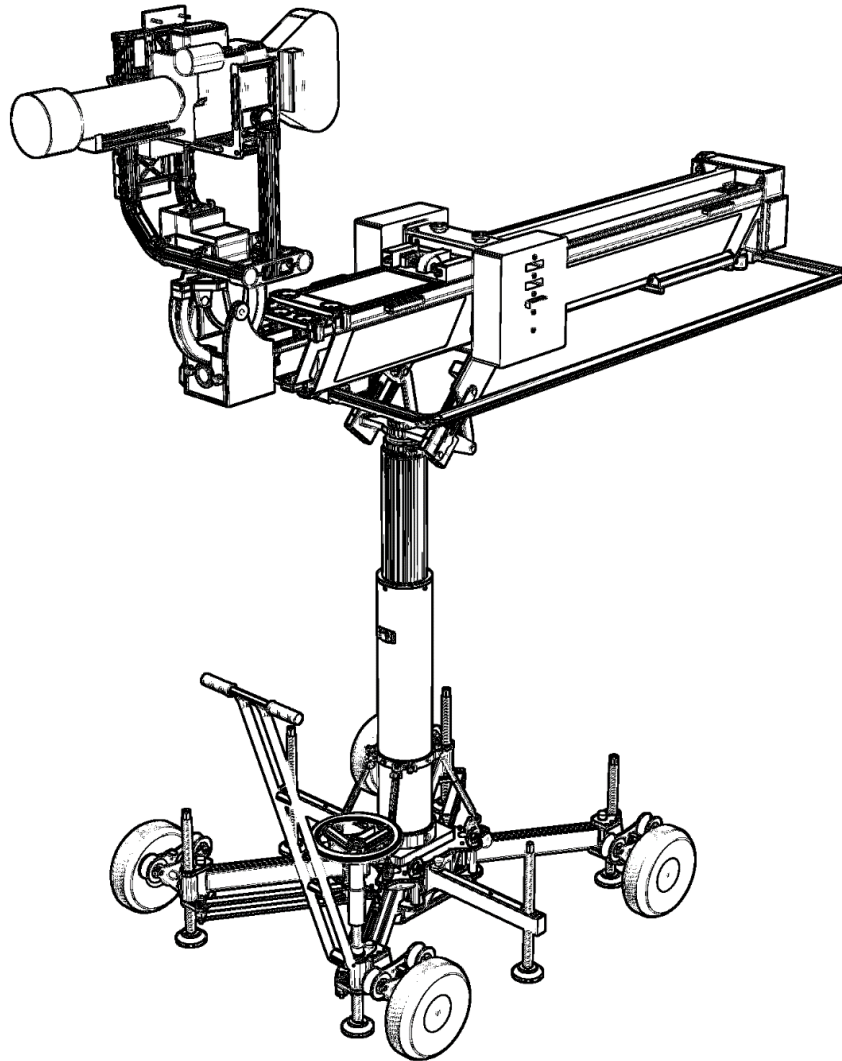


# MB12 Verticrane Instruction Manual



**MovieBird International Sp. z o.o.**

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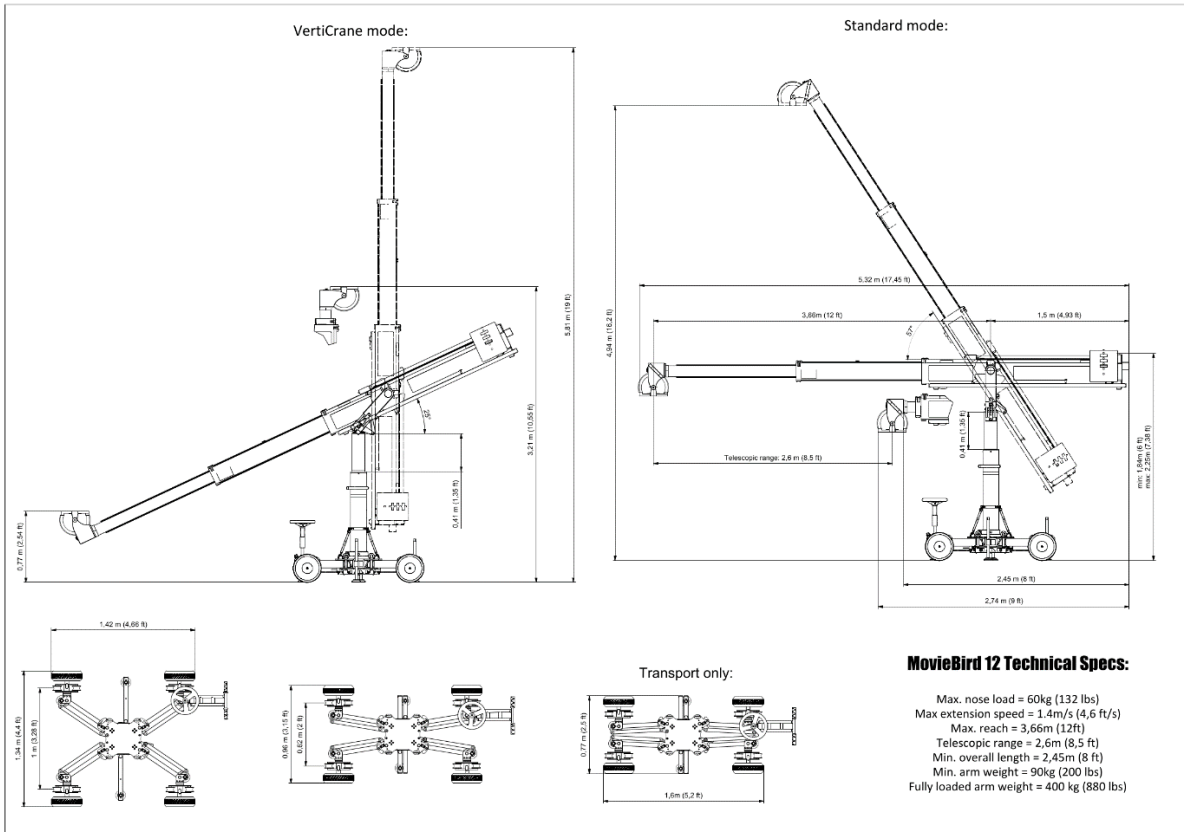
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# MovieBird MB12 Verticrane Instruction Manual



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## Table of contents

<b>Safety guidelines</b> .....	4
<b>Safety precautions</b> .....	6
<b>Crane balancing</b> .....	9
<b>SYSTEM DESCRIPTION / CONTENTS</b> .....	12
<b>SYSTEM ASSEMBLY</b> .....	17
Dolly assembly.....	17
PanBearing installation/removal.....	18
Yoke installation.....	19
Arm installation.....	19
Levelling head and electronics installation.....	22
<b>Enabling Verticrane function</b> .....	24
<b>Crane maintenance</b> .....	32
Cables.....	32
Main drive belt.....	33
Motor belt.....	34
Guide rails.....	35
<b>Dolly mechanics</b> .....	36
Articulated arms.....	36
Side supports.....	36
Steering handlebar.....	37
Steering lock.....	37
Track wheels.....	38
Column lifting.....	39
<b>Electronics</b> .....	40
Parts list and description.....	40
Connection and power up.....	41
Levelling head manual.....	43
Troubleshooting.....	44

## Safety guidelines.

1. The assembly instructions must be read and understood before setup or operation. The crane may only be assembled in accordance with the manufacturer's instruction manual. The manufacturer's technical specifications and limits must be adhered to at all times and in no way exceeded.
2. The MovieBird Telescopic Crane may only be assembled, setup or operated by trained and experienced operator.
3. The crane may not be assembled or operated under the influence of alcohol, drugs or any other intoxicating substances.
4. The manufacturer accepts no liability for damages, injuries, or accidents occurring due to negligence by the crane operator, misuse of the crane or disregarding the instruction manual.
5. The camera crane must be used on even terrain.
6. Make sure there are no electronic cables and electronic appliances within the movement range of the crane arm when it is left unattended in assembled state. If the pan and tilt remote head is higher than the central pivot section the crane system should not be left unsupervised.
7. After setup of the crane the pan and tilt remote head should be positioned under the central pivot section. If the pan and tilt remote head is higher than the central pivot section the crane system should not be left unsupervised.
8. Make sure that there are no wires with electric power which has a higher voltage than the safety level within the movement range of the whole crane system. The power supply cable should not be under any tension when swivelling the crane arm.
9. Avoid abruptly swivelling or stopping the crane as it may cause the crane to fall.
10. The crane must not be used in environments with wind speed faster than 5.5 m/s.
11. When the camera crane is used during wet weather the pan and tilt remote head, control box and control bar must be protected against the rain as the control box is strictly prohibited from making contact with water.
12. No loose objects may be stored or placed in or on the crane.
13. Ensure the location where the crane is installed can support the double overall weight of the crane, (including the counterweight) and operators.
14. Only original accessories manufactured by MovieBird Technologies may be used with the crane.
15. Check that there are no objects placed on the side rails that can interfere with the moving counterweight hanger.
16. The telescopic sections of the crane must not be touched during crane operation.

17. MovieBird telescopic crane must not to be left unattended without first securing arm to base with straps provided.
18. Care must be taken when lifting counterweights onto hanger.
19. All protective covers must be left in place on MovieBird during operation (unless removed by MovieBird operator for adjustment only and then to be re-fitted before re-use of MovieBird)
20. Electronic & mechanical "end stops" must be in full safe working order ( to be verified by MovieBird Operator)
21. Pan and Tilt brake must be operated by MovieBird operator only.
22. Base must be maintained horizontally in a level position when in use.
23. All personnel in the vicinity of the MovieBird are to be made aware of its scope and speed of movement.
24. To reduce the possibility of injuries, the crane must be operated by at least two persons.
25. It is forbidden to remove or add any weight to the crane without permission of the crane operator. Any added/removed weight will cause unbalancing of the crane which may lead to serious accident.
26. Any time during operating of the crane, the crane operator must have at least one hand holding the crane. Any hand-free movement of the crane arm is forbidden.
27. All of the service points, safety covers, adjustment screws – if not stated otherwise in this manual – are to be handled only by certified MovieBird technician.
28. Any people in the vicinity of the crane must be informed about the intended movement of the crane, it's work characteristics and safety guidelines included in this manual.

## Safety precautions.

### 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.

The safety straps will keep the crane stable when retracted but they can't ensure safety in every situation. If the crane is unbalanced and fully extended it might tip over so it is important to balance the crane before telescoping out.

