DYNASAFE

Mobile Explosion Containment Vessel

MECV 5

Manual

990496 A

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1 Safety instructions

When the trailer has been uncoupled from the towing vehicle make sure that

- the parking wheel has contact with the ground
- the parking brake is engaged
- the trailer is in level.

Before towing make sure that

- the parking wheel is raised to the transport position
- the parking brake is released
- the towing mechanism is secured
- the safety wire is hooked on to the towing vehicle.

The vessel is designed to contain the effects of an explosion from a charge equivalent to a maximum of 5 kg TNT. Do not exceed this limit as more powerful charges may subject the surrounding area to great danger.

The maximum permitted load that may be placed in the sphere is 50 kg.

Remain outside the operational hazard areas for moving parts.

When performing maintenance on the sphere with its lid up in the open position, always use the safety-bar supplied with the vessel.

Never look directly in to the laser range-finder instrument mounted on the grip claw of the manipulator arm.

Make sure that the gas-pressure release valves, on the top and bottom of the sphere, are closed.

When handling the equipment it is important to follow the instructions given in this manual, otherwise there might be damages on the equipment. Such damages will not be covered by the warranty.

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2 General

The MECV is intended for transporting suspected explosive devices to a site where they can be safely detonated. In the event of an explosion the shock wave, fragments and gasses formed are contained within the sphere.

The MECV is designed to withstand repeated explosions from charges equivalent to a maximum of 5 kg TNT. After a detonation has taken place it is likely that some parts of the sphere, internal and external, will need to be replaced or repaired. The extent of the damage is dependent on the characteristics of the explosive device.

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3 Design and technical data

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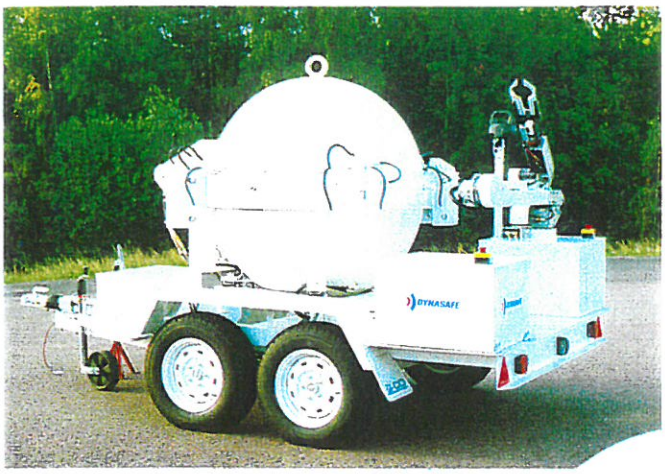
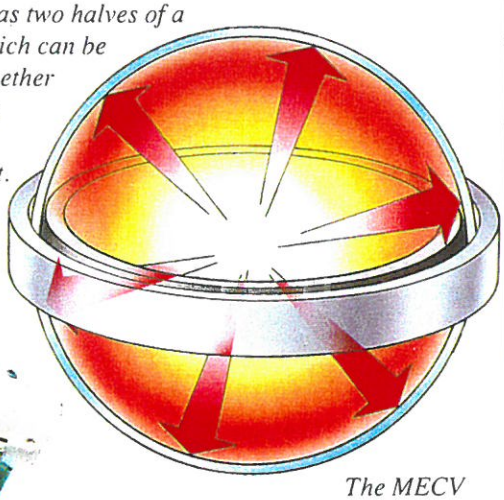
DYNASAFE MECV

Mobile Explosion Containment Vessel

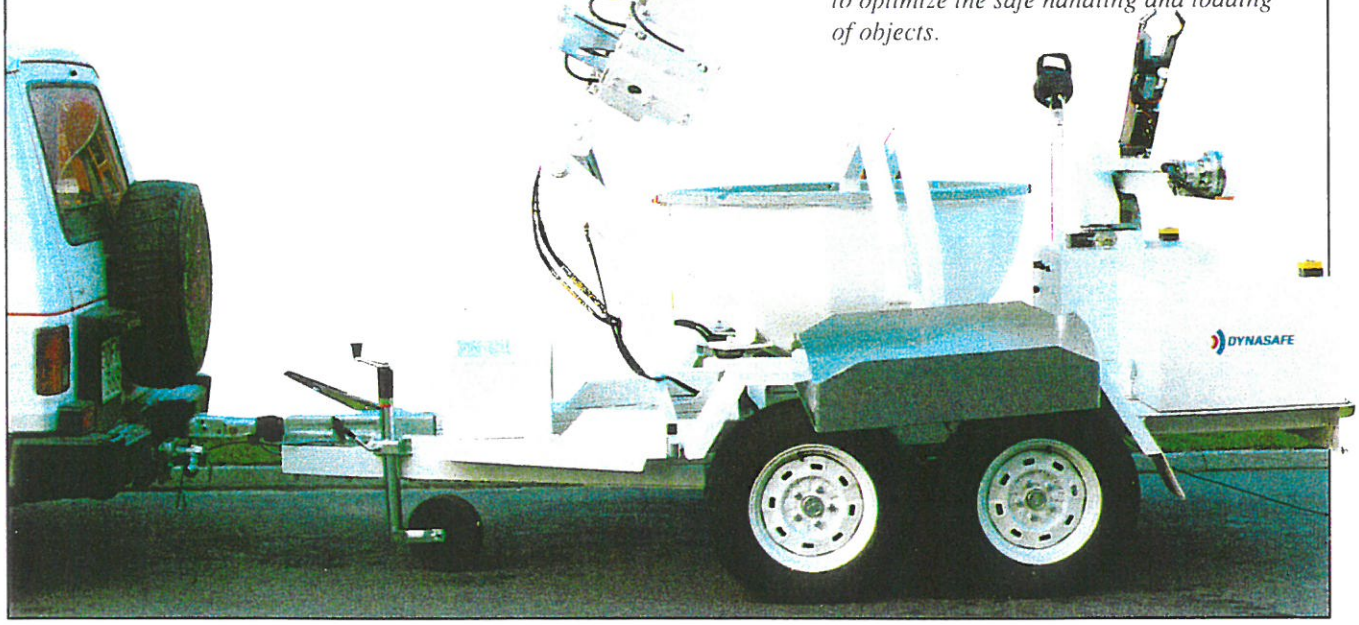


The MECV is built onto a four-wheeled trailer that can be drawn by a jeep, station wagon or similar vehicle.

