

Telescopic Camera Crane

SUPERTECHNO

50

Technocrane s.r.o.
Podnikatelska 19
CZ-30100 Plzen
Czech Republic
Tel. + 420 – 377 889 111
Fax + 420 – 377 889 100
e-mail: info@supertechno.com
www: supertechno.com

Emergency contacts:

For mechanical questions or for spare parts:
martin@supertechno.com
Martin Martinovsky: + 420 – 602 45 28 92

For questions on electronic or for spare parts:
jan@supertechno.com
Jan Kucera: + 420 – 602 34 53 76

Manual

Part 1

Safety information

Part 2

Mechanics

Part 3

Electronics (printed version only)

Part 4

Connectors

Supertechno, Techno15 and Technodolly are the registered and protected trademarks of Orion s.r.o./Technocrane s.r.o.

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

DE 3815342 C1

EU 02015890.3 (EP 1298087)

US no. 10/254,029

Contents

Part One.....	6
Safety information.....	6
1.1. Safety straps	7
1.2. Leveling jacks	10
1.3. Securing the counterweights	11
1.4. Securing the beam sections	12
1.5. Cleaning and maintenance	13
1.6. Protective covers.....	13
1.7. Outside shooting	13
Second part.....	14
Mechanics.....	14
2.1. Dolly	14
2.1.1. Leveling jacks	14
2.1.2. Fitting the leveling jacks.....	15
2.1.3. Leveling of the dolly	16
2.1.4. Pushbars	18
2.1.5. Pressure in wheels	19
2.2. Tracks and track wheels	20
2.2.1. Laying of tracks	20
2.2.2. Attaching the track wheels.....	21
2.2.2. Attaching the track wheels.....	22
2.2.3. Moving the dolly	23
2.2.4. Mounting the side rails.....	24
2.2.5. Securing the track ends	25
2.3. Telescopic column	26
2.3.1. Extending the telescopic column.....	26
2.3.2. Door height	28
2.3.3. Plugging in the centre cable.....	31
2.3.4. Battery	32
2.3.5. Horizontal friction clamp	34
2.3.6. Vertical friction clamp	35
2.3.7. Attaching the cables	36
2.3.8. Attaching the encoders.....	37
2.4. Beam sections	38
2.4.1. Removal of the transparent protective covers	38
2.5. Rollers.....	40
2.5.1. Quiet and smooth movement.....	40
2.6. Drive cables.....	45
2.6.1. Tensioning the drive cables	45
2.6.2. Tensioning the motor drive belt.....	50
2.6.3. Tensioning the chain	51
2.7. Counterweights	53
2.7.1. Balancing the crane	53
2.7.2. Tensioning the counterweight cable.....	60

2.8. Autohorizon.....	62
2.8.1. Attaching the autohorizon gear.....	62
2.9. Z-head.....	63
2.9.1. Attaching the remote head	63
2.9.2. Attaching the camera.....	65
2.9.3. Balancing the camera (tilt).....	67
2.9.4. Adjusting to the camera size.....	71
2.9.5. Assembly of the third axis (roll).....	72
2.9.6. Balancing the camera in the third axis (roll).....	73
2.9.7. Wiring	75
2.10. Electronics unit	77
2.10.1. Assembly of the electronics unit	77
2.10.2. Connecting	79
2.10.3. Switching on	82
2.10.4. Automatic cut-out.....	84
2.10.5. Error numbers	85
2.11. Telescope hand control.....	87
2.11.1. Operating.....	87
2.12. Counterweights trolley	90
2.13. Cable trolleys	91
2.13.1. Securing the cables.....	91
2.14. Rain cover	93
2.14.1. Putting cover over the first beam	93
2.14.2. Putting cover over the dolly.....	97
2.14.3. Assembling the bellows	98
2.15. Desk.....	103
2.15.1. Assembly.....	103
2.15.2. Connecting	106
2.15.3. Switching on	106
2.15.4. Hand-wheels	107
2.15.5. Joystick.....	108
2.15.6. Focus and zoom.....	110
2.15.7. Roll	111
2.15.8. Potentiometer panel.....	115
2.16. Roll pedal	116
2.16.1. Operation.....	116
2.17. Pan bars	117
2.17.1. Transportation.....	117
2.17.2. Assembly.....	117
2.17.3. Connecting leads	128
2.17.4. Operation.....	129

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 700 kg, and the crane weighs as much as 2.5 t. Only when they are in a state of balance can these forces be properly controlled.

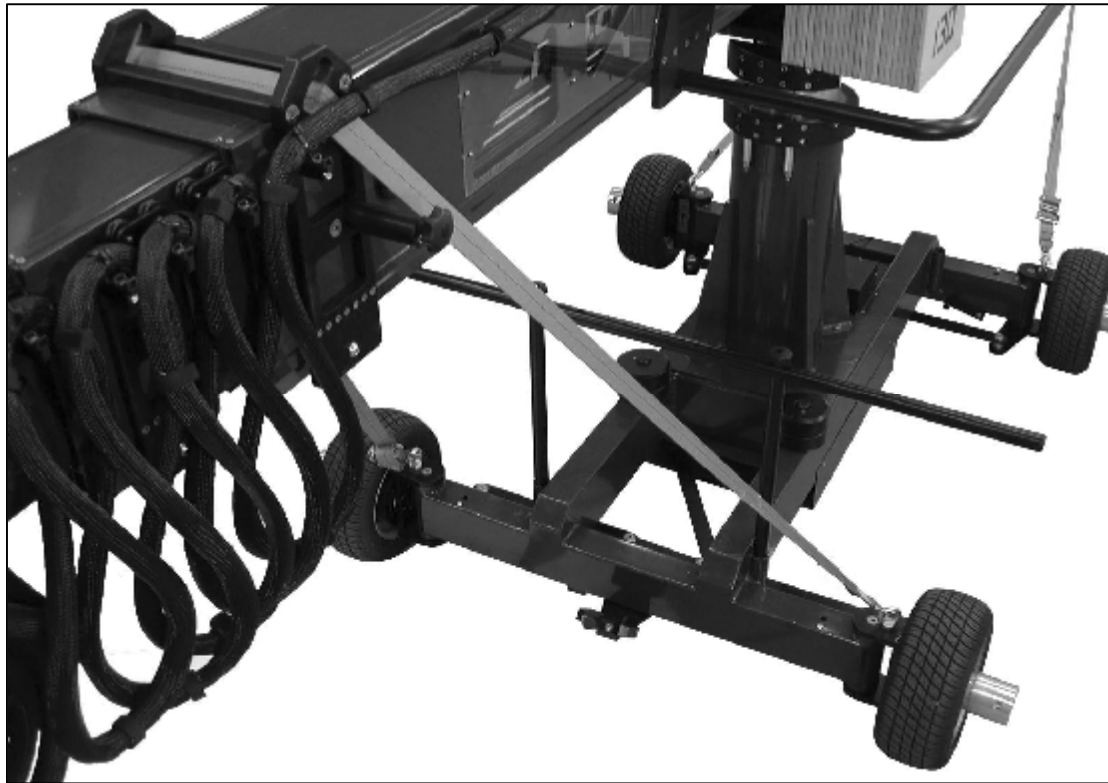
Important safety precautions

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

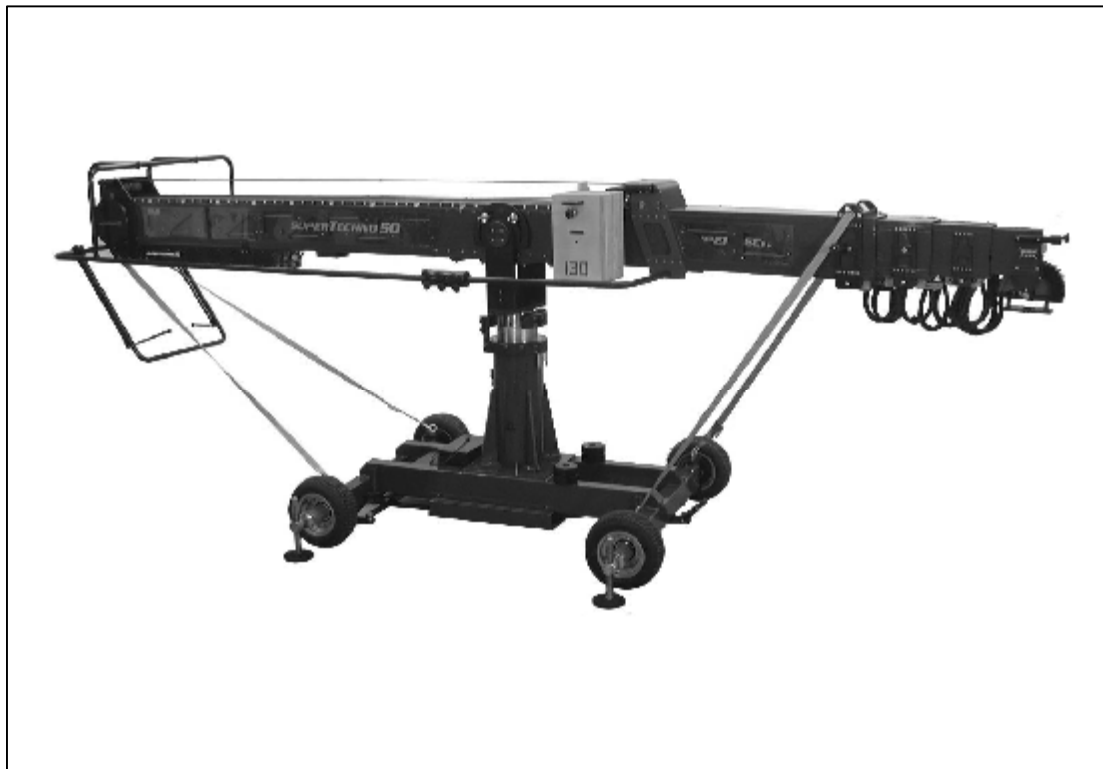


1.1.c - Strap at back hole

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 - ST50 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

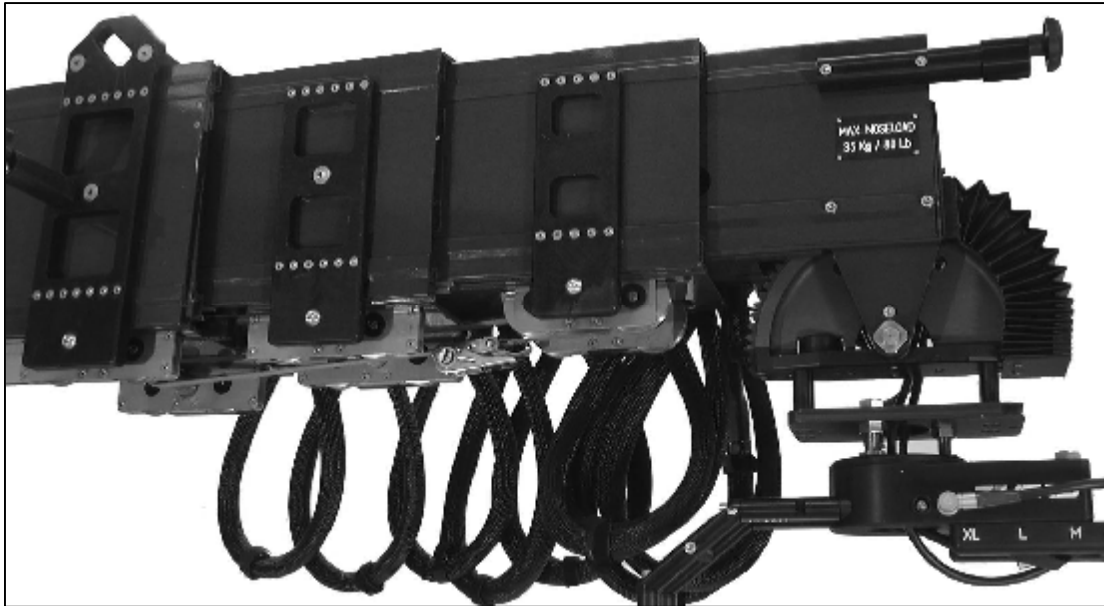
The counterweights should always be secured by their retaining bolts to prevent them falling off.



1.3. - Putting universal screw M 16x400 with nut at counterweights

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.



1.4.a - Strap between beams



1.4.b - Strap at autohorizon – don't use like this

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.a - Jack moving into wheel



2.1.2.b - Nut putting on the jacks

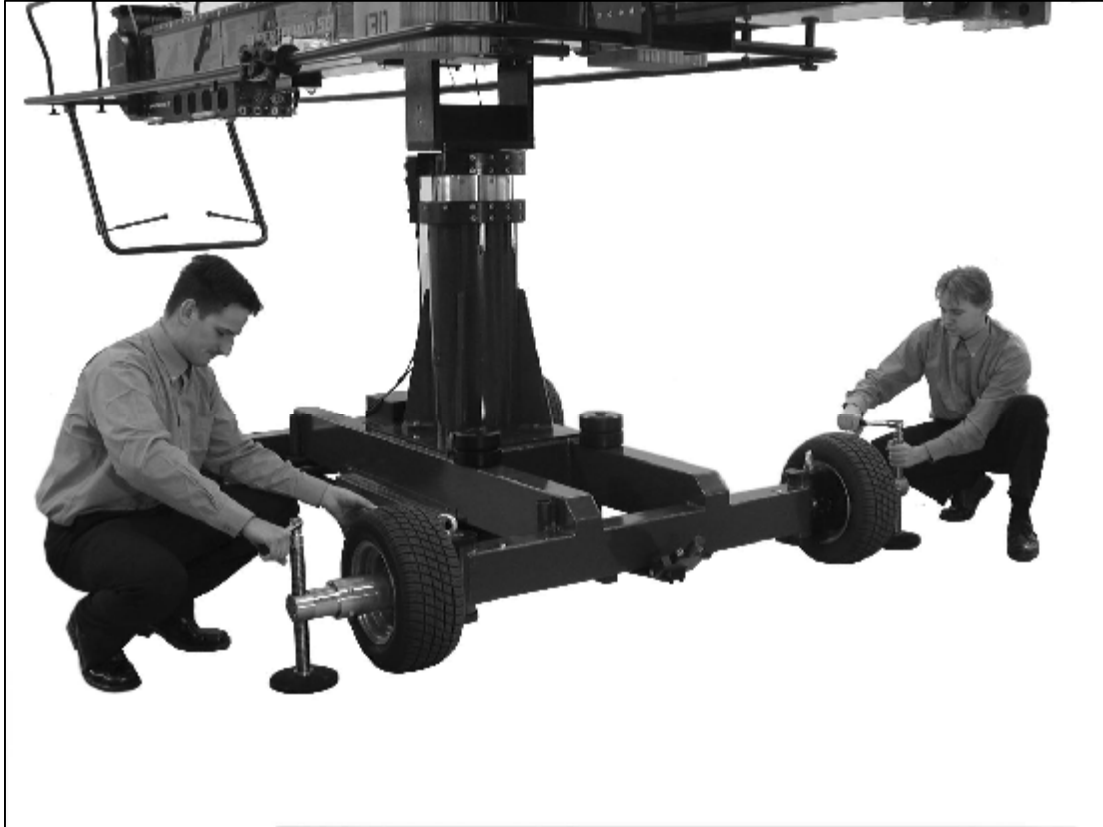
2.1.3. Leveling of the dolly

Before levelling the dolly the steering must be locked by the locking bar.



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.



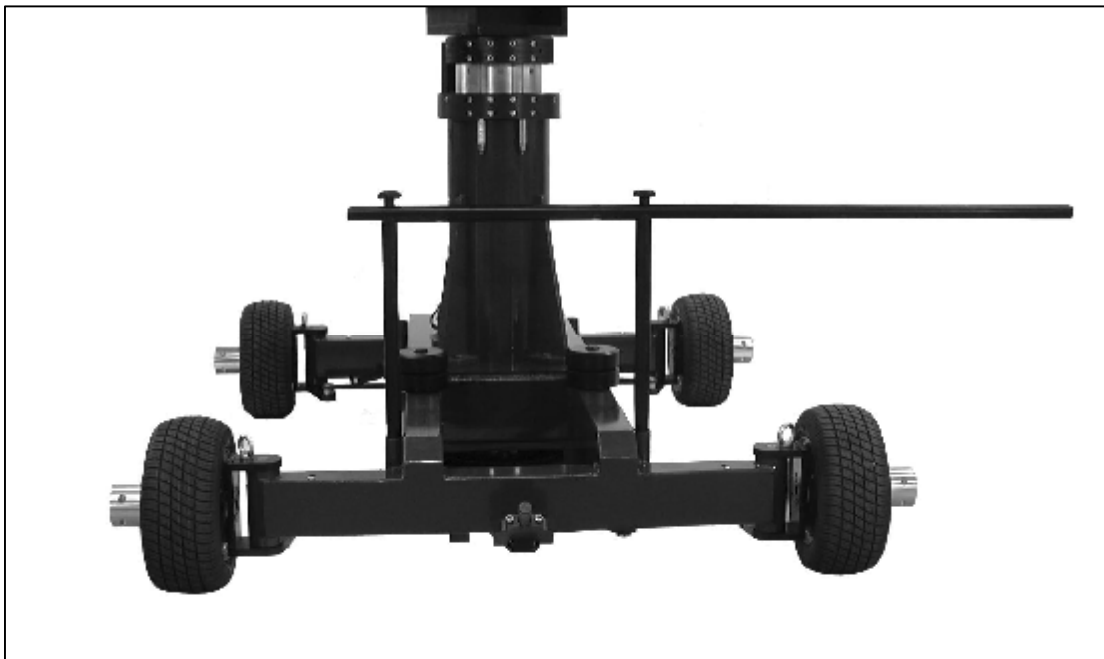
2.1.3.b – Moving jacks up

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



2.1.4.b - Top pushbar to one side

2.1.5. Pressure in wheels

Dolly	630 kPa
Counterweights trolleys	300 kPa
Desk	300kPa

2.2. Tracks and track wheels

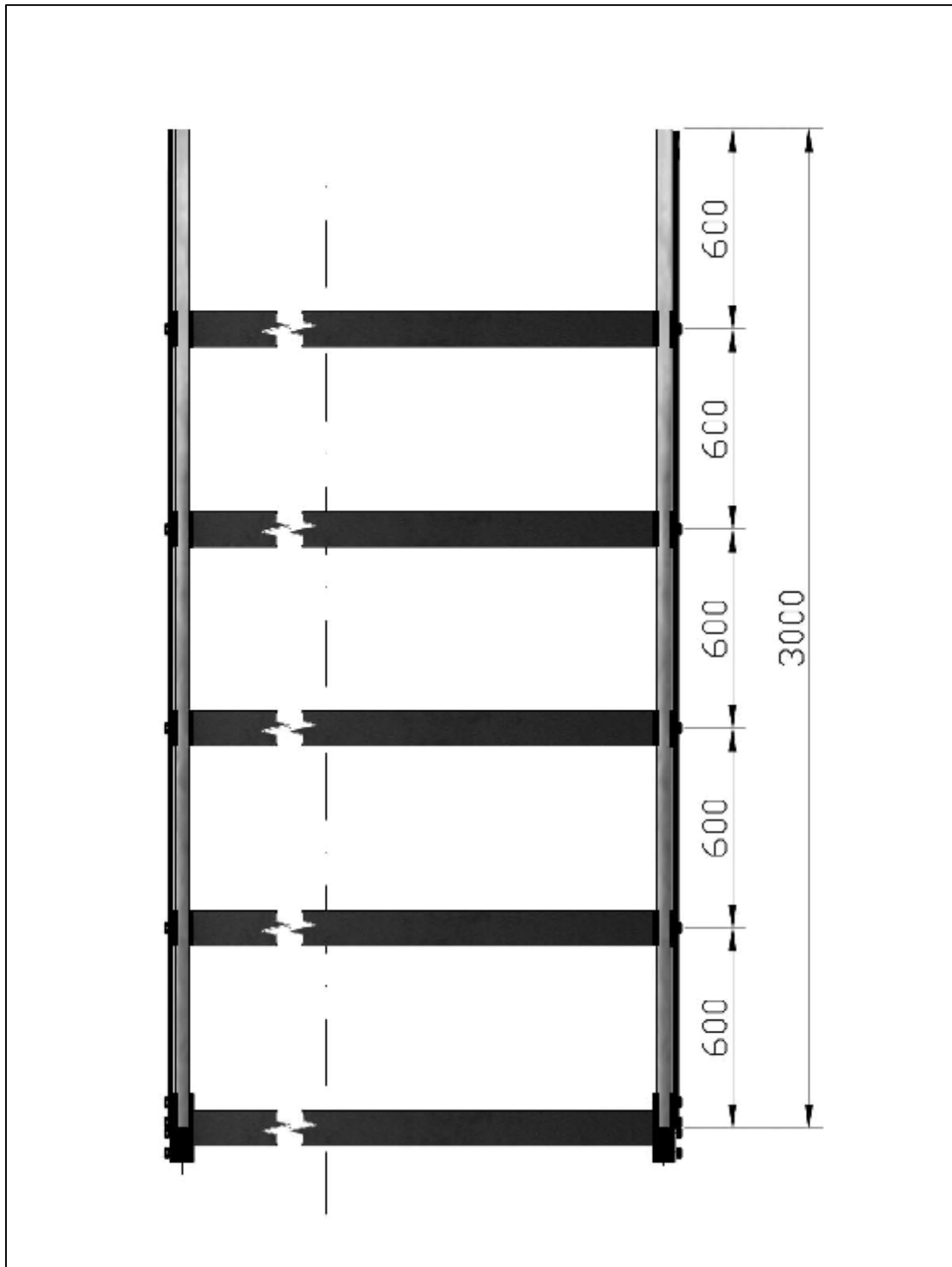
2.2.1. Laying of tracks

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 (2500 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

