

Telescopic Camera Crane

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Manual

Part 1

Safety information

Part 2

Mechanics

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The camera cranes described here are protected by the following patents:

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Part One

Safety information

Preliminary remarks

Camera cranes operate in accordance with the counterbalance principle of a “seesaw”. In other words, the camera is fixed on one side of a beam (arm) and counterweights are attached to the other side. Obviously if there’s no camera, or there are no counterweights, the seesaw will be out of balance. This can prove very hazardous. So to avoid potential dangers, careful attention must always be paid to the forces at work on the camera crane: the counterweights exert loads of up to 500 kg, and the crane weighs as much as 1.2 t. Only when they are in a state of balance can these forces be properly controlled.

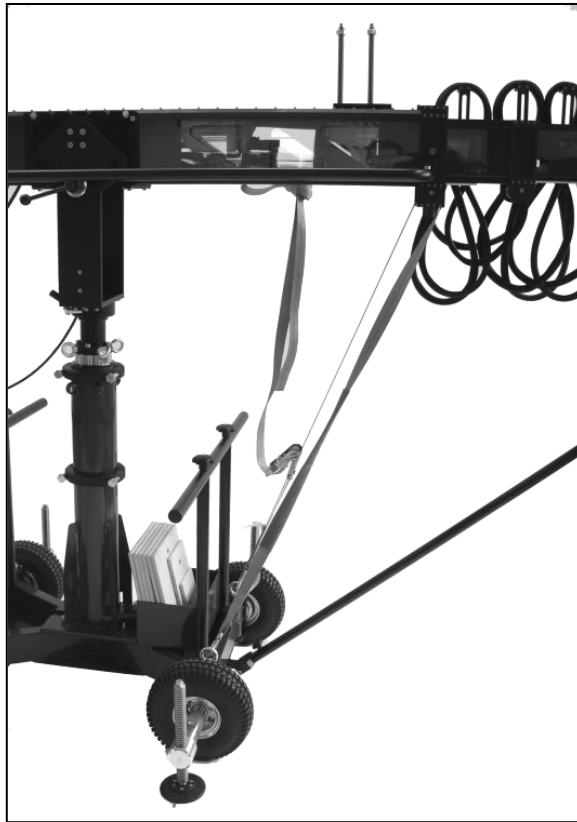
Important safety precautions

1.1. Safety straps

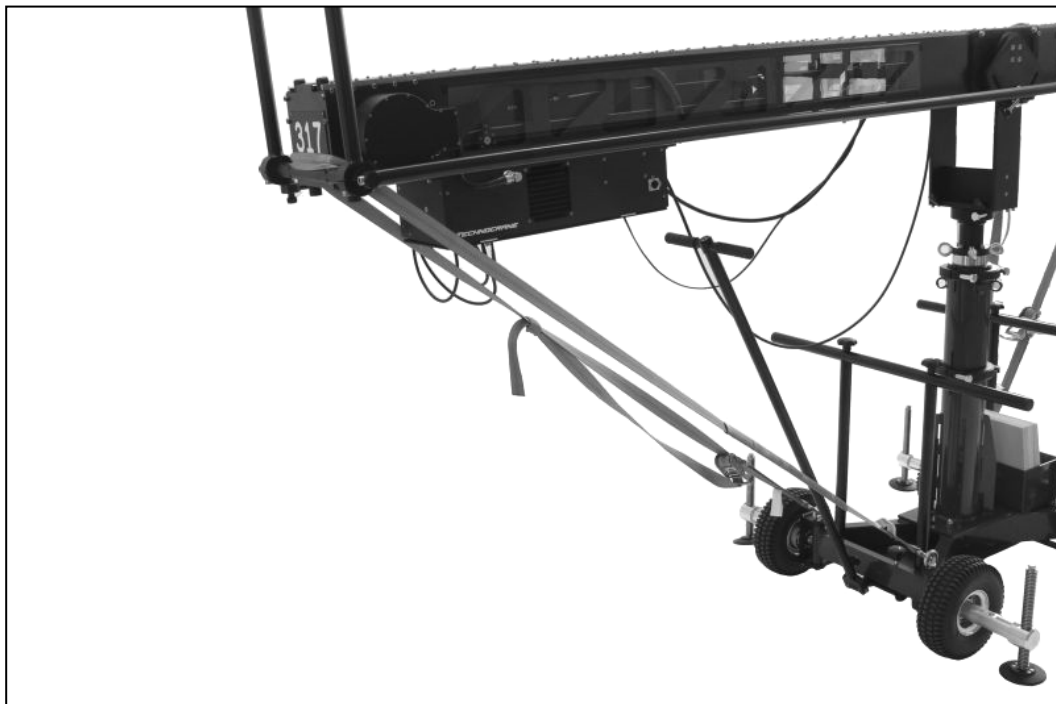
When not in use, or during transport, the crane should always be secured by two safety straps – one at the front and one at the back. On the dolly, fasten the safety straps with snap hooks at the eyebolts. On the crane, pull the straps through the holes provided. This prevents the straps from slipping off under strain or becoming detached unintentionally.



