



MO-SYS L40



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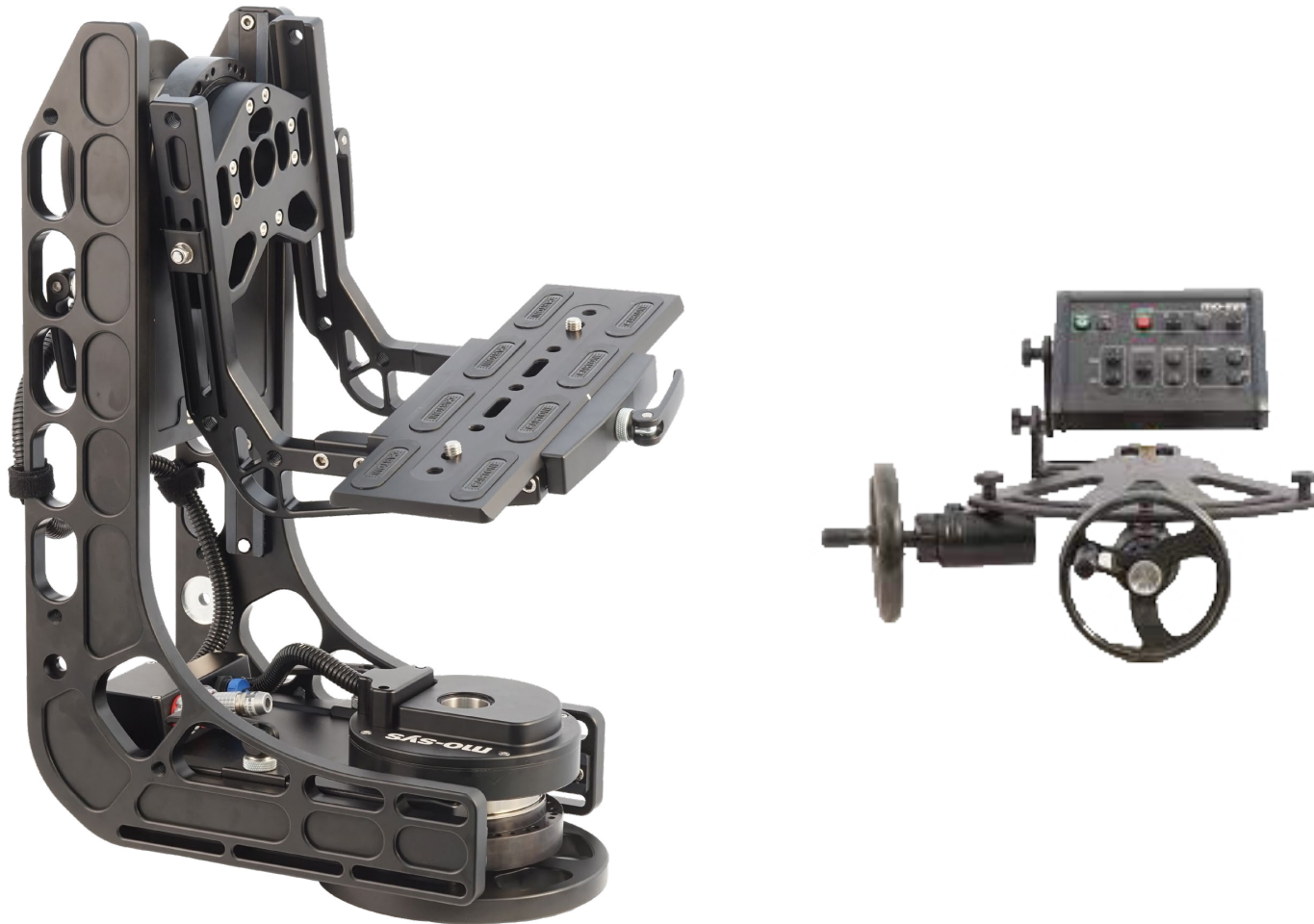


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MO-SYS L40



The L-40 is a light weight 2-axis head for high-end digital cinematography is ideal for medium sized camera packages, for example ARRI Alexa with a large zoom lens, such as Optimo 12:1 or Panavision 12:1. At the core of the L-40 is a highly robust and precise motor drive with zero backlash, providing lag-free operation.

MO-SYS L 40 Quick Set-up Guide

REMOTE HEADS



MO-SYS L 40 Quick Set-up Guide

REMOTE HEADS

The Mo-Sys L40 was designed to be set-up and operational in minutes. This reference guide is for basic operations. For more detailed instructions and information see the full Mo-Sys L40 Manual.