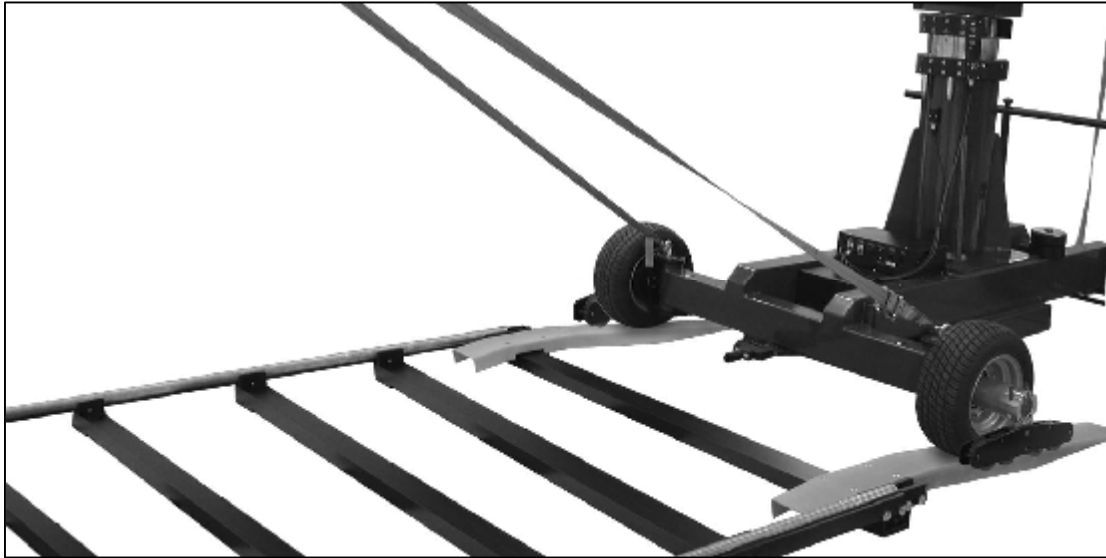
The track wheels are mounted using two screws for each wheel truck.



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. Mounting the side rails

With a weight of 2.5 t the tracks must be connected to side rails. The side rails also ensure the correct distance between the track sleepers.



2.2.4.a – ST50 tracks, assembly of side rails

2.2.5. 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.



2.2.5. - Fixing buffer

2.3. Telescopic column

2.3.1. Extending the telescopic column

The column has two inner columns, which are extended telescopically with a battery-powered motor. To raise or lower the column this respective switches must be pressed until the required position is reached. At the highest and lowest points the movement is automatically halted by electric cut-offs.



2.3.1.a – Pushing button up



2.3.1.b – Pushing button down



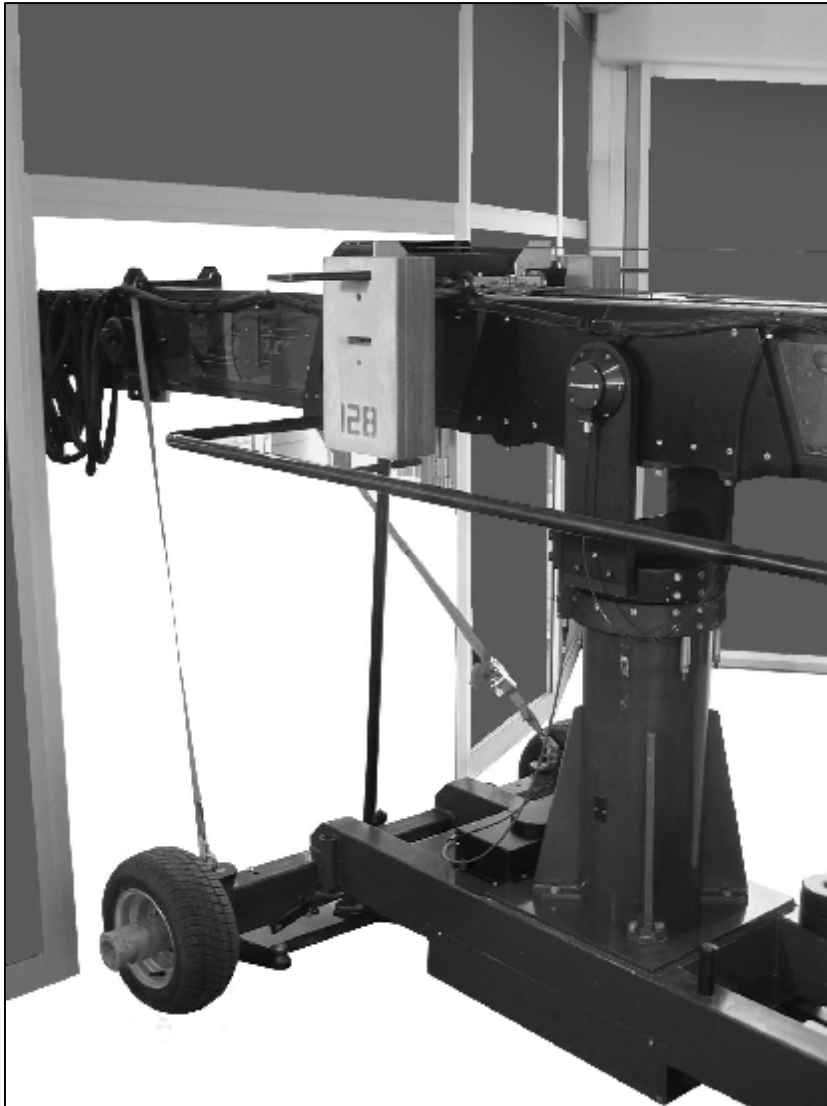
2.3.1.c – Total column in



2.3.1.d – Total column out

2.3.2. Door height

SUPERTECHNO50 has a minimum height of 2.10 metres and can therefore pass through standard double-doors.

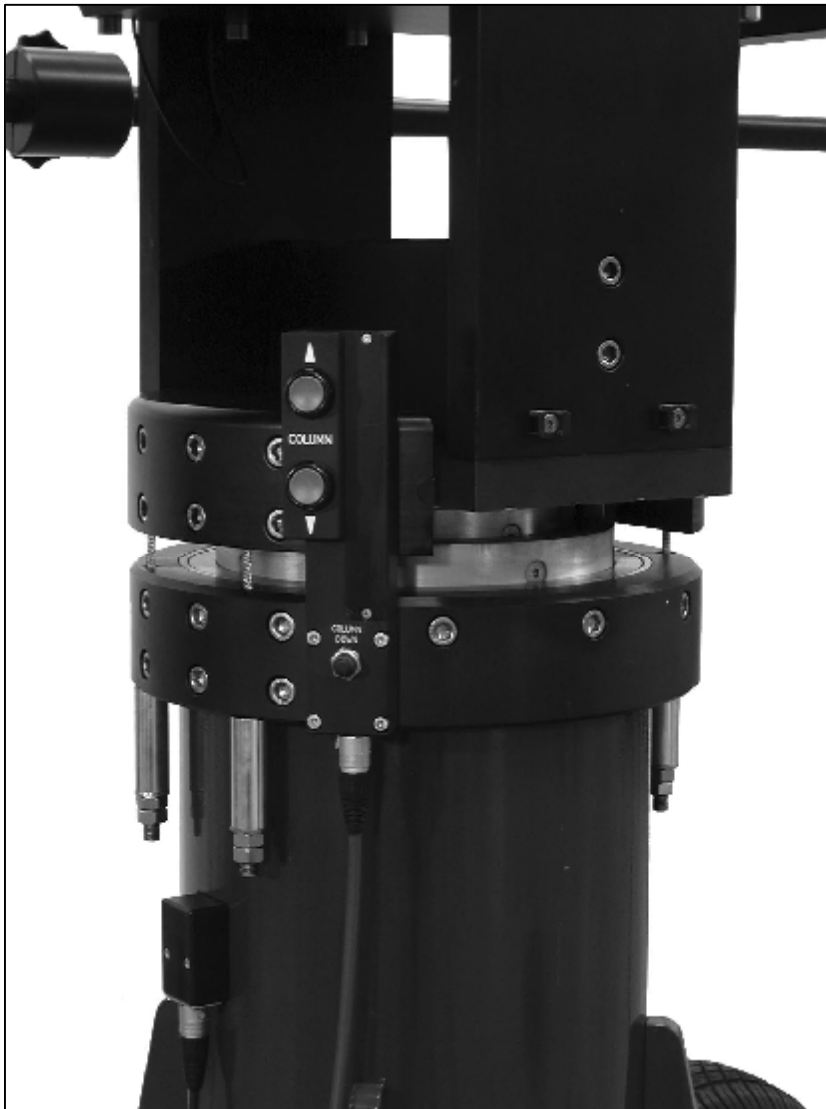


2.3.2.a – Crane passing door, dimension: “2.1 m”

To achieve minimum height, the column must be brought into “door height” position, which is lower than the retracted end position. This “down” switch must be pressed while holding the green switch AND MAKING SURE THAT THE CRANE FORK IS POSITIONED TO PASS EXACTLY INTO THE SLIT PROVIDED FOR THIS PURPOSE.



2.3.2.b –Pushing both buttons



2.3.2.c – Fork moves into the column for door height

After the crane has passed through a door the column must immediately be raised again to its normal minimum height, so that the fork re-emerges from the slit and the crane can pan freely.

The crane must never be transported or panned in the “door height” position because movement in the retracted fork would cause serious damage to the column.

2.3.3. Plugging in the centre cable

Located in the crane's tilt axis is a sensor that automatically controls the camera horizon. For this to work the centre cable connecting the sensor and the electronics unit must be plugged in.



2.3.3. – Centre cable

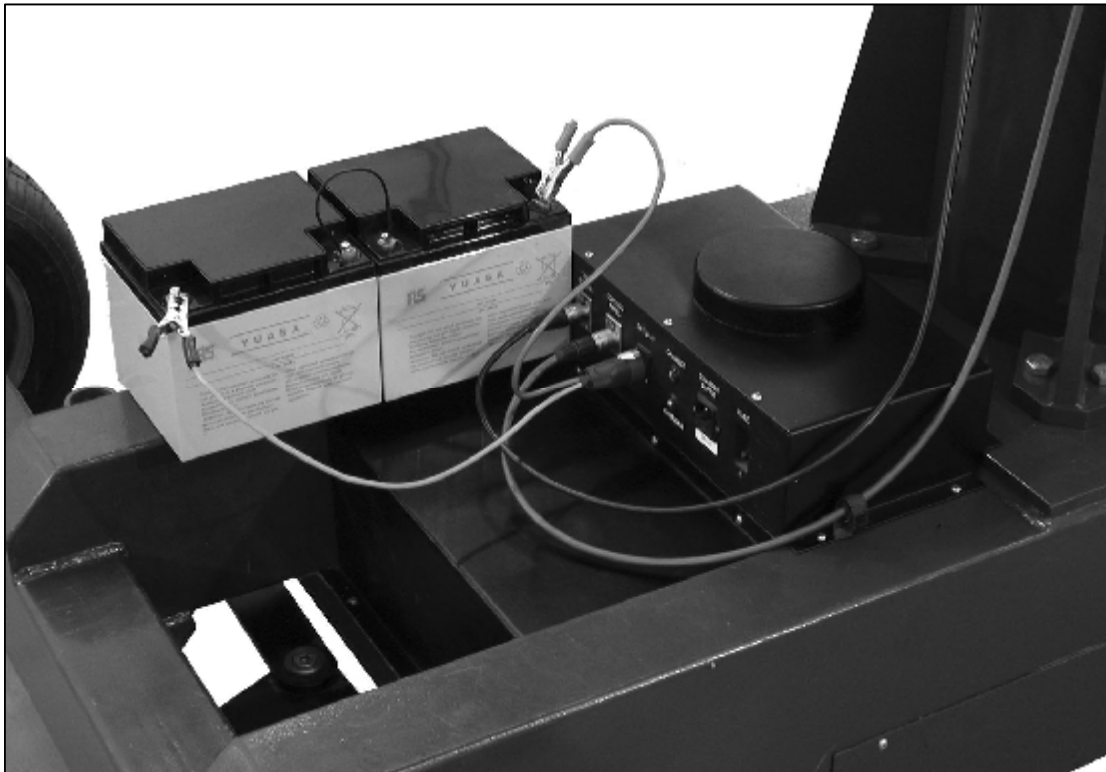
2.3.4. Battery

When the crane is switched on and the connecting cable plugged in, the battery for the column motor will be continuously charged.



2.3.4.a – Cables at column

The column motor can also be powered by an external battery connected via another cable.



2.3.4.b – Column with external battery and cable

2.3.5. Horizontal friction clamp

The brake blocks are fitted in the top end of the innermost column. This must be adjusted by tightening the four brake screws with a long Allen key.



2.3.5. – Locking pan brakes

2.3.6. Vertical friction clamp

The crane's tilting action can be retarded by the two hand-levers.



2.3.6. – Locking tilt brakes

Caution: never leave the handle in the upright position, because it could be broken off by the counterweight carriage moving past.

2.3.7. Attaching the cables

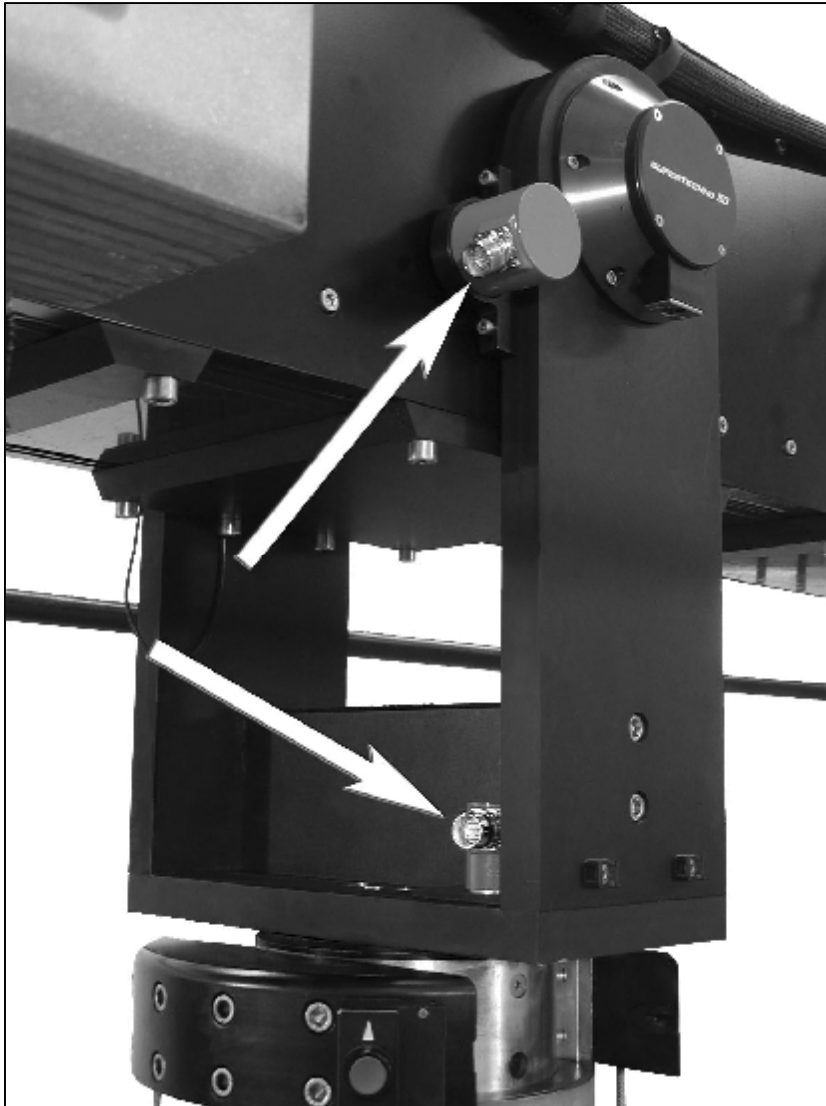
It is important that all cables leading away from the crane are well secured to the fork with the cable loops. This prevents the plugs in the electronics unit from being pulled out.



2.3.7. – Cable loop at fork

2.3.8. Attaching the encoders

The crane's panning and tilting axes can be fitted with encoders which read out the position of the beam.



2.3.8. –Encoder at crane pan and tilt

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.

To take off the protective covers first loosen the fastening screws by one turn. The covers can then be shifted sideways and removed.