1.1.a - Snap hook at eyebolt on dolly



1.1.b – Strap at front hole

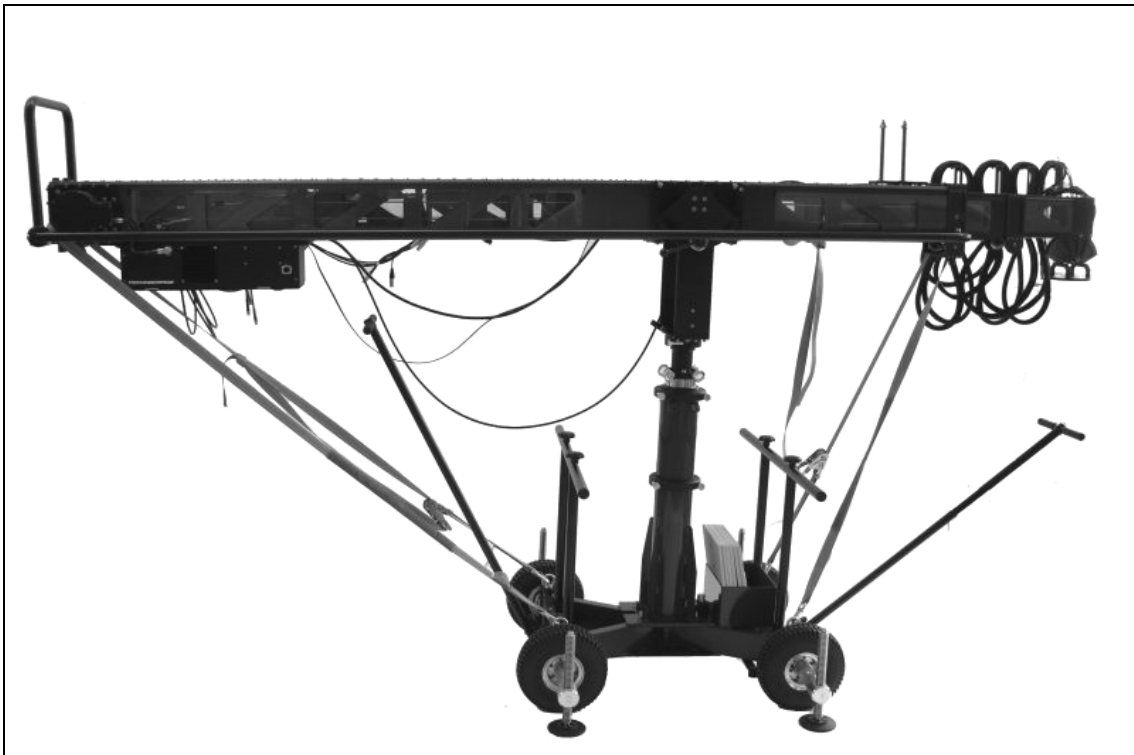


1.1.c - Strap at back hole

Do not use only one safety strap when the crane is being transported, assembled or parked. In these situations one side of the crane is much heavier than the other and the straps hold down the heavy side. Since it is not clear which side happens to be heavier, the safety straps must always be attached on both sides.

But even when the straps are attached to the dolly, the crane can still be brought out of balance if, for instance, the telescopic beam is fully extended without having the counterweights attached. The crane can still tip forwards or backwards even with the safety straps in position. In other words, the straps in themselves do not ensure balance in every situation.

Only when the camera is attached to the crane and the crane is perfectly balanced with counterweights for every length, may the safety straps be released. Once the straps are off, the camera operator must keep hold of the crane. Whenever the operator leaves the crane, he must first ensure that the safety straps are re-fastened.



1.1.d – New Technocrane with straps

1.2. Leveling jacks

The dolly is set horizontally by adjusting the leveling jacks. To place the crane on the largest possible footprint, attach the leveling jacks to the dolly wheels. Since the dolly wheels can turn in different directions, the steering at the front and rear of the dolly must be first be locked before setting down the leveling jacks.



1.2. - Locking steering

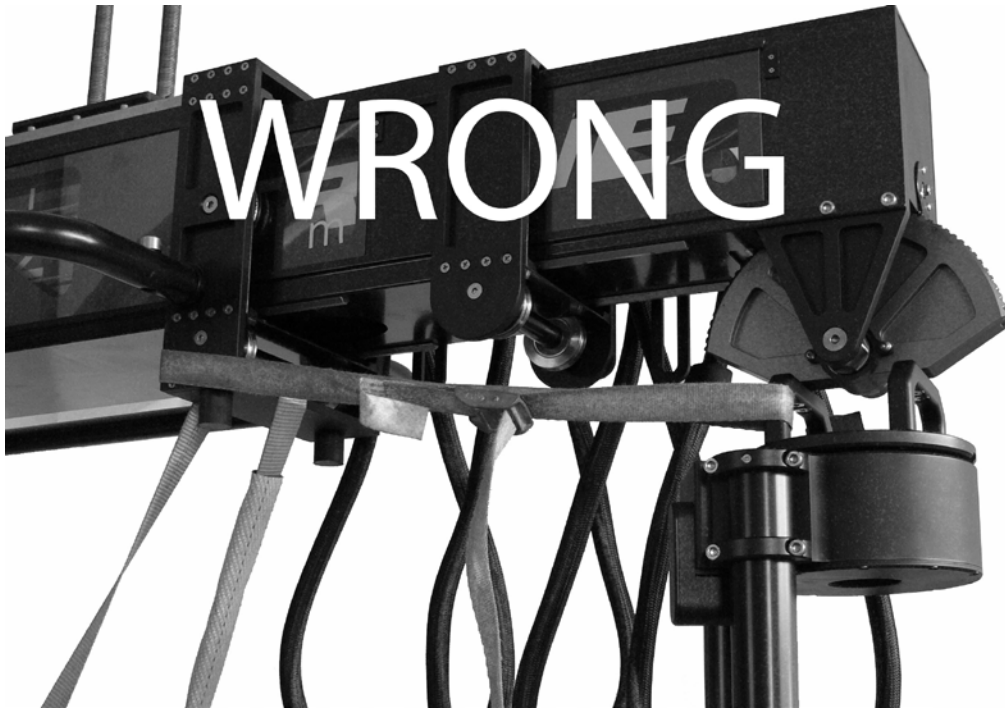
1.3. Securing the counterweights

The counterweights should always be secured by their retaining bolts to prevent them falling off.

1.4. Securing the beam sections

During transportation the beams might extract themselves and extend outwards. Avoid this danger by ensuring that the beam sections are fully retracted and then secured with the small ratchet strap. Do NOT attach the ratchet strap to the auto horizon gear.

.4.a - Strap between beams



1.5. Cleaning and maintenance

The crane should never be cleaned when the electronics are switched on. To clean and service the crane it is necessary to put one's hands into the beams, so if there is any unintended telescopic movement of the beams a serious accident could occur. And make sure that no one else manually pushes the beam in or out; this could also cause injury to the person servicing the beam.

1.6. Protective covers

There is always a danger of someone gripping the crane beam and having their hands cut off by the moving sections. It is therefore forbidden to work with a crane without the plastic protective covers being fitted. The protective covers should only be removed for servicing and cleaning the tracks and rollers, and must always be screwed back on afterwards.



Important: *BEFORE REMOVING THE PLASTIC PROTECTIVE COVERS ALWAYS SWITCH OFF THE ELECTRONICS AND PULL OUT THE PLUG FROM THE POWER SOCKET TO PREVENT ANY RISK OF THE CRANE MOVING UNINTENTIONALLY AND INJURING SERVICE PERSONNEL.*

1.7. Outside shooting

If the crane is extended to its full reach and, furthermore, the arm is directed upwards, gusts of wind at open-air locations can threaten the crane's stability.

Do not work in a wind stronger than force three (3 Beaufort or 20 km/h = 15 mph)

