

P r e d a t o r

H X

U s e r   G u i d e



### Features of the Predator H X

- 1 X/Y (Horizontal/Vertical) mirror control
- 1 7 gobo (squares, tunnel, dots, star, circle, triangle, flower)
- 1 7 dichroic colours (magenta, yellow, cyan, pink, red, green, blue) and white
- 1 7 split colours
- 1 Colour scrolling
- 1 Blackout shutter and lamp on/off control
- 1 250W halogen lamp with dichroic reflector
- 1 Adjustable Focus
- 1 DMX control
- 1 0-10V Analogue Control

### Modes of Operation

- 1 Independent (internal microphone)

The Predator HX will move to each bass beat, going through a sequence of patterns at random, including up/down, side-to-side, square, octagon, diamond, figure-of-eight, random and chevron, along with colour and gobo changing.

- 1 Synchronised (internal microphone)

The Predator HX will perform the above patterns either synchronised together, or with the movement mirrored. In addition, the colours and gobos will operate in one of three modes: random, synchronised or chasing. The movement can be reversed by setting the control switches in order that two rows of Predator HXs can be set up opposed to each other, and will continue to move in synchrony.

- 1 Externally controlled from IQ-MX80, IQ-MX40, Merlin, or any DMX output controller.

The IQ-MX80 has 10 preset programs, 10 user-programmable programs, real-time programming and a joystick. and can control any number of Predator HXs and Predator HXs arranged as up to 16 channels.

The IQ-MX40 can control 4 channels of Predator HXs and has a total of 256 selectable functions including fourteen patterns, each with selectable colour/gobo, four different colour/gobo change modes (fill, random, shift and sync), and four different run-sequences of colours and gobos.

With a programmable DMX controller such as Merlin, up to 32 channels

(only 27 channel if your controller has only 108 outputs) of Predator HXs can be controlled, there is no limit to the number of Predator HXs on each channel. The beam can be positioned to an accuracy of 0.7°, and the colour/gobo can be selected.

The Predator HX can also be controlled from any lighting desk with 0-10V analogue outputs.

### Installation

The Predator HX is supplied with its handle pre-assembled. The handle can be lengthened by removing the four pozidriv screws fixing the three sections together, and re-assembling in a different position. The U-shaped piece can also be fitted at right angles to the side pieces so that the Predator HX can be mounted on a wall.

By removing the handle completely and re-assembling the other way round, the Predator HX can be tilted in the opposite direction.

Fix the Predator HX securely, and fit a safety chain. Tighten the handle fixing screws with the Allen key provided.

The Predator HX should be operated with the fan at the lower end and the mirror at the upper end. Operating the other way up may reduce lamp life.

The Predator HX should be installed more than 0.8 metres from any object that it is illuminating. Connect the Predator HX to the mains supply with the lead provided, via an isolating switch or a switching pack such as the NJD SP10000. If the Predator HX circuit is connected via an MCB then it is recommended that a time-delay MCB (generally used for motors) is used (Type 3 to BS3871). The Predator HX should not be dimmed.

#### **The Predator HX is an inductive load.**

When first powered up with no DMX leads connected the beam is in the central position. Adjust the hanging bracket until the beam is in the best position. The Predator HX may be moved whilst it is operating provided that it is done carefully. It is recommended that the Predator HX is allowed to cool for 5 minutes after switching off before moving - this is when damage to the lamp is most likely to occur.

### Changing the lamp.

Disconnect from the mains supply. Slacken the knob on the lamp cover and remove the lamp/reflector assembly. Remove the lamp, holding it with a cloth to avoid getting fingerprints on the glass. Replace with a new lamp, type A1/259, being careful not to touch the glass envelope of the lamp. Replace the cover and tighten the lid-fixing knobs.