The Explosion Containment Chamber is formed as two halves of a sphere which can be locked together to form an explosion proof joint.



The MECV can be equipped with a remotely controlled manipulator arm to load the suspected object into the basket. The manipulator head has several alternative attachments to optimize the safe handling and loading of objects.



The MECV is used for the safe containment and transportation of explosive objects up to the equivalent of 5 kg TNT. The unique design of the containment chamber enables the MECV to be used repetitively. The whole sequence, opening, loading, closing and locking is remotely controlled from a safe distance. The unit can also be used in conjunction with an independent remote controlled robot.

Technical Data

Length	3 700 mm
Width	1 900 mm
Height, open	2 700 mm
Height, closed	1 800 mm
Weight (with manipulator)	2 800 kg
Maximum loading capacity	50 kg
Maximum explosives capacity	5 kg TNT

*	Total weight:	3 150 kg
*	Total length:	5 500 mm
*	Total width:	2 000 mm
*	Total height (incl. canopy):	2 020 mm
*	Height (sphere open):	2 200 mm
*	Max. Permitted weight of object:	50 kg
*	Operational radius	
*	of manipulator arm:	3 000 mm
*	Number of joints:	6
*	Max load on Manipulator arm:	50 kg
*	Tyre dimensions:	4 x 185 R14C 102/100 Q 8 P.R.
*	Rim (wheel) hole pcd:	112 mm x 5-off
*	Tow coupling:	40 mm DIN-eye-bolt
*	Frequency for Radio Control:	405 - 490 MHz
*	Cable lengths, Control system:	2 x 25 m

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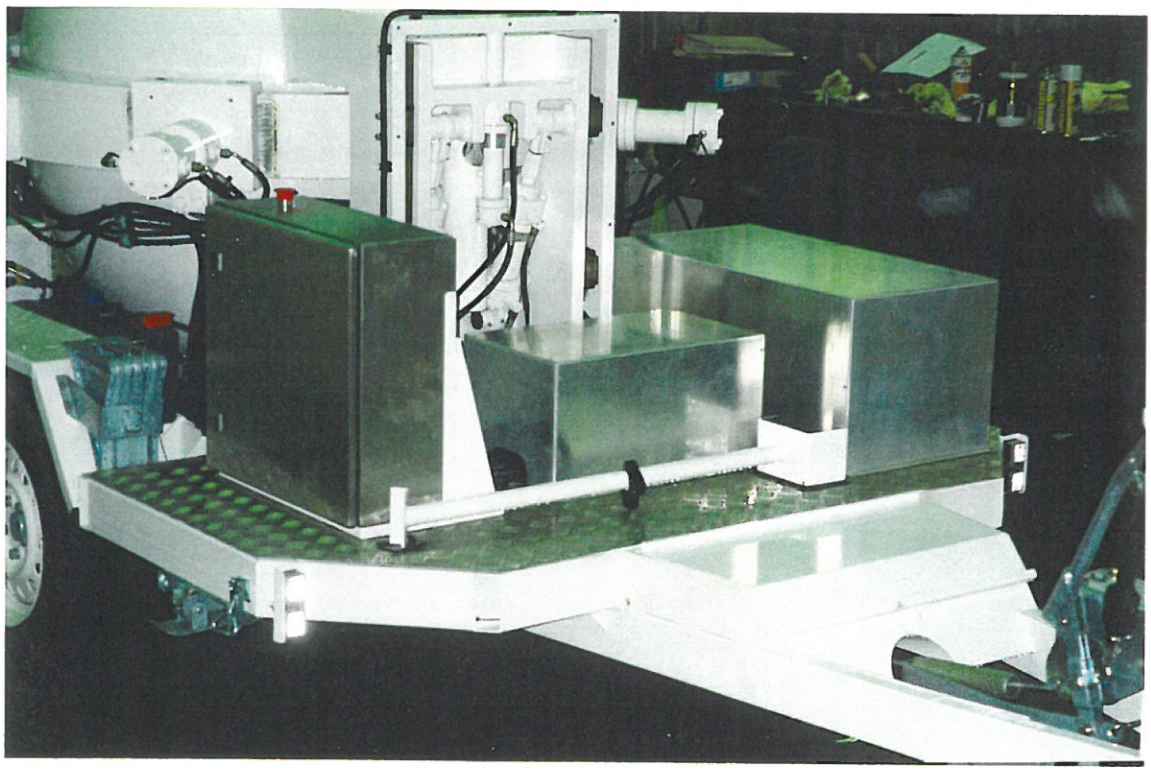
4 Components

There are three boxes at the front of the trailer, see figure below:

- the box on the right contains electrical and electronic equipment
- the centre box contains hydraulic valves for the sphere,
- the box on the left contains a hydraulic pump with filter.