2.4.1.a – Screw being loosened



2.4.1.b – Taking off the plastic shield



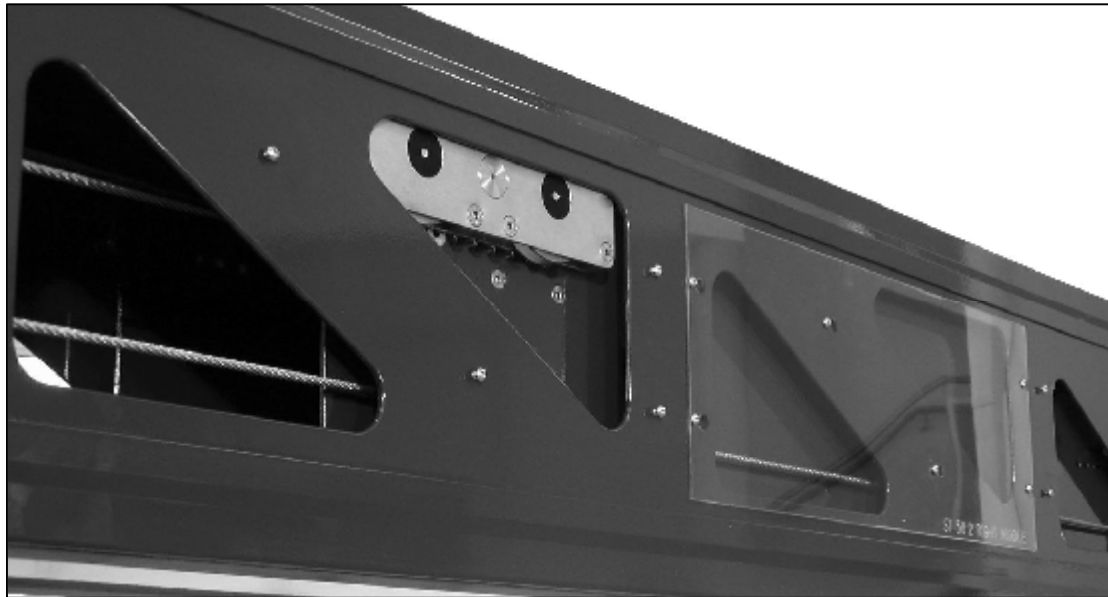
Important: AFTER EVERY SERVICE ALWAYS REPLACE THE PLASTIC PROTECTION SHIELDS. THERE IS ALWAYS A DANGER THAT PERSONNEL OR MEMBERS OF THE PUBLIC WILL TOUCH THE CRANE BEAM AND INJURE THEIR HANDS ON ITS MOVING SECTIONS.

When the plastic protective covers have been put back into position do not turn the screws too tight. This might damage the protective covers.

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.

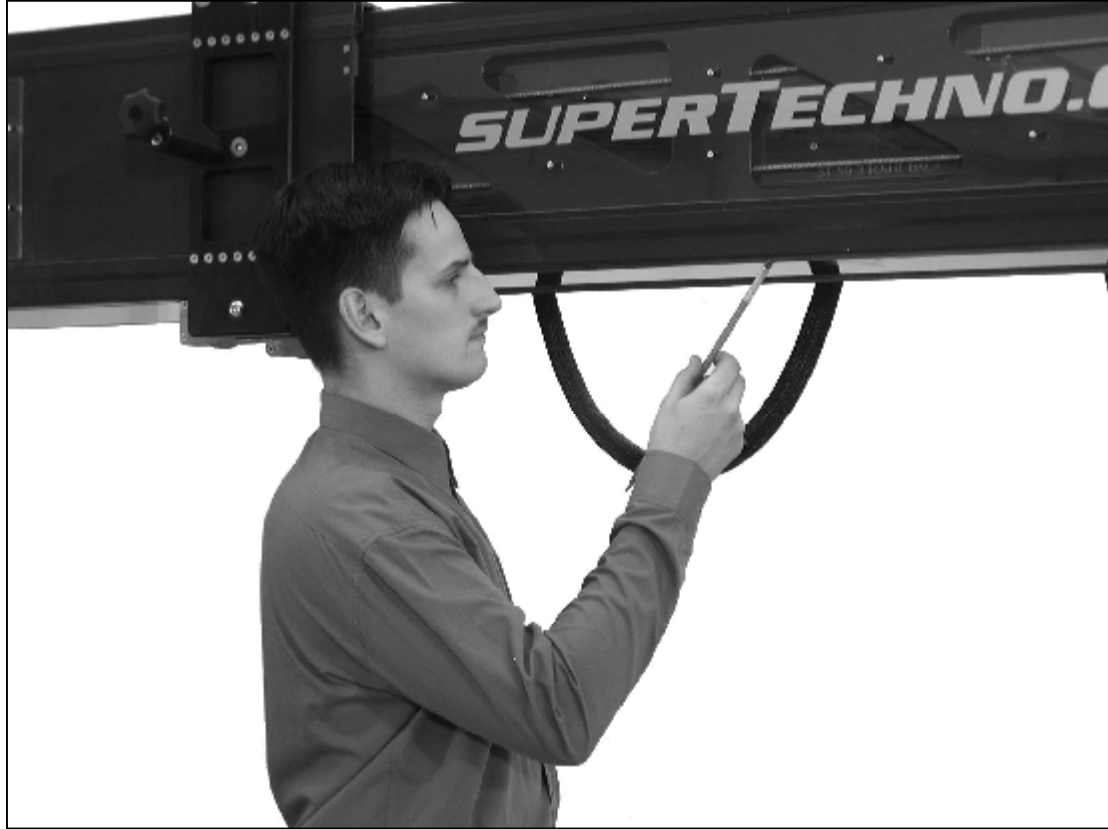


2.5.1.c - Cleaning tracks



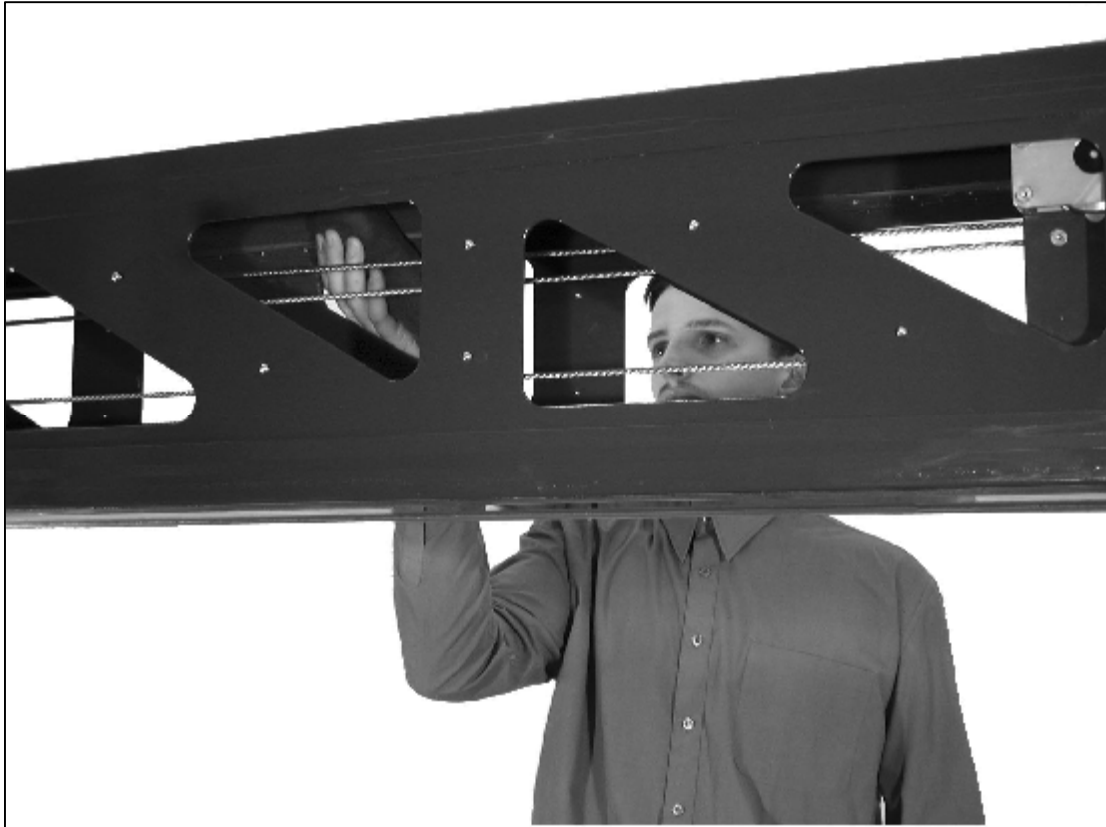
2.5.1.d - Cleaning rollers

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 700 kg. Any dirt will cause slight vibrations that are transferred to the film image.



2.5.1.g - Cleaning the counterweight tracks

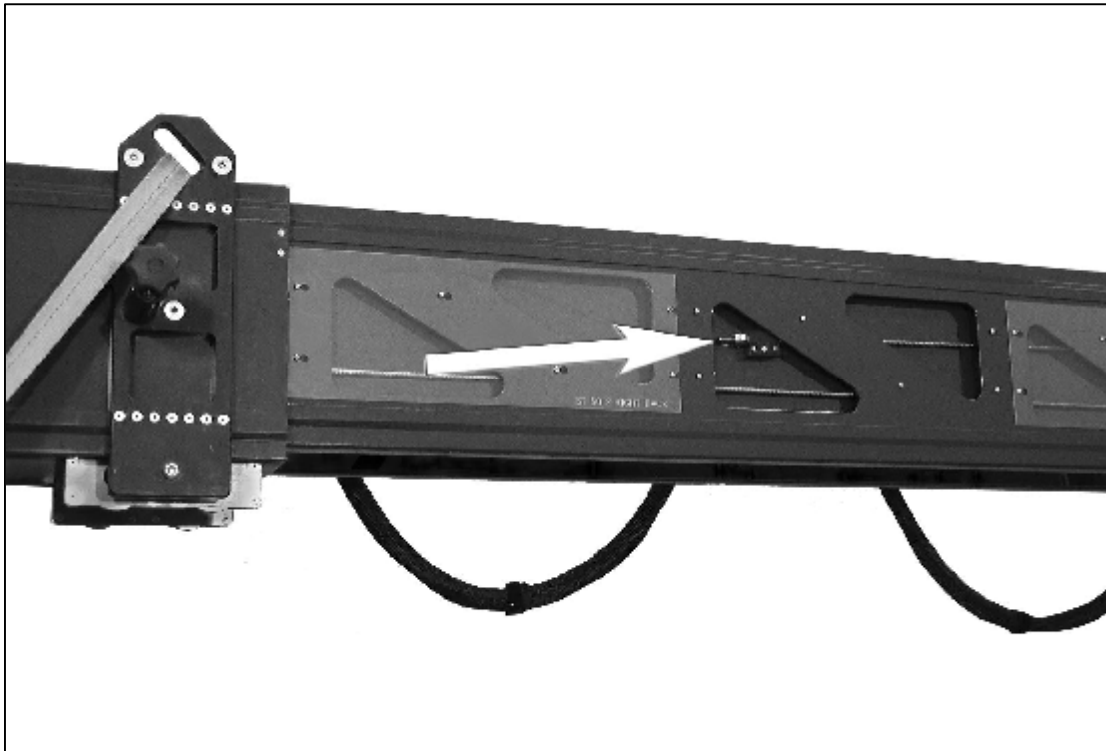
2.6. Drive cables

2.6.1. Tensioning the drive cables

The beam sections of the telescopic crane are extended and retracted by a cable mechanism. To ensure there is no play in the movement of the beam sections, all six cables must be evenly tensioned on their anchorages.



2.6.1.a - Anchorage pull in and out cable (2nd beam section)



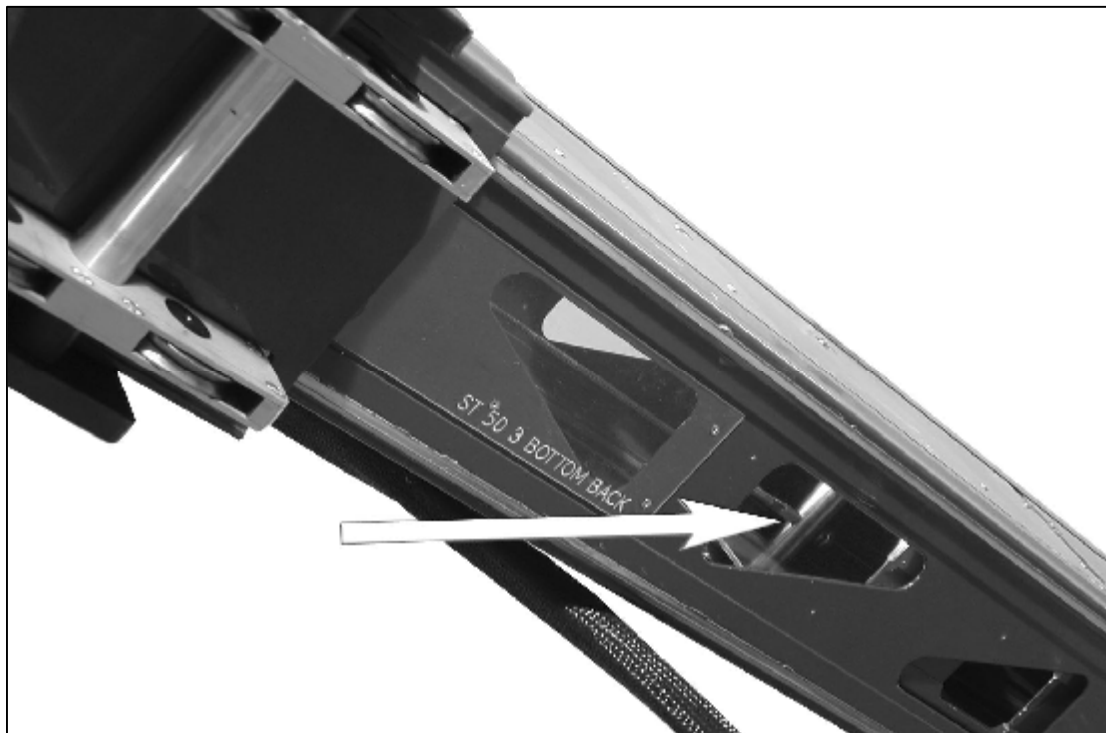
2.6.1.b - Anchorage pull out cable (3rd beam section)



2.6.1.c - Anchorage pull out cable (4th beam section)



2.6.1.d - Anchorage pull in cable (3rd beam section)



2.6.1.e - Anchorage pull out cable (4th beam section)

To tension the cables hold the threaded anchor bolt steady with a 7mm and tighten the nut with a 13mm spanner.



2.6.1.f – Tightening cable

The cables have the correct tension if they are still quite taut when the crane has been tilted up at 60 degrees.



Important: AFTER TENSIONING THE CABLES ALWAYS SECURE THE NUT ON THE ADJUSTING BOLT WITH THE LOCK-NUT.



2.6.1.g – Securing nut

2.6.2. Tensioning the motor drive belt

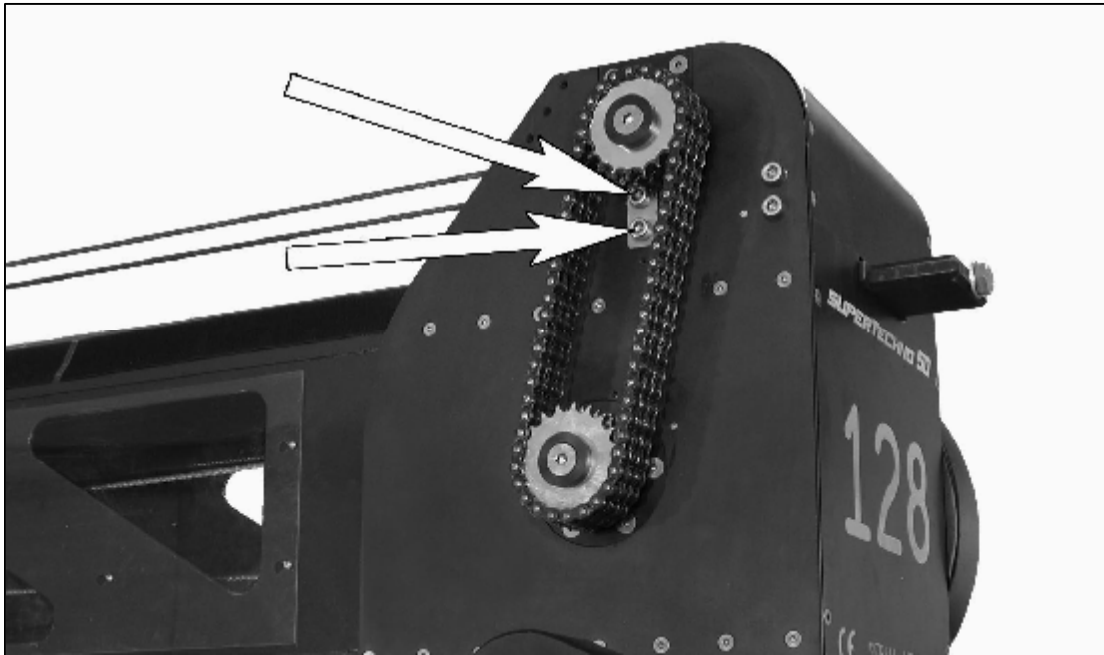
The motor drive belt is kept taut by an eccentric pulley. Having removed the belt cover, slightly loosen the fastening screws in the middle of the pulley with an emery key. Turn with an Allen key and then move the eccentric axle with a 19mm spanner until the belt has no play. The fastening screws can then be tightened up again.



