Do not place the laser near the direct output from a smoke machine. Make sure there is a distance of at least 15m from a smoke machine.

16. Every time the laser is to be used all of its functions should be tested before the show.

17. Do not throw away the original packaging. If you need to return the laser to the retailer then for maximum protection the original packaging must be used.

18. Failure to observe the above may cause damage to the laser and will invalidate the warranty.

19. If you have any suggestions on the operation of this laser or require technical information or support please email: sales@nu-light.co.uk

WARRANTY INFORMATION:

This laser system uses the highest quality components for the price / performance ratio. The laser comes with a full 12 month return to base warranty from the original date of purchase which covers all electronics, electromechanical components, enclosures and the laser source.

Laser Technique reserves the right to repair or replace the faulty product and to substitute any materials which may no longer be available with alternative parts. Charges for shipping the laser to and from Laser Technique must be covered by the customer.

The warranty does not cover defects which may be the result of misuse outside the specified operating conditions. Any non authorised attempts at repairs or service of the product will void the warranty.

GENERAL DESCRIPTION OF LASER SYSTEM:

LASER PHYSICAL FEATURES:

1. The DMX GRAPHIC SCAN laser head has the following features:

   - Rear:

   a) IEC Power Input
   b) Serial Label
   c) DMX Signal Output
   d) DMX Signal Input
   e) Red DMX Error LED
   g) Green Power LED
   h) DMX Address Selection Switches

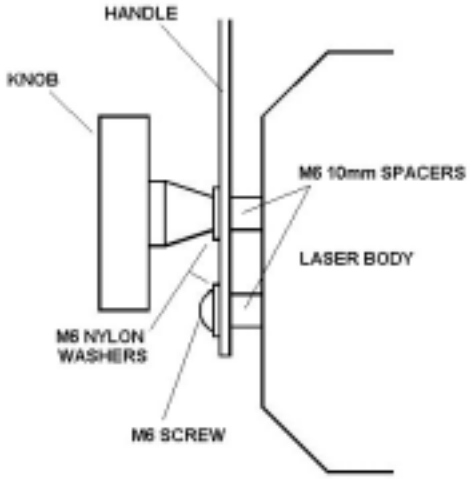
   - Front:

   a) Projection window, pan and tilt mirror, where the laser patterns project out from,

MOUNTING HANDLE:

2. On each side of the laser body there are 2 sets of M6 threaded handle mounting holes for attaching the handle. Depending on the position of the laser in your installation the set near the pan and tilt assembly or the set half way down the lasers side can be used.

   When mounting the handle make sure it is attached correctly. See the diagram below for details on how to assemble and mount the handle.



DMX CHANNEL SELECTION:

3. To select a DMX start address, remove power from the laser and follow the procedure below: (remember the laser takes 8 DMX channels)

   - Locate the DMX selector switches on the rear panel, decide what start address you want, and adjust the appropriate switches. The address can be selected with the switches as shown: (1=switch ON, 0=switch OFF)

SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8	SW 9	
1	2	4	8	16	32	64	128	256	< Binary Value
on/off	on/off	on/off	on/off	on/off	on/off	On/off	On/off	on/off	DMX Start Add
on	off	Off	off	off	Off	Off	Off	off	001
off	off	Off	on	off	Off	Off	Off	off	008
on	off	On	off	off	On	Off	Off	off	036
on	off	On	off	on	Off	Off	On	off	149
on	on	Off	off	off	On	On	On	on	483

4. Switch 10 is reserved for future use and must always be in the off position.

5. Once the DMX address has been selected with the power turned off, the laser is ready for operation. Plug in the output lead from a DMX controller, then plug the laser into a suitable power outlet. You will see the pan and tilt unit start to calibrate. It is ready for control via DMX.