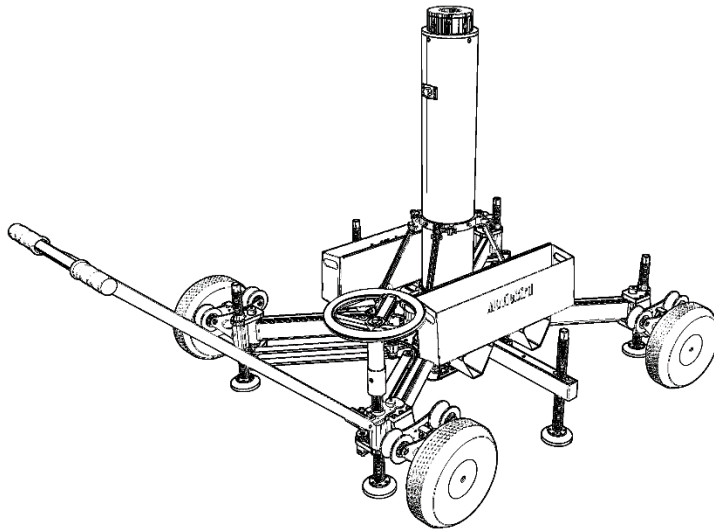
### Counterweights.

The counterweights should always be secured by M16 bolts to prevent them from falling off.



During transport, all counterweights should be taken off the crane.

## Levelling jacks.



MB12 dolly has 6 sets of levelling jacks – one on each corner and additional two on the extendable side supports. When stationary, use the levelling jacks to keep the base from moving. Always set the base levelled (horizontal) before using the arm.

## Section lock.

During transport the sections might extract themselves and cause damage to the crane or nearby objects, therefore they need to be secured by attaching the locking bar to the first and last section:



## Protective covers.

It is forbidden to operate a crane without the protective covers being fitted. The protective covers should only be removed for servicing and cleaning the rails or tightening cables and must always be screwed back on afterwards. Operating the crane without side covers may result in serious hand injury. Electronic control box must be always switched off before removing the covers.

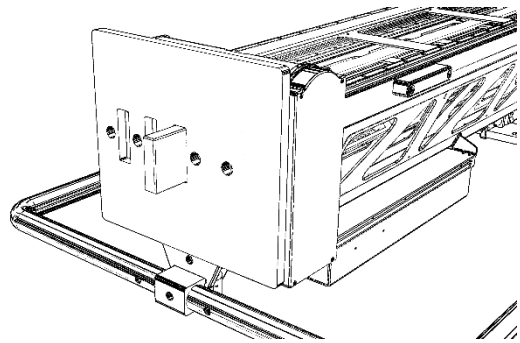


## Crane balancing.

Telescopic camera cranes need proper balancing for safe operation, quite different than balancing a fixed length camera crane. **Due to the small size and weight of the MB12 crane it is mandatory to have the crane perfectly balanced every time the electric control unit is on. Failure to do so might cause motor overheating and crane damage.**

To balance the crane:

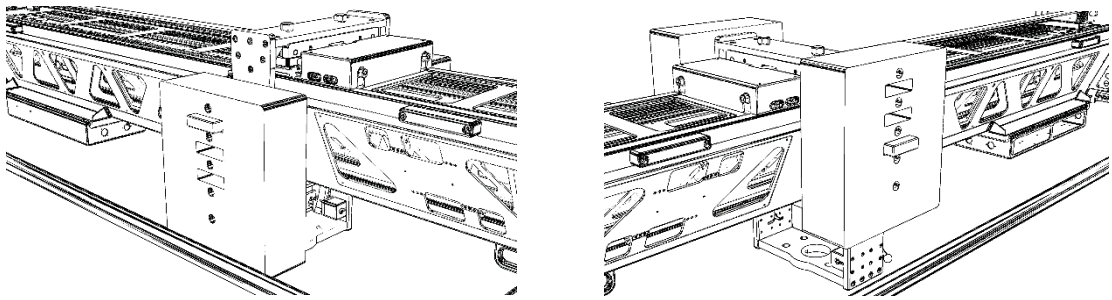
- Put both safety straps on the arm and level the dolly using levelling jacks.
- Install the levelling head, remote head with camera and all accessories and cables. Install the control unit and plug all the cables in.
- Remove the section lock and extract the sections manually until the counterweight hanger is right on top of the yoke/column. Release both pan and tilt brakes.
- Now, with one person holding the arm by the side rails, the other person carefully loosens one safety strap, preferably the one with more tension on it. Check for balance and add static balance on the arm (side rail weights or counterweights at the back of the arm).



When You feel the arm is more or less in balance, remove both safety straps from the arm and check again, add/remove weights if needed.

-At this point You can power the electronics on and wait for the levelling head to calibrate (wait for the LED to stop flashing). Now retract the crane until the near limit switch is engaged and after that slowly extract the sections (speed setting 1) and check for balance. When You feel the arm tilts forward by itself, stop and add counterweights on the weight hanger equally on both sides, do not touch the static weights added earlier.

The MB12 counterweights have multiple slots that allow You to move their position up and down on the hanger. This will come with experience of the operator but in most situations You will use the bottom slot (top setting) when underslung and the top slot (bottom setting) when overslung. Moving the counterweights on the hanger helps with tilt balance which will be explained further in the manual.



- Check for balance all the way until the arm is fully extended, remember to put the securing bolts on the weight hanger while checking. At this point You might have to adjust the static balance a bit by moving the weights on the side rails. Now the crane should be balanced at every length.

#### Tilt balance:

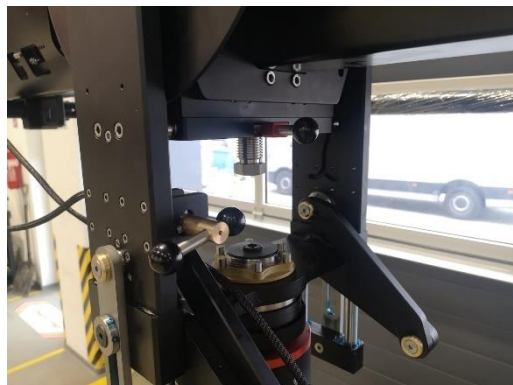
After balancing the crane in horizontal position it is important to balance the center of gravity (COG) relative to the tilt rotational axis. Due to the small size and weight of the MB12 and multiple load variants (underslung, overslung, matrix) the COG can move up or down relative to the tilt axis. When in use, the levelling head also shifts the COG of the camera package and that affects the crane balance as well. To account for all that you can adjust the balance on the Yoke and/or move the counterweights up or down on the hanger using their multiple slots to find the correct setting.

#### To check for tilt balance:

- verify that the arm is perfectly balanced in horizontal position
- tilt the arm approx. 30 degrees upwards and release grip. If the arm increases the tilt angle by itself it means it's top heavy. If the arm tilts back towards horizontal position it means it's bottom heavy.

There are two ways of adjusting the position of COG. The first is the aforementioned moving of the counterweights on the hanger using their multiple slots. If the crane is top heavy You need to move some (or all) of the counterweights down one or two slots on the hanger. If the crane is bottom heavy You need to move the counterweights higher on the hanger.

The other way of adjustment is by moving the arm on the yoke by turning the central screw:



To adjust the screw:

- Put the arm in horizontal position
- Loosen the locking nuts on both sides of the yoke:

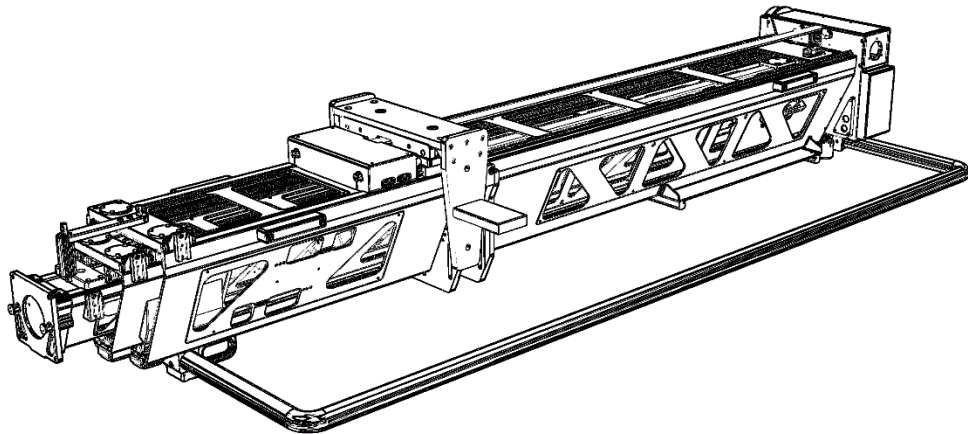


- Turn the central adjusting screw to lift or lower the arm. Lift the arm if it's bottom heavy, lower the arm when top heavy. Check for balance. Once set, tighten both locking nuts.

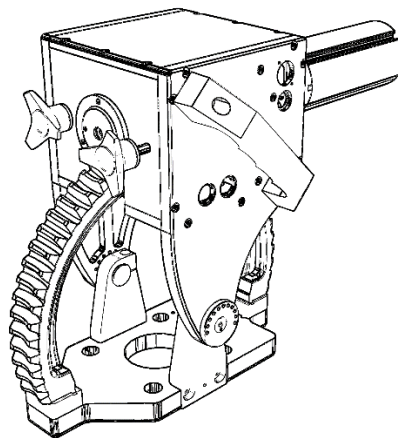
## SYSTEM DESCRIPTION / CONTENTS.

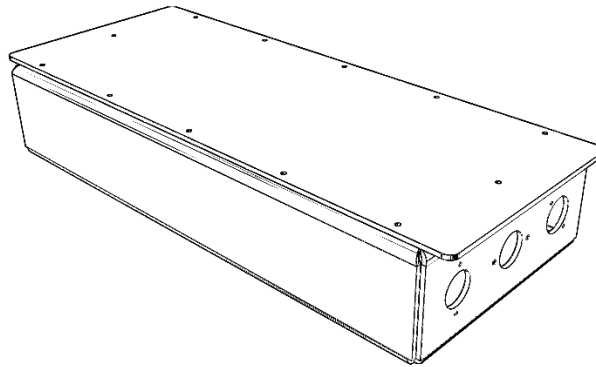
Depending on the options You've selected on ordering, the MB12 Verticrane System will come with the following main parts:

MovieBird MB12 Arm.



The MB12 arm will come with its own dedicated levelling head, a set of counterweights and an Electronic Control Box with a separate Power Supply Unit:

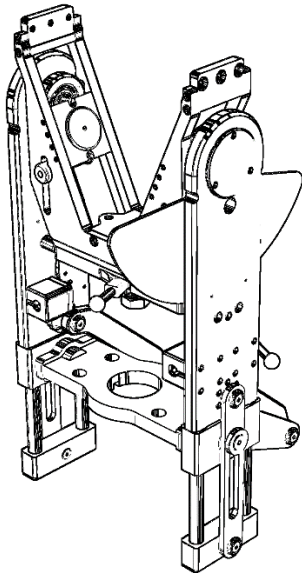




The power supply unit is necessary if using mains power (230/120V). You can also run the system with 48V battery pack, in that case plug the power cable straight into the electronic control unit.