### Changing the fuse

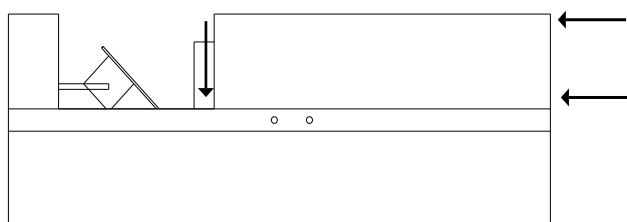
If the fuse blows, replace with a new fuse type 20mm x 5mm 3.15 Amp Anti-surge, High breaking capacity. This type of fuse has a ceramic case. Do not replace with any other type or value of fuse. If the new fuse blows, consult a dealer. The fuse is located in a small drawer beneath the mains inlet connector (remove the mains cable to gain access).

### Focusing.

To focus slacken the focusing control on the front of the unit, move forwards or backwards as required, and re-tighten the screw when the best image is obtained.

### Cleaning.

The Predator HX should be cleaned periodically as the light output will become less intense as smoke fluid residues build up on the mirror and lenses. Disconnect from the mains supply and remove the cover as follows: Remove the 6 screws at the positions indicated by the arrows using a #2 *Pozidriv* screwdriver. The top section of the cover can be lifted



off vertically to gain access to the optics.

Clean the lens and the mirror using a soft lint-free cloth and methylated spirit, isopropyl alcohol or hi-fi cleaning fluid. Also, make sure that the fan

is not becoming obstructed.

The Predator HX has a thermal switch which will cut off power if it overheats due to ventilation being obstructed.

Setting up.

If the Predator HX is to be operated in the “independent” mode, then proceed as follows:

1) To allow the Predator HX to select a colour and pattern at random, set all the DMX switches to OFF.



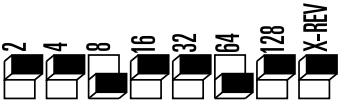
2) If you wish to select the operating mode, then turn switch 64 ON, then turn the following switches on to decide which operating mode you would like.



To select all gobos and magenta, yellow, cyan or pink turn switch 2 ON.



To select colours with no gobos (red, green, blue and white) turn switch 4 ON.



To select change-colour-to-sound, beam stationary, turn switch 8 ON.



To select flash-to-sound, turn switch 16 ON.

If more than one switch is turned ON the Predator HX will sequence through all the selections in turn.

Control from a low-voltage switch panel (such as Logic S121v or Logic T12)

Set the DMX switches as follows: Turn switch 64 ON and all other switches OFF. Connect the output from the switching panel to the 5-pin DIN socket. Connect to channel 1 (pin 3) if you want to select gobos only, connect to channel 2 (pin 5) if you want to select colours only. Connect to channel 3 (pin 4) if you want to select change-colour-to-sound. Connect to channel 4 (pin 1) if you want to select flash-to-sound.



If more than one channel is used, the Predator HX will sequence through all the selections in turn.

Direct Analogue Control .

The x and y movement and the colours and gobos may be controlled directly by using the 0-10V inputs.



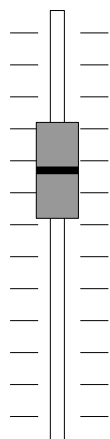
Set the DIL switches as shown - Switch 128 ON all others OFF. Channel 1 controls the x movement, channel 2 controls the y-movement,

channel 3 controls the colour and channel 4 controls the gobo and the blackout shutter.

The 0-10V dimmer levels control the movement as follows:

**x-motor** - increasing voltage moves the beam to the right. Use the **X-REV** switch to make the beam moves in the same direction as the control, depending on whether the Predator HX is facing towards or away from the operator

**y-motor** - increasing voltage moves the beam upwards



**colour:**

- 8.75V to 10V white
- 7.5V to 8.75V blue
- 6.25V to 7.5V red
- 5V to 6.25V green
- 3.75V to 5V pink
- 2.5V to 3.75V cyan
- 1.25V to 2.5V yellow
- 0V to 1.25V magenta

**gobo:**

- 8.75V to 10V blackout shutter for strobe
- 7.5V to 8.75V circle
- 6.25V to 7.5V flower
- 5V to 6.25V triangle
- 3.75V to 5V star
- 2.5V to 3.75V dots
- 1.25V to 2.5V tunnel
- 0.5V to 1.25V squares
- 0V blackout/ shutdown

Voltage control .