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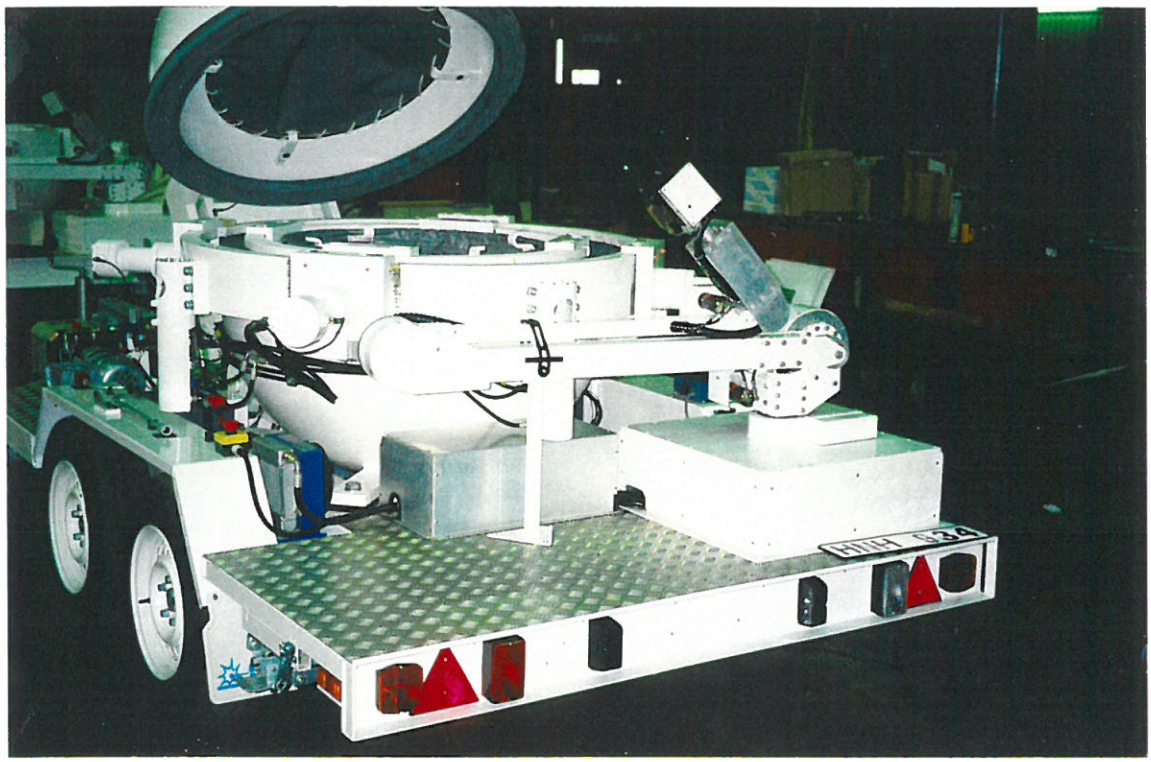
On the trailers back end there are a box for the hydraulic valves for the manipulator arm.

On the left side is the oil cooler for the hydraulic system.



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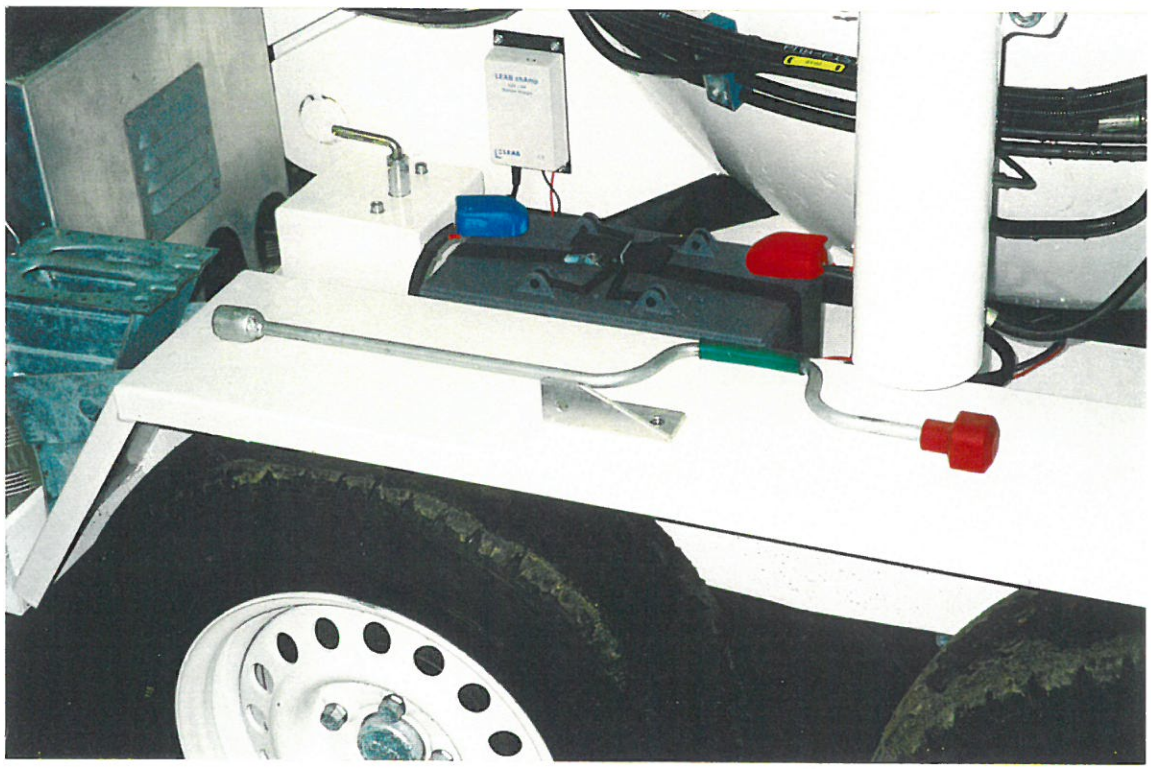
On the left side inside the mudgard there are two batteries to supply power to the hydraulic system. Each battery has its own separate charger located on the lower hinge base for the sphere.

The battery/mains connection for the hydraulic pump is located on the left side front mudguard.

The crank for the support legs is located on the left mudguard.