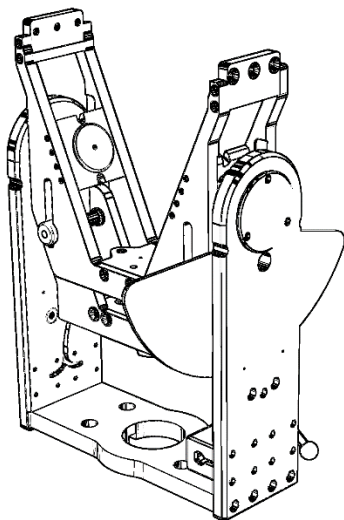
The MB12 can be ordered with one of the following Yokes, both dedicated for different jobs:

### Verticrane Yoke.



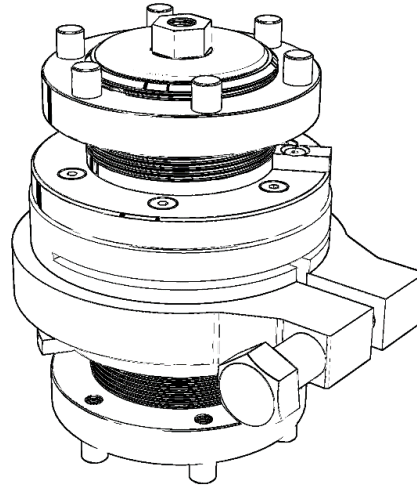
The Verticrane Yoke is a folding Yoke that allows the MB12 arm to enter the Verticrane position. In the Verticrane position the arm can operate with a tilt angle from -25 degrees downward up to full vertical position (90 deg). When folded back to standard position the arm has a symmetrical tilt angle of +-57 deg. **The Verticrane Yoke can only be used on a dedicated MB12 dolly and column positioned stationary on level ground.**

### Fixed Yoke.



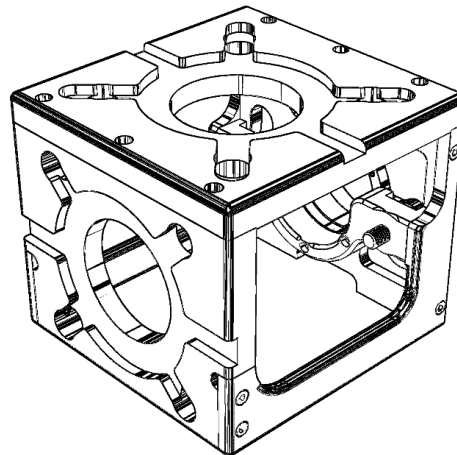
Fixed MB12 Yoke is a standard Yoke for the MB12 that can be used on a moving platform (dolly, car, EV cart). It mounts on any Mitchell-type pan bearing ( like the MB12 PanBearing) and is equipped with a Tilt brake. It's more rigid than the Verticrane Yoke and is necessary if the MB12 should be used on any platform in motion.

## MB12 PanBearing.



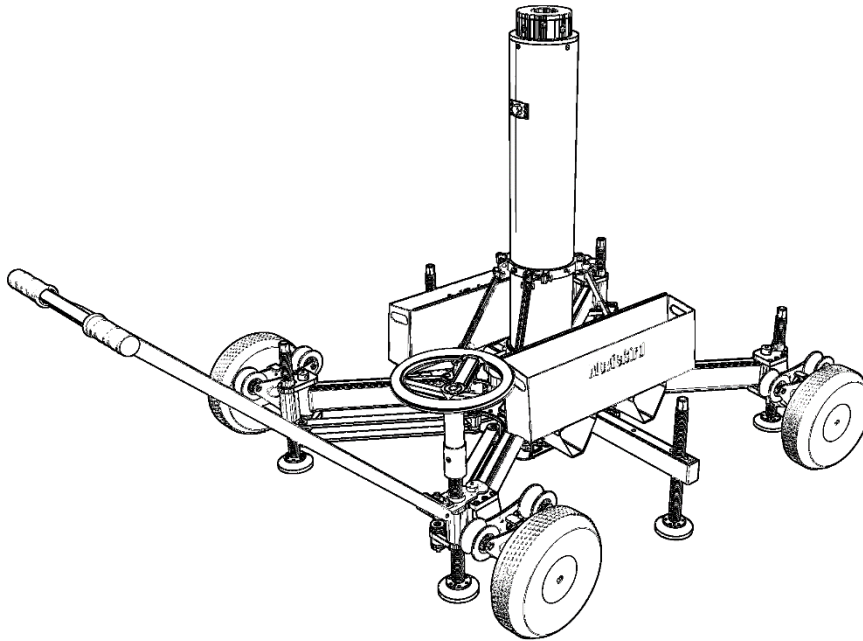
MB12 PanBearing is a universal double-Mitchell pan bearing with integrated pan brake. By default it's mounted on the top of the MB12 column but can be easily removed and mounted on a car/dolly or any other platform that can accept Mitchell or Moe mounts.

## MB12 Matrix Mount.



The MB12 Matrix Mount can be installed in place of the levelling head, it has 2 Mitchell mounting sockets (front and top/bottom) and can be used with various remote heads.

## MB12 Dolly with column.



An articulated dolly dedicated for the MB12. It has extendable supports for more stability and is the only dolly suitable for the Verticrane function. The column can extend by 0.41m (1,35 ft) and can accept the MB12 PanBearing. It has removable side boxes that can hold extra equipment, counterweights or the Power Supply Unit. Its articulated arms enable it to go through tight passages or ride on tracks of different spacing.

## MB12 Case Set.

MovieBird MB12 can be ordered with a dedicated case set that consists of an MB12 arm case and a MB12 dolly and column case. The MB12 arm case holds the MB12 arm and one of the Yokes, as well as the counterweight hanger and side rails. The arm rests on a specially designed cradle that can be removed from the case and used as a servicing stand. The MB12 dolly and column case has an integrated ramp that helps in loading and unloading the dolly from the case.

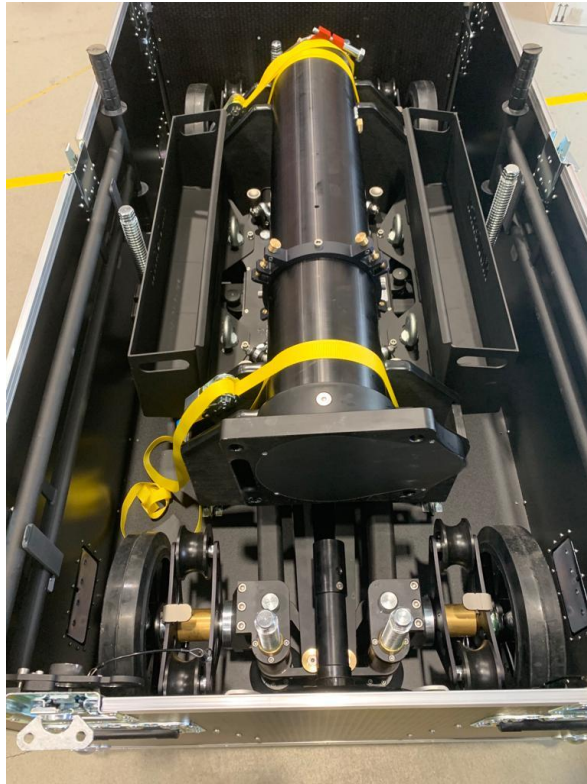




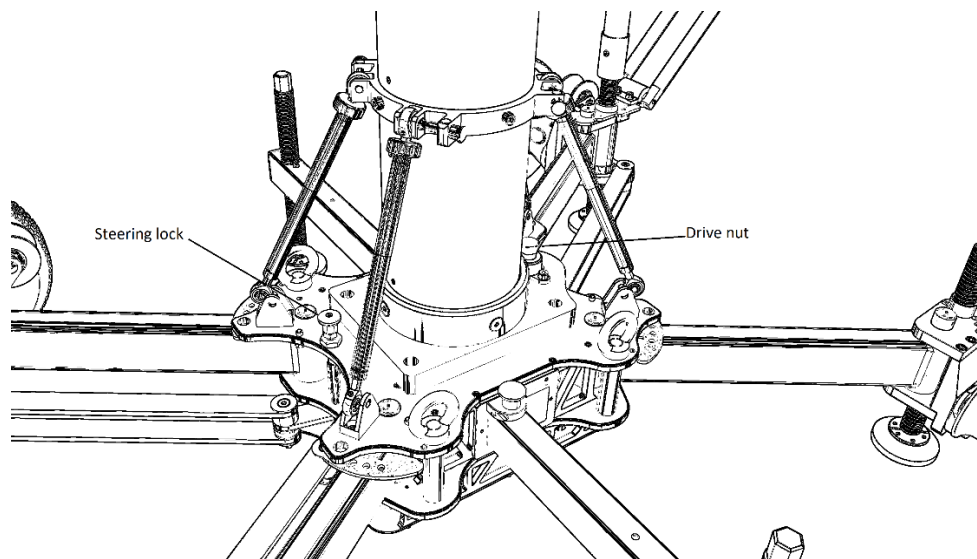
## SYSTEM ASSEMBLY.

### Dolly assembly.

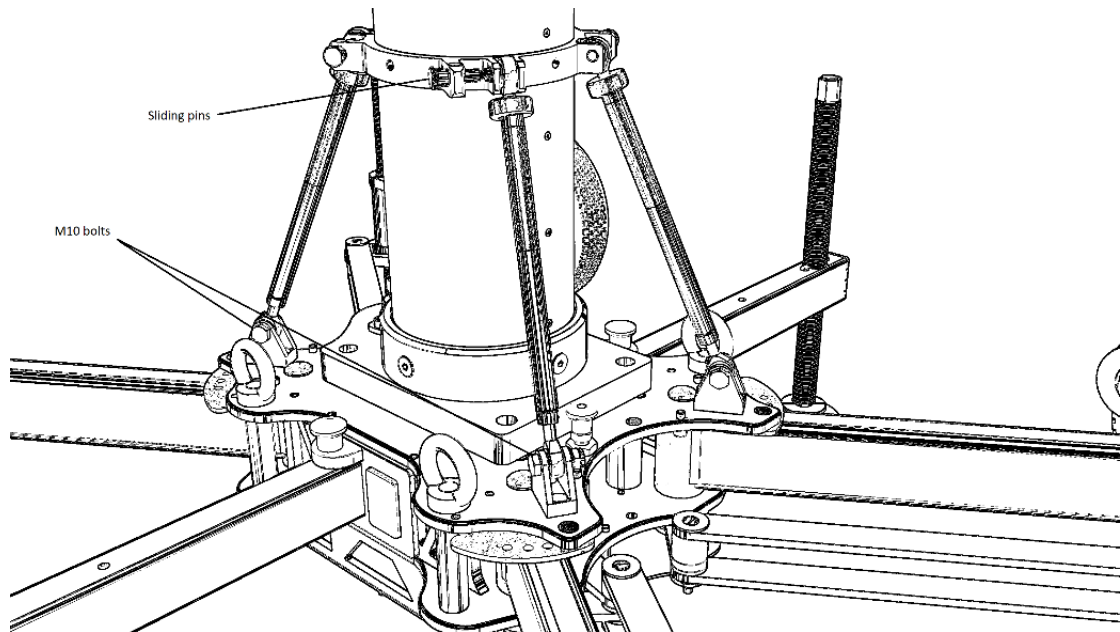
The MB12 dolly comes mostly assembled, the only thing to do on arrival is installation of the column. The dolly can be ordered with its own dedicated case:



To install the column, unstrap it from its cradle and position it on the base with the drive nut located on the opposite side than the steering lock. Secure the column using four M16 bolts:



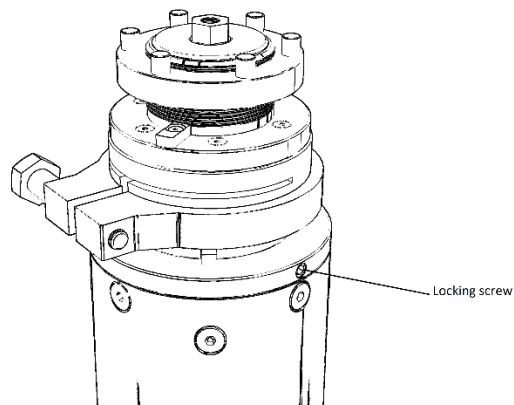
With column fixed to the dolly, install 4 side braces connecting dolly with the column. Side braces have adjustable length, You might need to adjust it to ease the installation process. The braces are mounted to the base by 4 M10 bolts and fixed to the column by special sliding pins.