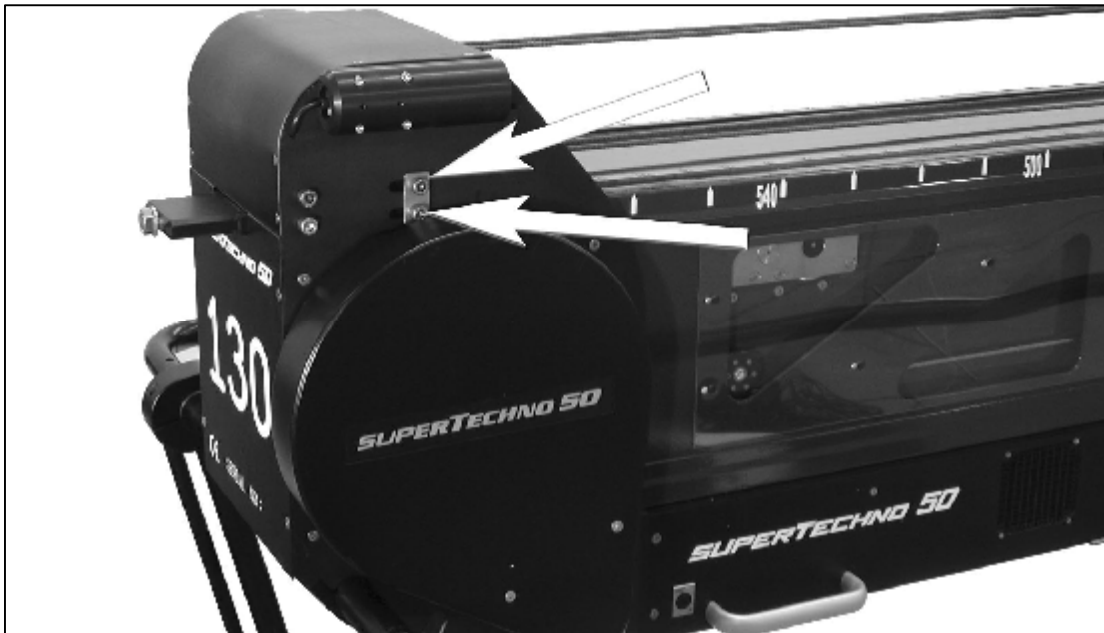
2.6.2 - Adjusting the eccentric pulley

2.6.3. Tensioning the chain

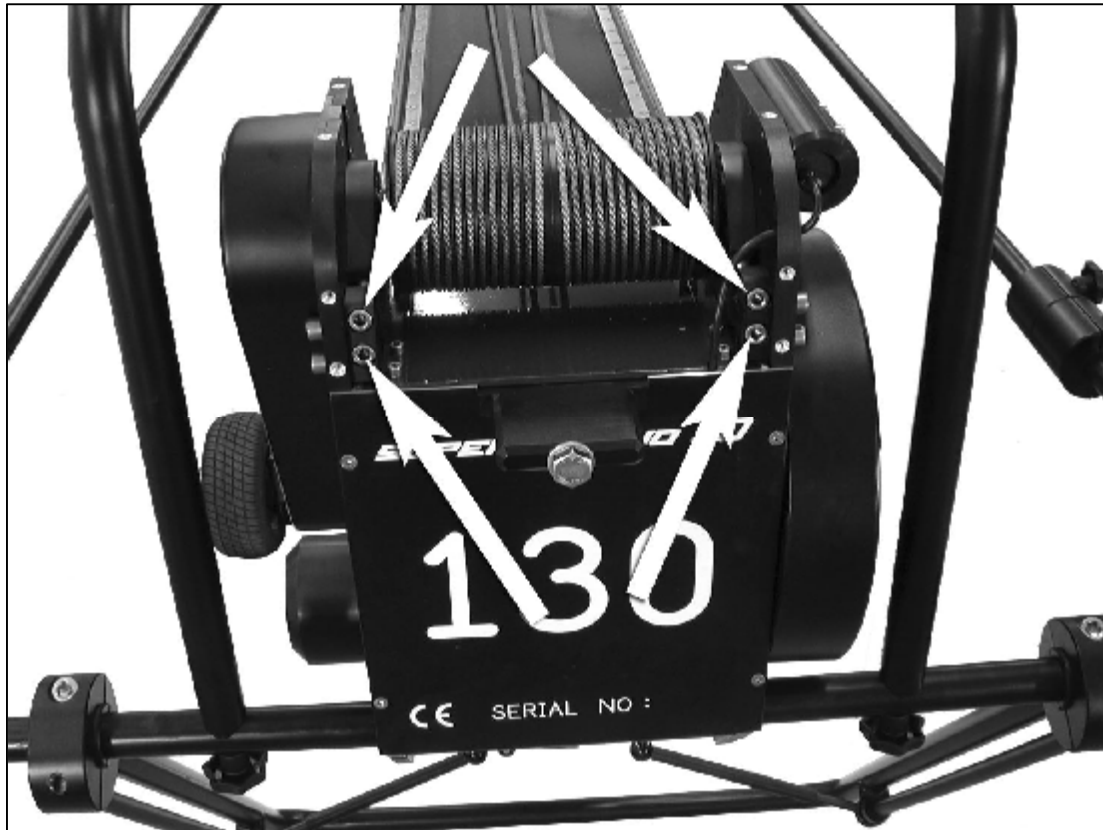
Like the belt cover, the chain cover must also be removed. On either side there are two fastening screws in the axle-box case which have to be loosened slightly. The chain can now be tensioned with the four adjusting screws.



2.6.3.a - Both screws on chain side



2.6.3.b - Both screws on belt side



2.6.3.c - Four adjusting screws



Important: After the chain has been adjusted to remove any play, the two fastening screws in the axle-box case must be re-tightened.

Important: Screw the cover back on immediately afterwards. Serious injury can be caused if fingers get into the belt or chain gears.

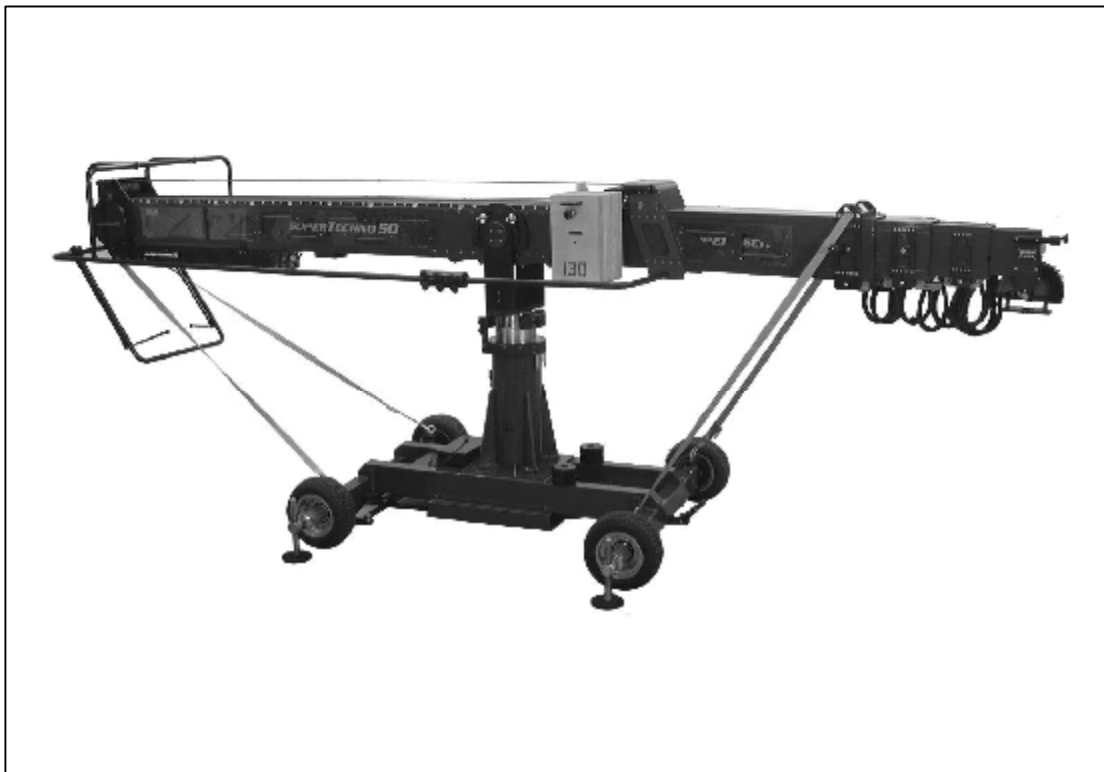
2.7. Counterweights

2.7.1. 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.



2.7.1.a – ST50 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:

SUPERTECHNO 50 with Z-HEAD (just Pan and Tilt)

Camera	Quantity of flat weights	Quantity of donats and position	Flat weights on pivot in the back	Position of carriage	Sliding weights
Video (10 kg)	45 + $\frac{1}{3}$	1 st Boom front 1 pc.	0	Front	Middle
Film light (20 kg)	47 + $\frac{1}{3}$	0	0	Middle	Back
Film heavy (35 kg)	50 + $\frac{2}{3}$	0	1	Back	Front

SUPERTECHNO 50 with Z-HEAD (Pan, Tilt and Roll)

Camera	Quantity of flat weights	Quantity of donats and position	Flat weights on pivot in the back	Position of carriage	Sliding weights
Video (10 kg)	47	0	0	Front	Middle
Film light (20 kg)	49	0	0	Middle	Back
Film heavy (35 kg)	52 + $\frac{1}{3}$	0	1	Back	Front

**SUPERTECHNO 50 with Z-HEAD (just Pan and Tilt)
and Raincover**

Camera	Quantity of flat weights	Quantity of donats and position	Flat weights on pivot in the back	Position of carriage	Sliding weights
Video (10 kg)	51	0	1	Back	Front
Film light (20 kg)	53	0	2	Back	Middle
Film heavy (35 kg)	55 + 1/3	0	3	Back	Middle

**SUPERTECHNO 50 with Z-HEAD (Pan, Tilt and Roll)
and Raincover**

Camera	Quantity of flat weights	Quantity of donats and position	Flat weights on pivot in the back	Position of carriage	Sliding weights
Video (10 kg)	52 + 2/3	0	2	Back	Front
Film light (20 kg)	54 + 2/3	0	3	Back	Front
Film heavy (35 kg)	57	0	3 + 1/3	Back	Back

The fine adjustment of the position of the weights on the counterweight carriage is done by turning the four adjusting nuts using a 36 mm spanner.

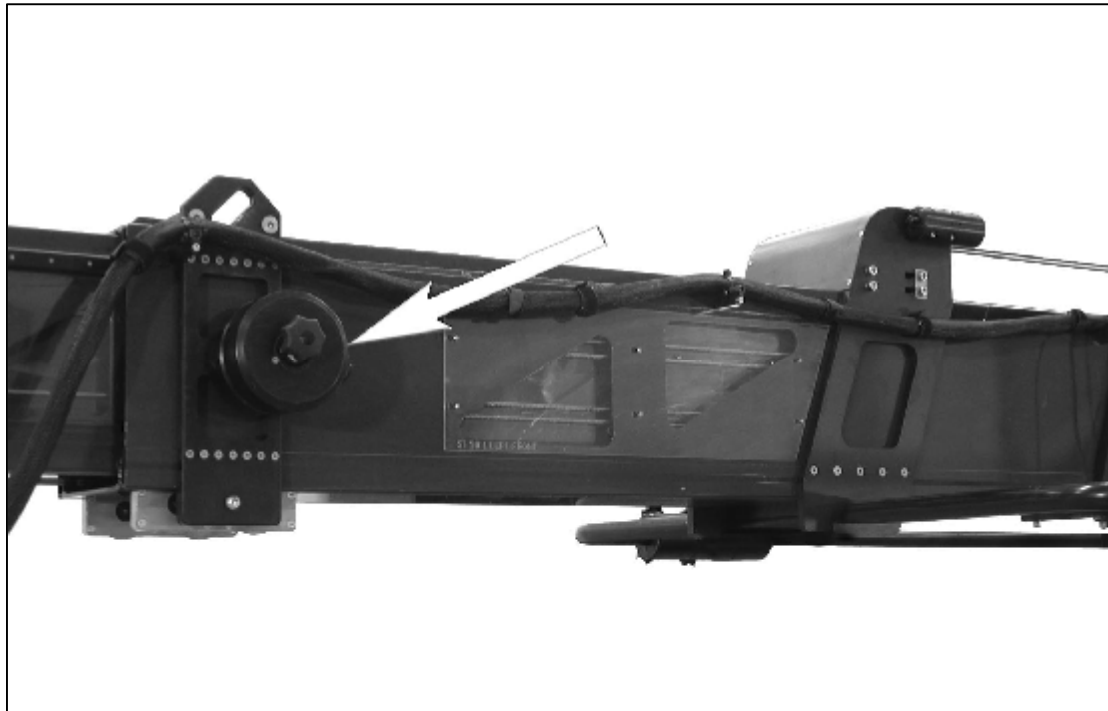


2.7.1.b - Adjusting the carriage

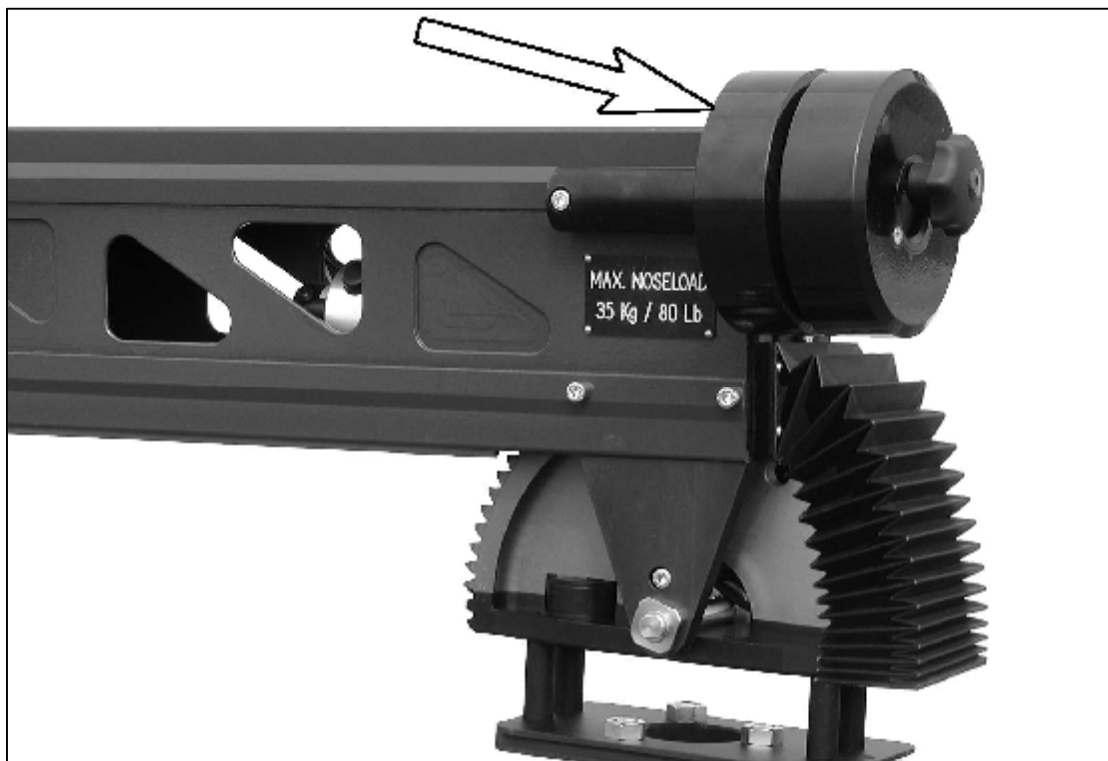
With the aid of the moveable weights the crane can now be finely balanced in its retracted state.



2.7.1.c - Sliding weights on crane



2.7.1.e - Two donuts at first beam front



2.7.1.f - Two donuts at autohorizon

Final step:

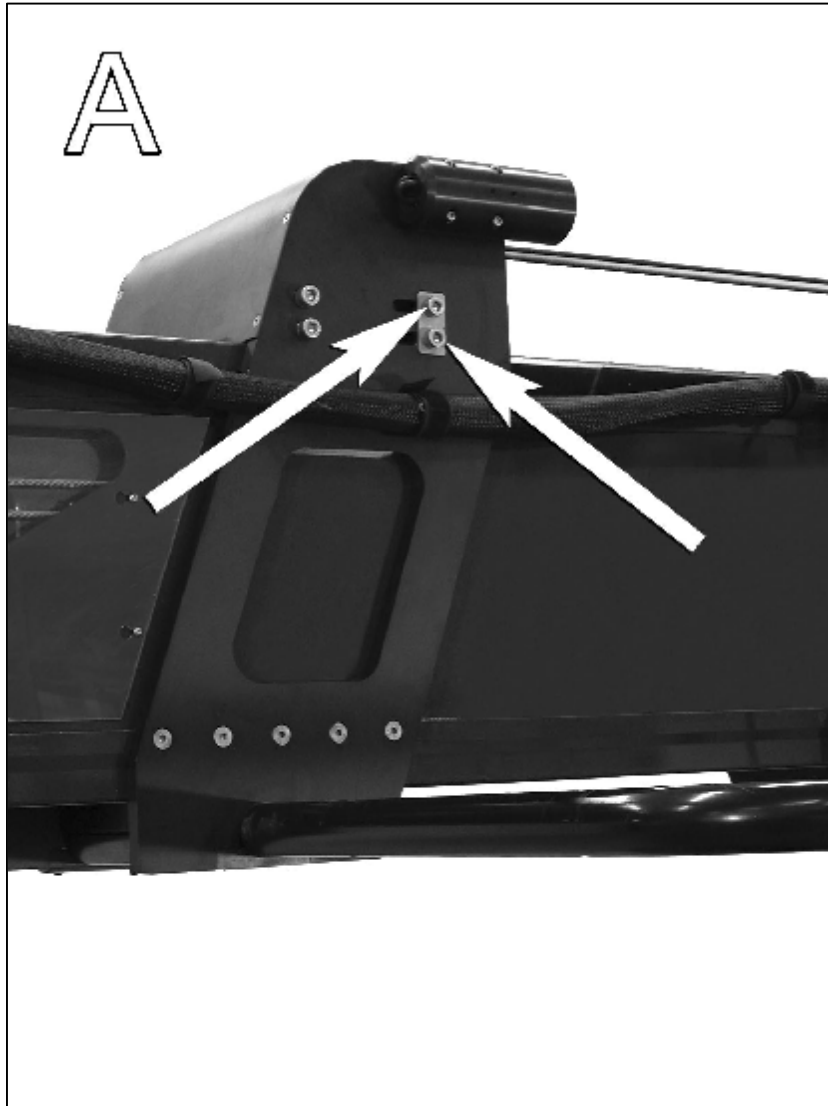
Slowly extend the beam. If the crane is heavier at the front, whole or smaller weights should be added to counterweight carriage.

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

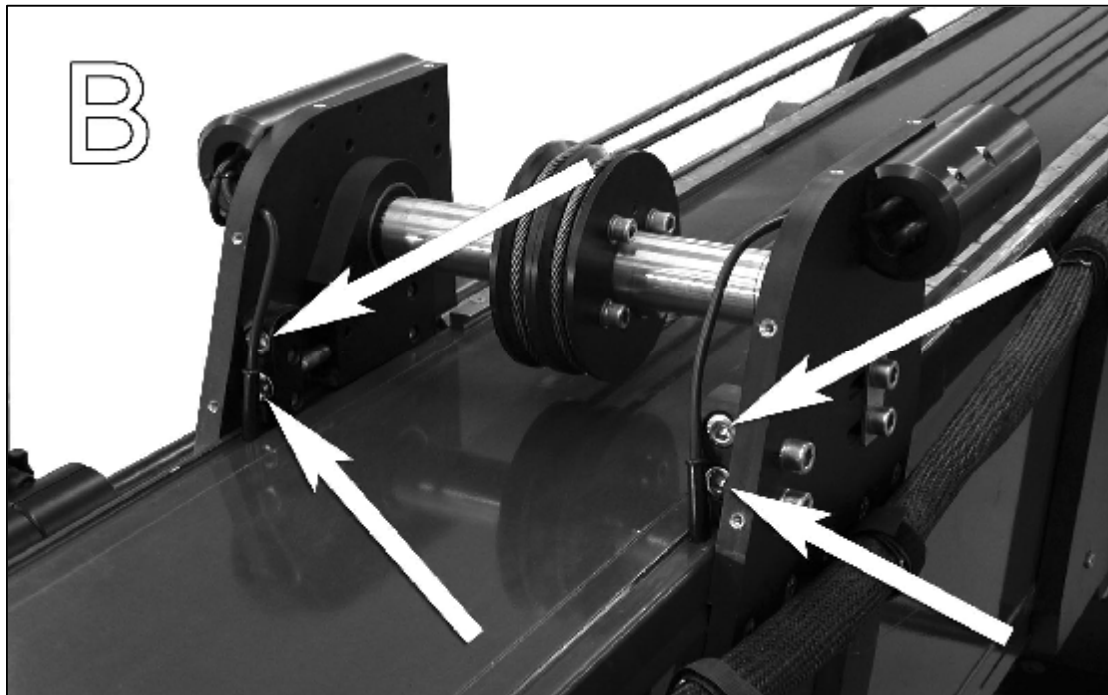
This procedure is repeated until the crane is perfectly balanced along the full length of its movement.