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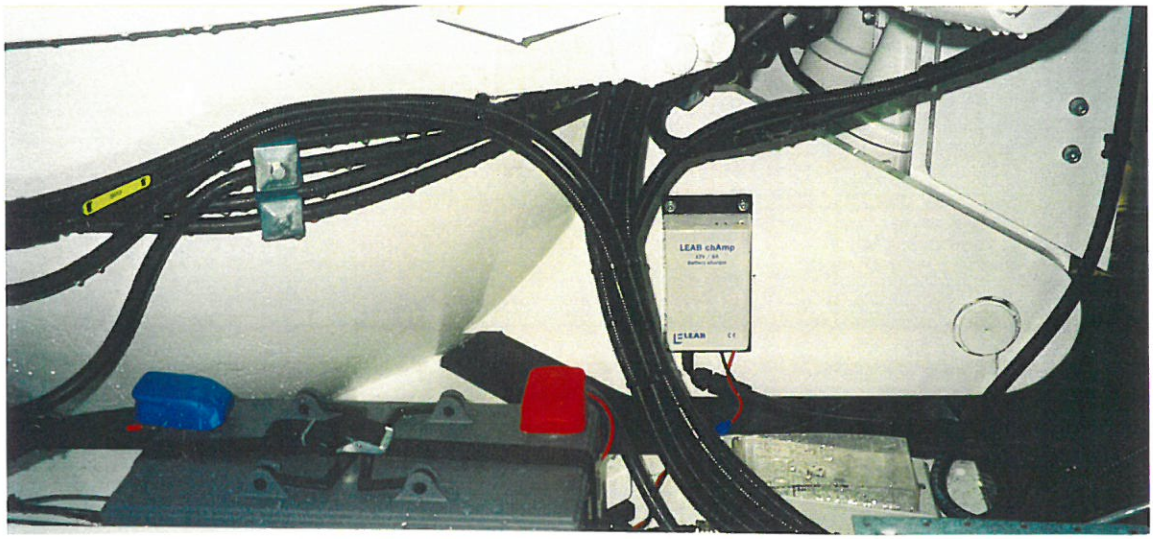
An earth fault breaker for the battery chargers is located on the right-hand side at the hinge base for the sphere cover lifting arm.

A 220 V input socket for the battery chargers is located on the back on the right side of the sphere.

The electronics unit for radio controlled operation is located on the rear right side, behind the mudguard. An input/output connector for cable transmission is located on the gable side of the unit.



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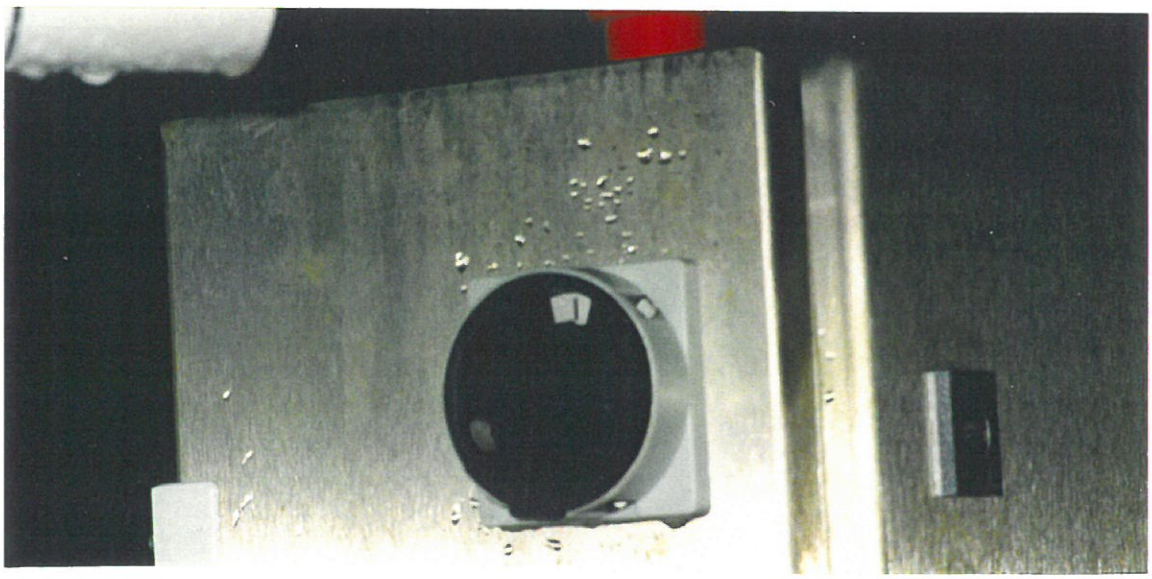
The main power switch for the electronic system is mounted on the gable end of the electrical/electronics box.

There are two Emergency Stop switches, one is located on the top of the electrical/electronics box, and the other on the rear of the left side mudguard.

There are also a separate tool box containing various tools, the tool box has no fixed position on the trailer.



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5 Operation

5.1 Trailer

1. Uncouple the trailer from the towing vehicle.
2. Set the parking wheel so that the trailer is level.
3. Engage the parking brake on the trailer. See figure 5.1.1.
4. For further stabilisation of the trailer during operational use the trailer is equipped with four support legs, two at the front and two at the rear. They can be wound down using the crank located on the left rear side. **Note:** the support legs must not be used to lift the trailer. See figure 5.1.2.
5. Release the canopy rear locking hooks, one on each side of the trailer.
6. Fold the canopy forward.
7. Power-up the system by turning the Main Power Switch to position **1**.
8. Release the Emergency Stops on the Electronics box and on the left rear mudguard by turning the red rubber button clockwise.
9. Fold out the Manipulator arm using the Control system. **Note:** Never run the Manipulator arm against its stop positions as there is a risk that the gears in the joints will be damaged. There are **no** stops on the base joint so keep in mind that you **don't** turn the base joint more than one turn.

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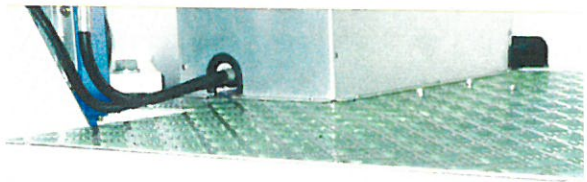

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5.2 Connecting-up Control system

Transmission of operating signals from the Control system can be done remotely (radio) or by cable.