After installing the braces to their mounting points on the base and column, tension them equally by adjusting their length.

## PanBearing installation/removal.

On arrival, the PanBearing should be already installed on the top of the column. To remove it: unlock the locking screw on the side of column top collar and unscrew the PanBearing from the column by turning the top 19mm hex counter-clockwise:



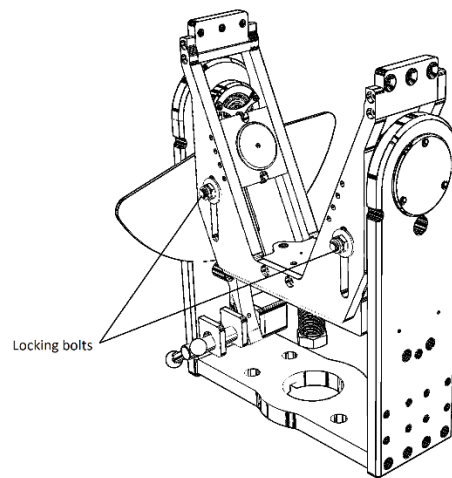
Installation is the reverse of removal.

## Yoke installation.

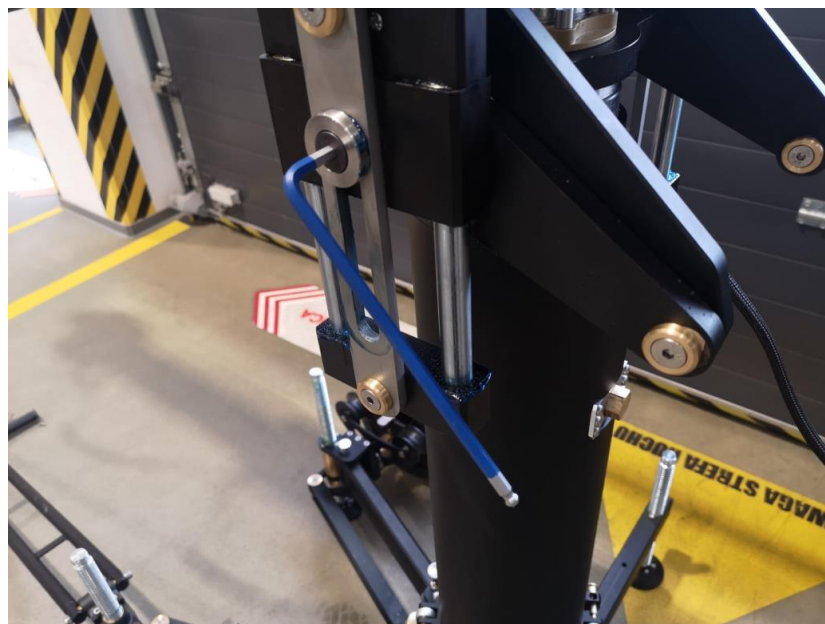
Both types of MB12 yokes are installed the same way: position the Yoke base on top of the PanBearing, pay attention that the key goes inside the slot in the base. Secure the Yoke with a Mitchell nut screwed in from the top.

## Arm installation.

Before installation, remove (if not already removed) the two locking bolts from the Yoke:



If using the Verticrane Yoke make sure it's in the standard (non-tilted) position and the side locking screws are tight on both sides:



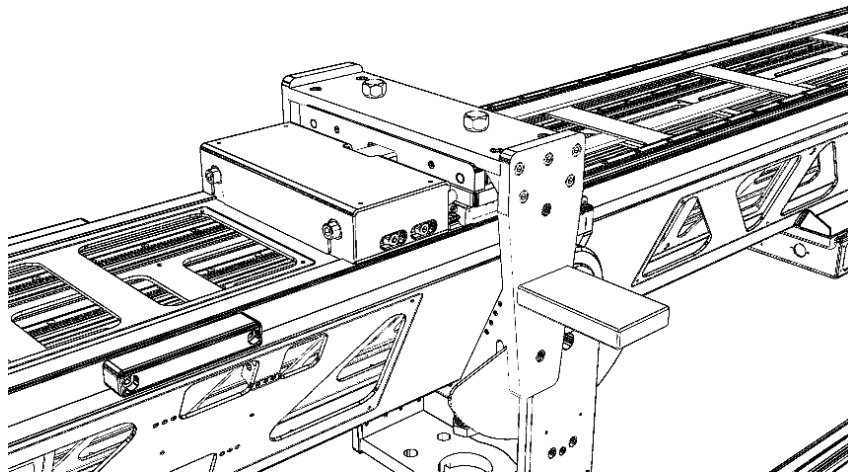
Unstrap the side rails from the MB12 arm case and install them in their mounting brackets on the arm and secure them with bolts. The dedicated MB12 case has special cutouts that allow that.



Grab the arm by the side rails on both sides and lift it from the case. Position the arm on top the Yoke and slide it downward making sure the Yoke uprights slide easily onto the cradle cutouts on the arm. You may also use a gantry or any applicable lift- in this case pit lifting straps under the main section on both sides of Yoke cradle making sure the center of gravity is under the lifting hook. Once the arm rests on the bottom of the Yoke, put the front strap on and put the locking bolts back in place and tighten the nuts.



Install the counterweight hanger and secure it with two M14 bolts:

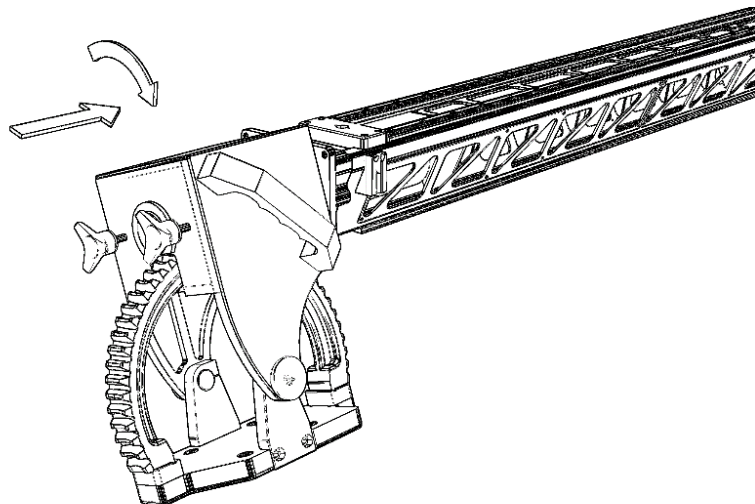


## Levelling head and electronics installation.

The MB12 levelling head and Electronics module are transported in their own dedicated case:



To install the levelling head, position it in front of the 3<sup>rd</sup> section and slide the motor tube in. Pull the locking bolts so they don't protrude out the back, then rotate the levelling head approx. 18 deg counter-clockwise. If You want to install it in the overslung position rotate it upside down and then additional 18 deg counter-clockwise. Push the levelling head fully in so the locking pins go inside, then rotate it clockwise 18 deg so that it sits levelled:

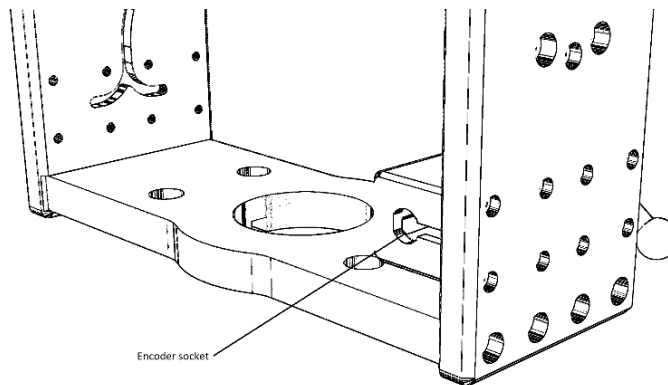


Push the locking bolts back in and tighten them. Remember to check the orientation of the inclinometer (the arrow must point down, You may have to rotate it if You go overslung).

Take the electronic box out of the case and slide it into its slot at the back of the arm. Secure it with locking screws on both sides.



Connect the arm motor and endstops to the control unit. Connect the levelling head power cable and the tilt encoder on the Yoke:



## Enabling Verticrane function.

The MovieBird 12 Verticrane has a unique option of fully vertical telescopic movement of the arm. Special design of the arm and the Verticrane Yoke makes it possible to smoothly transition from a horizontal to full vertical movement. The Verticrane function is an option possible only on the MB12 dedicated base and column and using the Verticrane tiltable Yoke.