1. Remove the cable tray from the Console Kit.
2. Underneath the cable tray you will find the operator console attached to the pan and tilt encoders. This console is pre-wired with a Mo-Sys cable from the pan encoder to the console and an encoder cable between the pan and tilt encoders. There is also a Terminator in the pan encoder, this is necessary for operation of the L40.
3. Remove the operators console and attach it to a standard mitchell mount with the moy nut supplied.
4. Remove the L40 remote head from the box and attach it over or under slung with the supplied moy nut. A tightening tool is supplied in the cable tray in the console kit.
5. There is a power supply in the L40 head case. Remove this and open it, you will find an AC cable and 3 pin XLR cable. (alternatively the head can be powered by a 24V battery, polarity is not an issue)
6. Plug in the power supply to available AC and the XLR from the power supply to the rear on the console. (either XLR input will work, two are supplied for "hot swapping" batteries without power-ing down)
7. In the cable tray there are 2 - 25m Mo-Sys cables. You can use one of these if the length is appropriate or attach them with the cable coupler located in the L40 head case. Plug one end into the back of the console with the red "key" dot at the top. Run the other end through the hole in the pan motor assembly on the head and plug into the corresponding connector in the pan motor next to the Terminator.
8. Attach your sliding base plate to the camera plate with the supplied hardware. Please return the hardware to the camera plate when finished with the system.
9. Adjust the head size by loosening the kip handles on the pan and tilt arms as required for balance and to enable full camera rotation.
10. Press the on/off switch on the back of the console to ON, it will turn green if power is present.
11. Press the ENABLE button on the top of the operators console. Pan and tilt will be enabled, adjust speed, direction and smoothening as required.

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REMOTE HEADS



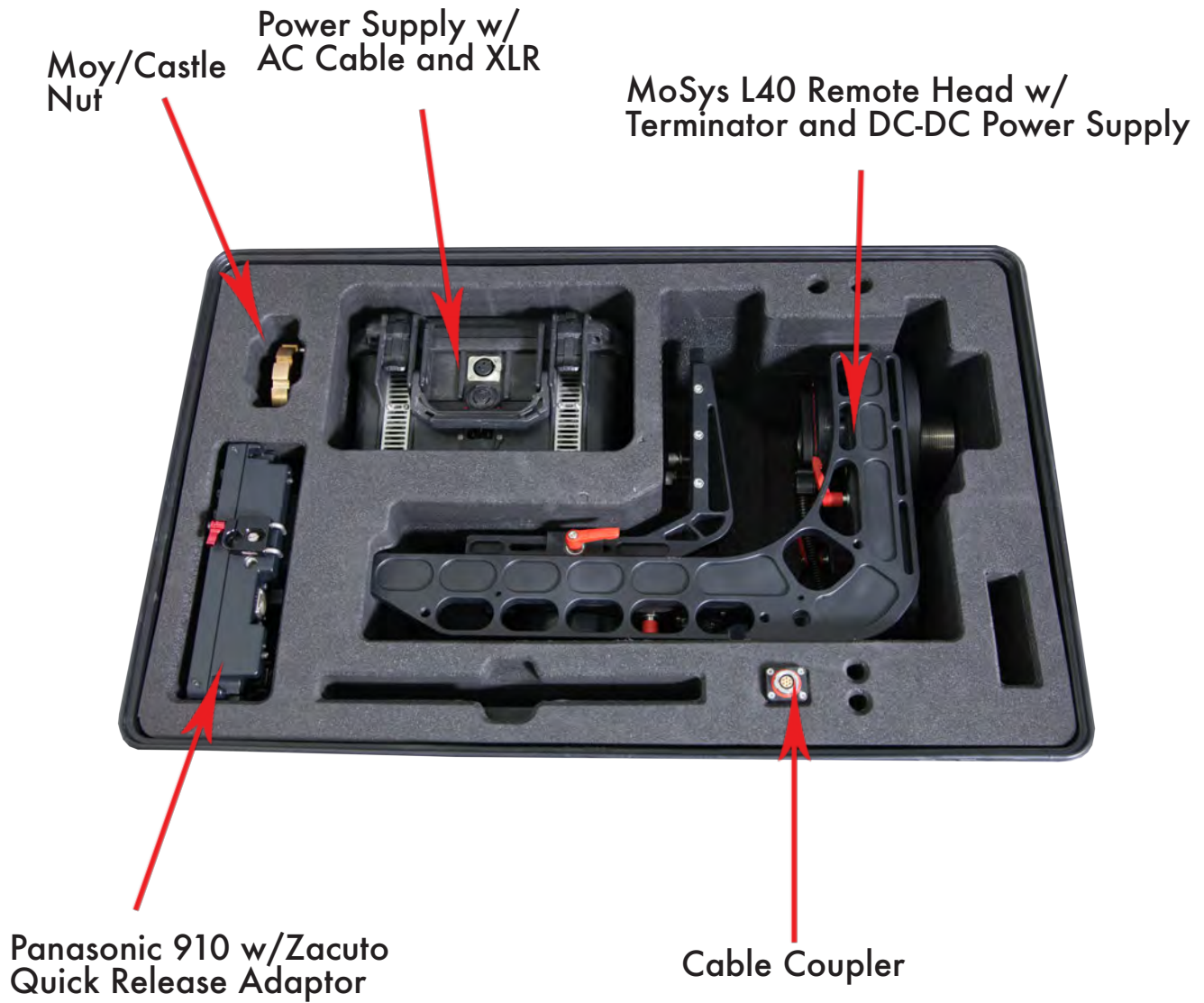
1. Press to turn on head (after on/off switch on back of the console is on), LED turns green when enabled
2. Locks pan and tilt, LED turns red
3. Turns *Back Pan* on, LED turns red. Adjust sensitivity down if head is vibrating. *disregard *Drift Cal* and *Scaling*
4. Adjusts pan and tilt speed
5. Smooths out operation and stops with varying levels of drift
6. Changes direction of axis for over/under slung operation
7. Adjusts degree of feathering to programmed stops set in *Soft Stops #8*
8. Set stops by holding down corresponding axis, rotate encoder wheel in desired range and release button, LED turns red when set. Hold down until LED stops blinking to clear stop



9. Power input, 24v polarity protected
10. On/Off switch, turns green when powered
11. Mo-Sys cable, sides interchangeable. One cable from encoder to console and console to head.

