



**GLOBAL CRANE TRAINING**

# **AC200-1 OPERATION**

## Suspension



# Suspension Content



Content	Pg.	Content	Pg.
Hydraulic suspension general	3		
Setting for transport position	6		
Manual setting of the level	7		
Raising axles	14		

## Hydraulic Suspension

All axles of the crane chassis have hydraulic suspension.

During normal use (e.g. when driving on the road) the hydraulic suspension is divided into four separate circuits.

When driving on road surfaces which are very uneven (extreme ramps, slopes, humps), the suspension can be switched over to a three circuit system to improve road handling.

You switch to the three circuit system by pressing the lockable switch (99).

When indicator light (A6) comes on, the suspension is in the three circuit system.

**Driving with the three circuit system means less lateral stability. The max. road speed should therefore not exceed 15 km/hour (9 mph).**

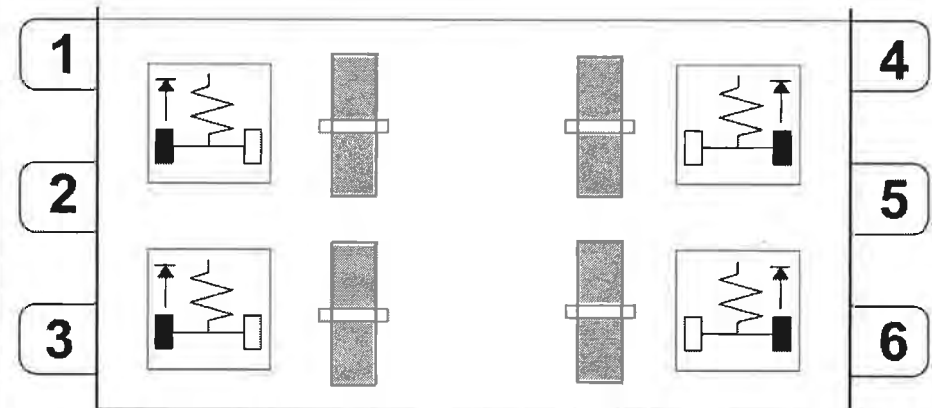
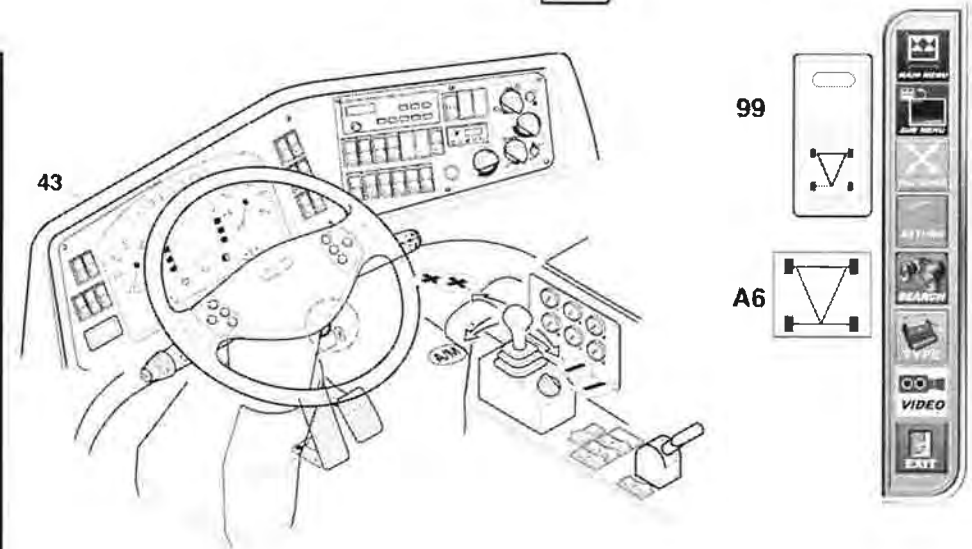
**When the crane's equipment is erected, it must be driven with the four circuit system.**

*All operating and monitoring equipment is located in the cab of the chassis.*

*You can call up the current settings of the suspension circuits on display (43) under menu point 4.1 "Suspension levels". (Example middle position Z 200 151)*

**Proceed with caution when carrying out adjustment work! Risk of crushing!**

**Make sure that no one is in the danger zone of the vertically extending / retracting suspension cylinders.**



## Distribution of the suspension circuits / assignment of the pressure gauge

### Normal case: 4-way system

The figure 'A' in figure shows a principle sketch of the distribution of the suspension circuits of the 4-way system in the 5-axle basic unit.