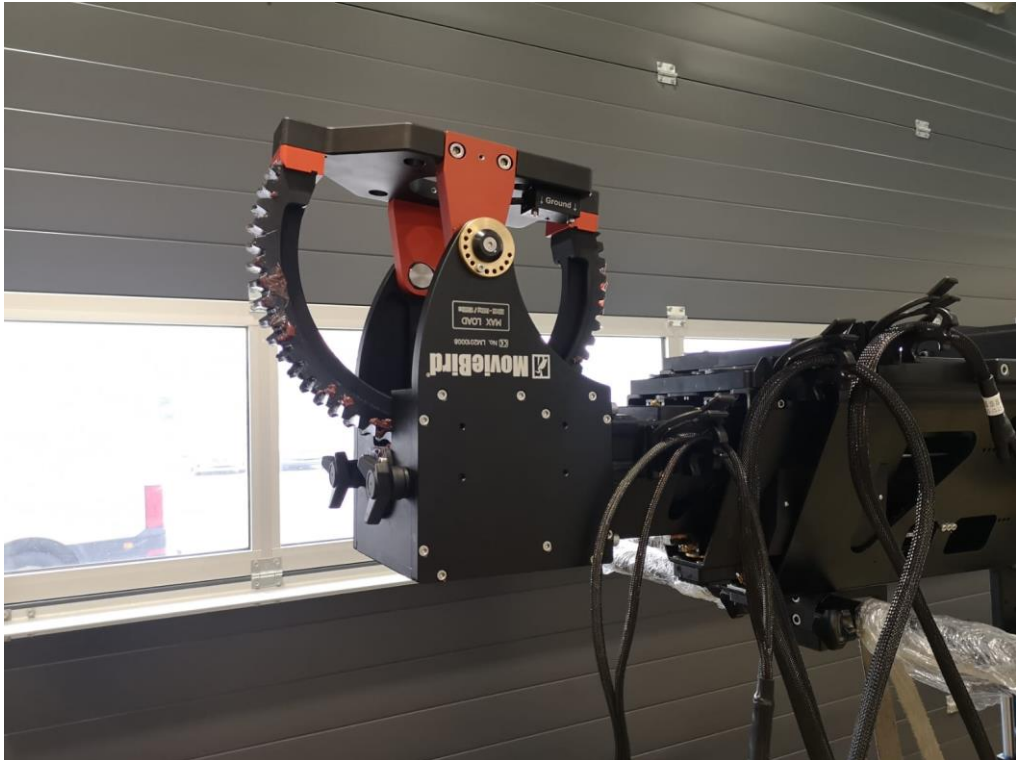
**IT IS IMPORTANT TO FULLY AND PROPERLY BALANCE THE CRANE WHEN USING THE VERTICRANE FUNCTIONALITY !! CHECK THE BALANCE AT ALL ANGLES, THE CRANE MUST NOT ROTATE ALONG THE TILT AXIS ON ITS OWN. IT IS UNSAFE TO USE A VERTICRANE THAT IS NOT PROPERLY BALANCED.**

1. The crane must be installed on a MovieBird MB12 VertiCrane base with the bases' retractable supports extended, all the jack screws must be engaged and the base must sit perfectly levelled. The base must not be standing on the wheels.





2. Level the crane and install the VertiCrane levelling head in the Overslung position. Do not put any load on the levelling head, do not install any counterweights.



3. Rise the column to the full extended position.



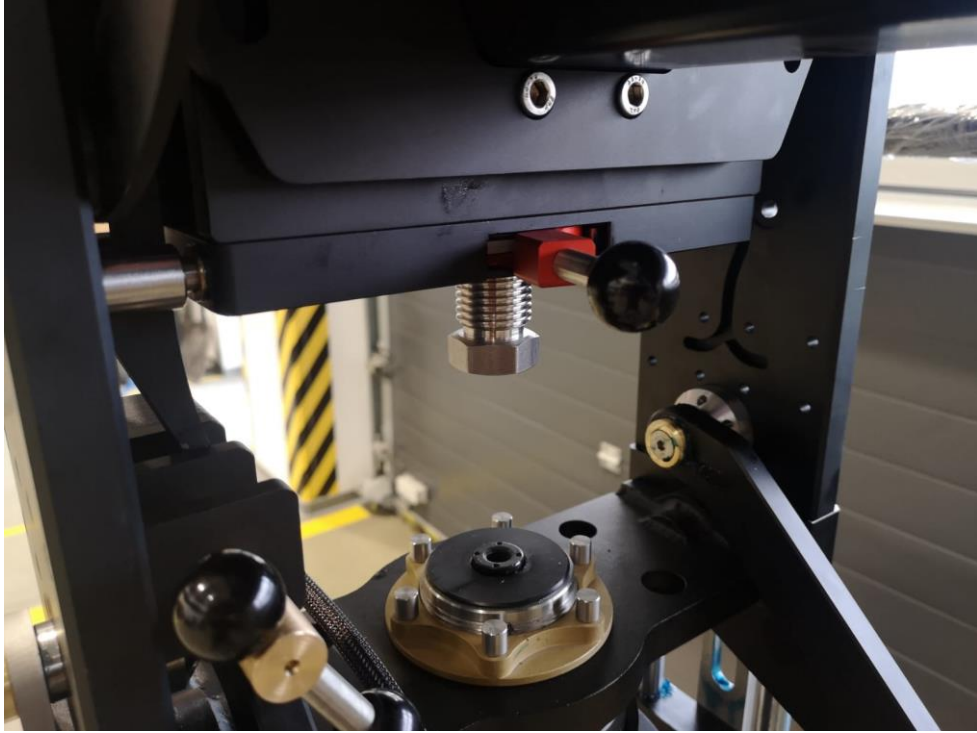
4. Manually extend the telescopic sections to the point where the crane arm is naturally balanced by its own weight. Do not balance the crane with counterweights.



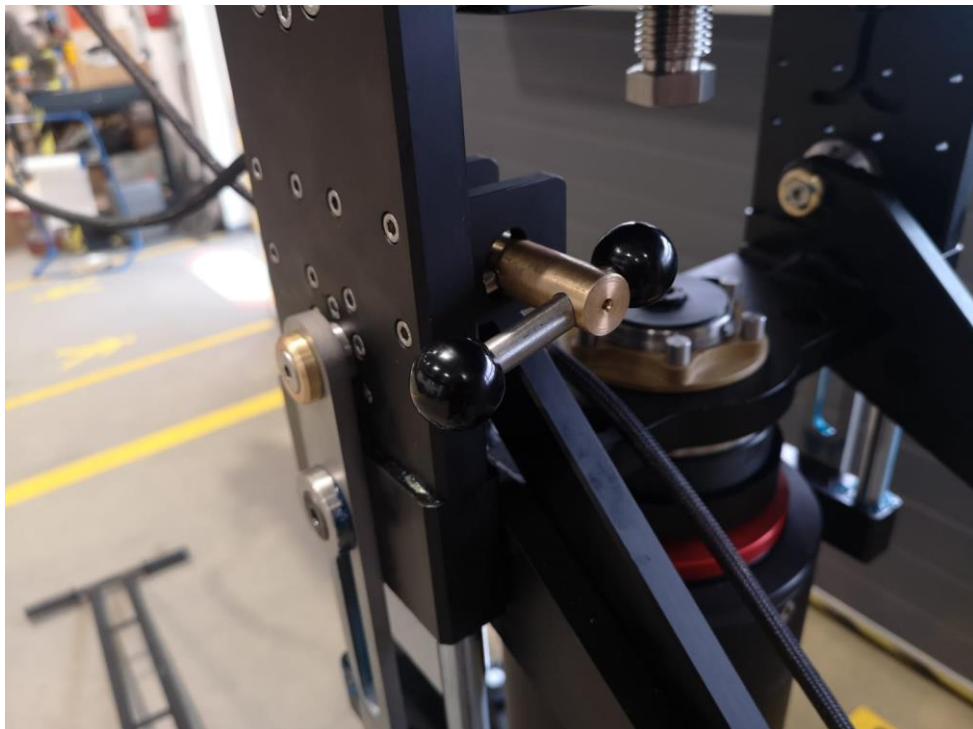
5. Turn on the electronic box to hold the motor, do not use the remote and do not calibrate the arm.



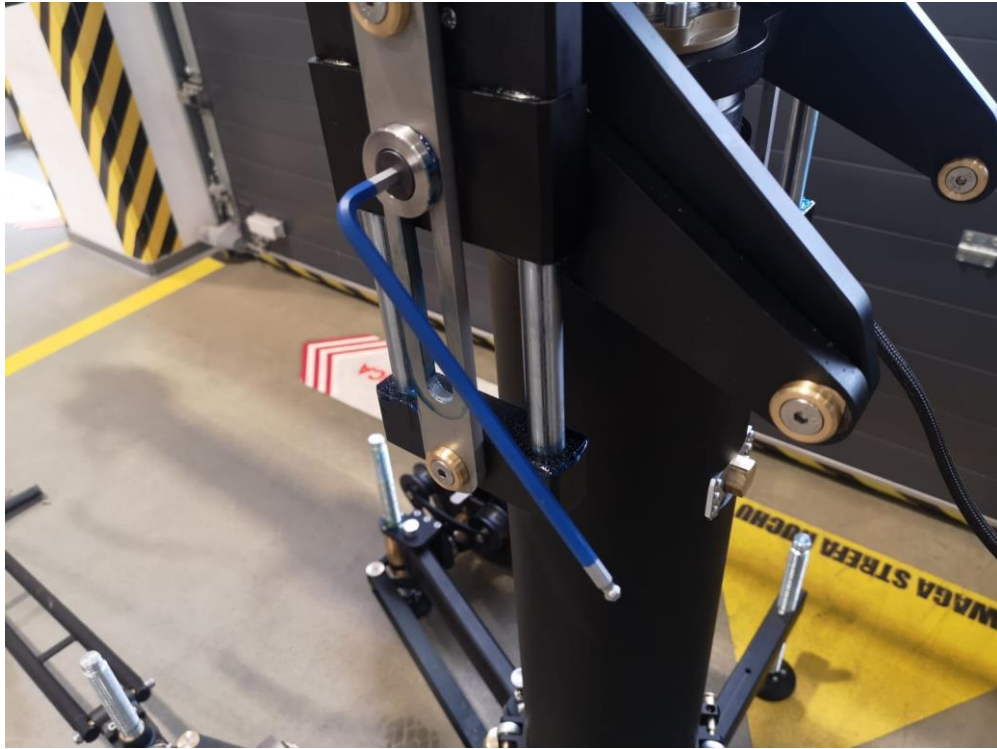
6. Engage the Yoke Lock pins on the bottom of the Yoke cradle by shifting the lever mechanism. The pins must lock into their seats on both sides.