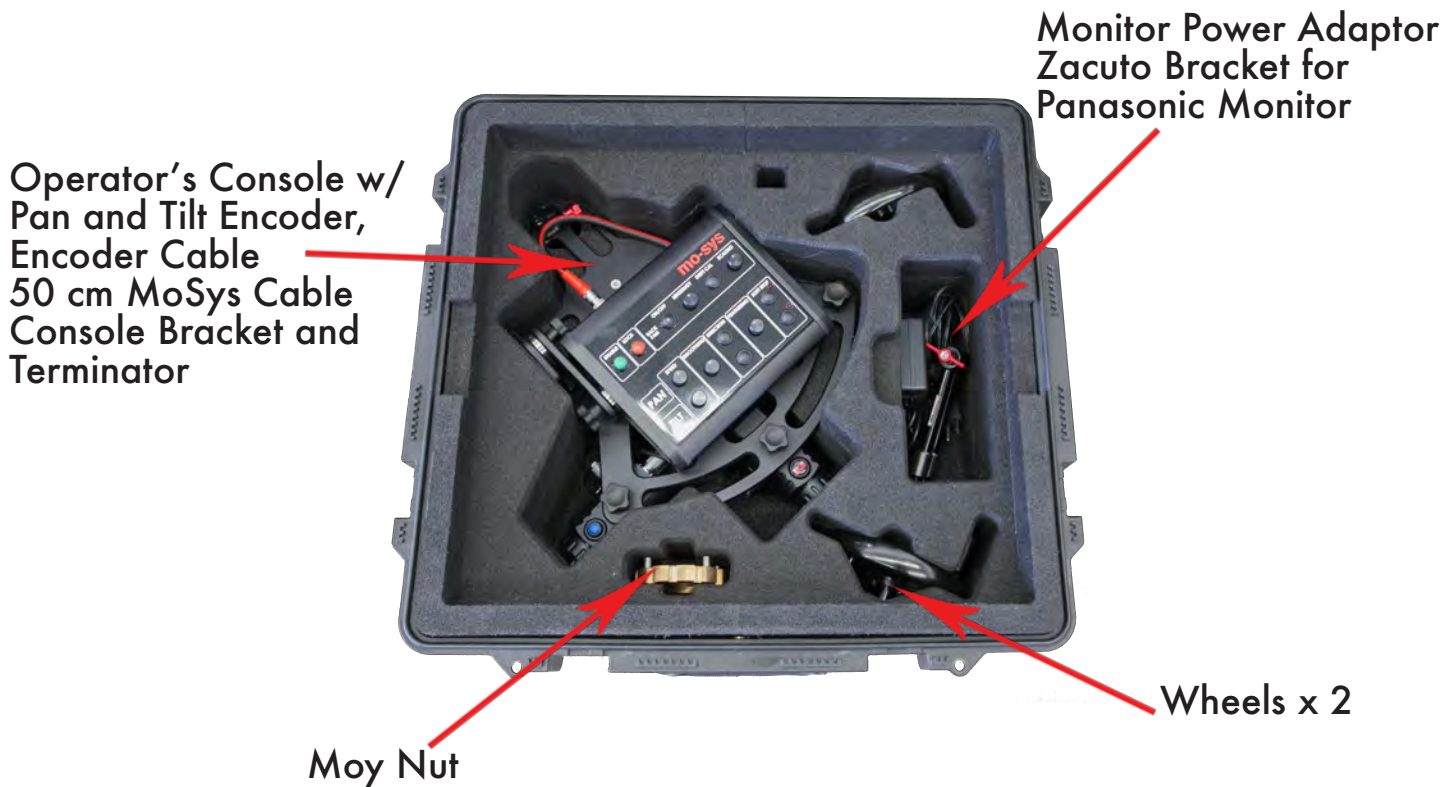
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