2.7.2. Tensioning the counterweight cable

The chain must first be tensioned before the counterweight cable can be tensioned. The fastening screws (A) are loosened on the front axle-box case and then the cable tension is set with the adjustment screws (B). After the cable has been tensioned, the axle-box case is screwed back tight with the fastening screws.

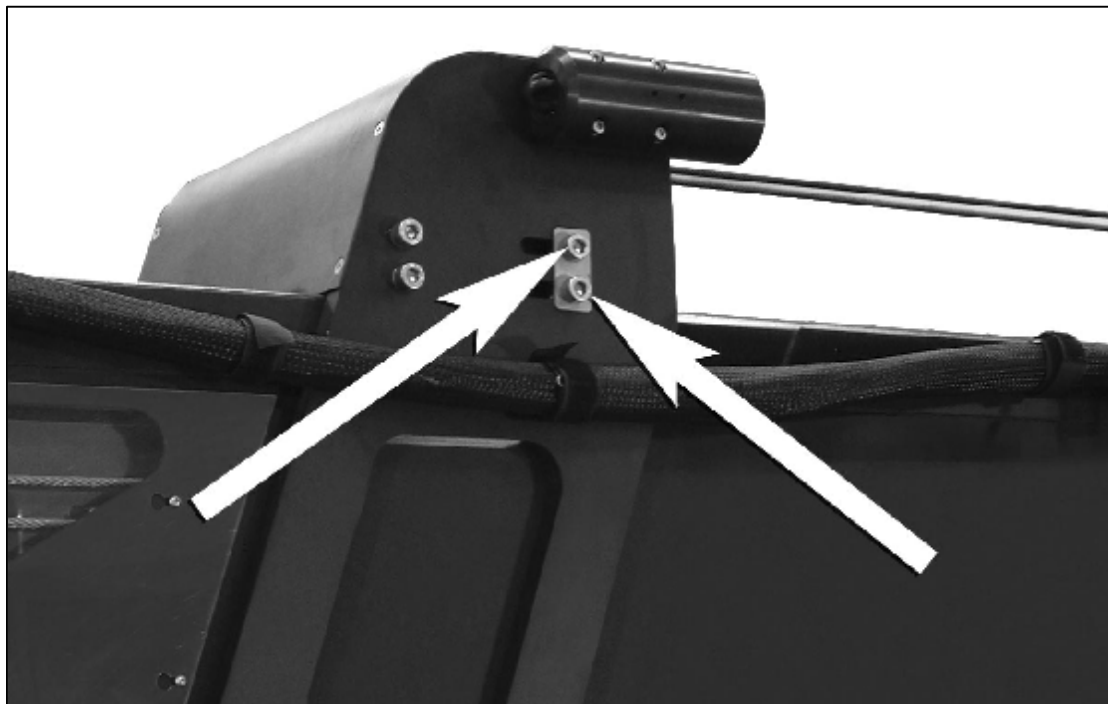


2.7.2.a - The fastening screws



2.7.2.b - Adjustment screws

Always make sure that the lock-nuts are securely screwed onto the threaded bolts and tightened.



2.7.2.c - The fastening screws

2.8. Autohorizon

2.8.1. 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.



2.8.1. - Four screws on the right

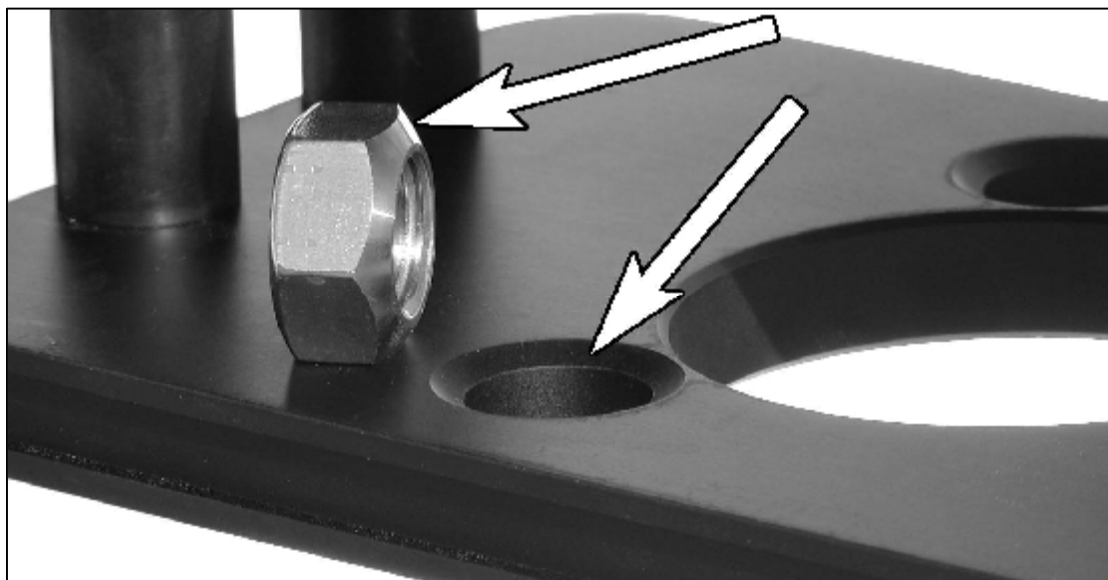
2.9. Z-head

2.9.1. 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.



2.9.1.a – Mounting head



2.9.1.b - Detail of nut and hole

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



2.9.1.c – Leveling the head

2.9.2. Attaching the camera

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



2.9.2.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.

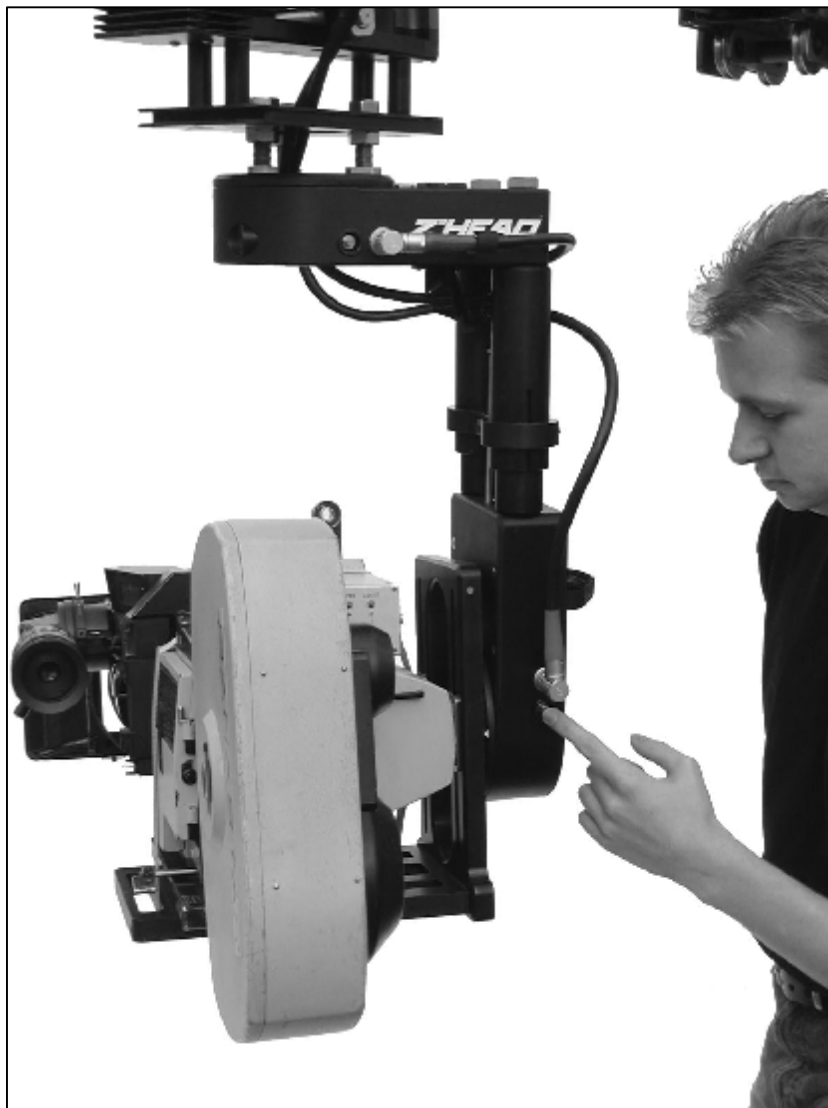


2.9.2.b - Securing the camera with a strap

2.9.3. Balancing the camera (tilt)

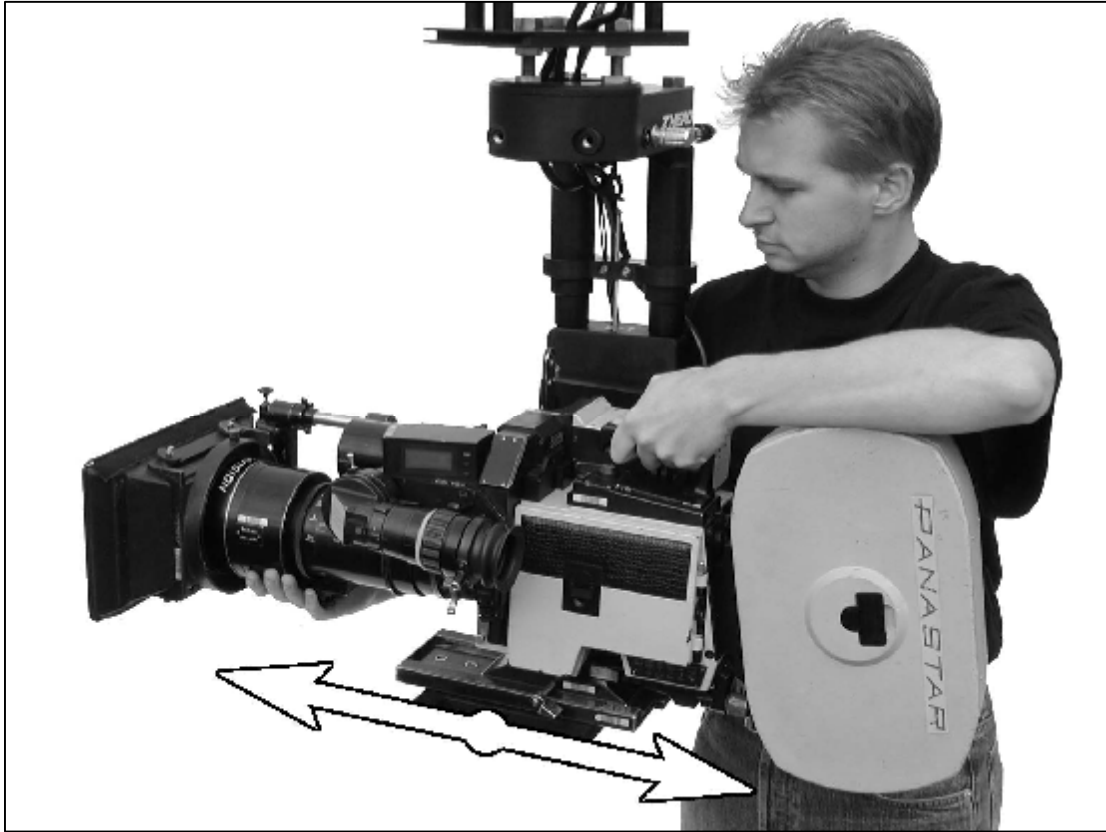
The camera must be attached to the remote head as close to its center of gravity as possible. The camera can be slid back and forth to find this point.

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



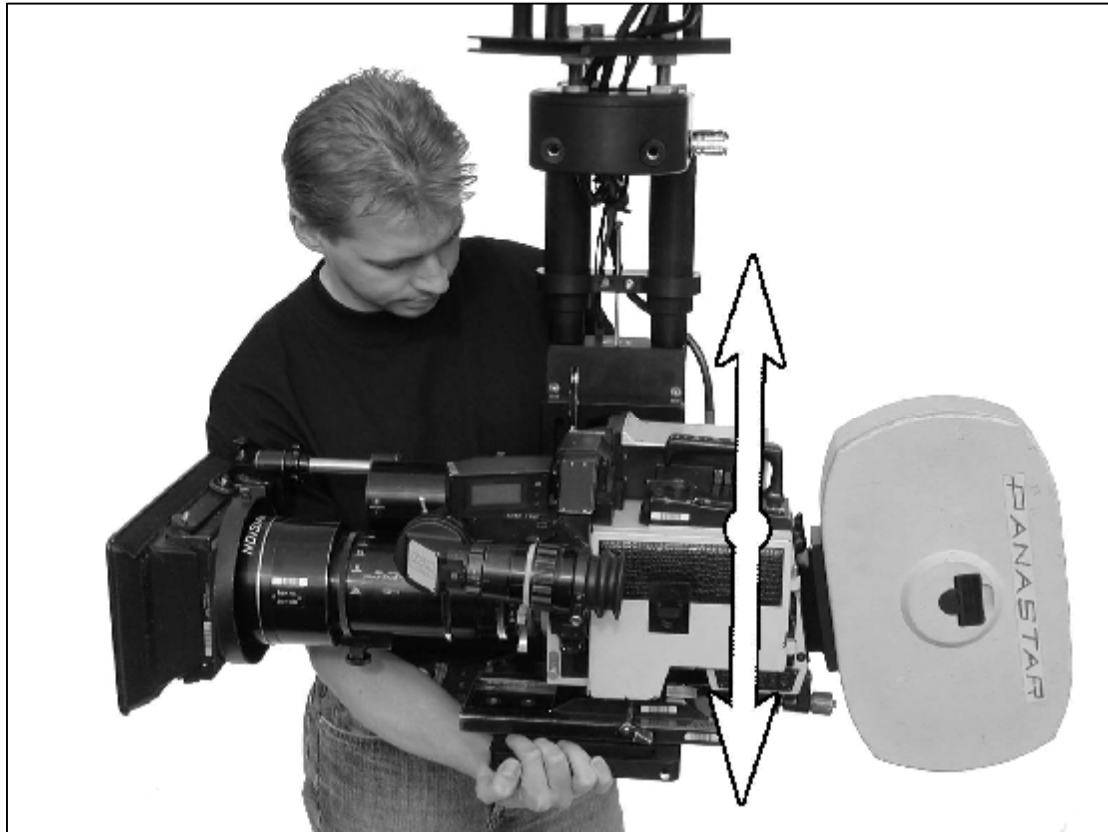
2.9.3.a - Finger at switcher

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



2.9.3.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).



2.9.3.c – Moving camera up and down



Important: Make sure that the fastening bolts for each pan, tilt and roll section are the right length for the depth of the plates and have the corresponding color-coded markings. If the wrong screws are used and they are too long, they may protrude and damage the ball bearings.



2.9.3.d - Screw at plate – note: protrusion max. 10 mm

2.9.4. 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.



2.9.4. – Moving raiser up and down

2.9.5. Assembly of the third axis (roll)

The third axis is attached to the tilt unit with four screws.



2.9.5. - Assembling roll unit

2.9.6. Balancing the camera in the third axis (roll)

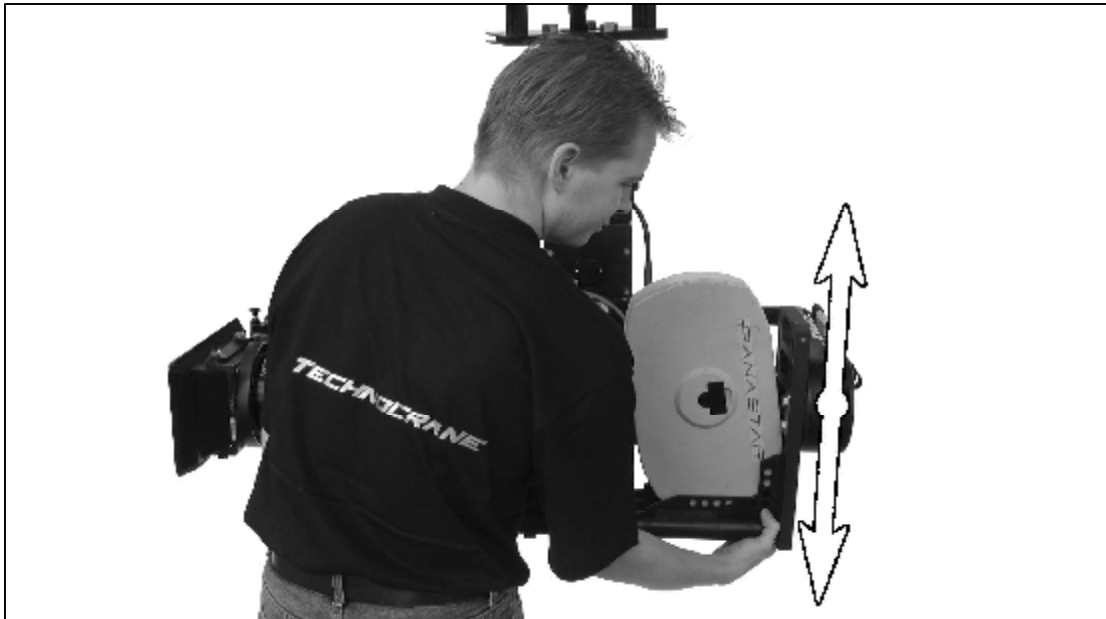
The remote head is equipped with three axes, so balancing must begin with the third axis (roll), after which the tilt axis can be balanced.