The figure 'B' in figure shows a principle sketch of the distribution of the suspension circuits of the 4-way systems in the 6-axle basic unit. In the 7-axle design the suspension cylinders of the additional axle are added to the individual rear suspension circuit of the basic unit.

#### - Suspension circuit 1:

axles 1 and 2, front

right Pressure gauge I (5)

#### - Suspension circuit II:

\*separate suspension circuit for Lift axle "axle 3,

right pressure gauge II (6)

#### - Suspension circuit III:

axles 4 to 5 (5-axle basic unit),

axles 4 to 6 or 7 (6-axle basic unit or 7-axle basic unit):

rear right

pressure gauges III (7) + II (6)

#### - Suspension circuit IV:

axles 1 and 2, front left

pressure gauge IV (8)

#### - Suspension circuit V:

\*separate suspension circuit for Lift axle"

axle 3, left

pressure gauge V (9)

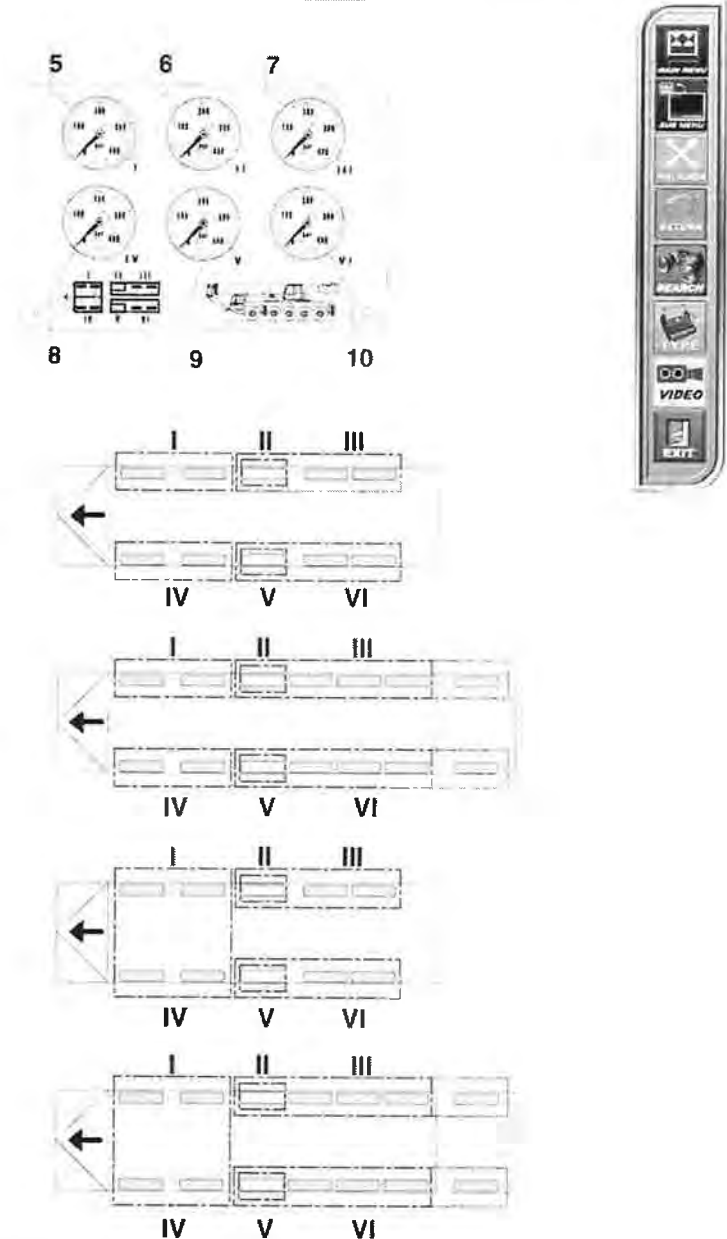
#### - Suspension circuit VI:

axles 4 to 5 (5-axle basic unit), axles 4 to 6 or 7 (6-axle basic

unit or 7-axle basic unit):

rear left

pressure gauges VI (10) + V (9)



\* When the lift axle (axle 3) is raised, the suspension circuits II / V assigned to this axle are automatically separated from the other axles (separate pressure display on pressure gauges II / V (6 / 9)) and – after it has been lowered to the ground – switched to suspension circuits III / VI again.

### Special case: 3-way system

The figure 'C' in figure Z 200 371 shows a principle sketch of the distribution of the suspension circuits of the 3-circuit system in the 5-axle basic unit.