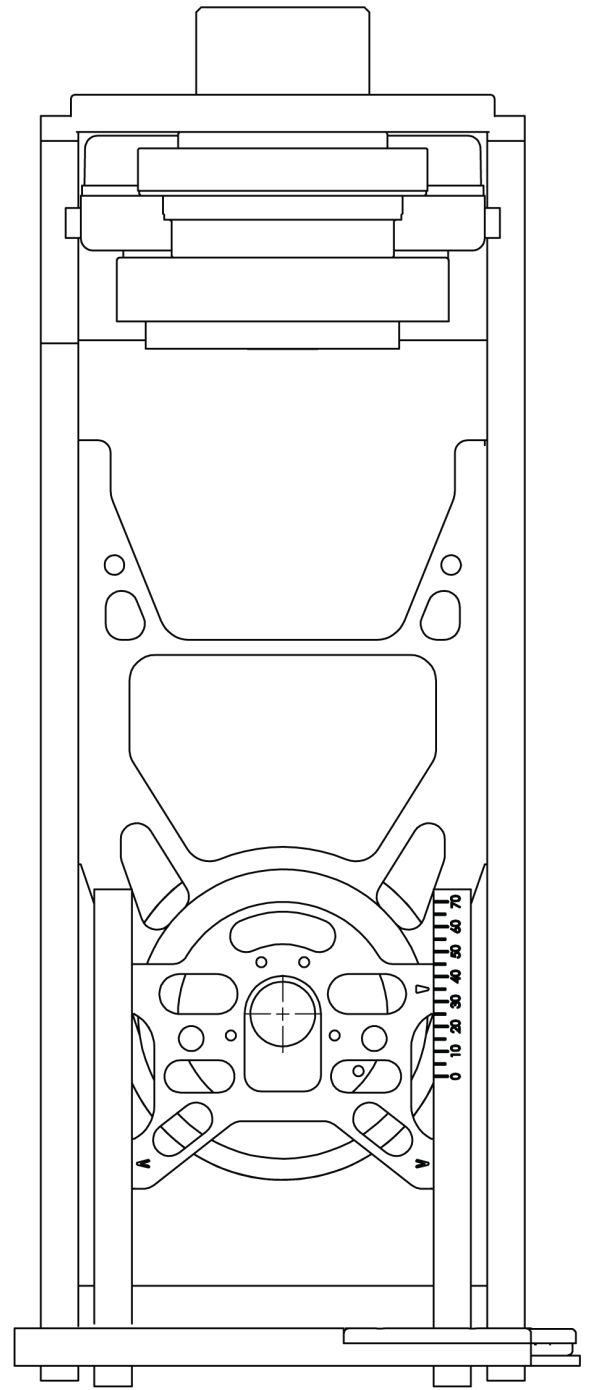
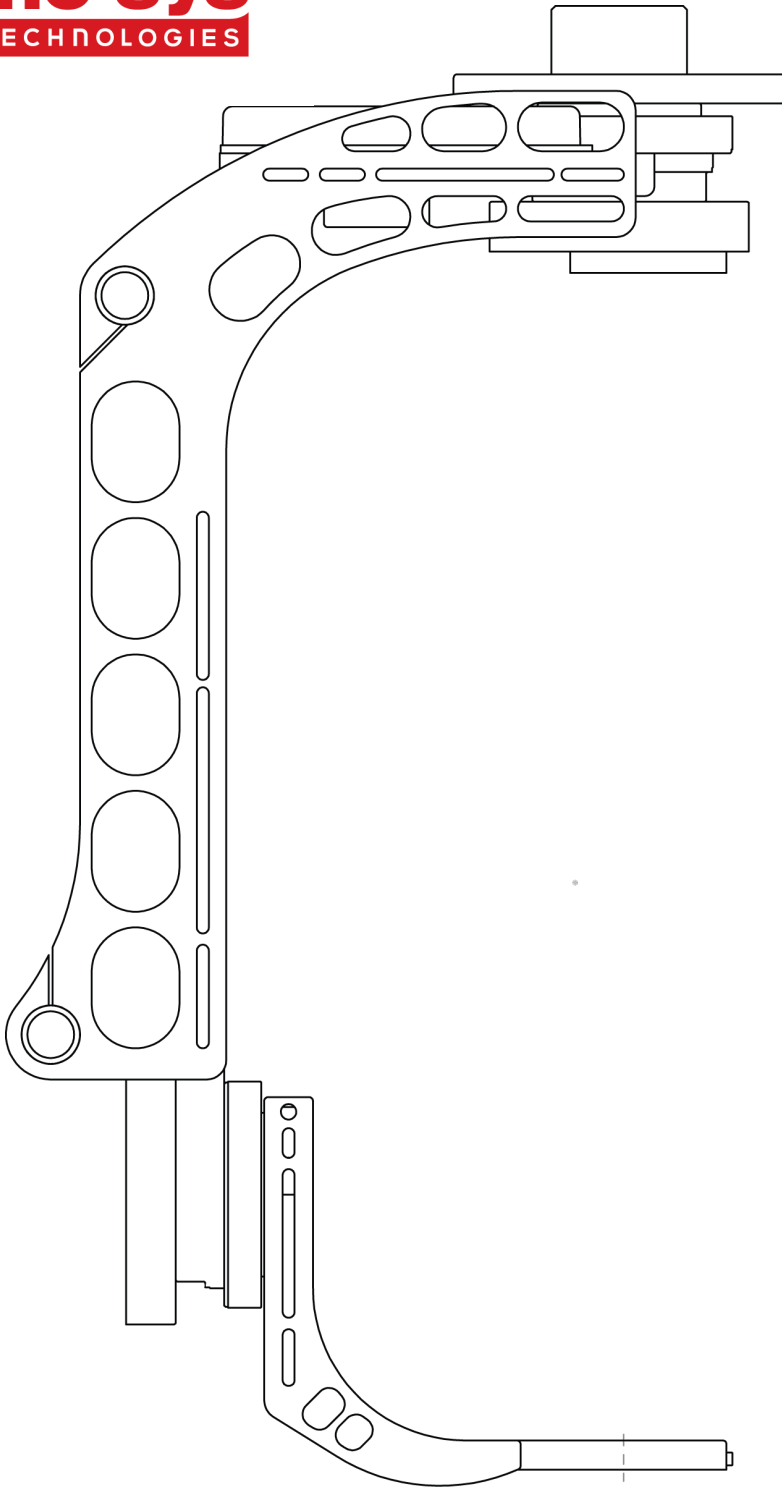
REMOTE HEADS