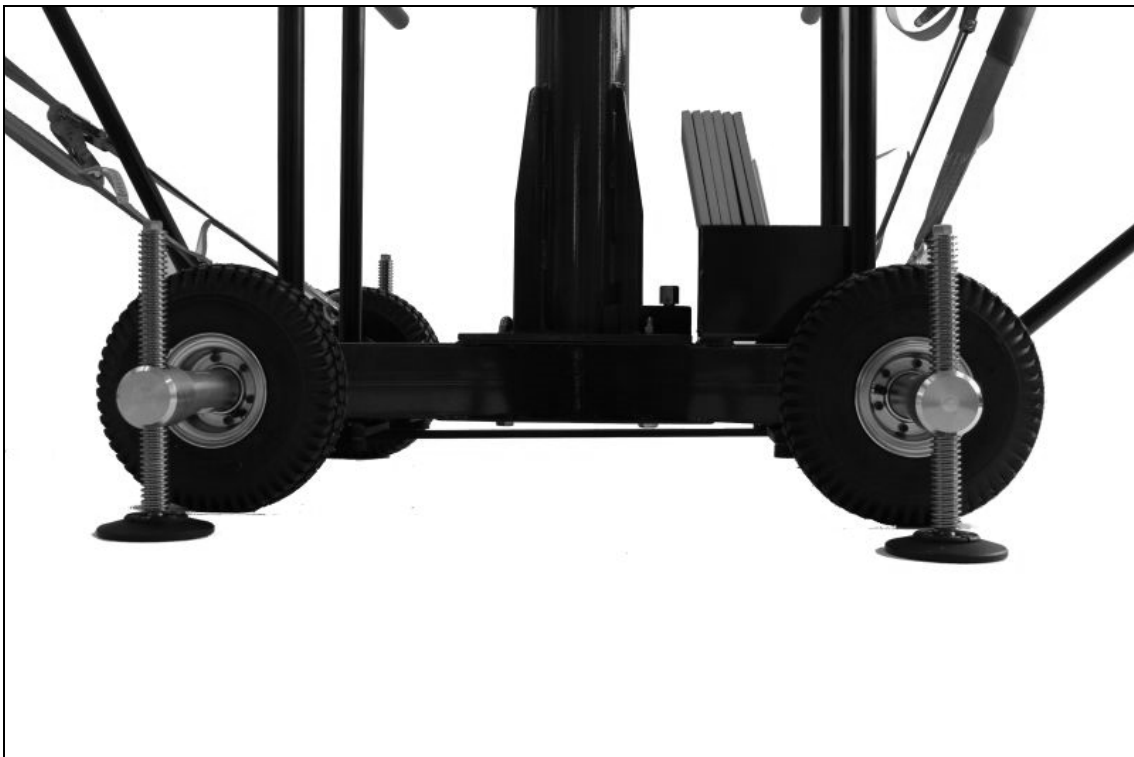
Second part

Mechanics

2.1. Dolly

2.1.1. Leveling jacks

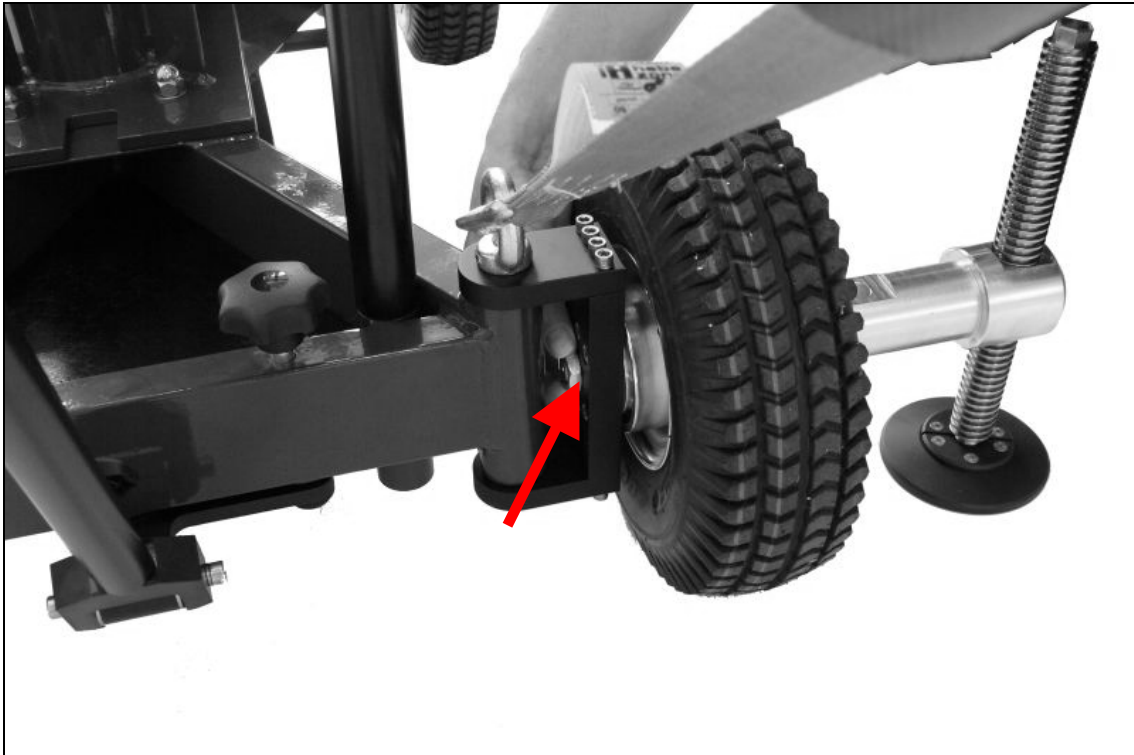
We generally recommend that the leveling jacks be used. They give the basic balance to the dolly. The crane is more stable when the jacks are mounted than when it is simply resting on the pneumatic wheels. Furthermore, it is unsafe to operate the crane when it is not perfectly level in both axes.



2.1.1. - Dolly with jacks

2.1.2. Fitting the leveling jacks

The leveling jacks are fitted by pushing them into the hollow shaft of the wheel and tightening the nut on the inside of the wheel assembly.



2.1.2.b - Nut putting on the jacks

2.1.3. Leveling of the dolly

Before leveling the dolly the steering must be locked by screwing



down the locking pin.

2.1.3.a - Locking steering

The dolly should be leveled evenly using all the jacks. If only one side is jacked the dolly will tilt excessively.



2.1.3.b – Moving jacks up

2.1.4. Pushbars

The pushbars can be inserted in the dolly at the front or at the rear. The upper pushbar can be attached symmetrically in the middle but also to one side if preferred.