7. Engage the Tilt brake on the left side of the Yoke.



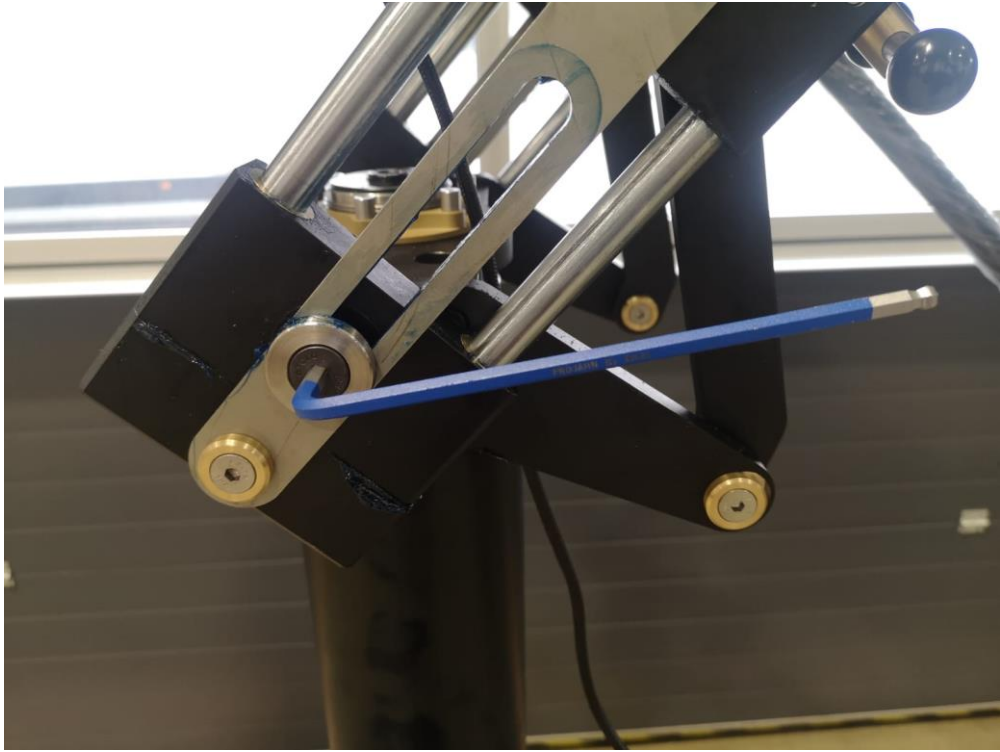
8. Slightly loosen fixing screws on both sides of the Yoke with a hex wrench.



9. Carefully press on the sidebars on the back of the MB12 arm tilting the Verticrane Yoke back about 45 degrees. Do not let go of the sidebars, the operator must control the movement of the arm at all Times.



10. Tighten both fixing screws on the sliders.



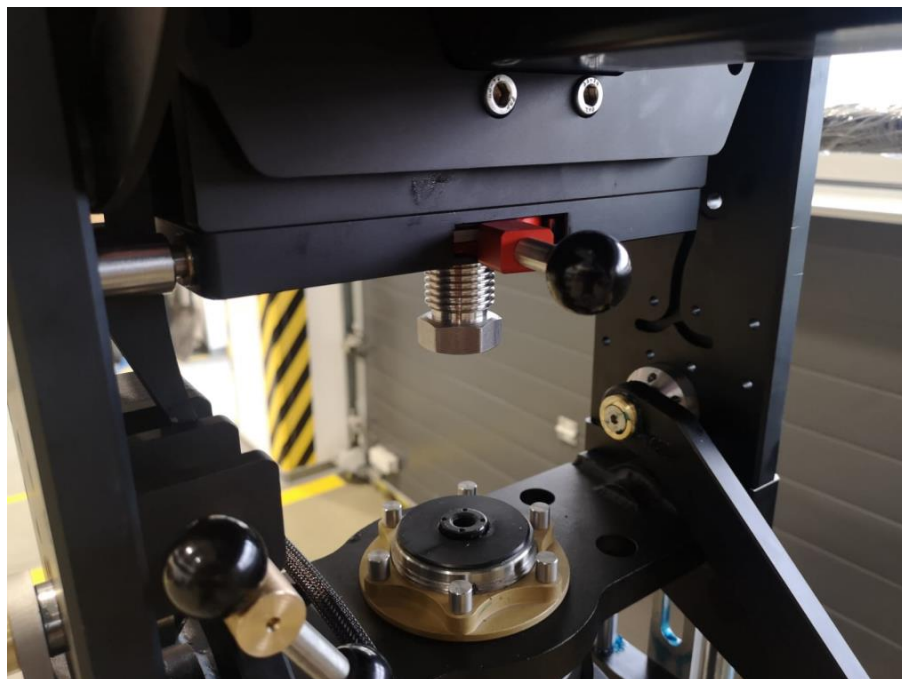
11. Disengage the Tilt brake and the Yoke Lock pins (red lever)



12. Rotate the arm to level position by lifting the sidebars at the back of the arm.
13. Cycle the electronic box off and on to reset the levelling head. You might need to do it twice in order for the levelling head to calibrate properly.
14. Install camera head and camera equipment, balance the crane by installing the counterweights and doughnuts (refer to balancing section of this manual). The counterweights have multiple slots in them, when overslung it is a good idea to install the counterweights in the lower positions and fine tune the crane balancing using the Yoke adjustment screw. To do so, first loosen slightly the adjustment lock nuts at both sides of the crane:



Then adjust the balancing using the single adjustment screw at the bottom of Yoke cradle



IT IS IMPORTANT TO FULLY AND PROPERLY BALANCE THE CRANE WHEN USING THE VERTICRANE FUNCTIONALITY !! CHECK THE BALANCE AT ALL ANGLES, THE CRANE MUST NOT ROTATE ALONG THE TILT AXIS ON ITS OWN. IT IS UNSAFE TO USE A VERTICRANE THAT IS NOT PROPERLY BALANCED.

WHEN TILTING THE ARM TO FULL VERTICAL POSITION BE EXTRA CAREFUL NOT TO HIT THE COLUMN WITH THE BACK OF THE ARM. DOING SO MIGHT CAUSE THE ARM TO SHAKE AND CREATE DANGEROUS SITUATIONS.

## Crane maintenance.

### Cables.

MovieBird 12 has two sets of cables responsible for extension and retraction of the third section of the crane. They're located on both sides of the arm and need to be regularly checked for wear and tension.

To check and adjust the cables, load the crane with its operational load and balance the crane with counterweights. Fully extend the sections and remove side covers from section 2 and front of section 1. Tilt the arm approx. 40 degrees and check cable tension. If any of the cables is loose, return to horizontal position and turn the power off, put safety straps on the arm. Adjust tension equally on both sides of the arm, depending on the amount of adjustment left on each cable end. The adjustment can be done on the front of section 1 ( retraction cable on top, extension cable on the bottom) or in the back of section 3, visible through cutouts in front of section 2.





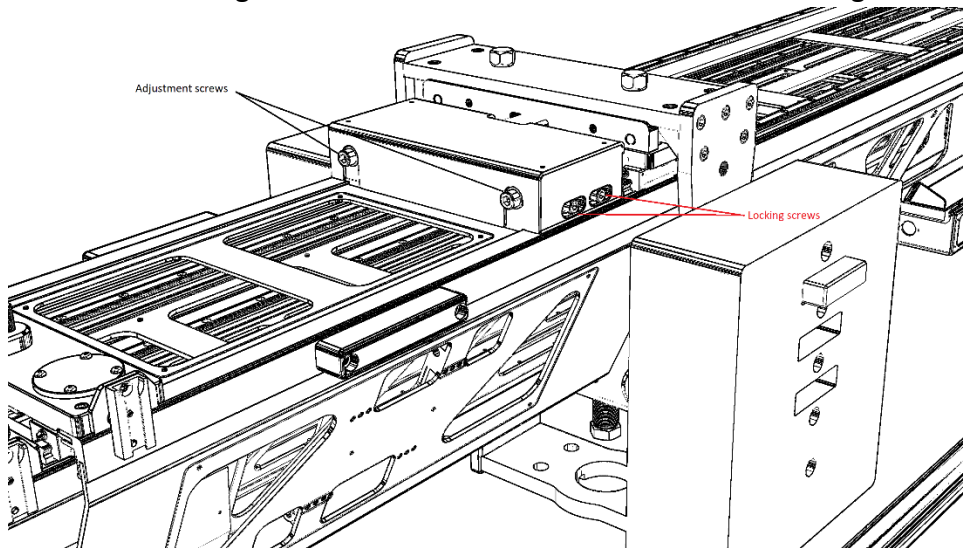
## Main drive belt.

The main drive belt is responsible for moving the counterweight hanger and section 2 of the MB12 arm. Extending of section 2 causes and opposite movement of the counterweight hanger. It is important to keep the belt tight at all times, otherwise it may skip a tooth when accelerating or stopping with a large load and cause damage to the arm.

To check the belt tension, load the crane with its operational load and balance the crane with counterweights. Tilt the arm at least 40 deg. , keep it retracted. Check the top loop of the belt, it should be tight.

To adjust the belt:

- Return to horizontal position and turn power off, put safety straps on the arm.
- Loosen the locking screws on both sides of the front shaft housing:



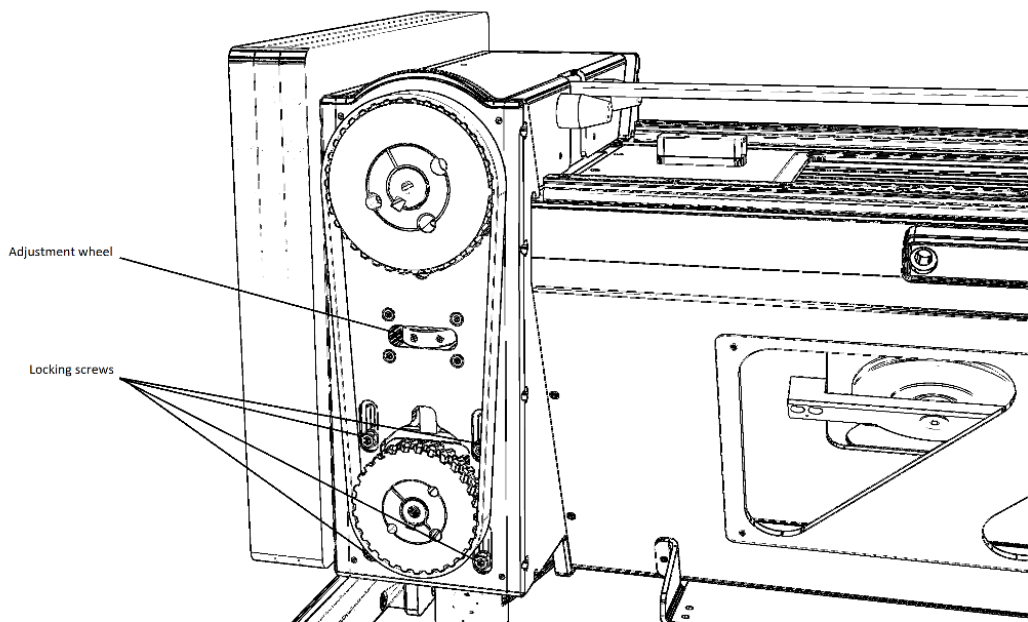
- Adjust the position of the front shaft by turning the adjustment screws equally on both sides. Tighten the locking screws when done.