CHANNEL FUNCTIONS:

6. PAN AND TILT CONTROL – Using Channels 1 and 2, the pan and tilt mirror will move from minimum to maximum corresponding with the slider movement on the DMX controller. Note that during the operation of the laser PAN and TILT may slightly loose their locations, if you are using this for location of specific graphics on targets, do not adjust your DMX programming. Instead recalibrate the PAN and TILT by moving channels 1 and 2 from minimum to maximum 3 times.

7. GRAPHICS AND TEXT BANK SELECTION – Using Channel 3 the laser will step through all the graphics and the contents of the 6 text banks corresponding with the slider movement on the DMX controller.

8. GRAPHIC SIZE SELECTION – Using Channel 4 will size the projected images from the minimum to the maximum corresponding with the slider on the DMX controller.

9. MODULATION / TEXT STORING – Using Channel 5 the various modulation effects of the graphics and text can be utilised, also when in text mode this channel is used to store the currently selected character into a text bank.

10. TEXT MODE – Using Channel 6 is used to enter text programming mode.

11. BEAM CONTROL – Using Channel 7 various beam effects can be engaged, from BEAM ON and OFF to strobe effects.

12. SCAN RATE / TEXT CHARACTER SELECTION – Using Channel 8 will control the scan rate of the graphics and text. When in TEXT PROGRAM MODE this channel will scroll through all the character set for text programming.

TEXT BANK PROGRAMMING:

13. To program any of the TEXT banks with a scrolling message follow the procedure detailed below:

    a) Select the TEXT bank that needs to be programmed or changed with CHANNEL 3.

    b) Move CHANNEL 5 to the minimum DMX setting (000).

    c) Move CHANNEL 6 to the maximum DMX setting (255), placing the laser into TEXT PROGRAMMING MODE.

    d) With CHANNEL 8 scroll through the character set until the letter, number or symbol you require is reached on the laser projection.

    e) To store the character that was selected in step d), move CHANNEL 5 from the minimum to maximum to minimum DMX value (000 to 255 to 000).

    f) Repeat steps d) and e) until your text message has been completed. Remember that each text bank stores a maximum of 256 characters including spaces.

    g) To store the text message and to exit TEXT PROGRAMMING MODE slide CHANNEL 6 to 000.

    h) The selected text bank will now be programmed with your message.

    I) Note that if you enter TEXT PROGRAMMING MODE and then exit without storing any characters the TEXT bank will be empty. Also if you have entered a sentence and you have some letters which are incorrect, you do not have to enter the whole sentence in again, when you enter text programming mode, you can use CHANNEL 5 slider to enter the existing characters again until you reach the incorrect character. Then you may select the correct one with CHANNEL 8. You must then continue to use the CHANNEL 5 slider to repeat enter the rest of the sentence until it is finished. Save and exit as in section g).

GETTING THE MOST FROM YOUR LASER:

14. Before installation, operate the laser in a dark room with a little smoke so that you can become familiar with the various effects it can generate.

15. A good idea is to step through each graphic one at a time and to apply all the modulation, sizing and strobe effects so that they can be clearly seen individually on each graphic projection.

16. Remember the graphics are designed for volumetric effects in smoke and for striking visual projections on surfaces. Some will look better than others depending on how they are being used. Experiment and try to get familiar with the effects generated in smoke and without smoke.

    Graphics which are complex in design and have many features in them and look less impressive in smoke than graphics that are hollow and volumetric. Graphics for projection are: eye triangle, musical note, lightening bolt, leaf, dollar, diamond star, cross hairs, heart, star. Graphics that are good for effects in smoke are: square, circle, sine wave, flat lines, slow square, box cross, 3 circles, array squares, splash, arrow, girder, slats, beam points.

    Adding modulations to the volumetric graphics will add an extra dimension to the effect in smoke. Also try reducing the scan rates of each graphic as this also has a big impact on the effect obtained in smoke.

LASER OPERATION:

SETTING UP AND TURNING THE LASER SYSTEM ON:

1. Position the laser head in a suitable position.

2. Connect a DMX control cable to the 3 pin male XLR connector on the back of the laser and the other end to the DMX controller. Make sure the controller is off.