The Predator HX may be controlled by two analogue channels from a lighting desk such as the Stage 12 or the Fade-4.



Set the DMX address switches with switch 32 ON and all the other switches OFF.

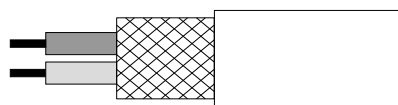
Connect the 0-10V input to channels 1 and 3 of the 5-pin DIN socket.

Channel 1 controls the pattern and channel 3 controls the colour, or the colour chasing mode. The levels that select various patterns and colours are explained overleaf.

	<b>Channel 1 (patterns)</b>	<b>Channel 3 (colours)</b>
—	8.75V to 10V - runs through all patterns all colours	9.3V to 10V white circle
—	8.1V to 8.75V up-down	8.75V to 9.3V blue circle
—	7.5V to 8.1V square	8.1V to 8.75V red circle
—	6.7V to 7.5V left-right	7.5V to 8.1V green circle
—	6.25V to 6.7V colour change	6.7V to 7.5V pink star
—	5.6V to 6.25V cross	6.25V to 6.7V cyan dots
—	5V to 5.6V diamond	5.6V to 6.25V yellow tunnel
—	4.4V to 5V figure of 8	5V to 5.6V magenta squares
—	3.75V to 4V octagon	4.4V to 5V chase left
—	3.1V to 3.75V up-down	3.75V to 4.4V chase right
—	2.5V to 3.1V square	3.1V to 3.75V random
—	1.8V to 2.5V left-right	2.5V to 3.1V flash
—	1.25V to 1.8V random	1.8V to 2.5V chase left
—	0-1.25V shutdown	

## D M X

The DMX system is a high-speed digital data system, which can transmit all the information required for light dimmers, multi-motor lighting effects etc. down a single cable. The Predator HX outputs a DMX signal when operating from its own microphone, which can be used to synchronise other Predator HXs. There is no limit to the number of units that can be connected to the DMX signal, but it is not recommended that the total cable length should exceed 250m. Each unit connected to the DMX signal



is given an **address**, and it compares this to the data being sent on the DMX cable, so it can determine which data is addressed to it. It then uses this data to move a motor or set a brightness level as

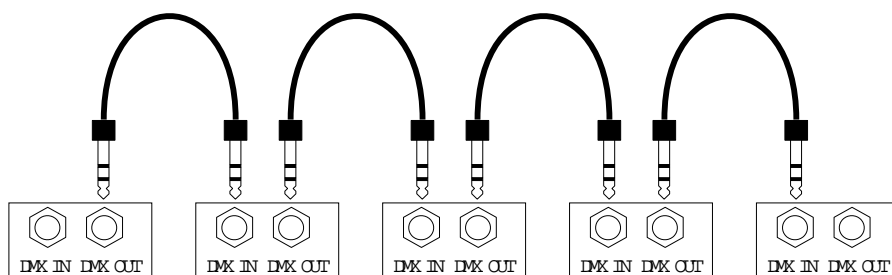
required by the controller. As the DMX system can transmit as much information as 512 analogue control wires down a single cable, it has to transmit very quickly, in fact, at a frequency 12 times higher than the highest audio frequency. Anyone who has used long leads for audio will realise that it is difficult to do without losing the higher frequencies.

To make the DMX system work at such high frequencies, it requires special circuitry and special cable. Cable can be designed to pass high frequencies with no loss if it has the correct resistance connected at each end, this resistance is called the **characteristic impedance** of the cable. DMX cable has a characteristic impedance of 120 $\omega$ .

All NJD DMX products are designed to ensure that the resistors are connected automatically. Without them, the signal reflects off the end of the cable and interferes with the new data coming the other way. If the cable is not correct, the system will not work. Most good quality **low-capacitance** screened twisted pair cables will work, but twin individually screened will not. Also, if the cable is split or joined other than end-to-end, the system will stop working.