## Motor belt.

Motor belt is located on the right side of the drive unit attached to the back of section 1. Remove the cover to inspect it – check for excessive flex under load changing. **DO NOT PUT YOUR HANDS NEAR THE BELT WHILE THE POWER IS ON AND THE CRANE IS RUNNING.**

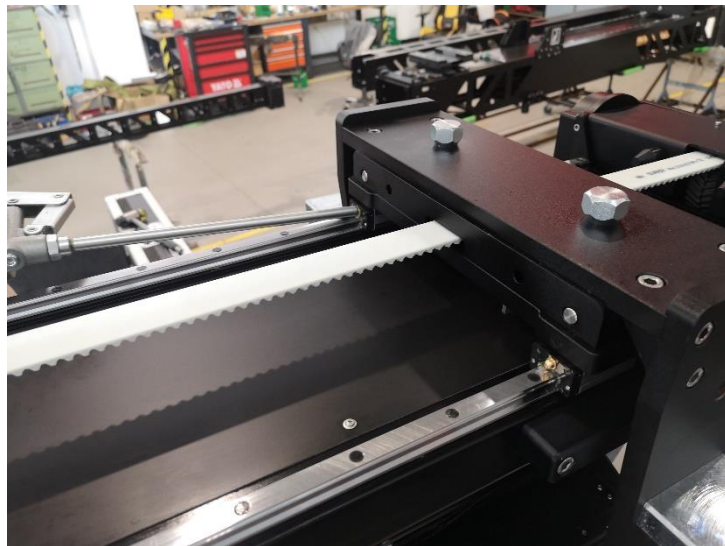
To adjust the belt:

- Power off the crane and put the arm in horizontal position
- Loosen the locking screws located around the bottom sprocket (4x)
- Adjust the belt tension by turning the adjustment wheel. You can turn it by hand or by inserting a screwdriver or a pin in one of the holes.
- When done, tighten the locking screws



## Guide rails.

Ball-type guide rails are used for the telescopic movement of both sections and counterweight hanger. When properly lubricated they provide smooth and quiet operation of the arm. Each telescopic section runs on 5 guide blocks, 4 on the top guide rails and one stabilizing the bottom guide rail. Counterweight hanger runs on 4 guide blocks. Each of the guide blocks need to be lubricated regularly with a high grade synthetic based guide rail grease (preferably THK AFA type grease



## Dolly mechanics.

### Articulated arms.

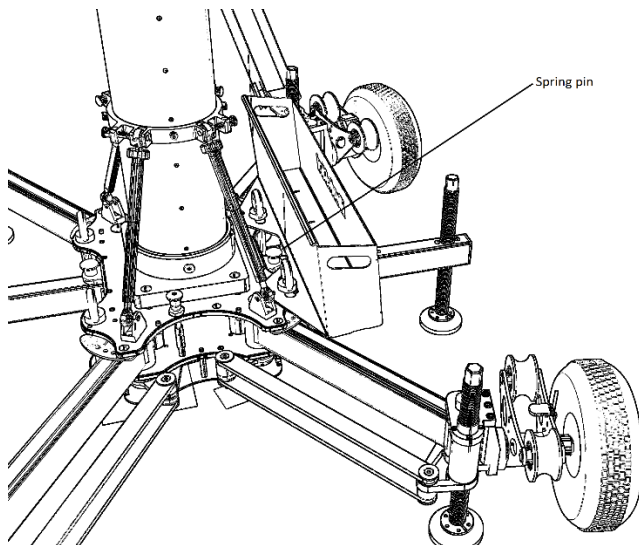
MovieBird 12 dedicated dolly has articulated arms that allow it to change its wheelbase to accommodate various track spacing and to allow it to pass narrow door openings. For standard operation on rubber wheels and for Verticrane use the widest setting should be used. The minimum width setting should be used only for passing through narrow door openings with assistance of at least 2 technicians. After clearing the opening the arms must be expanded for increased stability.

To change the wheelbase:

- Put both securing straps on the arm, take off the counterweights and remote camera
- Lift the dolly using levelling jacks until it stands on them only
- Lift one corner of the dolly using its levelling jack until one of the adjacent wheels is in the air
- Pull the spring-pin locating the loose arm and move it arm to the desired position. Release the pin and make sure its engaged in one of the holes.
- Repeat for all remaining arms until all are in the desired position
- Lower the dolly back on its wheels

### Side supports.

When using the Verticrane function or for additional stability, the retractable side supports need to be fully extended and engaged. To extend them, pull the spring pin located behind the side boxes up and extend the side support approx. 9 inches. Release the spring pin and make sure it drops in fully and locks the side support.

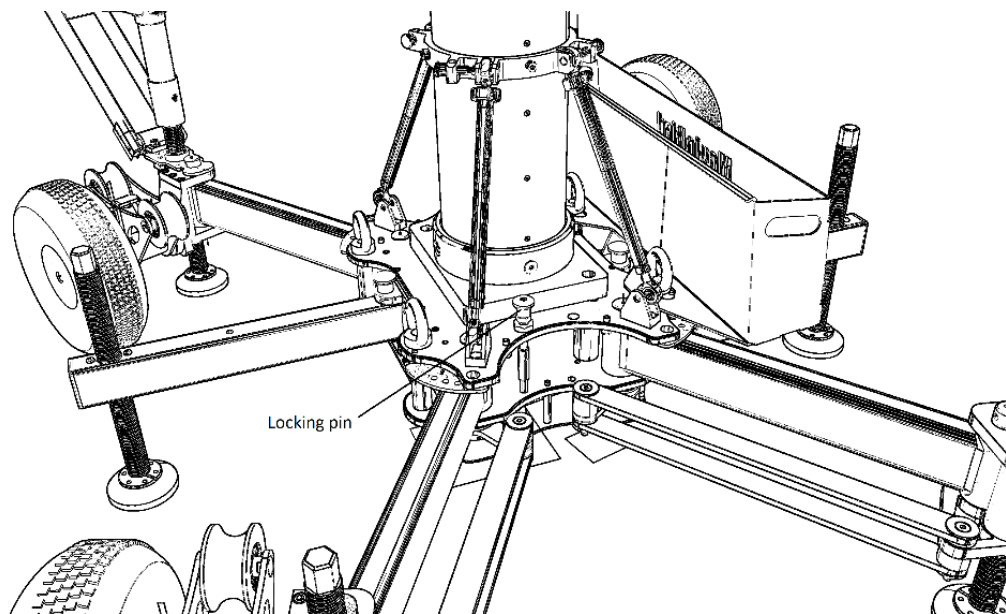


## Steering handlebar.

The dedicated MB12 dolly has removable handle bars that You can install on any of the four wheels. To install them, slide them on one of the corner levelling jacks and rest them on top of the knuckle making sure the steering axis/pin goes inside the hole in the handlebar. Lock them with the supplied cotter.

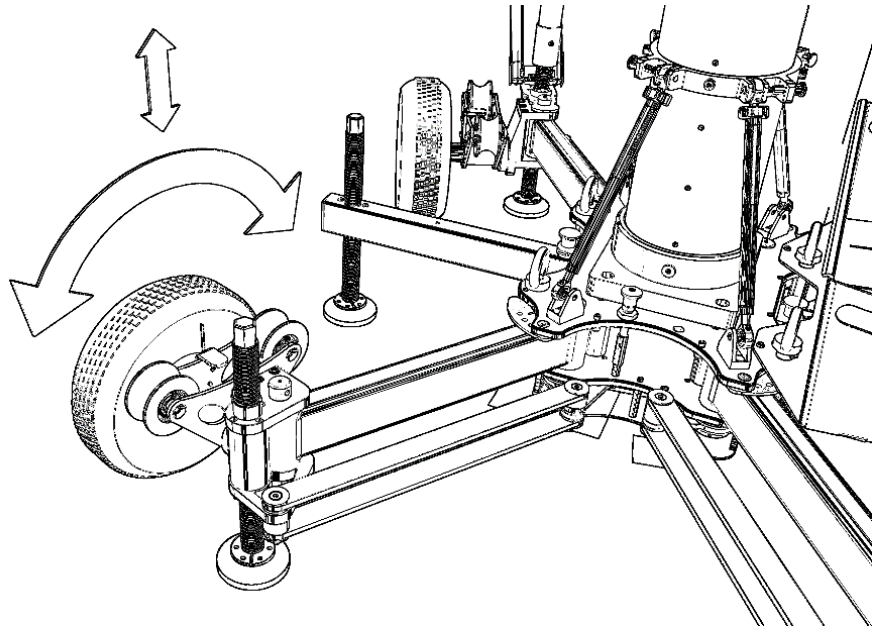
## Steering lock.

The MB12 dolly has a steering system on both sides of the dolly, which can be connected together making it possible for just one person to steer efficiently. To release the connection between both steering systems pull the locking spring-pin and rotate it 90 degrees so it remains in the up position. This way the connecting bar is unlocked and both steering systems can be operated independently. To lock it back, pull the spring-pin and rotate it back 90 degrees making sure it goes through the hole in the connecting bar.



## Track wheels.

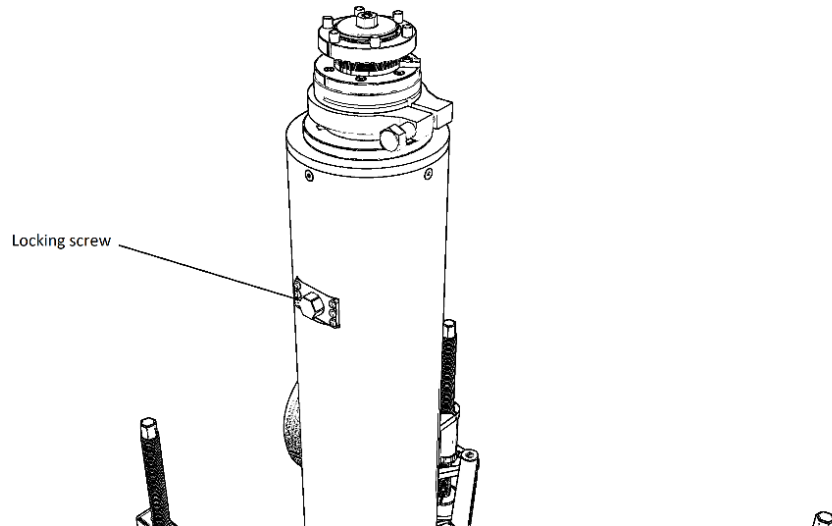
There is a full set of track wheels mounted permanently on wheel axes of the dolly that can be used on tracks of multiple width by adjusting the position of the arms. To prevent any damage and for better ground clearance the track wheels are mounted upside down. To put them in the normal position: lift the dolly on the levelling jacks high enough that the track wheels trucks can rotate freely, pull on the latch located on the truck to release it from the groove in the wheel axes and rotate the track wheels to the working position:



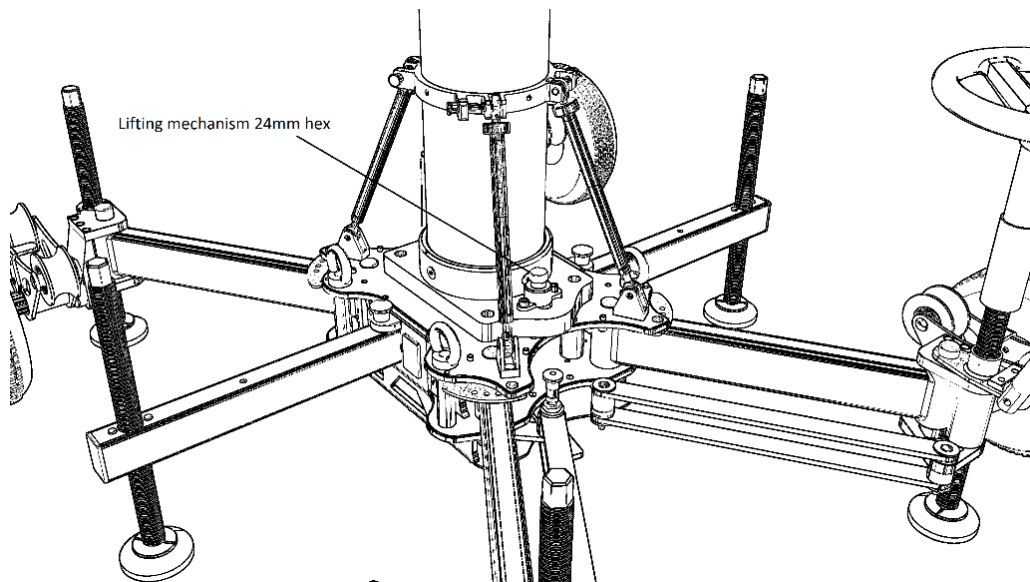
## Column lifting.