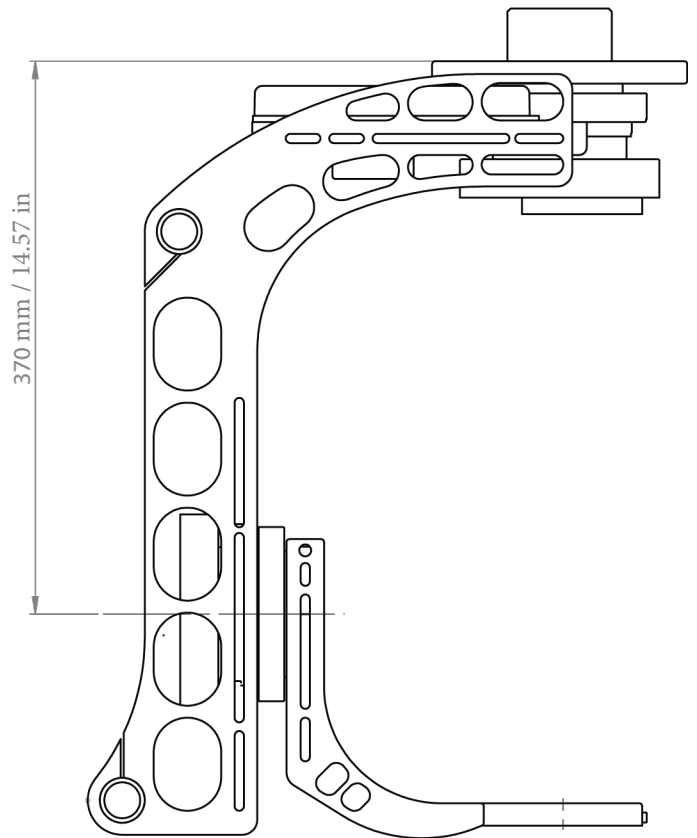
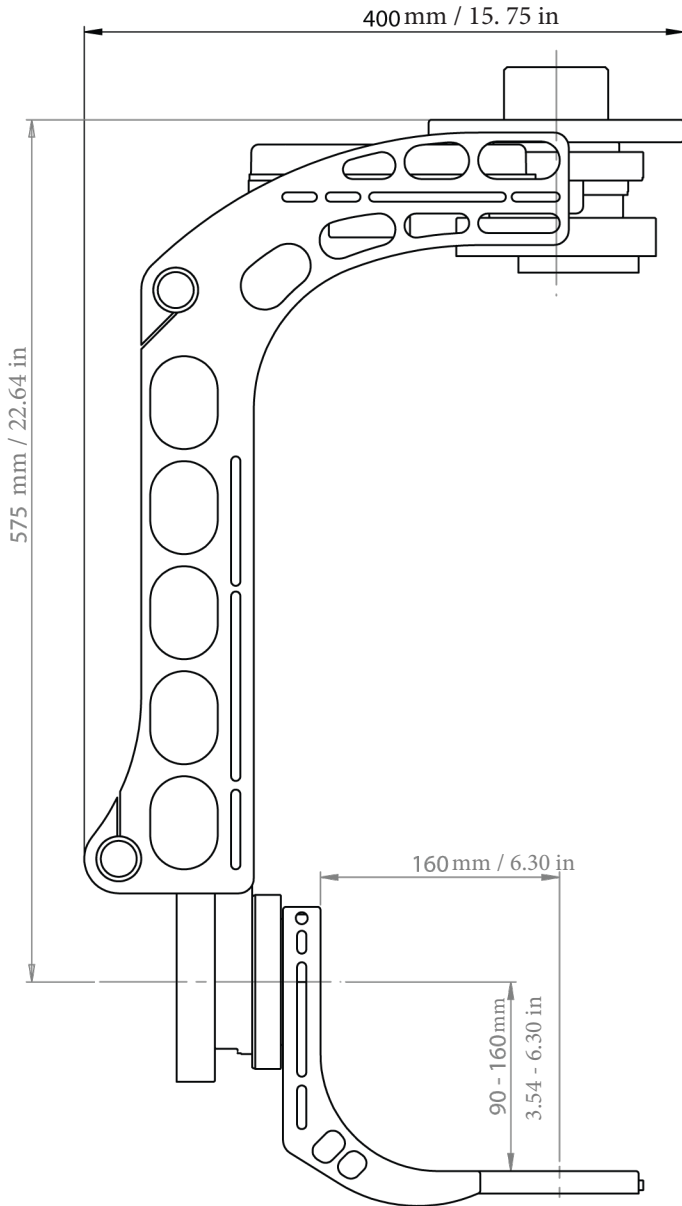
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REMOTE HEADS