### Synchronised Operation without a controller

To synchronise Predator HXs without a controller, connect a DMX lead from the **DMXout** jack on the first Predator HX to **DMXin** on the second. Connect from **DMXout** on the second Predator HX to **DMXin** on the third, and so on. DMX line termination is performed automatically by the Predator HX.



**DMX leads must never be joined (apart from end-to-end) or split. Using a 2-to-1 splitter or similar will prevent the system working.**

To obtain the the correct movement and colour changing sequence the switches on the back of each Predator HX must be adjusted to tell it which channel it is set to. The switches are labelled 128, 64, 32, 16, 8, 4 and 2. These set the DMX address.

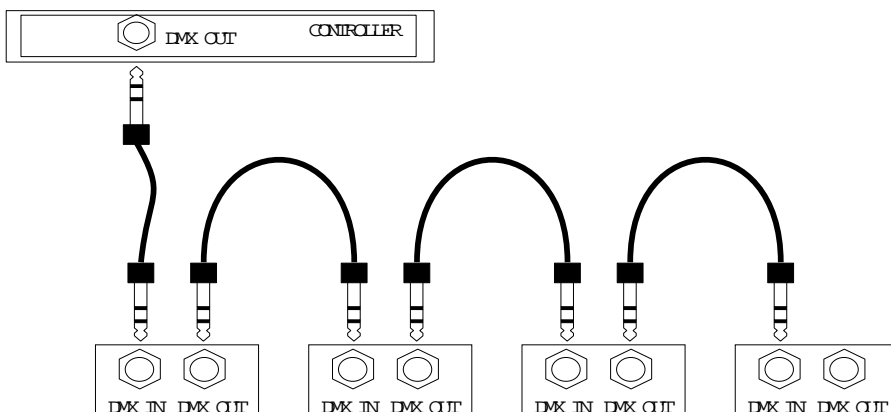
The Predator HX produces 4-channel colour and gobo-changing sequences, as well as mirrored operation in both X and Y directions, to allow two rows of Predator HXs to be installed facing each other, the four channels are set on the switches as follows: The first Predator HX, that is, the one with no jack in its DMXin socket controls all the others. It operates as channel 1, with no X or Y reversing, regardless of the position of the switches.

If all Predator HXs are required to operate indentially, set all the switches to channel 1. To achieve the colour and gobo changing sequences, set the switches so that a group of 4 Predator HXs has the first set to channel 1, the second to channel 2, the third to channel 3 and the fourth to channel 4.

Channel.	DMX start address	Switches ON (other switches OFF)
1	1	None
2	5	4
3	9	8
4	13	8, 4
1 (reversed in X direction)	17	16
2 (reversed in X direction)	21	16, 4
3 (reversed in X direction)	25	16, 8
4 (reversed in X direction)	29	16, 8, 4
1 (reversed in Y direction)	33	32
2 (reversed in Y direction)	37	32, 4
3 (reversed in Y direction)	41	32, 8
4 (reversed in Y direction)	45	32, 8, 4
1 (reversed in X and Y directions)	49	32, 16
2 (reversed in X and Y directions)	53	32, 16, 4
3 (reversed in X and Y directions)	57	32, 16, 8
4 (reversed in X and Y directions)	61	32, 16, 8, 4

Using the Predator HX with the IQ-MX80 or  
IQMX40

To connect to a controller: Connect a DMX lead from the **DMXout** from the controller to **DMXin** on the first Predator HX. Connect a DMX lead from the **DMXout** jack on the first Predator HX to **DMXin** on the second. Connect from **DMXout** on the second Predator HX to **DMXin** on the third, and so on. DMX line termination is performed automatically by the Predator HX.



**DMX leads must never be joined (apart from end-to-end) or split. Using a 2-to-1 splitter or similar will prevent the system working.**

Refer to the User Guide accompanying your controller for information on how to set the switches. The X-REV switch reverses the movement in the x direction. Use this to make the Predator HX move the same way as the controller joystick, which depends on whether the Predator HX is facing towards or away from the controller.

Connecting to Merlin or any Lighting control desk with DMX output.