2.1.4.a - Top pushbar in the middle

2.1.5. Pressure in wheels

Dolly	300 kPa
Counterweights trolleys	300 kPa
Desk	300kPa

2.2. Tracks and track wheels

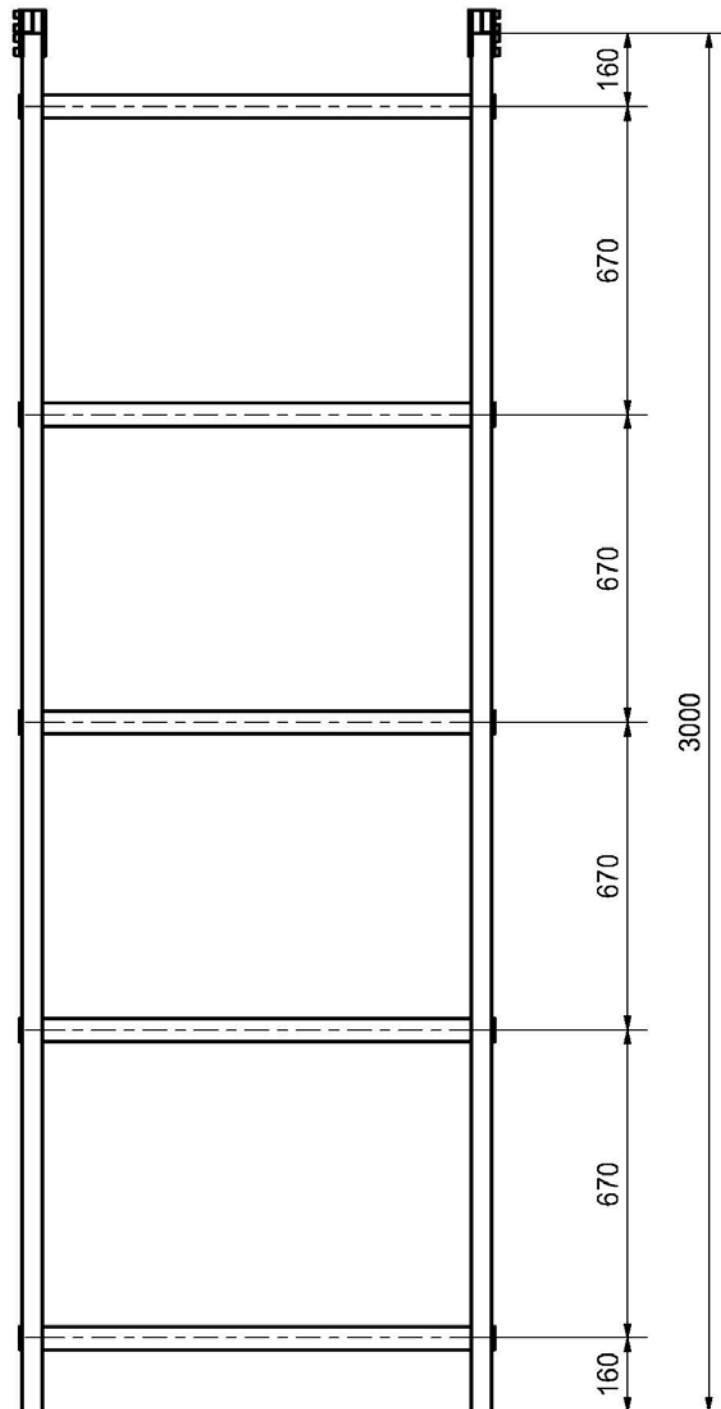
2.2.1. Laying of tracks

The track sections are attached to each other with a pressure clamp on the cross-ties (sleepers). Make sure there are no gaps along the rails.



2.2.1.a - Locking two tubes with the double clamp

It is very important that the tracks are laid horizontally and securely. The track support must be sturdy and stable so that the entire weight of the crane (1300 kg) is securely supported. Check after several movements to make sure that the track support has not become loose or shifted position.



2.2.1.b – One section of the tracks

2.2.2. Attaching the track wheels

The track wheels are mounted using two screws for each wheel truck.



2.2.2. - *Fixing the screws*

2.2.3. Moving the dolly

First the starter ramps must be laid on the sleepers. The dolly is then slowly rolled onto the tracks.



2.2.3.a - Dolly moving onto the ramps

Make sure that the track wheels are seated properly on the tracks before the pneumatic wheels are moving down the ramp.



2.2.3.b - Track wheels moving on tracks

2.2.4. Securing the track ends

The ends of the track must be secured to prevent the dolly unintentionally rolling off. A buffer must be fixed at both ends.



2.2.4. - Fixing buffer

2.3. Column

2.3.1. Mounting onto the dolly

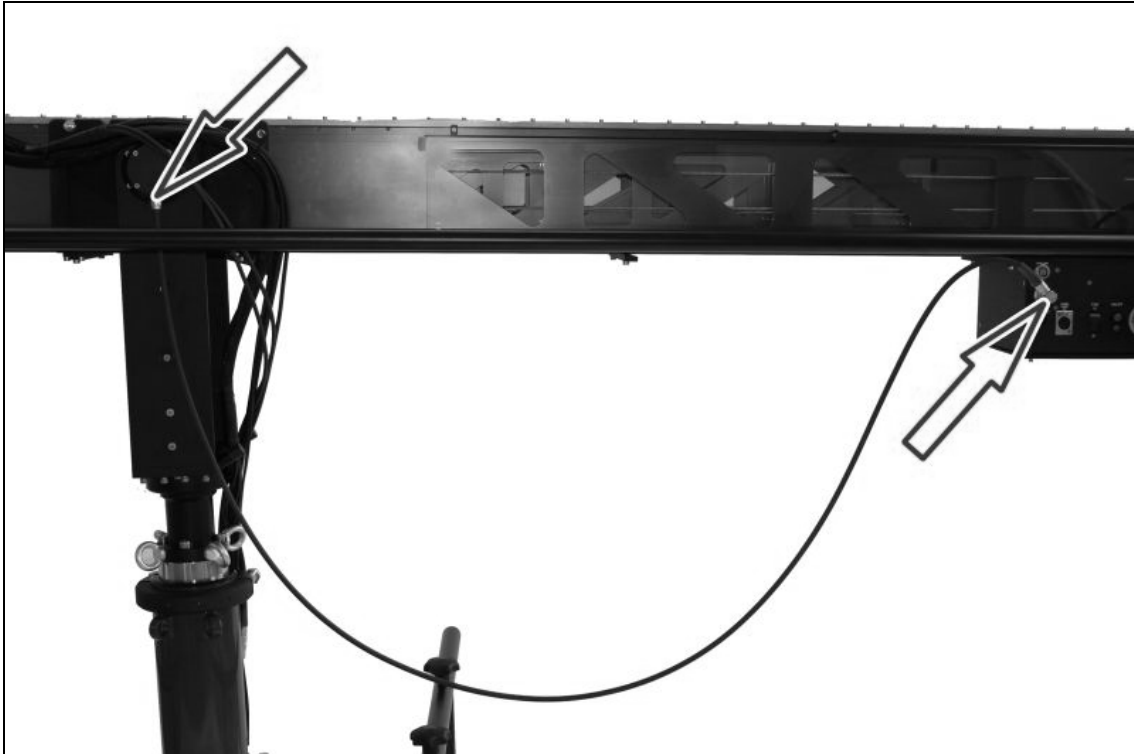
The column is mounted onto the dolly by means of four nuts.



2.3.1.a - Placing column onto the dolly

2.3.2. Inserting the center cable

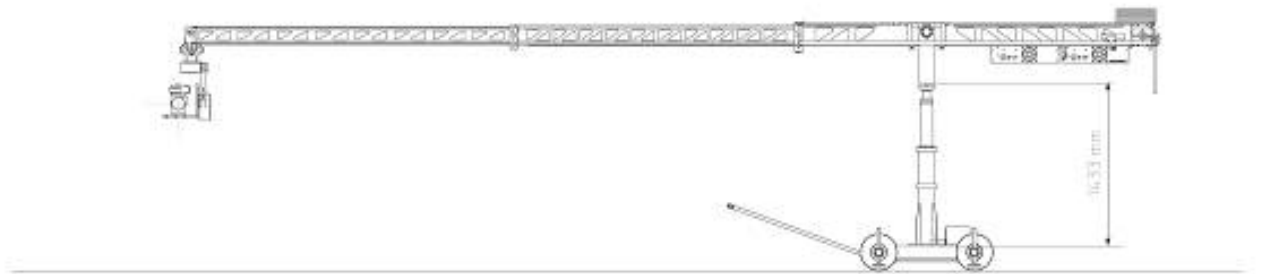
In the crane's tilt axis there is a sensor which automatically controls the camera horizon. For this to work, the center cable, which links the sensor and the electronics unit, must be plugged in.