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5.2.1 Description of Remote Control System

The Remote Control system is a radio control system from SCANRECO. A detailed description of all its facilities is given in the manual in the Delivery documents binder.

To facilitate using the hand-held control panel, the six tilt switches that control the Manipulator Arm are provided with symbols to indicate which function they control.

On the left side of the control panel are located several switches. See figure 5.2.1.3.

Switch 1, is not used.

Switch 2, marked "LOCK", second switch on left side, is a three-stage, return spring-loaded tilt switch for activating the hydraulic valves that control the locking functions on the sphere.
This switch should be kept depressed until the lock/unlock cycle has been completed i.e., when you can hear that the pump is under load.

- Left: Unlock
- Middle: Idle
- Right: Lock

Switch 3, marked "SPHERE", third switch on left side, is a three-stage, return spring-loaded loaded tilt switch for activating the hydraulic valves that control the open/close functions on the sphere.
This switch should be kept depressed until the open/close cycle has been completed i.e., when you can hear that the pump is under load. **Note:** it is not permitted to open the sphere unless the Unlock cycle has been completed.

- Left: Open sphere
- Middle: Idle
- Right: Close sphere

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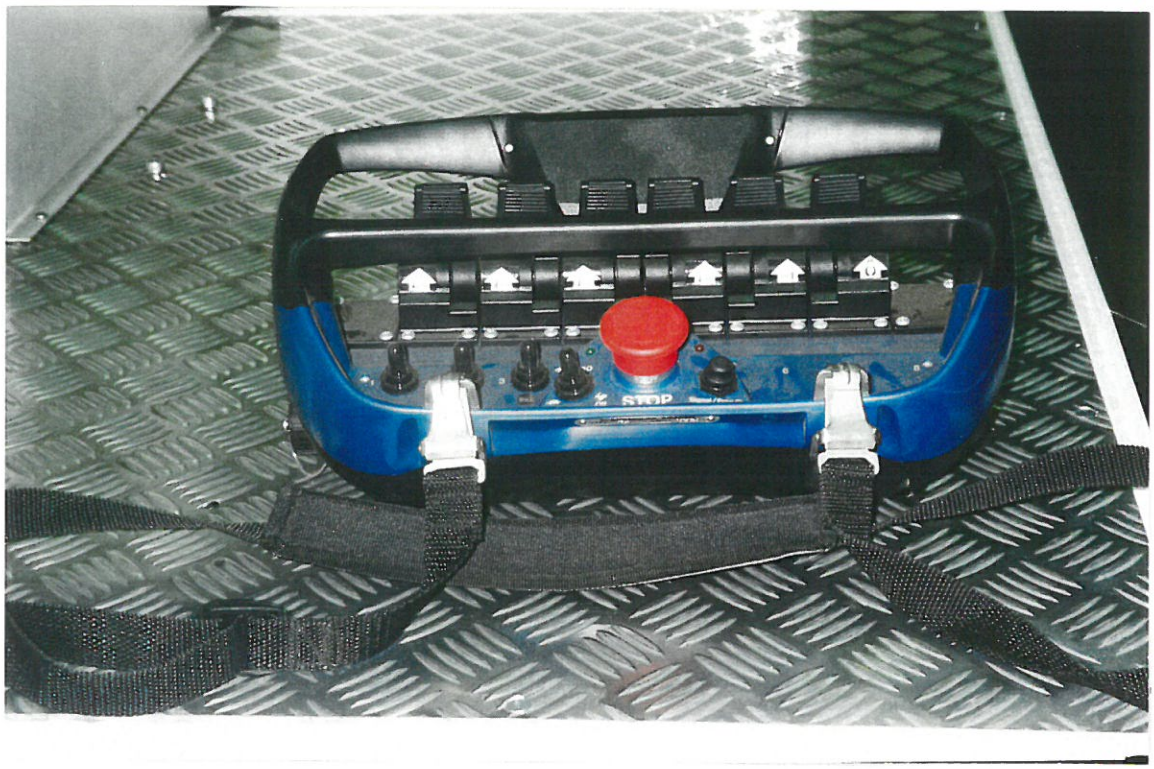

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5.2.2 Wireless control

To activate the remote control function the right key breaker in the electronics box shall be in the "AUTO" position.

The switch on the remote control electronics unit should be moved to the "REMOTE" position. The control panel cable must not be connected.

Start the control panel by turning the emergency break button clockwise on the control panel and the press the on button. A red LED shall illuminate.

5.2.3 Wire control

There are two rolls of cable, 2 x 25 m long, for the control system. They can be connected together to give a 50 m cable.

Connect the cable between the remote control system electronics unit and the control panel.

To activate the remote control function the right key breaker in the electronics box shall be in the "AUTO" position.

The switch on the remote control electronics unit should be moved to the "REMOTE" position.

Start the control panel by turning the emergency break button clockwise on the control panel and the press the on button. A red LED shall illuminate.

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5.3 Opening the sphere

The Normal mode is to control opening of the sphere from the control panel. There is also an Emergency mode that can be used should a fault occur in the sphere sensors.

When the Emergency mode is used the switch on the electronics unit for the radio control should be moved to the "MANUAL" position. The control is performed from the control panel inside the electrical/electronic box on the front right side of the trailer.

5.3.1 Normal mode

1. Always begin by locking the sphere with the switch marked 2 on the control panel.
2. Keep the switch depressed, to the right, for approximately 5 seconds.
3. Press the switch marked 2, to the left, on the control panel, and after a short delay the outer locking ring on the sphere will now move outwards.
4. Release the switch after approximately 20 seconds.
5. Check that all segments of the outer locking have opened.
6. Open the sphere completely by pressing the switch marked 3, to the left, on the control panel.
7. Keep it depressed until the sphere has opened fully (approx. 15 seconds), check visually that the sphere opens normally.