MO-SYS L40 MANUAL AND USER GUIDE



Head Weight: 15 kg / 33 lbs

Max. Payload: 40 kg / 88 lbs

Max movement speed: 180°/
Sec. At 24V

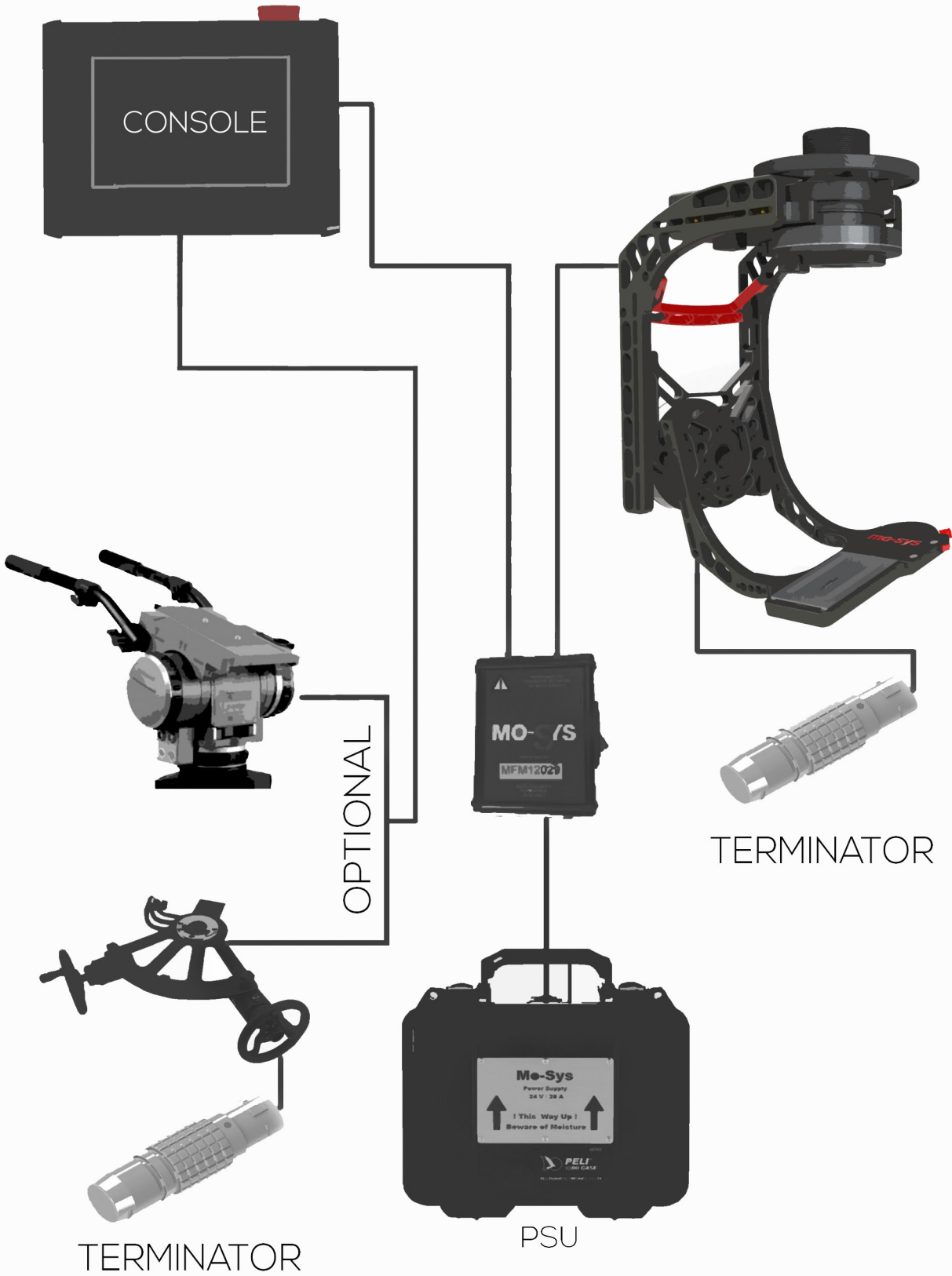
Power supply:

Nominal 24V

Nominal 3A

Peak 10A

SYSTEM CABLING SETUP



PUSH BUTTON GUIDANCE

Smoothing is the input smoothing- set it to minimum for fastest response with zero lag or set it to a higher level for more averaging on the input- the same as the smoothing on the touch screen console- to smooth out shaky hands etc.

Soft stop is the position limits for each axis. It works like this- hold down the soft stop button so the red LED illuminates and at the same time move the head between the limits of the range you want to be able to move. When you release the button that range will be set and you will not be able to move the head beyond that range. To clear the soft stops you just have to hold the button again- the LED will start to flash. Keep holding it for a few seconds until the LED stops flashing. Then you can release the button and the range will be free again. Do this for each axis individually.

The Feathering knob determines the amount of speed ramping into the soft stops you have set. If you set it to minimum (full anti-clockwise) then the head will stop like it hit a brick wall. If you turn it to maximum feathering it will glide in and gently decelerate into the stop. The Feathering control is global- it will affect pan and tilt soft stops the exact same.