2.3.2 - Center cable

2.3.4. Extending the telescopic column

The crane is mounted on a telescopic column which can be raised 40 cm on a spindle. This upward extension allows the crane to be tilted higher, giving the operator an additional camera lens height of 2 meters.



2.3.4.a - Drawings of the crane extended, one with column in, one with it out

First the four screws on the locking rings must be loosened.



2.3.4.b - Opening screws

Then the horizontal crane brake must be locked.



2.3.4.c - Locking the horizontal brake

Then the inner column can be raised or lowered with a 24 mm ratchet or by using battery-powered drill.



2.3.4.d – Ratchet moves column

Caution: Do not use drive the inner column with excessive force against its mechanical buffer plate. To prevent this, do not use a mains-supplied power drill because this can destroy the buffer plate.

When brought to the desired height, the four screws on the locking rings must be re-tightened so that the inner column is clamped firmly into the outer column.



2.3.4.e - Locking screws

2.3.5. Horizontal friction clamp

The horizontal friction clamp is located at the top end of the inner column and is tightened with a 24 mm spanner.



2.3.5. - Locking horizontal brake

2.3.6. Vertical friction clamp

Friction can be introduced into the tilt axis by turning the lever.



2.3.6.a - Locking tilt brakes

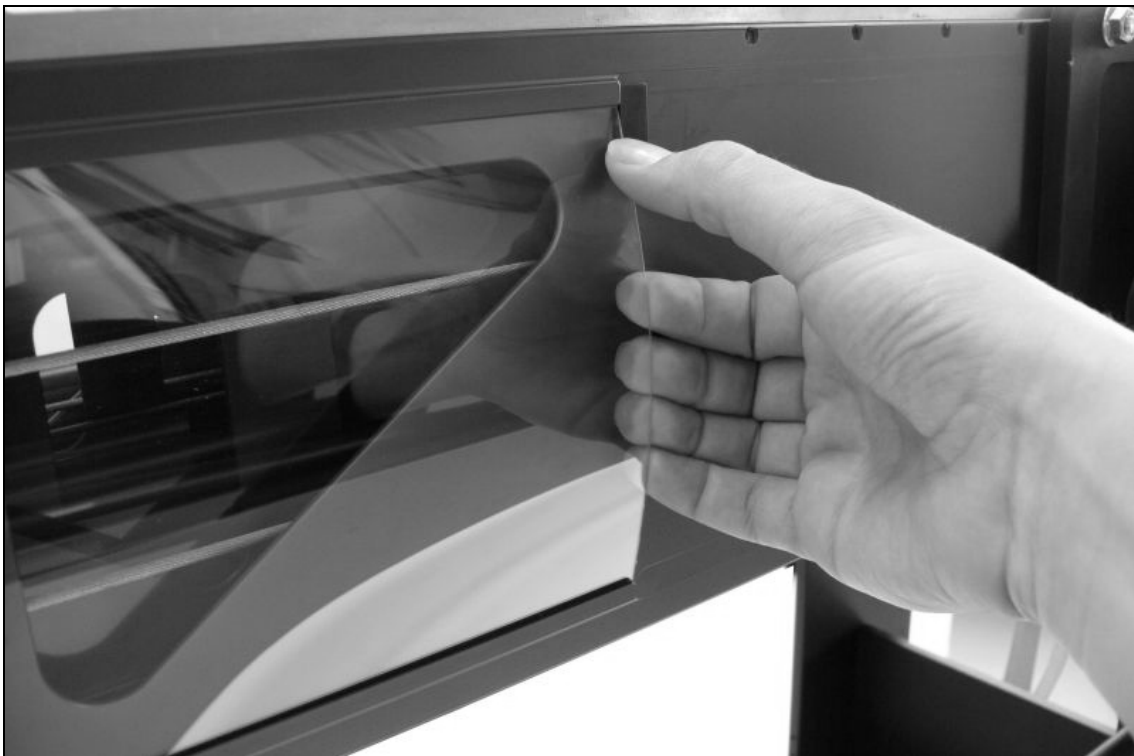
2.4. Beam sections

2.4.1. Removal of the transparent protective covers

The plastic protective covers have to be removed from the beam sections to enable servicing and cleaning. It is usually sufficient to remove only the side covers.



Important: BEFORE REMOVING THE PLASTIC PROTECTIVE COVERS ALWAYS SWITCH OFF THE ELECTRONICS AND PULL OUT THE PLUG FROM THE POWER SOCKET TO PREVENT ANY RISK OF THE CRANE MOVING UNINTENTIONALLY AND CAUSING INJURY TO SOMEONE.



2.4.1.b – Taking off the plastic shield



Important: AFTER EVERY SERVICE ALWAYS REPLACE THE PLASTIC PROTECTION SHIELDS. THERE IS ALWAYS A DANGER THAT PERSONNEL OR MEMBERS OF THE PUBLIC WILL TOUCH THE CRANE BEAM AND INJURE THEIR HANDS ON ITS MOVING SECTIONS.

2.5. Rollers

2.5.1. Quiet and smooth movement

Outside and inside tracks are attached to the beams. The beam sections telescope by running on inner and outer rollers along these tracks.



2.5.1.a - Inner rollers



2.5.1.b - Outer rollers

A quiet and smooth sliding movement, which is essential for perfectly smooth camera work, requires clean and lubricated tracks and rollers. Any dirt must first be carefully removed from the tracks and rollers with a degreasing cleaning agent.



2.5.1.c - Cleaning tracks



2.5.1.d - Cleaning rollers

Then a fine film of grease is applied (using a brush for best results) to the tracks.