First step:



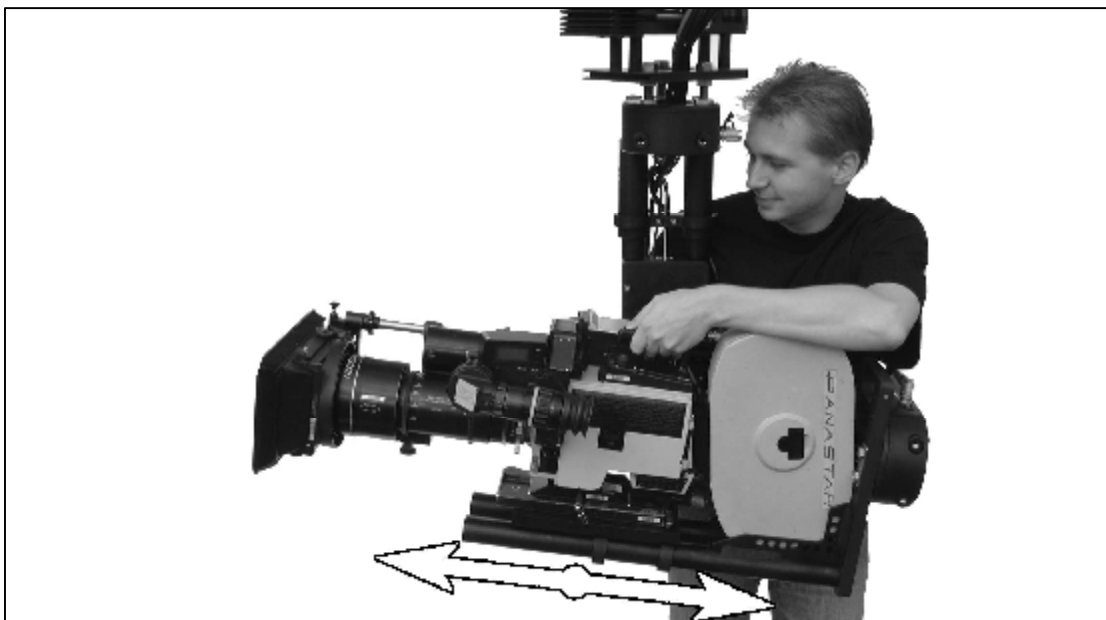
2.9.6.a - Camera moving on roll left and right

Second step:



2.9.6.b – Camera moving up and down

Third step:



2.9.6.c – Camera moving back and fore

2.9.7. Wiring

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



2.9.7.a - Cables at pan, tilt and roll



2.9.7.b - Recommended fixing points for cables

2.10. Electronics unit

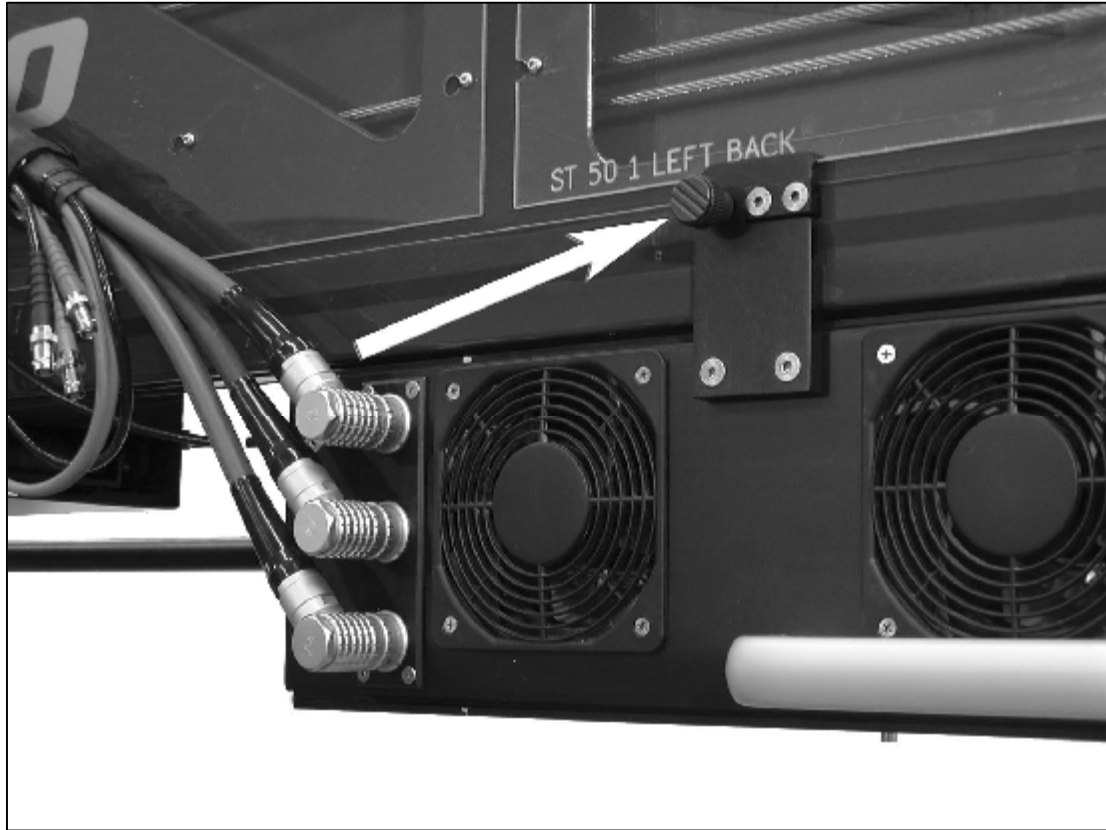
2.10.1. Assembly of the electronics unit

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



2.10.1.a - Lifting unit into crane

The unit must then be secured in position using the two safety screws.

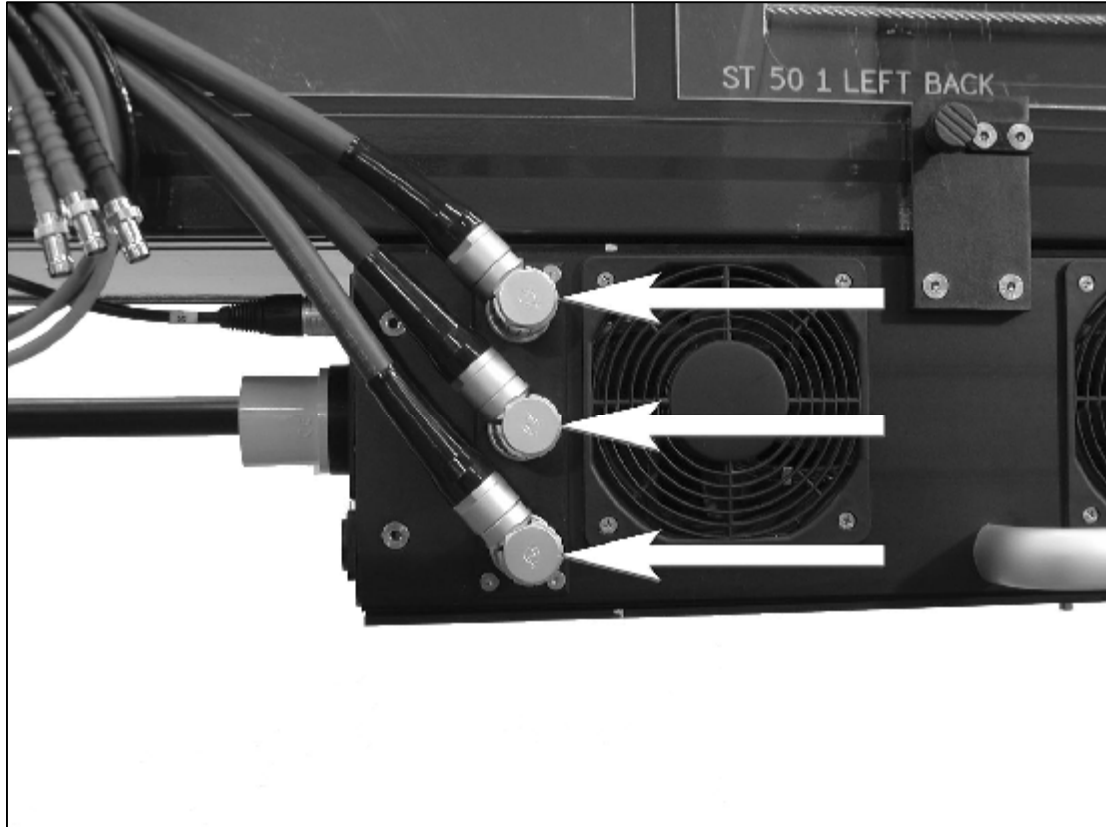


2.10.1.b - Safety screw

2.10.2. Connecting

The following plugs must be inserted:

- a. the three main plugs (Lemo right angle plugs)



2.10.2.a - Three lemos

- b. the CEE mains connector
- c. the desk connector (BNC)
- d. the center cable (XLR 3 pole)



2.10.2.b - Front side of unit

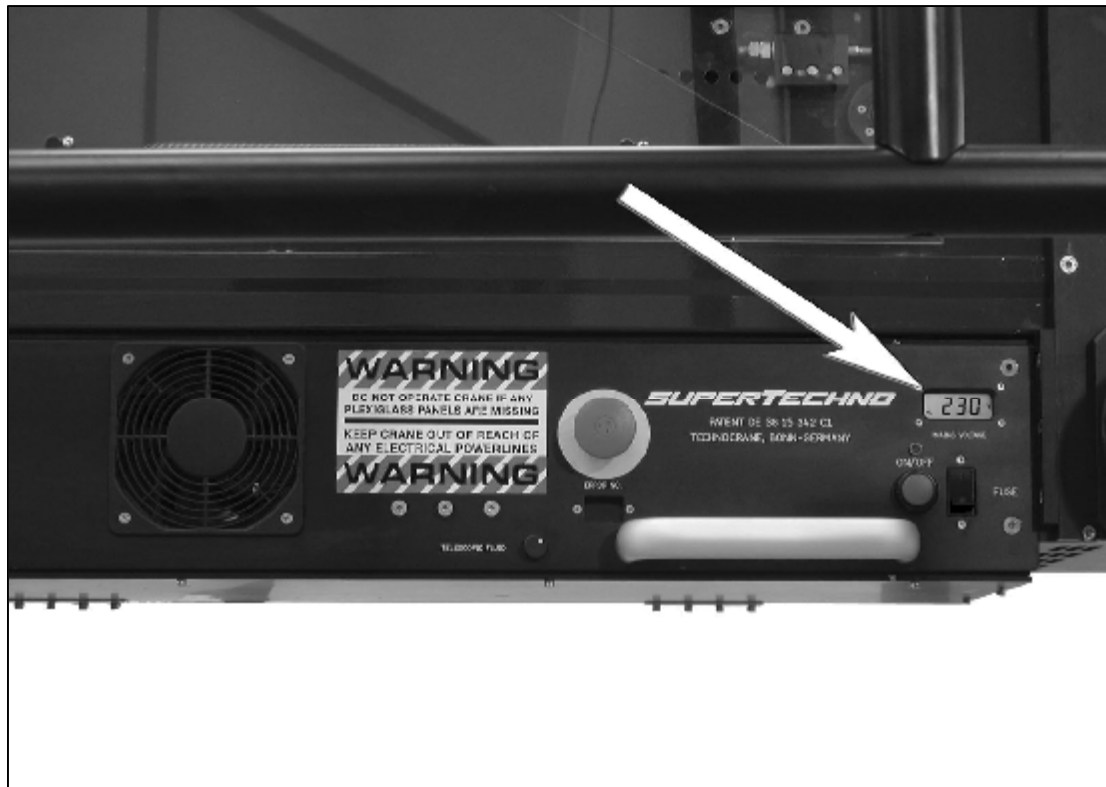
e. the hand control connector (XLR 7 pole)



2.10.2.c - Back of unit

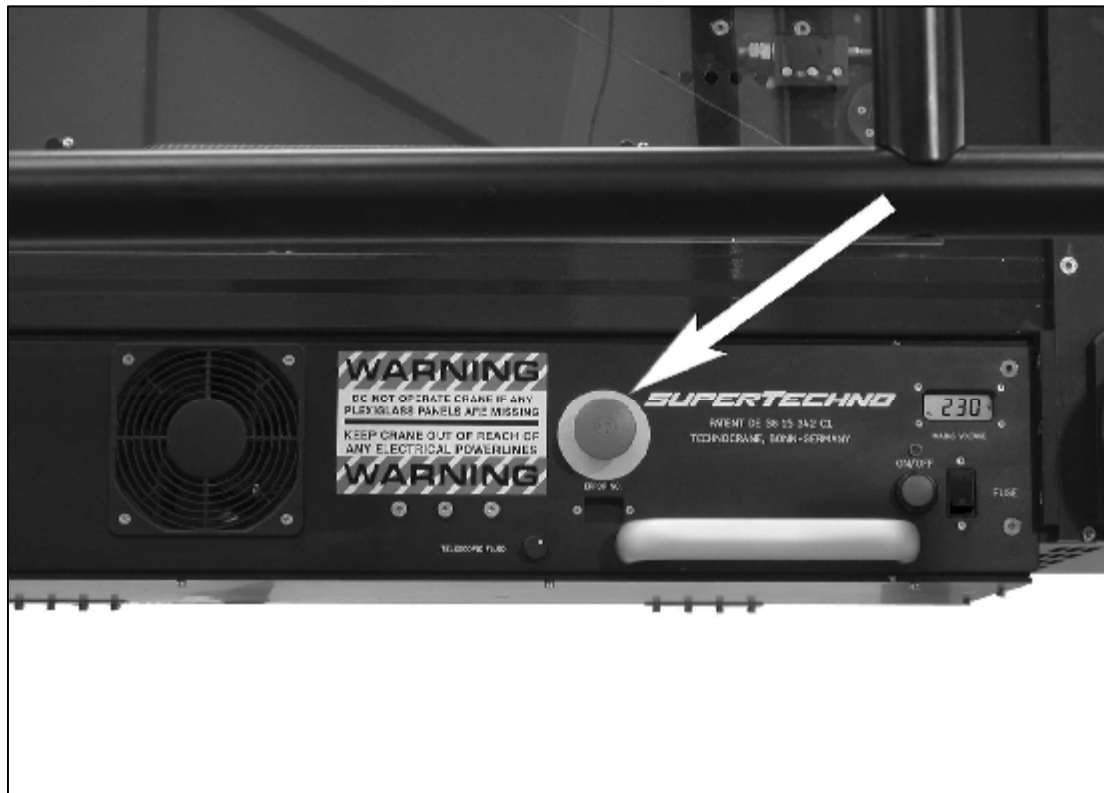
2.10.3. Switching on

First of all the main fuse is activated with the rocker switch. The voltmeter shows the voltage from the mains supply. If power supply is less than 200 volts, find a stronger source. Also check whether the problem arises because the connecting cable is too long or its wires too thin.



2.10.3.a - Display at unit

Also check that the emergency cut-off button has not been pressed.

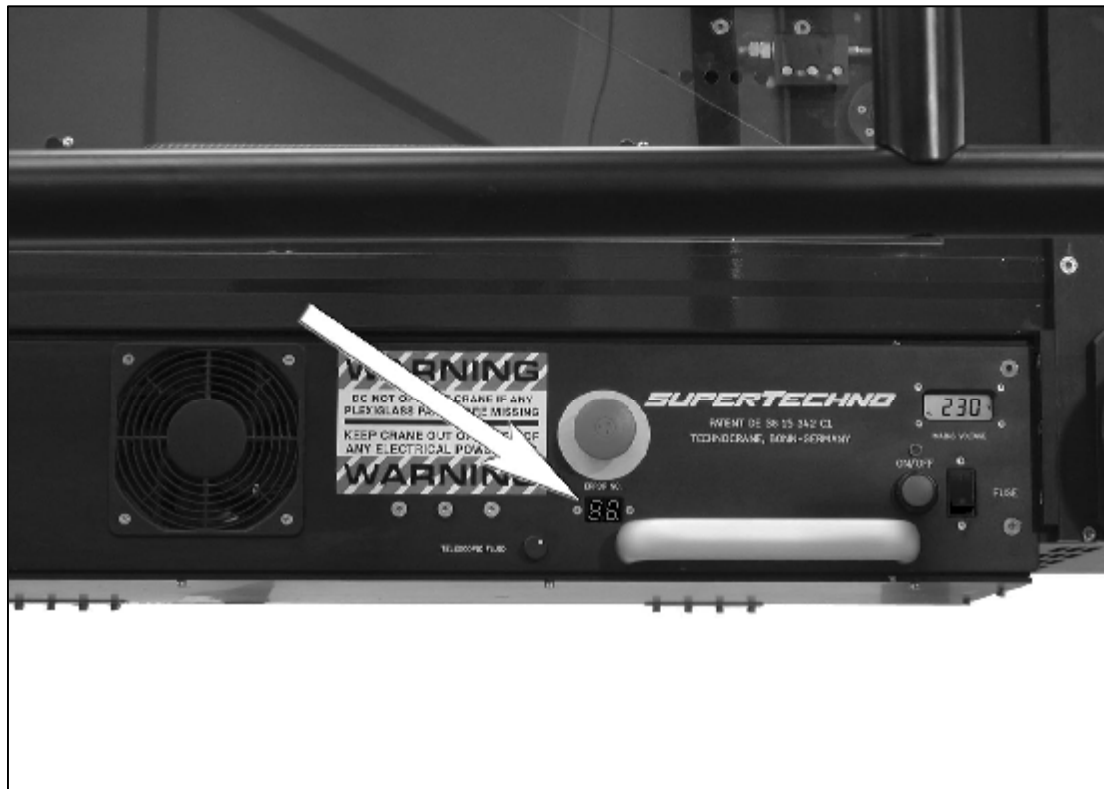


2.10.3.b - Emergency button out

The crane can then be switched on with the green starter switch. It is operational after about 4 seconds, as soon as the LED on the auto horizon has stopped blinking. If the LED continues to light up, the BNC connection to the control desk or to the pan bars has not been properly connected or is interrupted.

2.10.4. Automatic cut-out

The electronics contain a “watchdog” board which automatically switches off the system when various operating errors or defects occur. The reasons for a cut-out are indicated by the error code display.



2.10.4. - Error code display

2.10.5. Error numbers

- 01 Pan out at range in positive direction
- 02 Pan out at range in negative direction
- 03 Pan overcurrent
 - check: Cable snapped?**
 - check: Head-cage caught crane-beam?**
- 11 Tilt out of range in positive direction
- 12 Tilt out of range in negative direction
- 13 Tilt overcurrent
 - check: Cable snapped?**
 - check: Camera correct balanced?**
- 21 Roll out of range in positive direction
- 22 Roll out of range in negative direction
- 23 Roll overcurrent
 - check: Cable snapped?**
 - check: Camera correct balanced?**
- 30 Autohorizon:
 - Tachometer cable broken
 - Motor blocked
 - check: Autohorizon gear has small play in every degree?**
 - check: Head-cage caught crane-beam?**
- 31 Autohorizon:
 - Tachometer cable broken
 - Motor blocked
 - Amplifier error
 - check: like 30**
- 32 like 30
- 33 like 31
- 34 Telescope:
 - Tachometer cable broken
 - Motor blocked
 - check: Too much friction in beam**
 - check: End sensors are working and correct adjusted?**

-
- 35 Telescope:
- Tachometer cable broken
- Motor blocked
- Amplifier error
check: like 34
- 36 like 34
- 37 like 35
- 40 Emergency push-button pressed at desk
- 51 Off-push-button pressed at autohorizon
- 52 OFF button pushed at the telescope joy
- 53 Overtemperature at heatsinks
check: Are fans working?
check: Is heatsink clean and not covered?
- 54 Overtemperature at autohorizon motor
check: Has autohorizon gear some?? play in every degree?
- 55 Overtemperature at telescope motor
check: End-sensors are working and correct adjusted?
- 56 Overvoltage on -30V internal power supply
check: Mains or generator o.k.?
- 57 Overvoltage on +30V internal power supply
check: Mains or generator o.k.?
- 60 Undervoltage on -15V internal power supply
check: short cuts somewhere?
check: mains or generator o.k.?
- 61 Overvoltage on -15V internal power supply
- 62 Undervoltage on +15V internal power supply
check: short cuts somewhere?
check: mains or generator o.k.?
- 63 Overvoltage on +15V at internal power supply
- 64 Undervoltage on +5V a1 internal power supply
check: short cuts somewhere?
check: mains or generator o.k.?
- 65 Overvoltage on +5V
- 67 Emergency push-button pressed at electronic case

2.11. Telescope hand control

2.11.1. 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.



2.11.1.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.



2.11.1.b – Turning potentiometer

Using the fluid potentiometer, which is integrated in the electronics unit, the operator can set the maximum acceleration and delay.



2.11.1.c - Turning fluid potentiometer at electronic unit

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



2.11.1.d - Red button at hand control

2.12. Counterweights trolley

The counterweights trolleys facilitate transportation of the counterweights when the crane is being assembled and dismantled. A trolley can carry 11 counterweights and, fully-loaded, weighs a total of 140 kg.