The MB12 column has a 41 cm (approx. 16 inches) telescopic lift range. To raise the column:

- Loosen the locking screw on the side of the column



- Using a power drill, lift the column by turning the 24mm hex screw at the base of the column. The maximum lift will be indicated by 3 grooves on the side of the inner column. Stop the lifting process when the ridges appear in sight.



- The locking screw should only be used when additional stiffness of the column is needed (i.e. motion tracking situations). There is no need to lock the column in standard use. **Unnecessary locking the column might cause oscillations of the levelling head.**

## Electronics.

### Parts list and description.



MB12 electronic equipment is stored in a case and consists of:

- Electronic Control Box (ECB)
- 48V Power Supply Unit (PSU)
- Levelling Head
- Cable remote control ("Joystick")
- Loom cable for levelling head
- Main power cable for PSU
- PSU-ECB power cable
- Battery-ECB cable (Battery not included)
- ECB – Arm cables
- Remote control cables (2m and 10m length)

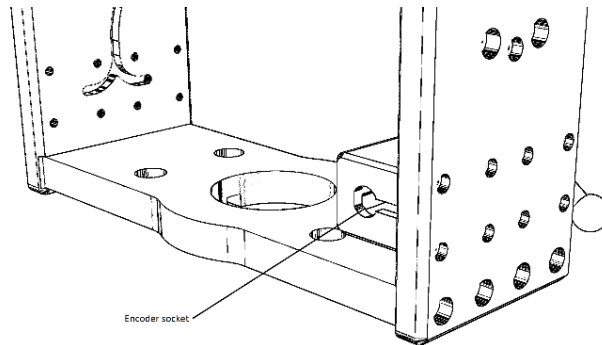


## Connection and power up.

With the arm mounted on the base and secured with both safety straps, slide the Electronic Control Box to its slot at the back of the crane and secure it with screws on both sides. Install the Levelling Head.

Connect both ECB-Arm cables to their corresponding sockets on the ECB and MB12 rear.

Connect one end of the Loom cable to the ECB socket marked “Leveling Head” and Tilt encoder socket on the Yoke.



Connect the other end of the Loom cable to the levelling head.

Connect one of the remote control cables to the ECB and plug the remote control in. Put the remote in the holder on one of the side rails.

If using batteries (standard 48V Li-Ion batteries charged to max 55V, 15A peak) connect the ECB to the battery using the provided Battery-ECB cable. The DC Monitor on the ECB should indicate battery voltage. If it doesn't display anything than the polarity of the battery needs reversing (the arm will still work though).

If using mains power (100-240 V) connect the ECB to the PSU and the PSU to mains using provided cables. The DC Monitor on the ECB should indicate 55V.

### Power up:

Remove the section lock from the top of the crane. Grab the levelling head and manually extrude the sections just enough so the counterweight hanger disengages the limit switch (about 1 foot).

Make sure the emergency stop switch is not engaged (turn the knob clockwise to check). Power up the crane by turning the power switch on the ECB. Wait for the levelling head to calibrate, don't touch the arm until the LED on the levelling head stops flashing (approx. 15s).

Press and hold 'T' on the rocker switch on the remote control until the arm retracts fully. Now the front limit switch is calibrated. Now press and hold 'W' on the remote control rocker switch, the crane will slowly extend. Check and adjust the balance if needed. Extend the arm

fully until the rear limit switch is engaged. Now the arm is fully calibrated and will operate with the speed selected on the remote control dial switch (Speed 1-9).

**THE CALIBRATION PROCESS IS DONE IN REDUCED SPEED, INDEPENDENT FROM THE SELECTION ON THE REMOTE CONTROL. AFTER CALIBRATION THE CRANE AUTOMATICALLY SWITCHES TO THE SPEED SETTING SET ON THE REMOTE. WE STRONGLY ADVISE TO SELECT SPEED SETTING '3' OR LESS ON THE REMOTE BEFORE CALIBRATION, THIS WAY THE OPERATOR IS NOT SURPRISED WITH THE SUDDEN CHANGE OF SPEED AFTER CALIBRATION.**

If space is limited and there is no room to make full arm calibration, you can use the Manual End Stop push buttons located on the ECB panel. To do so, after powering up the arm calibrate the rear end stop (by using the "Back" push button or by engaging the front limit switch with the remote control). After that You can extend the arm to the maximum reach You need and press the "Front" push button on the ECB panel. Now Your arm is calibrated between the two positions You've selected.

You can calibrate the arm by using mechanical or digital limit switches or by any combination of them. You can change the digital limit switch at any time by simply pressing the corresponding push button and setting it at a different arm position. The push button lights up when position is stored in memory.

#### Speed and Damping settings:

After successful arm calibration the user can select between 9 maximum speed settings and 7 damping settings. Speed can be adjusted on the remote control (dial at the end of the remote). The selected speed is displayed on the remote screen. The selected speed is the maximum speed allowed at the current setting, lower speed is achieved by gently pressing the W-T rocker switch.

Damping adjusts the maximum acceleration and deceleration of the arm. The bigger the value, the slower the accel/decel. Setting '7' is the maximum available damping (slowest acceleration and deceleration). Setting '0' results in sharp movements and requires an experienced crane operator for smooth shots. The Damping setting is done by a push button located in the Damping display on the ECB.

#### Emergency stop switch:

The emergency stop switch is located on the front panel of the Electronic Control Box. In any emergency situation press it and it will cut both power to the arm electronics and to the levelling head. To disengage the switch, simply rotate the knob clockwise.

## Levelling head manual.

The MB12 Levelling Head has a load capacity of 60kg (132 lbs) in both underslung and overslung positions. It relies on input from the tilt encoder located in the MB12 Yoke and from an inclinometer located on the levelling head main plate. It's powered by 48V from the ECB. It powers up together with the rest of the crane by the power switch located in the ECB. After power up, the levelling head needs approx. 15s to calibrate its position, during this time the arm must be completely stationary. Calibration is done when green LED light on the side of the levelling head stops flashing.

Red light indicates an error: tilt encoder not connected or communication lost with the levelling head motor.

Always make sure the arrow on the inclinometer housing points downwards. When going overslung, rotate the inclinometer upside down so the arrow points to the ground. Failure to do so will result in the levelling head reversed operation and inability to calibrate.

### Offset setting:

Levelling head offset is set at the factory and should only be adjusted when main plate is not level after calibration. To adjust the offset:



1. Turn the levelling head on
2. Wait for the green light to stop flashing
3. Put a bubble level on the main plate of the levelling head
4. Simultaneously press and hold both buttons until the light starts flashing red
5. Adjust the main plate level by pressing the "+" and "-" buttons until perfectly levelled.
6. Simultaneously press and hold both buttons until the light turns green.

## Troubleshooting.

Symptom	Cause	Solution
After turning on the Electronic control Box the DC Monitor is off and crane doesn't respond.	Blown fuse or power supply problem.	Check fuse and power supply.
LCD display on the remote shows "TERMINAL" after 5 sec from turning on the system.	Remote control cable fault or interface electronics in remote control or main board damage.	Check remote control cable, if cable is ok then check internal communication interface in remote control or main board.
LCD display shows "READY" but the motor is not stable.	Tachogenerator cable is damaged.	Check crane cable, motor cable, brushes. If cable is ok then check connection between cannon connector and servo amplifier.
LCD display shows "READY" but you can't move the crane with the remote control or manually.	<ol style="list-style-type: none"> <li>1. Motor cable fault, security bridge is open, startup electronics is damaged</li> <li>2. Proximity switches connection fault.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check motor cable if it's ok then check motor connections and security bridge connection and start up electronics</li> <li>2. Check motor cable, if it's ok then check connections on the crane and internal electronics (both proximity switches are normally closed)</li> </ol>
Crane doesn't stop on proximity switch.	Proximity switches connection fault.	Check motor cable, if it's ok then check both proximity switch, if you push them they're opened, if pushing doesn't have any effect then probably the cable is shorted or proximity switch is broken.
LCD display shows "ERROR 01"	2.5V remote control wire is damaged.	Check connection between speed potentiometer and remote control PCB.
LCD display shows "ERROR 02"	GND remote control wire is damaged.	Check connection between speed potentiometer and remote control PCB.
LCD display shows "ERROR 03"	1.25V remote control wire is damaged.	Check connection between speed potentiometer and remote control PCB.

LCD display shows "ERROR 04"	Remote control speed wire is damaged	Check connection between speed potentiometer and remote control PCB.
LCD display shows "ERROR 05"	DAC range error	Check connection between security voltage check, if it's ok then check internal DAC module.
LCD display shows "ERROR 06"	DAC check wire fault	Check connection between security voltage check, if it's ok then check internal DAC module.
LCD display shows "ERROR 07"	DAC feed error	Check connection between security voltage check, if it's ok then check internal DAC module.
LCD display shows "ERROR 08"	Encoder ADCQAF	Check encoder QAF connection, check motor cable, crane cable and encoder
LCD display shows "ERROR 09"	Encoder ADCQBF	Check encoder QBF connection, check motor cable, crane cable and encoder
LCD display shows "ERROR 10"	Encoder XINT	Check encoder connection, check motor cable, crane cable and encoder
LCD display shows "ERROR 11"	Remote control stop.	Turn off and turn on BOX. If this doesn't help then check remote control cable, if it's ok then check internal electronics.
LCD display shows "ERROR 12"	Servo inhibit fault	Check connections between main board and servo, if it's ok then check internal electronics on main board and check servo
LCD display shows "ERROR 13"	DAC Init error	Check connection between security voltage check, if it's ok then check internal DAC module
LCD display shows "ERROR 14"	Encoder Init error	Check connections between encoder and mainboard and supply of the encoder
ECB emits 6-7 beeps.	Voltage error	Check all power supplies