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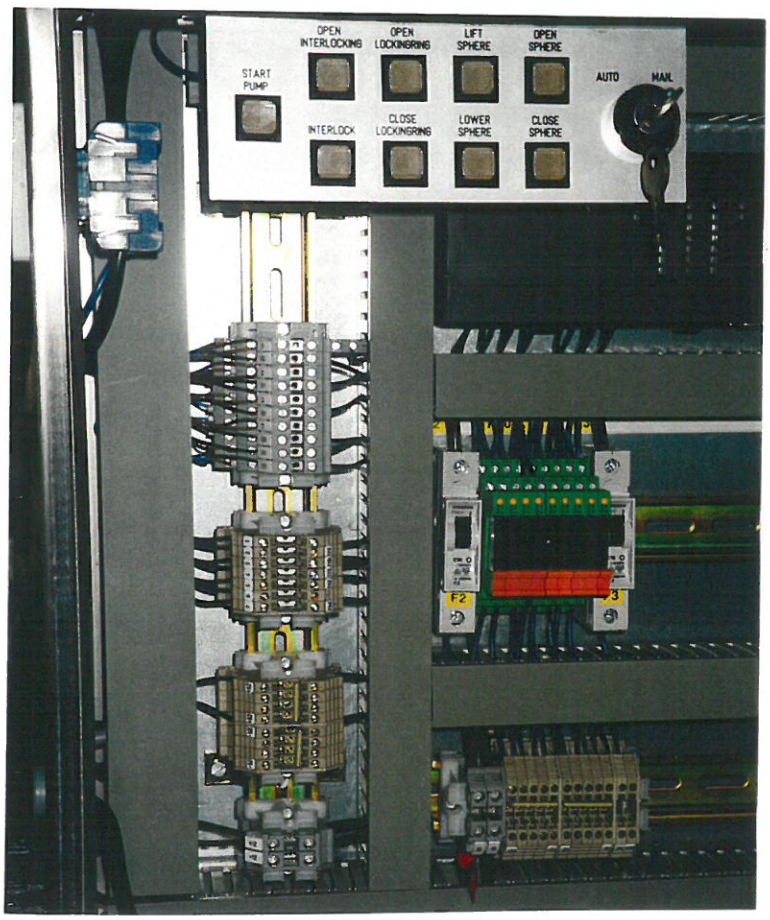
5.3.2 Emergency mode

1. Begin by folding down the canopy, one pin on each side.
2. Open the Electronics box.
3. Insert the key in the key switch and turn the key to the "MAN" position.
4. First, close the locking rings i.e., press switches "START PUMP" and "CLOSE LOCKINGRING" simultaneously.
5. Release them when the hydraulic pump comes under load.
6. Press switches "START PUMP" and "OPEN INTERLOCKING" until the hydraulic pump comes under load.
7. Press switches "START PUMP" and "OPEN LOCKINRING" until the hydraulic pump comes under load and the ring segments are open.
8. Raise the upper half of the sphere by pressing "START PUMP" and "LIFT SPHERE" until the hydraulic pump comes under load.
9. Open the sphere by pressing switches "START PUMP" and "OPEN SPHERE" until the hydraulic pump comes under load.



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5.4 Closing sphere

The Normal mode is to control closing of the sphere from the control panel. There is also an Emergency mode that can be used should a fault occur in the sphere sensors.

When the Emergency mode is used the switch on the remote control system electronics unit should be moved to the "MANUAL" position.

5.4.1 Normal mode

1. Press the switch marked 3, to the right, on the control panel, the sphere will now begin to close.
2. Keep the switch depressed until the sphere has lowered to its rest position (approx. 15 seconds).
3. Lock the sphere by pressing the switch marked 2, to the right, on the control panel.
4. Keep the switch depressed until the green light shines and all the sements of the outer locking ring have closed (approx. 20 seconds).

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5.4.2 Emergency mode

1. Begin by folding down the canopy, one pin on each side.
2. Open the Electronics box.
3. Insert the key in the key switch and turn the key to the "MAN" position.
4. First, open the locking plungers i.e., press switches "START PUMP" and "OPEN INTERLOCK" simultaneously.
5. Release them when the hydraulic pump comes under load.
6. Press switches "START PUMP" and "OPEN LOCKINGRING" until the hydraulic pump comes under load and all the ring segments are fully open.
7. Make sure that the upper sphere is in fully open position by pressing switches "START PUMP" and "LIFT SPHERE" until the hydraulic pump comes under load..
8. Close the upper half of the sphere by pressing switches "START PUMP" and "CLOSE SPHERE" until the hydraulic pump comes under load.
9. Lower the upper half of the sphere by pressing "START PUMP" and "LOWER SPHERE" until the hydraulic pump comes under load.
10. Lock the sphere by pressing switches "START PUMP" and "CLOSE LOCKINGRING" until the hydraulic pump comes under load and all the ring segments are closed.
11. Complete the operation by closing the locking plungers by pressing switches "START PUMP" and "INTERLOCK" simultaneously until the hydraulic pump comes under load.

5.5 Before transport

1. Park the Manipulator arm on its transport fixture. **Note:** check that the hydraulic hoses in the lower section are run free so that they do not become folded and damaged.
2. Activate the Emergency Stop
3. Turn the MAIN POWER SWITCH to the 0-position.
4. Raise the support legs.
5. Raise the canopy and lock it.
6. Couple the trailer to the towing vehicle, check that the towing coupling is properly locked.
7. Raise the parking wheel.
8. Hook the safety wire on to the towing vehicle.
9. Release the break.

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6 Maintenance

6.1 Trailer

See the manual in the Delivery documents binder.

6.1.1 Tyres

The tyre pressure shall be 300 kPa, check regularly.

6.2 Batteries

The trailer has two battery chargers both located on the left side.

When the batteries are being charged the yellow LED shines. When the batteries are fully charged both the yellow and green LED's shine.

Note: When the battery charger is charging batteries the hydraulic system must not be activated as this may cause damage the battery charger.

All the batteries are of maintenance-free type and therefore acid levels do not require checking.

The most suitable time to charge the batteries is when the equipment is not in use so that they are always fully charged when needed.