2.12. – Counterweights trolleys

2.13. Cable trolleys

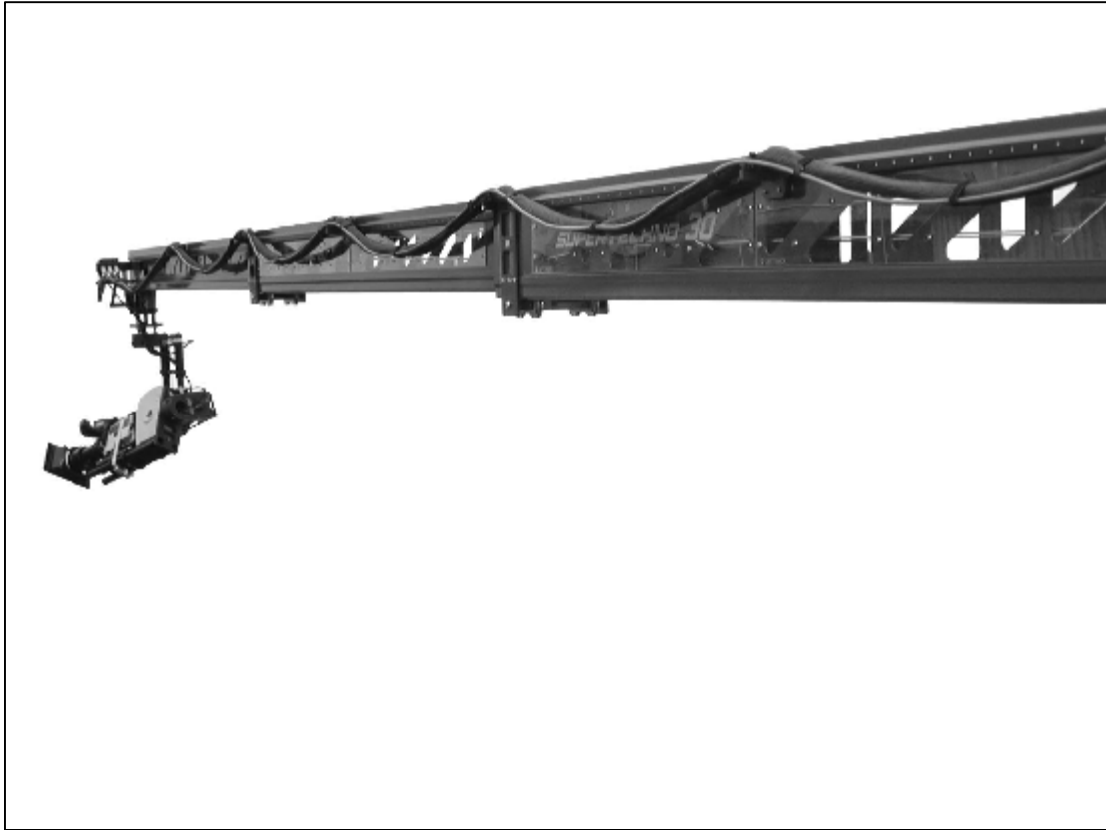
2.13.1. Securing the cables

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.



2.13.1.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.



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

2.14. Rain cover

2.14.1. Putting cover over the first beam

First remove the back tubes and the two donut holders on the front side of the first beam.



2.14.1.a - Taking the back tubes off



2.14.1.b - Taking off donut holder at autohorizon

Then screw the four cover poles on the hand railing.



2.14.1.c - Screwing four tubes on railing

Then place the cover on the tent poles and secure the covers with the bungee cords.



2.14.1.d - Putting cover over the first beam



2.14.1.e - Fixing rubber band

2.14.2. Putting cover over the dolly

First attach the upper part of the cover to the column.



2.14.2.a - Fixing to column

Then secure the four bungee cords to the four eyebolts on the dolly and close the cover with the Velcro strip.



2.14.2.b - Fixing to eyebolts and closing tent

2.14.3. Assembling the bellows

First attach one holding shaft to the front end of the innermost beam.



2.14.3.a - Fixing of shaft at fourth beam

The bellows is taken out of the transport case by its handle and placed over the beams.



2.14.3.b - Putting bellows on the beams

After the transport handle has been unscrewed, slide the front plate of the bellows into the autohorizon and secure the plate with the knob.



2.14.3.c - Sliding plate in



2.14.3.d - Securing with knob

Then fix the first frame of the bellows to the holding shaft of the innermost beam. Important: Do not turn the screws too tight, since the frame must be able to move.



2.14.3.e - Attaching bellows frame at fourth beam

There is a catch on the inside of the bellows where they cover the innermost beam. This catch must be attached to the cable trolleys on the innermost beam.



2.14.3.f - Mounting onto cable trolley

Each frame on the first, second and third beam section is attached with two thumb screws.



2.14.3.g - Mounting bellows frame on second beam

Finally the cover for the front section of the first beam is put on.



2.14.3.h - Fixing front part of cover for first beam

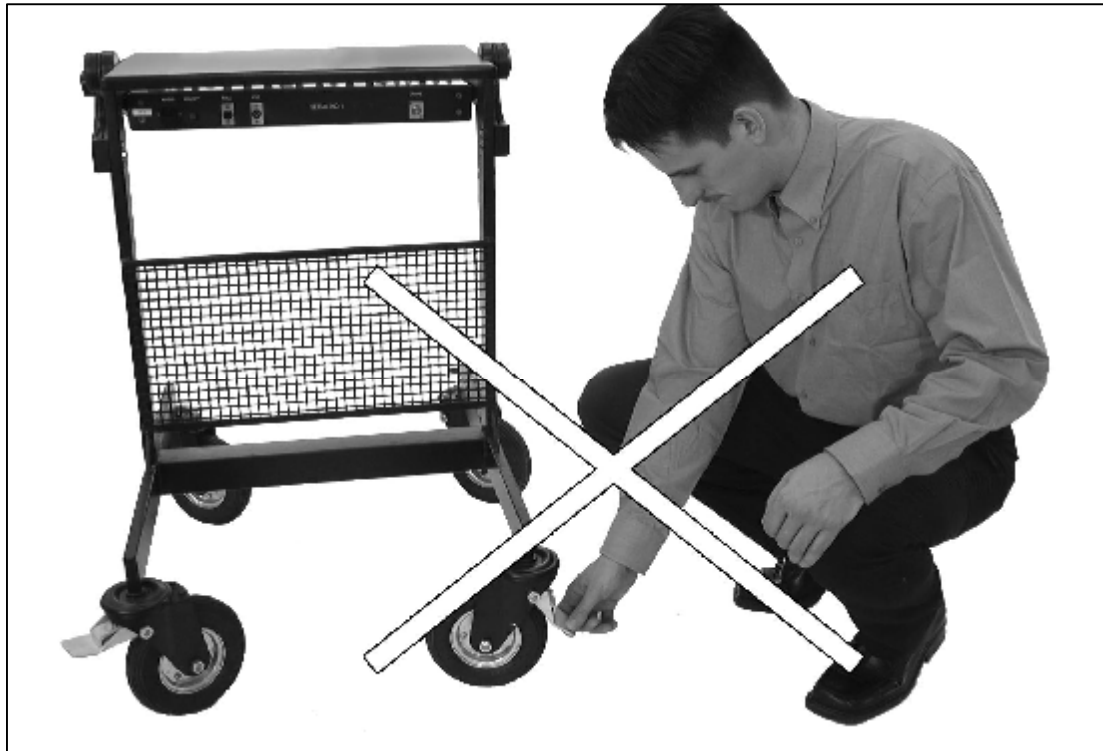
2.15. Desk

2.15.1. Assembly

For transportation the desk must always be folded up and the hand-wheels must be removed to prevent any damage to vulnerable controls.



2.15.1.a – Desk, folded



2.15.1.b – Do not open wheel breaks by hand



2.15.1.c - Open wheel breaks by foot

To assemble the desk, release all four locking levers. Then swing up the desk and, using the locking levers, fix it in an ergonomically favorable position.



2.15.1.d - Desk

2.15.2. Connecting

Before the desk becomes operational the following cables must be plugged in:

- a. Mains power cable (220 V plug)
- b. BNC connecting cable to the crane.
- c. Foot pedal cable (XLR 5 pole plug)
- d. Optional: cue (tally) signal (XLR 3 pole plug)

2.15.3. Switching on

Do not touch the controls during the first four seconds after switching on the power, because the desk is still adjusting itself. Wait until the red “wait” LED goes off).

2.15.4. Hand-wheels

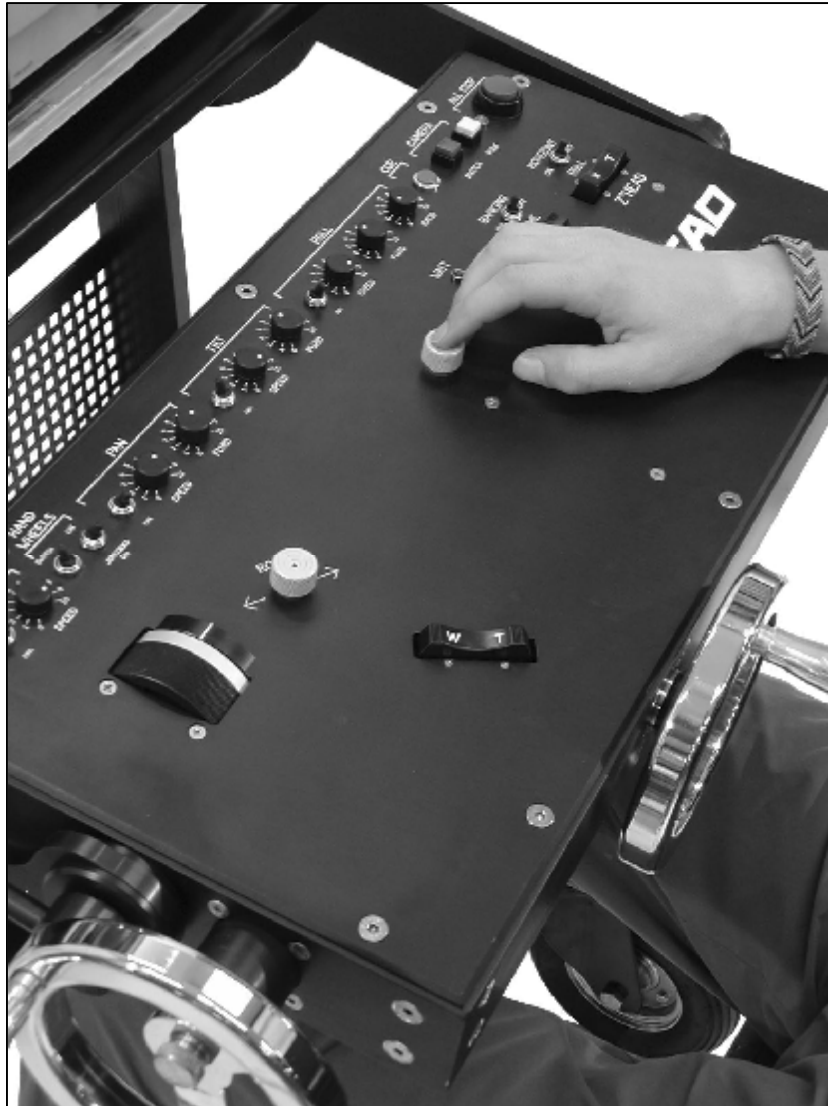
The remote head can be controlled either with the hand-wheels or with a joystick. Choose your option by using the selector switch on the potentiometer panel. To avoid damage to the hand-wheel axles the hand-wheels must be removed for transportation.



2.15.4 – Desk with hand-wheels.

2.15.5. Joystick

The joystick responds only when pressed and is operated with the fingertips.



2.15.5.a – Pan-tilt joystick

Alternatively the desk can be fitted with a simprop joystick.



2.15.5.b – Simprop joystick

2.15.6. Focus and zoom

Focus and zoom are controlled by the left hand of the remote head operator.



2.15.6. – Focus and zoom

2.15.7. Roll

Roll can be controlled in three different ways.

Either with the index finger:



2.15.7.a – Focus, zoom and roll

Or with the foot pedal:



2.15.7.b - Pedal

Or with the finger rocker:



2.15.7.c – Roll rocker

Roll can be controlled in two different modes:

Horizon “on”: the roll axis keeps moving as long as the joystick is pressed; once the joystick is released, the roll axis automatically returns. The maximum angle of the roll range can be pre-set using the “ratio” potentiometer. This mode ensures that the cameraman can easily return to the normal horizon.

Horizon “off”: the roll axis keeps moving as long as the joystick is pushed and a stop at the point the joystick is released.



2.15.7.d – Horizon switch

An additional feature, “banking”, can be activated. This switch turns off all the “roll” controls and the pan axis of the joystick also guides the roll axis. Similar to an aircraft when making a horizontal turn, the remote head tilts simultaneously sideways in the direction that it is panning, and returns to a level horizon when the head has stopped panning.



2.15.7.e – Banking switch

2.15.8. Potentiometer panel

All functions can be reversed by using the “rev.” switches. The “speed” potentiometer is used to pre-select the speed range. The “fluid” potentiometer is used to regulate the maximum acceleration or delay. The “camera on/off” button is for starting all cameras, if they permit this feature and are attached to the remote head. With the emergency cut-off button the whole crane can be shut down from the desk.

2.16. Roll pedal

2.16.1. Operation

Before switching on the power to the desk, the pedal should be placed on the floor in front of the desk and wired up with the XLR 5-pole plug. The pedal enables the camera operator to control the roll axis with his foot.



2.16.1. - Pedal

2.17. Pan bars

2.17.1. Transportation

For transportation it is important to make sure that the controls are protected. We recommend that the pan arms are removed and safely stored for transportation.

2.17.2. Assembly

The legs are placed in the preferred position and adjusted with their leveling screws until the base is level and stable.



2.17.2.a - Setting with M16 bolts

The telescopic column is then adjusted to the height preferred by the camera operator.



2.17.2.b - Locking of telescopic column

The pan bars can also be put on another stand or on a dolly equipped with a Mitchell adapter.



2.17.2.c - Mitchell plate at column

If the camera operator wishes to control the remote head with just two axes, the roll axis of the pan bars can be set in a fixed position with a screw.



2.17.2.d - Locking the roll

Two 9" monitors can be installed on the platform of the pan bars. Important: The monitors must be secured with a ratchet strap.



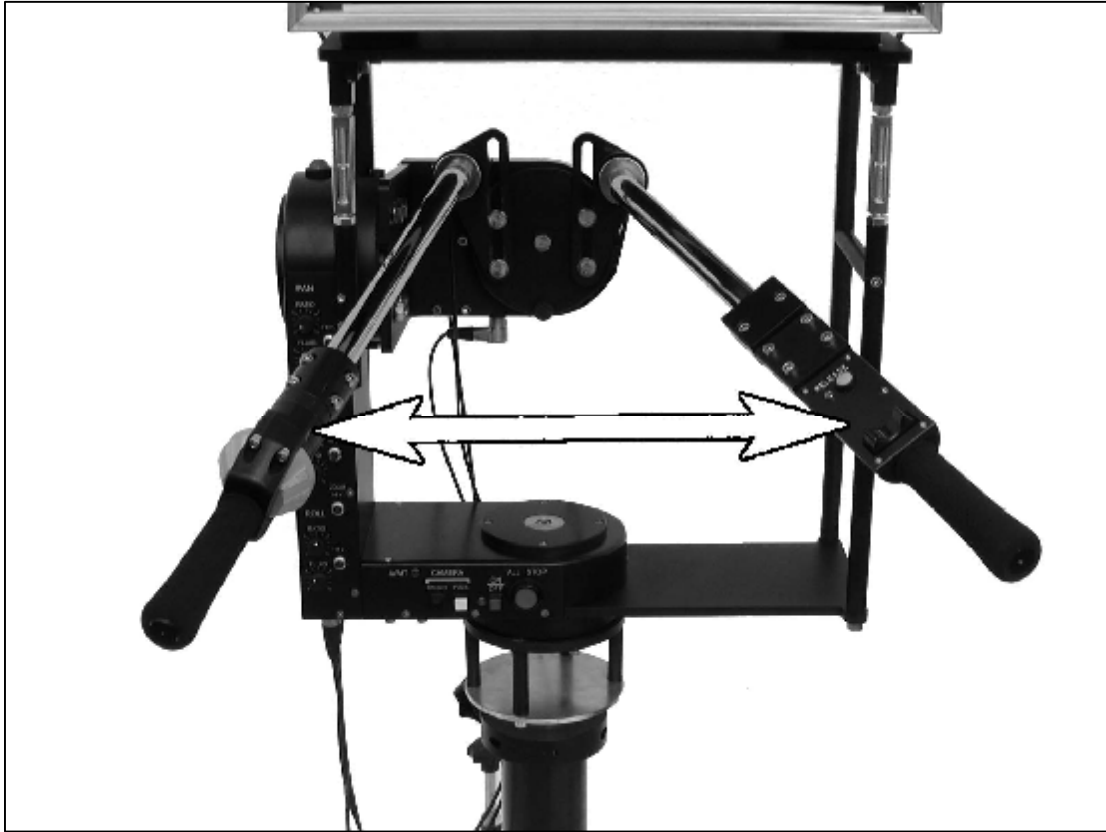
2.17.2.e - Two monitors on pan bars with straps

The angle of the monitor platform can be set with two movable studs.



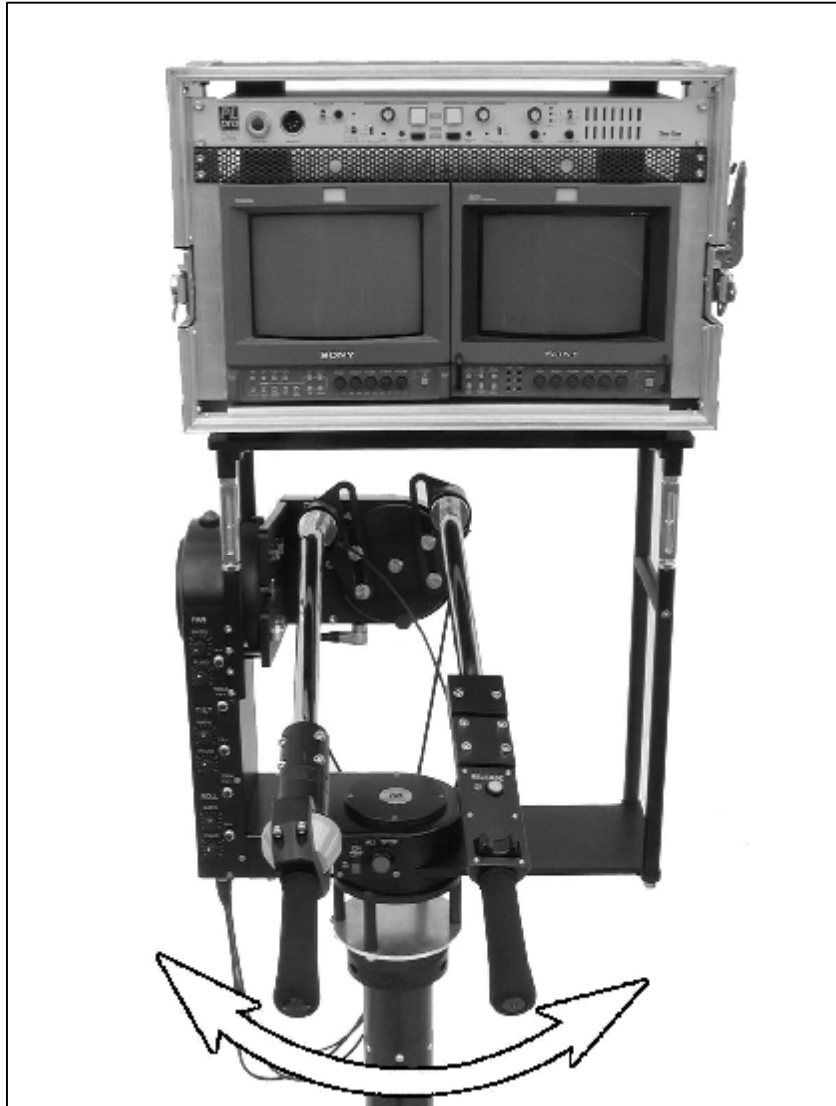
2.17.2.f - Setting the monitor angle with studs

The two arms can be swapped so that focus/zoom is controlled from the left or right side.