3. Connect the IEC mains input lead to the laser at the back.

4. The pan and tilt mechanism will start to calibrate, this takes approximately 10 seconds. When this finishes the laser is ready for operation.

5. Wait approximately 2-3 minutes before using the modulation effects on the laser, as it takes time for the oscillator to start. If the modulation does not work, turn the laser off, wait 3-5 minutes and then turn the laser back on.

6. Switch the DMX controller on.

7. Control the laser via the DMX controller.

TURNING THE LASER SYSTEM OFF:

8. Turn the DMX controller off.

9. Switch the main power to the laser head off.

10. Disconnect the IEC power lead.

DMX CHANNEL SPECIFICATIONS:

DMX XLR PINOUTS-

PIN1 - GROUND
PIN2 - NEGATIVE
PIN3 - POSITIVE

DMX CHANNEL ASSIGNMENTS-

CHANNEL 1: PAN POSITION 000 – 255

CHANNEL 2: TILT POSITION 000 - 255

CHANNEL 3: GRAPHICS AND TEXT BANK SELECTION

000 - 007	1: STAR	128 - 135	17: LEAF
008 - 015	2: SQUARE	136 - 143	18: 4 SQUARE ARRAY
016 - 023	3: HORIZONTAL FLAT	144 - 151	19: LIGHTENING BOLT
024 – 031	4: VERTICAL FLAT	152 - 159	20: BEAM
032 - 039	5: CIRCLE	160 - 167	21: EYE TRIANGLE
040 - 047	6: BOXED CROSS	168 - 175	22: MUSICAL NOTE
048 - 055	7: SINE WAVE	176 - 183	23: DOLLAR
056 - 063	8: SOLID ARROW	184 - 191	24: SPLASH
064 - 071	9: TRIANGLE	192 - 199	25: 4 SLATS
072 - 079	10: 3 CIRCLES	200 - 207	26: SLOW GIRDER PROFILE
080 - 087	11: HEART	208 - 215	TEXT BANK 1
088 - 095	12: CROSS HAIRS	216 - 223	TEXT BANK 2
096 - 103	13: 3 PETALS	224 - 231	TEXT BANK 3
104 - 111	14: DIAMOND STAR	232 - 239	TEXT BANK 4
118 - 119	15: BROKEN SQUARE	240 - 247	TEXT BANK 5
126 - 127	16: METEOR SHOWER	248 - 255	TEXT BANK 6

CHANNEL 4: GRAPHIC SIZE SELECTION

000 - 031	SIZE 1	128 - 159	SIZE 5
032 - 063	SIZE 2	160 - 191	SIZE 6
064 - 095	SIZE 3	192 - 223	SIZE 7
096 - 127	SIZE 4	224 - 255	SIZE 8

CHANNEL 5: GRAPHIC MODULATION SELECTION / TEXT STORING

MODULATION MODE:

000 - 032	NO MODULATION	128 - 159	SHRINK AND GROW
033 - 063	HORIZONTAL SPIN	160 - 191	ROTATE AND SHRINK
064 - 095	VERTICAL SPIN	192 - 223	ROTATE AND SHRINK
096 - 127	ROTATION	224 - 255	NO MODULATION

TEXT MODE:

000 - 255 - 000 STORE CHARACTER

CHANNEL 6: COLOUR CONTROL / TEXT ENTRY MODE

240 - 255 TEXT MODE

CHANNEL 7: BEAM CONTROL / REMOTE START

BEAM CONTROL:

000 - 020	BEAM OFF	041 - 199	STROBE EFFECTS
021 - 040	BEAM ON	200 - 230	BEAM ON

CHANNEL 8: SCAN RATE / TEXT CHARACTER SELECTION

SCAN RATES:

000 - 005	DEFAULT SCAN RATE	006 - 255	SCAN RATE EFFECTS (006 SLOWEST)