6.3 Earth fault breaker

The 220V input socket on the trailer is equipped with an earth fault breaker. Its function should be checked once every month by pressing the "test" button on the breaker. The breaker should then be activated. Pushing the fuse button resets the earth fault breaker.
If the earth fault breaker does not activate, contact an electrician.

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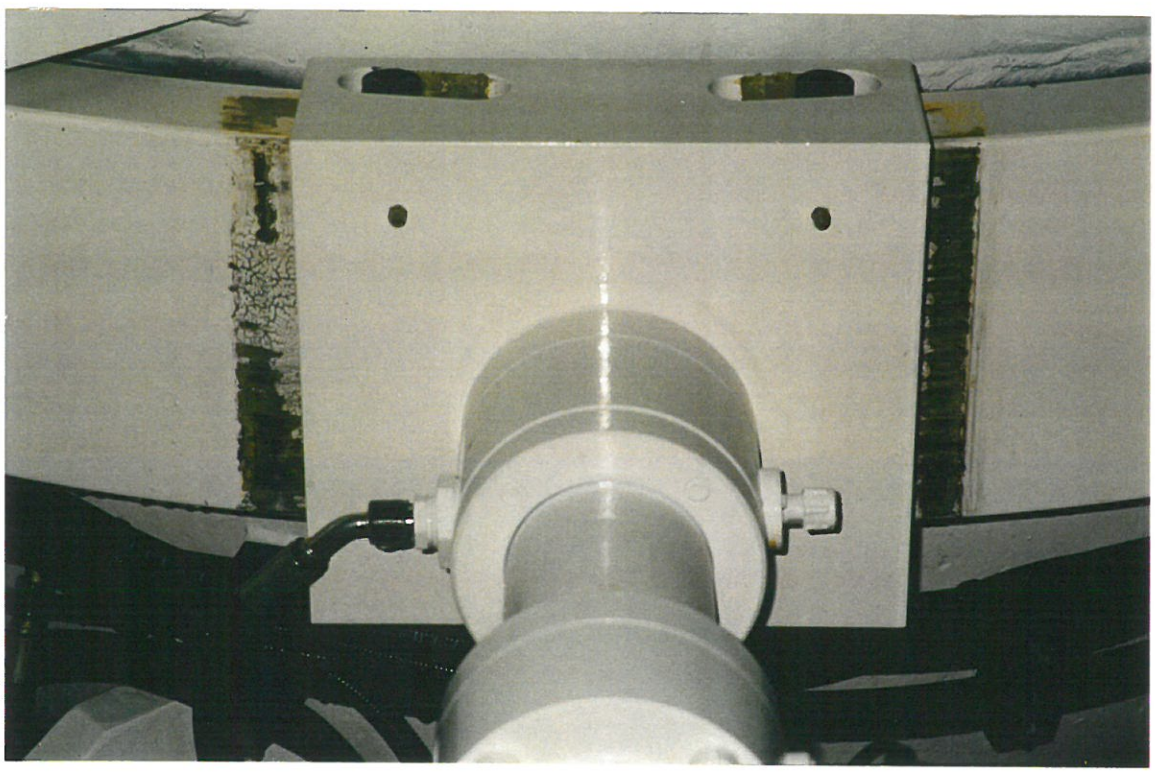
6.4 Lubrication

6.4.1 Monthly

- Throughway shafts for locking rings, lubricating grease.
- Landing surfaces for locking rings - flange, lubricating grease.
- Locking tubes, lubricating grease.
- Keeps for locking rings, lubricating grease, see figure 6.4.1.1.



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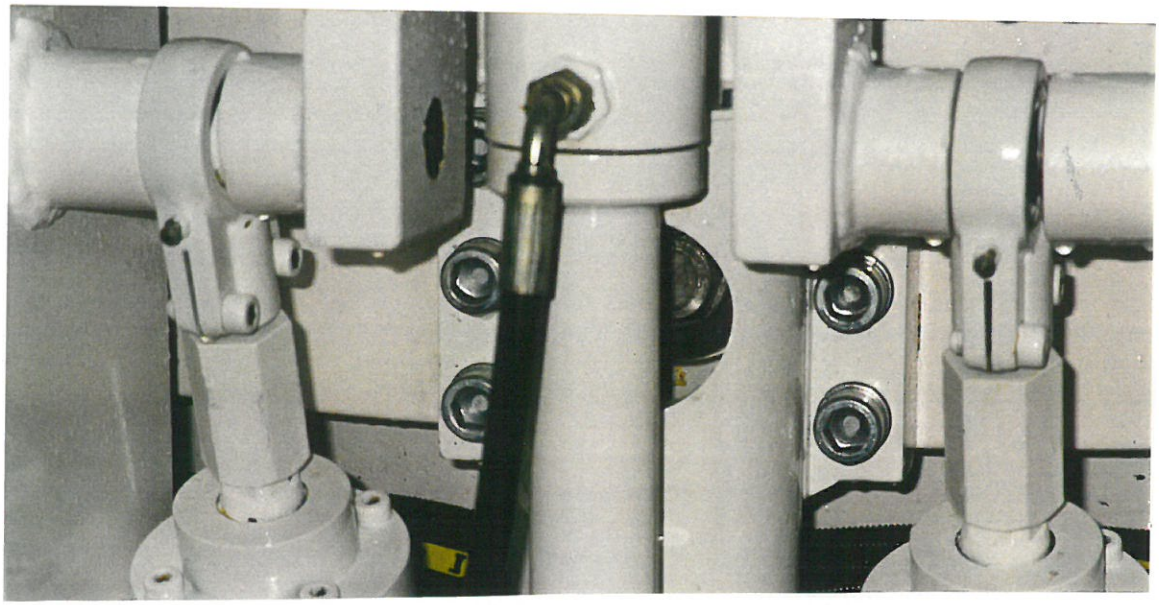
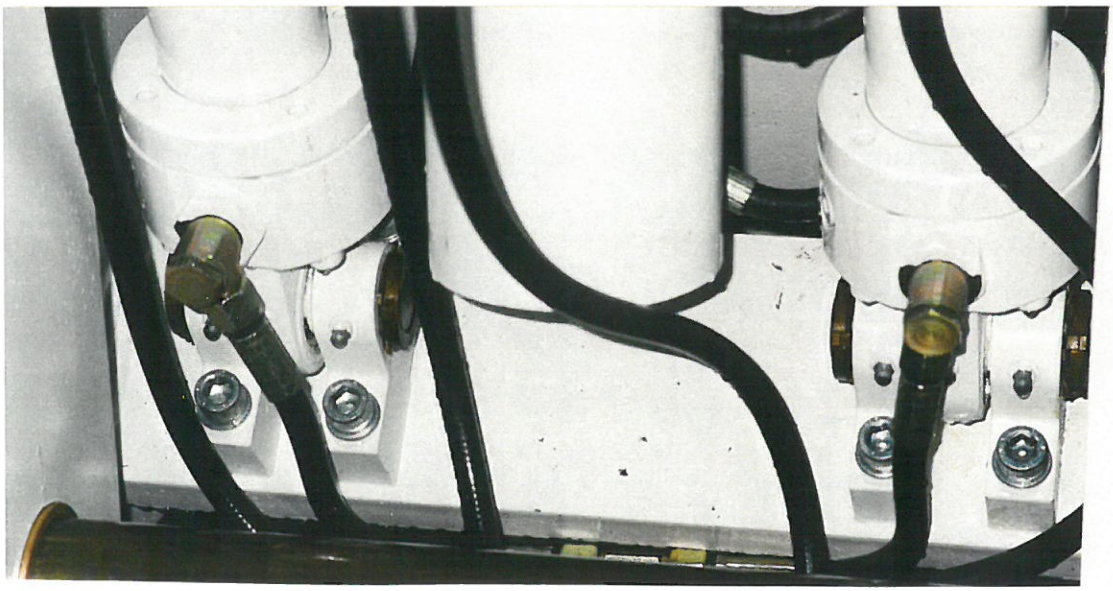
6.4.2 Annual