The back-pan function uses a single axis gyro to control the pan axis so that the head will remain pointing in the same direction if the thing it is mounted on (e.g. a crane arm) rotates (e.g. as the crane arm swings sideways). This is popular on cranes as it makes the operator's job much easier- they can focus on his moves without having to counteract the effect of the swinging arm.

Enable back-pan by pressing the button, disable by pressing again.

Sensitivity is an averaging of this function- set to maximum (full clockwise) the response is as fast and direct to the gyro input as possible. Whilst this sounds like a good idea, it can lead to resonance between the head and the support (crane arm) causing the head to shake. Usually the crane arm motion is slow so maximum response is not required so set it lower (maybe start at 50%- half way) and increase if necessary.

The problem with gyros is they can drift. Particularly with temperature change. Our gyro is very stable but you may need to calibrate it if you use it in very different temperatures. To do this, use the "drift cal" button. When you press it the back-pan enable button will start flashing for a few seconds. When it stops flashing the calibration is complete and the head should stop drifting. WARNING- the head must be absolutely static when you perform the calibration- you can't do it if you are on a moving vehicle or a boat. Also, disable the back-pan and disable the head so that motor vibration cannot affect the process.

Scaling doesn't do anything. It is planned for the future but not now.



mo-sys

CAMERA MOTION EXPERTS

Mo-Sys L40 Remote Head

*'High payload tech-less remote head
with zero backlash'*



Key Features

- **Industry Standard** – the most popular heavy duty remote head for high end Hollywood feature films.
- **Tech-less** – can be set up and used by a camera operator rather than a remote head specialist.
- **3 Axis Remote Head** – Pan & Tilt axis as standard, Roll axis as an optional module that can be added on set.
- **Single Sided 'L shape' Design** – easier access, and easier loading and unloading of camera rigs.
- **High Payload** – 40kg / 88lbs payload and 18kg / 40lbs weight.
- **Incredibly Powerful Motors** – 100Nm rated, equivalent to holding 20lbs at the end of a 1m pole, and therefore can hold a camera even out of balance.
- **Zero Backlash** – uses cycloidal gears, not affected by changes in temperature, no adjustment required under different loads, and most importantly no juddering under heavy loads.
- **High Speed Precision Movement** – pan 180 degrees/second, zero delay, even with the largest payloads.
- **Backpan Option** – automatically keeps camera face parallel to a scene when jib or crane moves through an arc.
- **Cable Hole Through Drive Motor** – no slip rings required, minimises cable tangles, no specialist cables required.



The Remote Head Landscape

The L40 is a remote head that sits between a standard 2-axis medium payload remote head, and a 3-axis gyro-stabilized head, based on its strength and rigidity achieved through its frame design and toughened bearings. It provides greater payload capacity, simpler operation, and several unique capabilities. But the L40 was primarily designed to address common challenges that most remote head operators experience.

Remote Head Movement

The motors and gears chosen for a remote head impact both its movement and its performance under different loads, and even in different ambient temperatures.

Lower priced remote heads often use worm gears, and whilst these reduce the price they add unwanted characteristics. The tooth gap of worm gear drives changes with temperature due to the different expansion rates of the manufacturing materials used.

The thermal expansion of aluminium is twice that of steel, and with gear housings often made of aluminium surrounding steel gears, this results in changes in the gaps between the gear teeth when these systems get warmer or colder.

For example a 50 cm long aluminium frame expands by 0.5 mm between -20 deg in Winter and 40 degrees in Summer, resulting in either sloppy or seizing gears if they're not adjusted to compensate.

However, the biggest problem with worm gear drives in changing ambient temperatures, is the juddering of the gear movement, which can cause steppy motion when moving larger camera and lens packages.



The Remote Head Landscape

Remote Head Costs

Often the complexity of a remote head requires a specialist to accompany it whilst on set, working in conjunction with the camera operator and focus puller. This makes setting up, operating, and adjusting the remote head easier, but it also adds additional headcount to a production budget.

Remote Head Setup and Operation

One of the challenges of connecting cables to a camera rig mounted on a remote head, is ensuring that the connected cables don't impede the full 2 or 3-axis range of movement of the head.

Normally slip rings are used to solve this issue, but these have limitations on the data rates they allow across the electrical connection, require specialist adapter cables, and are often the weakest in the connection chain adding a degree of uncertainty.

Remote Head Downtime

Remote head design is heavily focussed on ensuring the range and smoothness of camera movement is optimal. However, this can come at the expense of ignoring how easy it is for cameras and lenses to be mounted to and from the head, and how simple it is to balance the head after adjustments are made to the remote head payload.

Remote Head Limitations

About the last surprise you want on set is finding out that your remote head won't accommodate last minute changes/challenges; such as the addition of a 12:1 zoom lens making head motion steppy due to the additional weight, or the ambient temperature increasing and impacting smooth gear movement under heavy loads.

Remote Head Payload

The payload of a remote head is a flexible limit. It is not the case that a remote head would break if a heavier camera package was mounted than the specified maximum payload. It is more a question of what level of twist the frame can withstand, and how fast a larger package can be accelerated.

A larger camera package has significantly more inertia and requires much stronger motors to generate rapid movements. The payload rating is less a technical criteria and more an artistic one, so the question is more about what type of rapid moves are required.