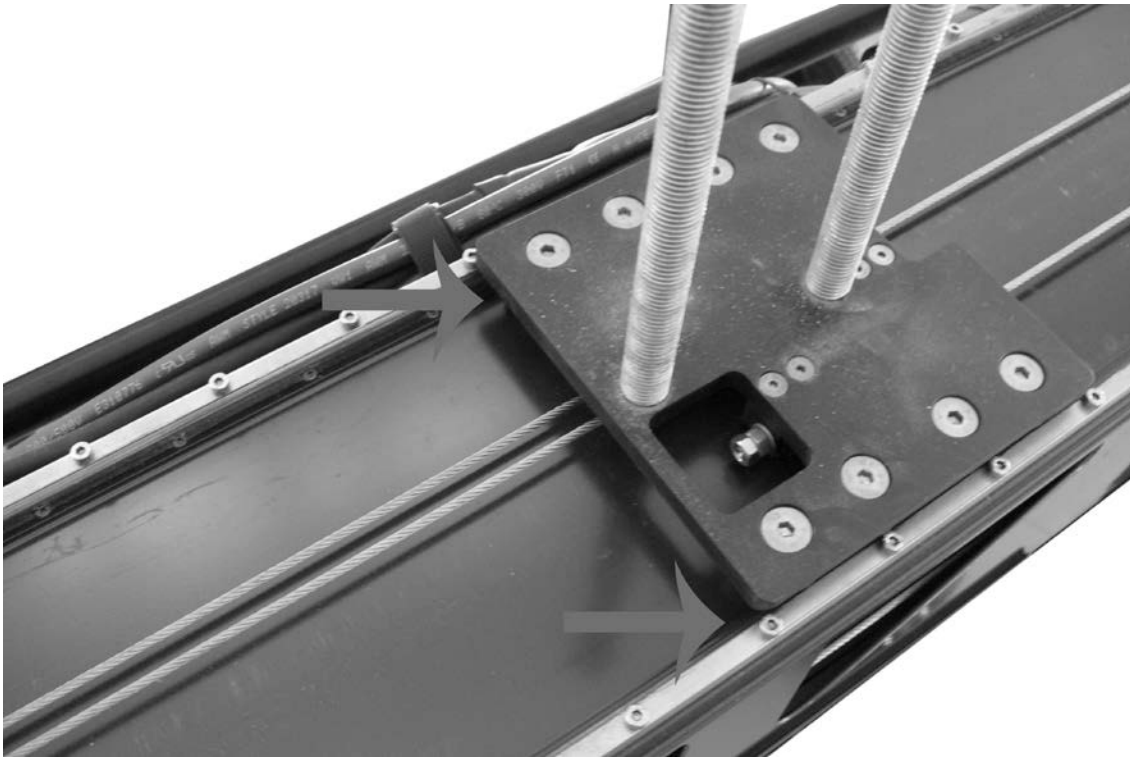
2.5.1.e – Greasing the tracks with a brush

When cleaning it is important not to forget the inside tracks, even though they are less accessible. They carry the same load as the outside tracks and are therefore equally important for smooth movement.



2.5.1.f – Cleaning inside tracks

It is also important to clean the tracks along which the counterweight carriage rides on the first beam. These tracks carry a moving load of 600 kg. Any dirt will cause slight vibrations that are transferred to the film image.



2.5.1.g - Cleaning the counterweight tracks

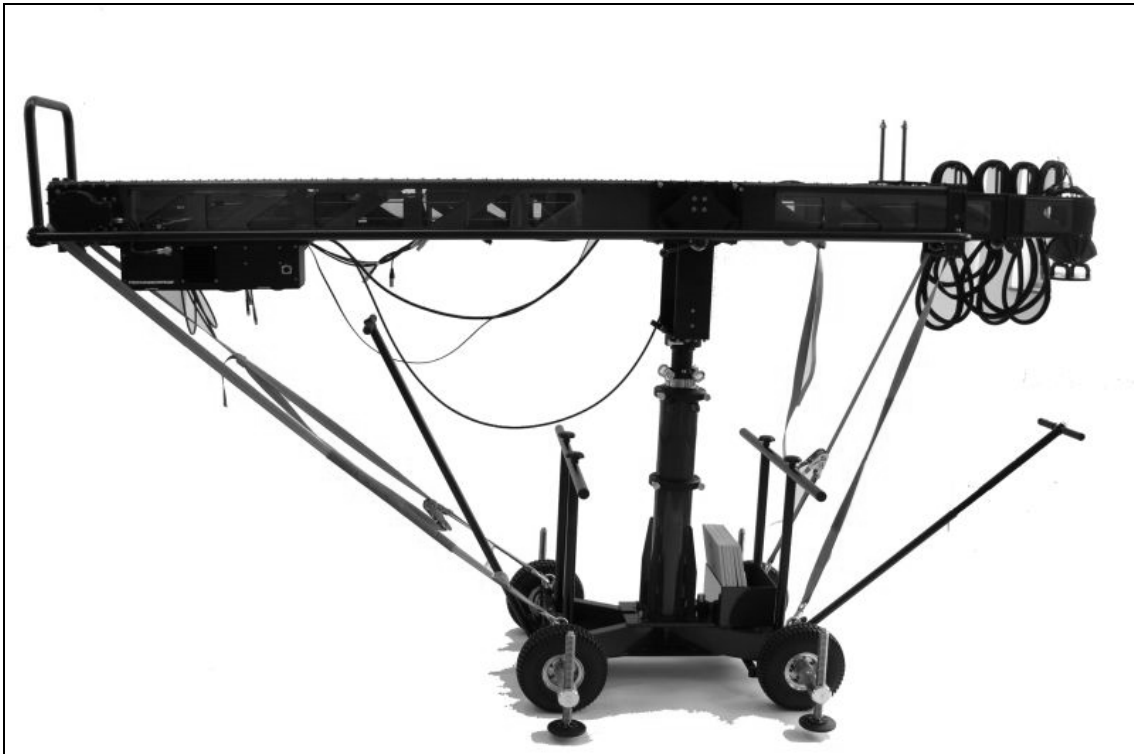
2.6. Counterweights

2.6.1. Balancing the crane

On a crane of fixed length the camera is mounted and then the counterweights are successively added until the crane is balanced. In the case of a telescopic crane, the counterweight carriage slides inwards and outwards to balance the crane at every length. For this reason the initial balancing of a telescopic crane is significantly different:

First step:

First make sure that the beam is secured by the two ratchet straps.



2.6.1.a - New Technocrane with straps

Second step:

With the crane fully retracted, the camera, with all its accessories and wires attached, is mounted on the remote head.

Third step:

The various counterweights are attached in accordance with the following table (approximately):

New Technocrane with Z-HEAD (Pan and Tilt)

Camera	Quantity of flat weights	Position of carriage	Sliding weights
5 kg	11 pcs + 1/4	Front	Front
10 kg	12 pcs + 1/4	Middle	Middle
15 kg	13 pcs + 1/2	Middle	Back

Final step:

Slowly extend the beam. If the crane is heavier at the front, whole or smaller weights should be added to counterweight carriage.

If the crane is heavier at the rear, whole or smaller weights should be taken off the counterweight carriage.

This procedure is repeated until the crane is perfectly balanced along the full length of its movement.

2.7. Autohorizon

2.7.1. Attaching the autohorizon gear

The autohorizon is mounted on the end beam section with 8 screws. By releasing all 8 screws the autohorizon can be easily removed.