Bearing blocks for hydraulic cylinders, lubricating grease, see figures 6.4.2.1 and 6.4.2.2.





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6.5 Oil change

The oil should be changed once annually, and at the same time the oil filter should be replaced.

The oil tank capacity is approximately 10 litres.

The oil should have a viscosity of 30 cs at 40°C the viscosity must not be less than 7.5 cs at 50°C, and it must not exceed 100 cs at -10°C.

6.6 Cleaning

When cleaning using a high-pressure washer, never point the wash nozzle directly at electrical components or the camera housing.

6.7 Painting

The trailer and sphere are painted with two-component epoxy paint, colour No. 00, pure white.

The flanges are surface treated with zinc paste.

When performing the monthly maintenance check, any damage to paint or treated surfaces should be rectified.

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6.8 Pressure testing

We recommend that the gas tightness of the sphere be tested annually.

Before performing the test the O-rings for the flange (Art. No: 970733-6 - 8) should be replaced.

- Remove the old O-rings.
- Clean the O-ring grooves.
- Fit the new O-rings. The Oring shall be fixed with glue, Loctite 480 or equivalent.

When pressure testing (se figure below)

- Open the expansion boxes on top and bottom of the sphere by first removing screws 13 and then releasethe locking device by turning item 15.
- Remove the counter flange, Item 8, by tapping gently with a plastic hammer.
- Remove the top flange, Item 11.
- Remove Item 19.
- Fit a valve in the upper and lower half at Item 19's position.
- Connect a high-pressure water wash pump (> 50 bar) via a valve, to the lower half of the sphere.
- Open the upper valve and fill the sphere with water until it runs out of the upper valve.
- Close the upper valve and fit a calibrated manometer (> 60 bar).
- Pressurise the sphere to 50 - 55 bar.
- The pressure shall be maintained for approximately 5 minutes during which time no appreciable reduction shall be noted.
- Slowly release the pressure to approx. 20 bar for 5 minutes during which time no appreciable reduction shall be noted.
- Slowly release the pressure to apporx.10 bar for 10 minutes during which time no appreciable reduction shall be noted.
- Check visually that water does not leak out from the sphere during the process.
- When assembling the expansion box, fit new O-rings, Item 9 and 10.

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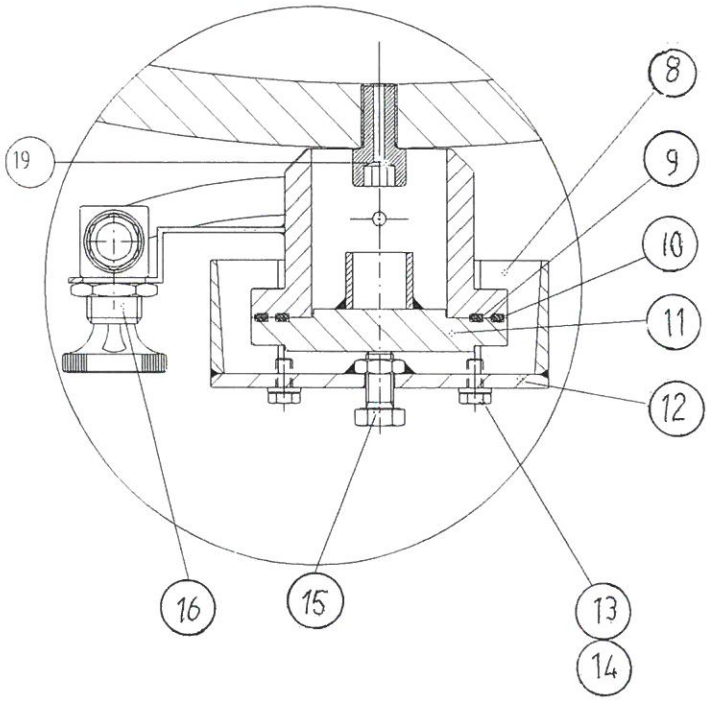

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