The L40 Remote Head

Provides Rapid Precision Movement

The L40 uses powerful 100Nm motors and cycloidal gears to allow rapid movement of even the heaviest payloads.

The motors are custom designed and built in-house specifically to provide the highest power output in the shortest package. The motor/gear combination provides zero backlash and with this zero delay, resulting in immediate crisp replication of the operator's commands. The Mo-Sys designed gear drive uses cycloidal gear technology that allows repeated 100 Nm torque. This is equivalent to holding 40 full pint bottles at the end of a 1m rod.

The L40 was developed for use on rapid movement motion-control robots, where the centrifugal force generated on the remote head at the end of a robotic arm, is easily sufficient to impact smooth motion.

The extremely stiff and over dimensioned precision bearings allow a static torque of 1000 Nm, which is equivalent to 400 full pint bottles held at the end of a 1m pole.

This excessive over engineering allows nose mounting of heavy camera packages and also provides the ultra-strong connection between the L40's frame sections. This enables the L40 to be used with the heaviest payloads on telescopic cranes, even with abrupt camera moves where normally a gyro-stabilised head would be required.



A popular choice on the L40 is the **back-pan** option. This enables the L40 mounted on a jib or crane to be swung through an arc, whilst automatically ensuring the camera is always facing the same plane of action from the start to the end of the arc movement. This makes combined camera and crane moves simpler, and the camera operator and crane operator can focus on their own tasks without impeding each other.



The L40 Remote Head

Reduces Costs

The L40 is specifically designed to be simple enough for either a Camera Operator or Focus Puller to set up and use, without requiring a remote head technician on set. This means that productions can benefit from headcount savings, whilst the Camera Operator and Focus Puller can easily fill the Remote Head Technician's role.

Simplifies Operation

The L40 uses a single daisy-chain power and communications cable - Mo-Sys Bus - to connect Mo-Sys components/equipment/modules together quickly and simply. In addition, all motors features a hole through the centre enabling standard camera cables to be connected to the camera whilst allowing full pan, tilt, and roll movement without the use of slip rings. This design significantly reduces any possibility of cable tangles, and removes the need for specialist adapter cables. Often sliprings together with connectors in general are the weakest point in a remote head system.



The L40 can be controlled by pan bars, hand wheels, or a joystick, using either a touch panel or a button console. It can be operated wired, wire-less, or over extreme distance (fibre optic cable). It can also have a 3rd Roll axis drive motor added, enabling the DP the widest possible choice of shots

Reduces Shooting Downtime

When moving a camera from a fluid head onto the L40, the power of the L40's motors, the cable connect holes through the centre of the tilt and pan motors, and the open 'L-shape' design, all enable the heaviest camera rigs to be moved straight onto the L40 without disassembling and reassembling the camera peripherals to save weight or aid balancing.



Lens changes are a frequent occurrence on set, which is why the L40's motors have been designed to be powerful enough to support an unbalanced camera body plus peripherals, during a lens change. This makes changing lenses faster reducing downtime between shots.

Combined these unique features reduce shooting downtime.

The L40 Remote Head

Accommodates Widest Choice of Camera/Lens Combinations

The clever design of the L40 delivers a remote head that weighs only 18kg/40lbs yet supports a camera/lens payload of up to 40kg/88lbs, meaning that virtually any camera/lens combination can be used. This enables DPs the widest choice of tools to choose from.

Virtual Production Enabled

The L40 is capable of virtual production workflows due to its 3-axis motors having in-built encoders. The encoders provide pan, tilt and roll data, and this can be supplemented by adding other Mo-Sys options to provide the additional X,Y,Z axis data completing the 6-axis data set.

The L40's data set can be delivered to virtual production software, and used live for on-set pre-viz or on-set finishing, or saved for post-production compositing. Mo-Sys manufactures all the components required for virtual production workflows, including Unreal Engine based previsualisation and 6-axis extended data recording.

The design of the L40 was inspired from a specialist head Mo-Sys developed for the film "Gravity" which required heavy remote head payloads, rapid acceleration on motion controlled industrial robots, both without impeding the light from the LED volume on the talent.

The L40 is the leading remote head choice in Hollywood, trusted by camera operators, DPs, and Focus Pullers. It's the only system that solves all of the typical remote head challenges production teams encounter, and it's the only remote head you'll need outside of a gyro-stabilized head.



What's in the Box?



L40 Remote Head



Touchscreen Console



PanBar



Handwheels



Gateway



Button Console



Roll-Axis

Specifications

| | |
|---|--|
| Weight | 18 kg (40 lbs) |
| Payload | 40 kg (88 lbs) |
| Pan/Tilt speed | 180 °/sec |
| Pan/Tilt range | ±720 |
| Max system bus length (operating distance) | 100 m |
| Max operating distance with optional radio | 300 m |
| Max operating distance with optical fiber bridge | 20 km |
| Pan/Tilt control options | Hand-wheels, pan-bar, joystick, micro joystick |
| VR encoder resolution | > 2 Million counts per revolution |
| Power | 15-32V (24V nom) 3A (nom) 20 Apk |
| Mains | With PSU 110V-200V |

For more information

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