The DMX system has 512 addresses, each address can be the brightness of a single dimmer, or a position on a motor. Because the Predator HX controls 4 motors, it requires four DMX addresses.

The Predator HX can be programmed to any address from 1 to 255 in steps of two, so there can be up to 64 channels of Predator HXs on a controller. Any number of Predator HXs can be assigned to each channel or address. If two Predator HXs are assigned to the same address then they will perform identically.

Each Predator HX occupies four DMX channels. The switches are labelled 128, 64, 32, 16, 8, 4 and 2. Add up the numbers of the switches that are on and add 1, to give the start address.

The X-motor appears at the start address, the Y-motor at start address plus 1, gobo/colour motor at start address plus 2 and blackout/lamp control at start address plus 3. (i.e. If switches 32 and 8 are ON, then start address is  $32+8+1 = 41$ , the X motor is on channel 41, the y-motor on channel 42, the colour motor on channel 43, and the gobo motor on channel 44.)

The **X-REV** switch reverses the movement in the x direction. Use this switch to make the Predator HX move the same way as the controller joystick, which depends on whether the Predator HXs is facing towards or away from the controller. This switch has no effect on the DMX address set on the other 7 switches.

The DMX dimmer levels control the movement as follows:

X-motor: 0 is extreme left (right for **X-REV** selected), 255 is extreme right (left for **X-REV** selected), 128 is central.

Y-motor: 0 is reflected back down lens, 128 is central, 255 is fully up.

<b>DMX data</b>	<b>colour</b>	<b>gobo</b>
0 - 31	magenta	squares
32 - 63	yellow	tunnel
64 - 95	cyan	dots
96 - 127	pink	star
128 - 159	green	triangle
160 - 191	red	flower
192 - 207	blue	circle
208 - 255	white	blackout

The gobo is always centralised but the colour can take any intermediate position allowing split colours and colour scrolling.

#### Portable Appliance Testing

The Predator HX should be checked for Electrical Safety annually, and if it is hire equipment, before it is hired out. A high-voltage test (at 500V or 1000V) should be carried out between live and earth, and an earth bonding test between the case and the earth connection (at 10A or 16A). Insulation resistance should be greater than 10MW and earth bonding resistance less than 0.1W. A high voltage test may also be carried out between the DMX and analogue inputs and live, if the equipment has passed the live-earth test.

Not all parts of the case are bonded to earth - these are separated from live parts by double insulation.

Do not test high-voltage or earth bonding between DMX or analogue inputs and earth - this will destroy the electronics.

Note: a common cause of failure of the insulation test is the build up of smoke fluid inside the lantern.

## Technical Specification.

Power supply:	230V nominal @ 50Hz 300VA (1.25A)
Power factor:	0.99
	210V minimum 255V maximum.
Fuse:	T3.15A (3.15 Amp anti-surge)
	5x20mm HBC to IEC127
Lamp:	A1/259
Colours:	7 dichroic plus white
CIE Chromaticity Co-ordinates	
Magenta:	(0.399,0.137)
Yellow:	(0.544,0.452)
Cyan:	(0.119,0.396)
Pink:	(0.523,0.318)
Green:	(0.246,0.686)
Red:	(0.700,0.296)
Blue:	(0.128,0.153)
White:	(0.242,0.400)
Gobos:	7
Beam intensity:	90,000 candela (high brightness)
	60,000 candela (long life)
Lamp life:	100 hours nominal @ 230V AC (high brightness)
	60 hours nominal @ 240V AC (high brightness)
	700 hours nominal @ 230V AC (long life)
	800 hours nominal @ 240V AC (long life)
Beam width:	210mm diameter at 1 metre
Beam Angle:	13° (227mrad)
Motors:	Unipolar Hybrid stepper: microstepping
Microstep size:	6'45" (1.95mrad)
DMX input/output:	complies with DMX512 (1990) 4µsec and EIA RS-485
Connectors:	¼" jack
Data+:	Tip
Data-:	Ring
Earth:	Sleeve

User Guide

Predator HX

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