TEXT CHARACTER SELECTION:

000 - 005	A	120 - 125	U
006 - 011	B	126 - 131	V
012 - 017	C	132 - 137	W
018 - 023	D	138 - 143	X
024 - 029	E	144 - 149	Y
030 - 035	F	150 - 155	Z

036 - 041	G	156 - 161	. (full stop)
042 - 047	H	162 - 167	_ (space)
048 - 053	I	168 - 173	0
054 - 059	J	174 - 179	1
060 - 065	K	180 - 185	2
066 - 071	L	186 - 191	3
072 - 077	M	192 - 197	4
078 - 083	N	198 - 203	5
084 - 089	O	204 - 209	6
090 - 095	P	210 - 215	7
096 - 101	Q	216 - 221	8
102 - 107	R	222 - 227	9
108 - 113	S	228 - 233	£ (pound sign)
114 - 119	T		

DMX GRAPHIC SCAN HEAD SPECIFICATIONS:

OPTICAL:

Laser Source : DPSS YAG,
Maximum Optical Power: 50mW, 100mW, 150mW, 200mW, 400mW, 600mW,
Classification : Class 3B for 50 to 400mW, Class 4 for 600mW,
Wavelength : 523nm,
Beam Divergence : 2mrad,
Beam Diameter : 2mm,
Estimated Laser Life : 5000 Hrs for 50 to 200mW, 10000 Hrs for 400 to 600mW,
Optics : Front surface aluminium mirrors with Anti Reflective coated output window,
Shutter : Solid State,
Maximum Scan Time : 1-5mS Exposure.

EFFECTS:

- 26 Pre-set Graphics,
- 6 x 250 Character Text banks,
- 150° Pan and 45° Tilt projection,
- 6 Modulations effects,
- Variable Strobe,
- Variable Scan Rate,
- Variable Pattern divergence angle,
- 2 Galvanometer Scanners.

POWER SUPPLY:

- Linear power supply for electronics and laser,
- 210 – 250VAC Operation, 120 Watt Power Consumption,
- IEC Fuse Rating: 1A Delay Action 20mm 250VAC for 50 - 200mW Lasers and 2A Delay Action, 20mm 250VAC for 300 - 600mW Lasers.

CONFORMITY / SAFETY FEATURES:

- CE Conformity to : EN 55011:1991 CLASS B (conducted and radiated),
  EN 61000-4-2:1995, EN 61000-4-3:1995,
  EN 61000-4-8:1994, LOW VOLTAGE DIRECTIVE,

- Recommended viewing distances for audience scanning. Note that these energy densities are approximate calculations based on the information provided in the HS(G)95 guide book.

Laser Power (mW)	MPE Energy Level (J/m^2)	Save Viewing Distance (m) in no Smoke and Energy Level (J/m^2)	Save Viewing Distance (m) in Low Density Smoke and Energy Level (J/m^2)	Save Viewing Distance (m) in Medium Density Smoke and Energy Level (J/m^2)
50	0.338	12.5, 0.335	6.3, 0.336	3.9, 0.331
100	0.338	18.1, 0.335	7.4, 0.336	4.4, 0.335
150	0.338	22.3, 0.338	8.0, 0.317	4.7, 0.282
200	0.338	25.9, 0.338	8.3, 0.319	4.8, 0.291
400	0.338	37.1, 0.337	8.9, 0.294	5.0, 0.272
600	0.338	45.6, 0.338	9.1, 0.295	5.1, 0.197

- X or Y Scanner failure protection. If X or Y scanners fail, laser source will be shut down. Typical response time 2-5mS.

PHYSICAL:

System Dimensions : 695(l) x 310(w) x 120(h)mm,
Weight : 12.0Kg
Operating Temperature : 5-35°C
Packaging Size : 810(l) x 290(w) x 500(h)mm,
Packaged Weight : 18.0Kg