2.7.1. - Four screws on the right

2.8. Z-head

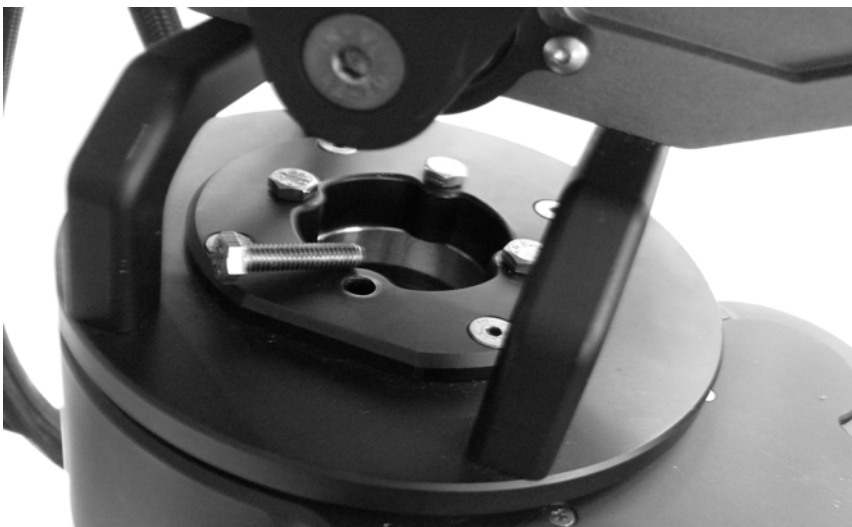
2.8.1. Attaching the remote head

The remote head is bolted on by tightening three nuts through the Mitchell base plate on the auto horizon. Make sure that the rounded side of the nut fits into the countersink at the hole.

2.8.1.a – Mounting head



2.8.1.b - Detail of nut and hole



The remote head can be leveled using the three threaded bolts.



2.8.1.c – Leveling the head

2.8.2. Attaching the camera

The camera's base plate is attached to the remote head with two 3/8" screws.



2.8.2.a - Mounting camera at base plate

The camera must also be secured with a non-flammable safety belt to prevent it from falling. This would not only harm the camera and anybody or anything beneath it, but would also cause the crane to become unbalanced with potentially disastrous consequences.

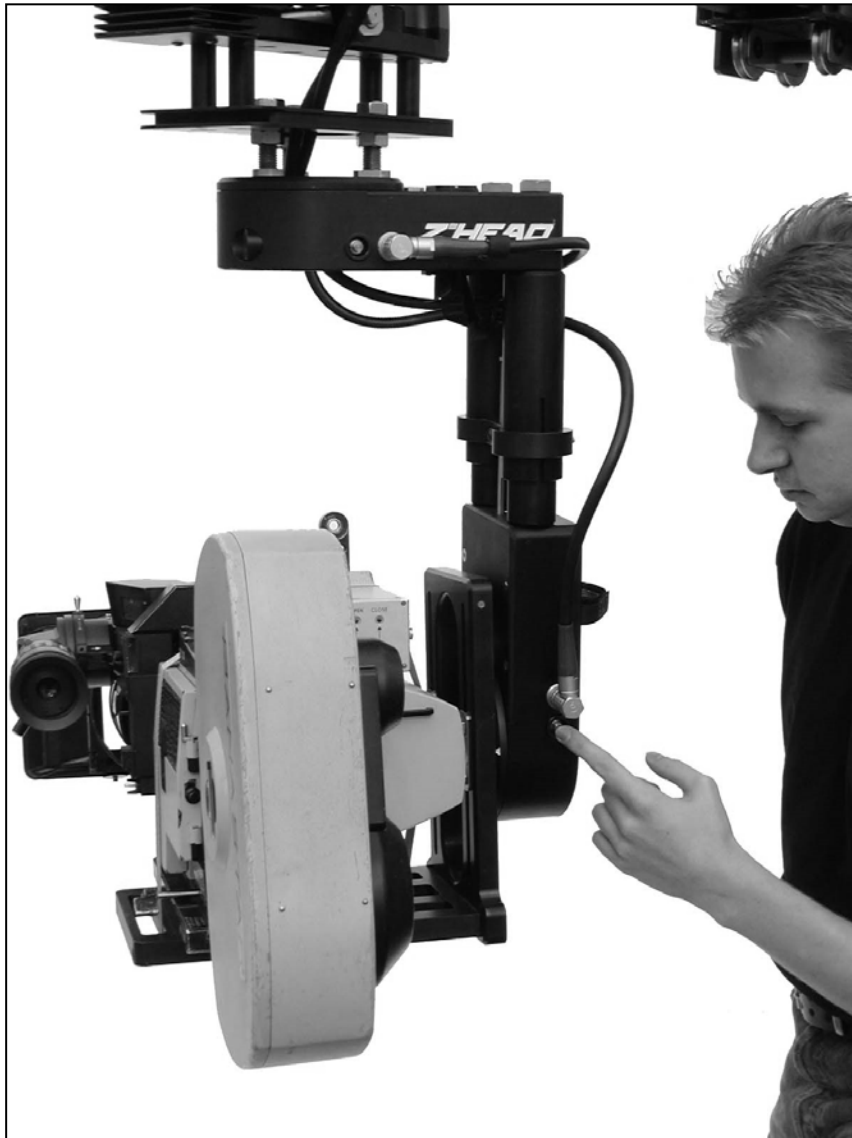


2.8.2.b - Securing the camera with a strap

2.8.3. Balancing the camera (tilt)

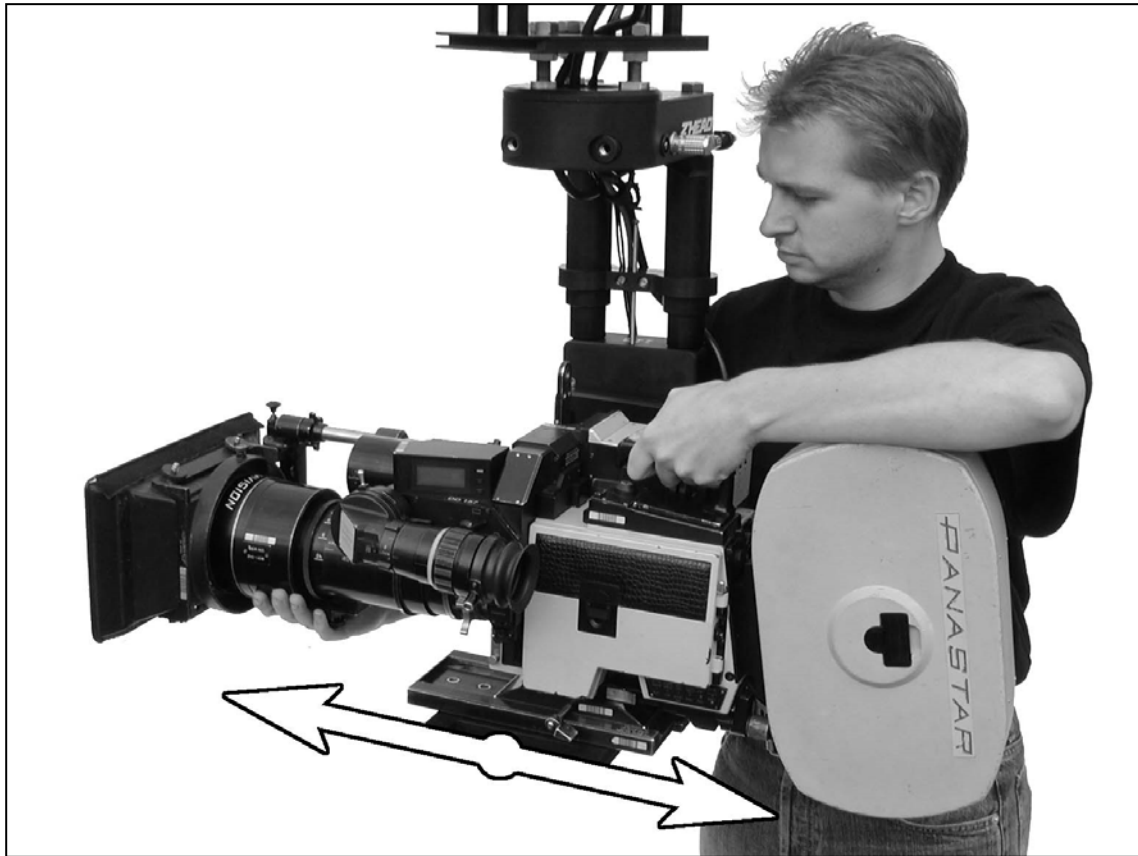
The camera must be attached to the remote head as close to its center of gravity as possible. The camera can be slid back and forth to find this point.