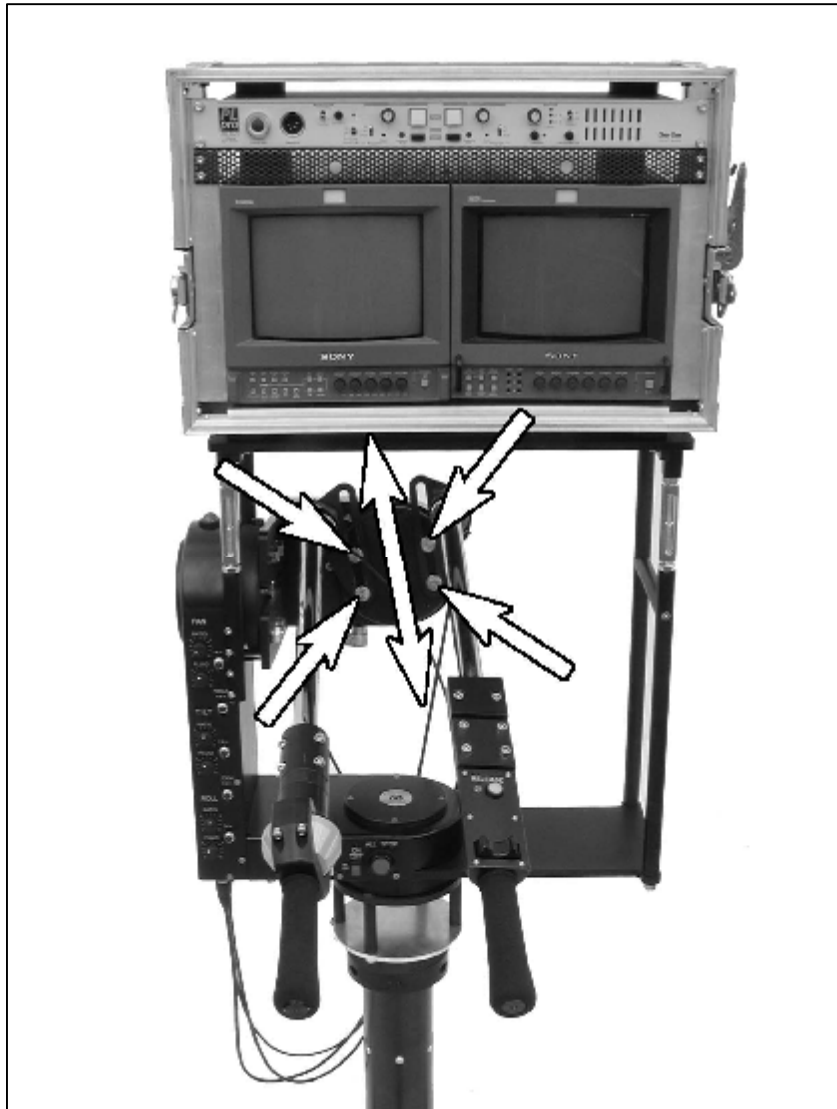


2.17.2.g – Swapping arms

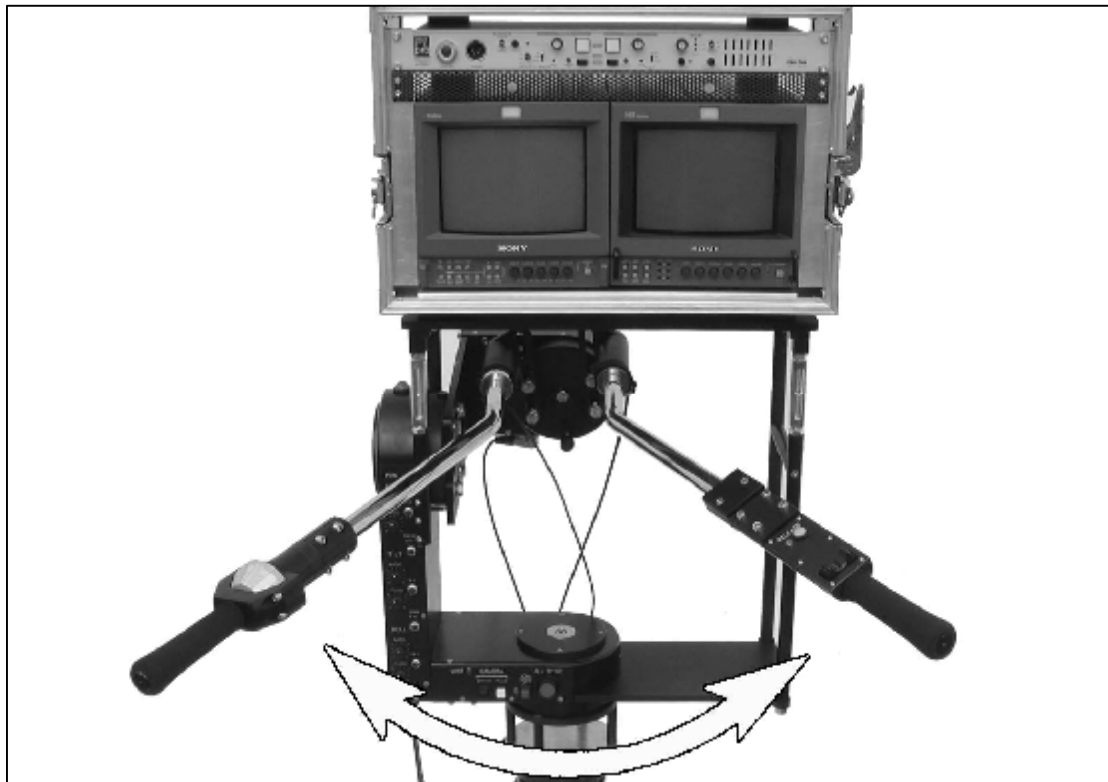
The two arms can be positioned close together or further apart. The height of the arms must be adjusted accordingly.



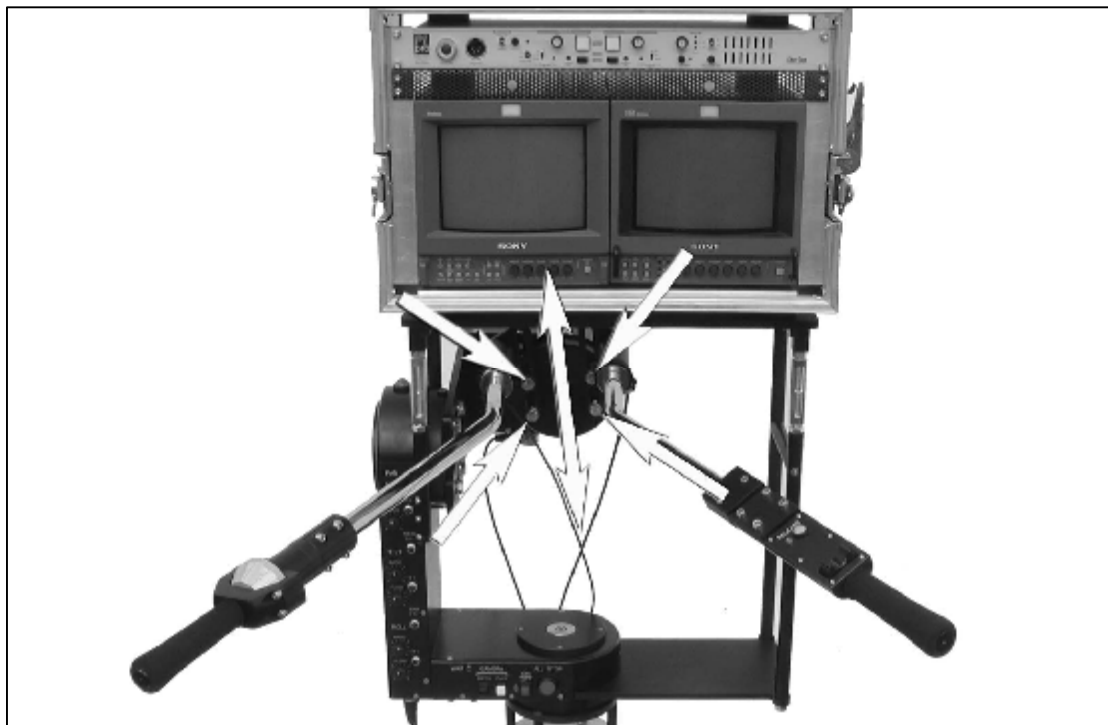
2.17.2.h - Arms together (min. separation)



2.17.2.i - Correct position of arm at slot

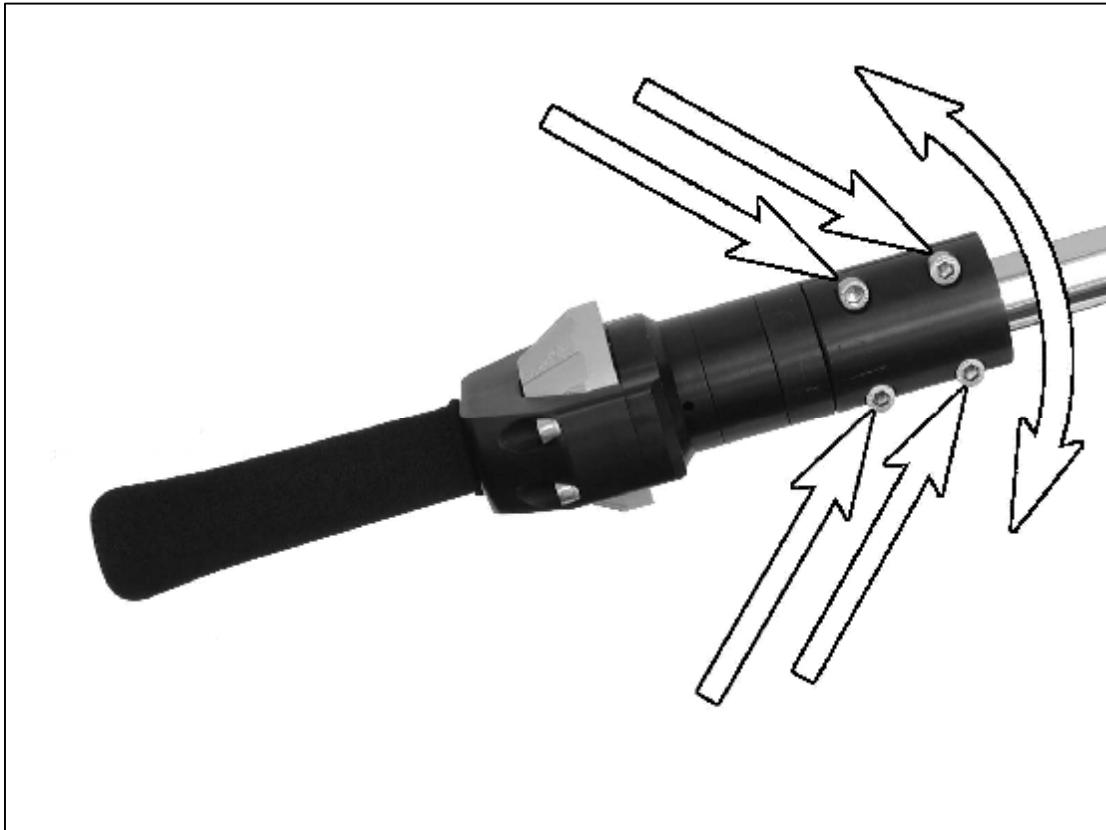


2.17.2.j - Arms apart (max. separation)

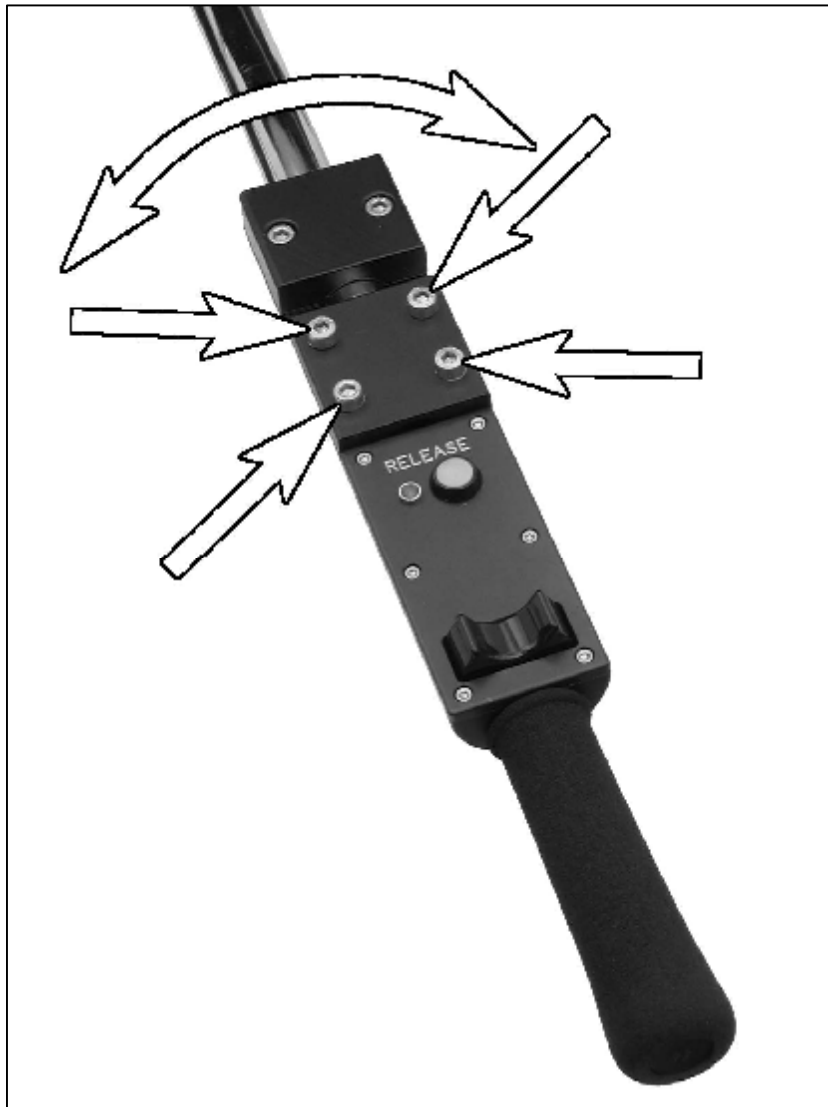


2.17.2.k - Correct position of arm at slot

The camera operator can also place the zoom and focus controls in the most favorable ergonomic position. To do this he unscrews the four locking screws and turns the controls to the desired position.



2.17.2.1 - Focus unit with four screws



2.17.2.m - Zoom unit with four screws

2.17.3. Connecting leads

The power supply to the pan bars is via the mains plug. The control signals are transferred via a video cable with BNC plugs. A lead from the CUE input socket controls the tally light on the crane and on the pan bars.

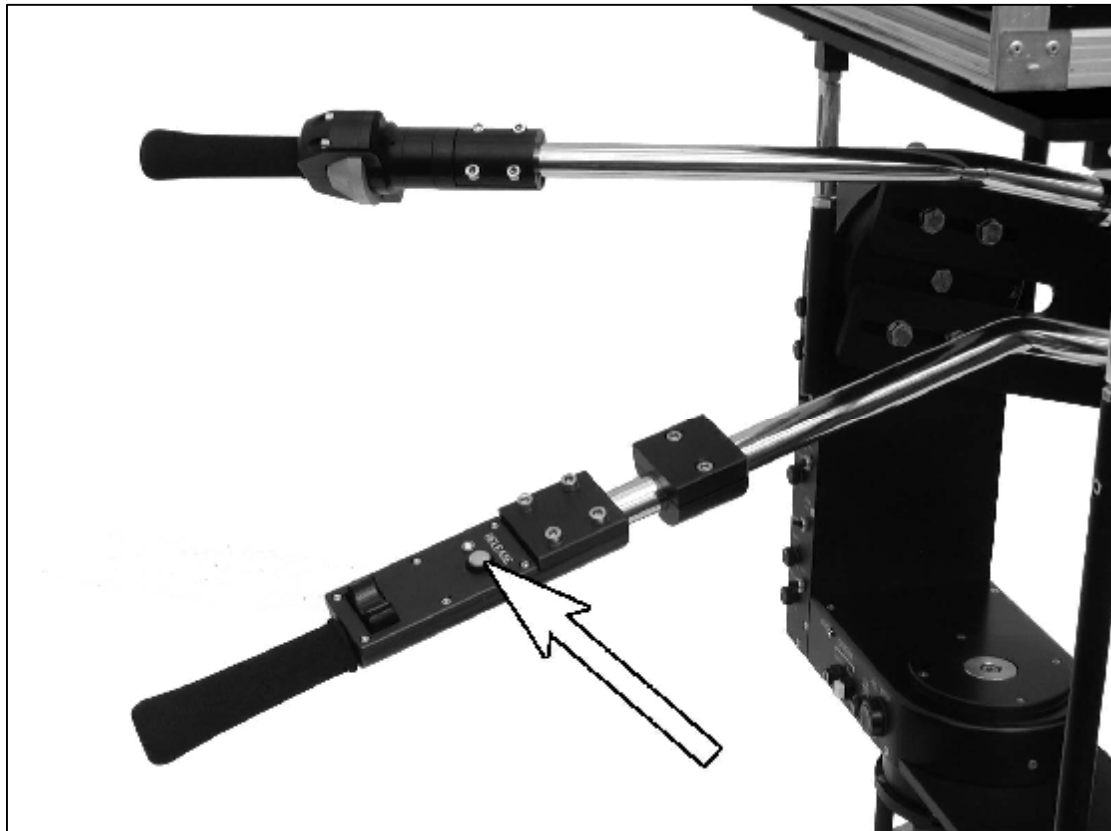
An accessory cable can also be attached for using “Preston” or “Scorpio” lens control systems. With this feature the camera operator controls the “Preston” or “Scorpio” lens motors with the focus roll and zoom rocker integrated in the arm of the pan bars.



2.17.3. - Connector sockets at pan bars

2.17.4. Operation

After it has been switched on, the camera is moved with the pan bars into the starting position. By pressing the RESET button above the zoom rocker, the remote head and pan bars are uncoupled. The pan bars are then moved to the desired working position and the camera and pan bars can be re-activated using the RESET button.



2.17.4.a. - RESET button at zoom

The ratio between the movement of the pan bars and the remote head is set by means of the RATIO potentiometers.

The maximum acceleration and delay of the remote head is set by means of the FLUID potentiometers.

The camera on/off switch is used to start and stop all film cameras.

The emergency cut off switch deactivates all functions of the crane and remote head.



2.17.4.b - Front view of pan bars with potentiometers