The remote head can be moved freely by switching off the crane's power or by disengaging each head motor



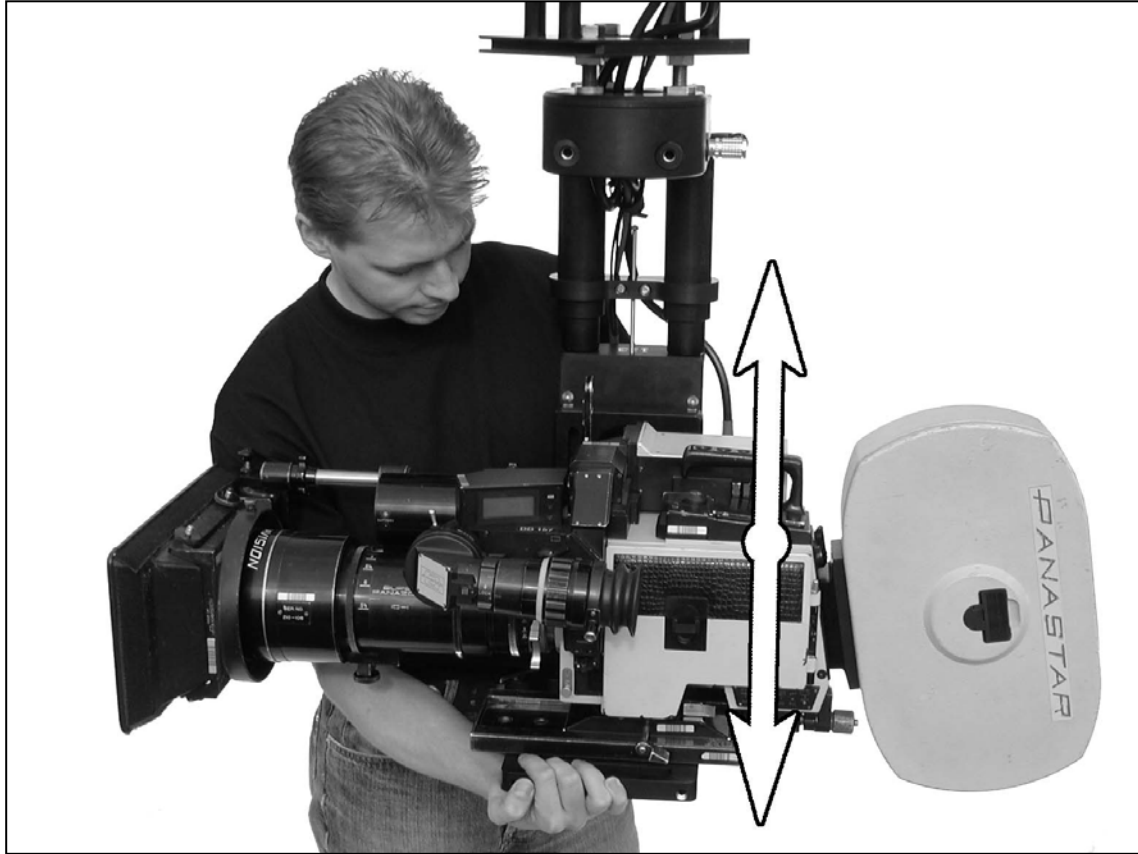
2.8.3.a - Balancing

First slide the camera back and forth on the camera plate until the camera remains horizontal (find its horizontal center).



2.8.3.b - Moving camera back and forth

Then raise and lower the camera on the vertical adjustment plate until the camera remains balanced and stationary at all tilt angles (find its vertical center).



2.8.3.c – Moving camera up and down

2.8.4. Adjusting to the camera size

After the camera has been balanced, the Z-head is adjusted to the size of the camera in use. Open the clamping jaws of the slide pipe and slide the camera to the point where a 360 degree tilt is still possible. It is very important that both sides of the cage be adjusted evenly, if a two-sided cage is being used. The more compactly the remote head is assembled; the better is the performance of the camera.



2.8.4. – Moving raiser up and down

2.8.7. Wiring

The remote head can turn three times on its pan and tilt axis. To avoid any damage to the wiring, all electrical cables must be passed through the hollow axles and secured to the fixing points.



2.8.7.a - Cables at pan, tilt and roll



2.8.7.b - Recommended fixing points for cables

2.9. Electronics unit

2.9.1. Assembly of the electronics unit

The electronics unit should be lifted by at least two people and carefully fitted into the mounting holes and guides.



2.9.1.a - Lifting unit into crane

2.10. Telescope hand control

2.10.1. Operating

The telescope hand control is connected by cable to the electronics unit. If the crane operator works from the rear end of the crane he should use the short cable. If he has to work at the camera-head, he should use the long cable. The two cables can also be plugged together for extra length.

The crane operator controls the telescoping speed of the camera by means of the rocker switch on the telescope hand control.



2.10.1.a – Telescope hand control unit

Using the potentiometer on the rear of the hand control, the crane operator can pre-select the speed range on the hand control.

The crane can be switched off from the telescope hand control using the red emergency cut off button.

2.11. Cable trolleys

2.12.1. Securing the cables

All cables that lead to the autohorizon and to the remote head and camera must be secured on the cable trolleys with Velcro cable wraps or cable ties. Additional cables, such as Triax for video cameras, may be added. The cables must always be bundled neatly to form a harness so that cables are not left hanging loose. Loose cables may get caught and pulled into the beam sections while the crane is retracting, causing the crane to malfunction.



2.12.1.a - Mounting additional cables at wagon

When the cable harness has been re-hung on the crane, check carefully by hand to make sure the cables are not under tension when the crane is extended to its maximum length. All the harness loops must be equally spaced, and hang equally.



2.12.1.b - Loops along beams (max. extended)