The figure 'D' in figure Z 200 371 shows a principle sketch of the distribution of the suspension circuits of the 3-circuit system in the 6-axle basic unit. In the 7-axle design the suspension cylinders of the additional axle are added to the individual rear suspension circuit of the basic unit.

#### – Suspension circuit I + IV:

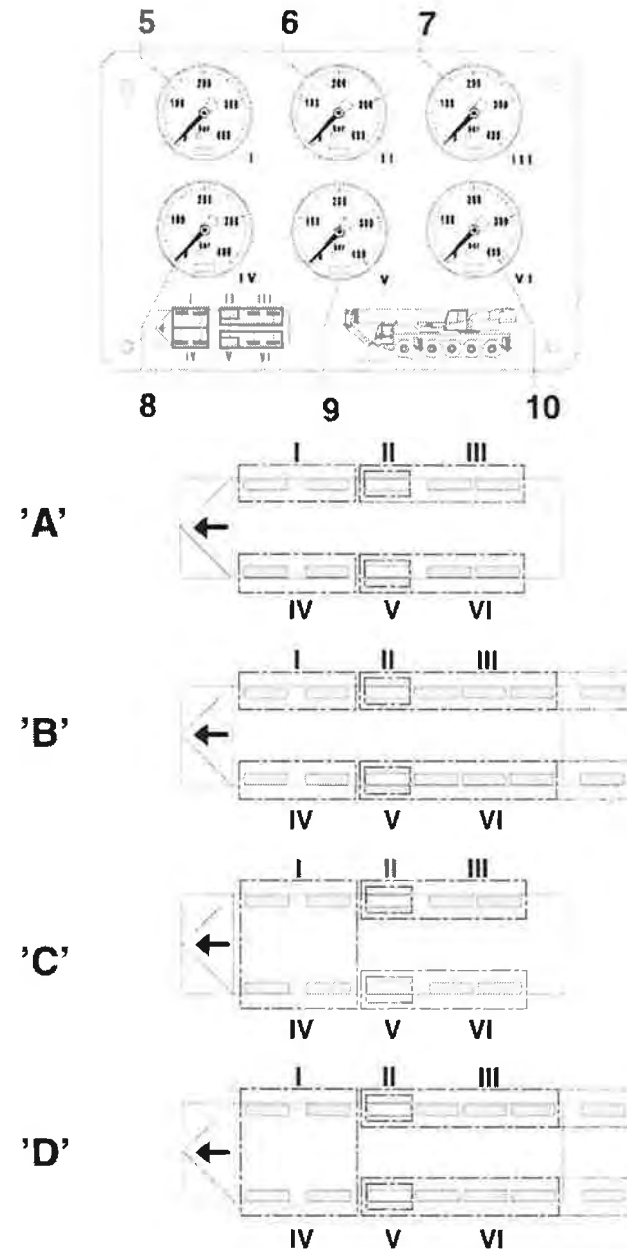
axles 1 to 2, front right and left  
pressure gauge I (5) / IV (8)

#### – Suspension circuit III:

axles 3 to 5 (5-axle basic unit),  
axles 3 to 6 or 7 (6-axle basic unit or 7-axle basic unit):  
rear right pressure gauges III (7) + II (6)

#### – Suspension circuit VI:

axles 3 to 5 (5-axle basic unit),  
axles 3 to 6 or 7 (6-axle basic unit or 7-axle basic unit):  
rear left pressure gauges VI (10) + V (9)



## Setting for Driving in the Transport Position

### General

When driving the mobile crane in the transport position (construction site or road travel) the suspension must be at the road travel level (all suspension cylinders in the road travel position).

The clearance between the fastening eyes on the suspension cylinder (dimension "X") is then 630 mm (24.8 in). Only in this condition can it be guaranteed that there is sufficient suspension travel available for driving operation.

At road travel level the suspension travel is + 110 / -110 mm (110 mm upward / 110 mm downward) or + 4.3 / - 4.3 in (4.3 in upward / 4.3 in downward).

The hydraulic suspension can only be set if:

- "Hold axles" is activated (display (A13) lights up).
- "Raise axles" is activated (display (A15) lights up).

"Raise all axles" is activated on the switch panel of the outrigger controls (button 9/19).

First "Hold axles" (button 101) must be actuated in the cab.

When the "Lift axle" is raised (steering program "Construction site operation"), the suspension circuits only react partially. The two front ones can be set, the two rear ones cannot (with the exception of axle 3).

The levels of the suspension circuits can either be set together (dual button 76) or individually (dual buttons 78 / 79 / 80 / 81).

### "Automatic" setting road travel level

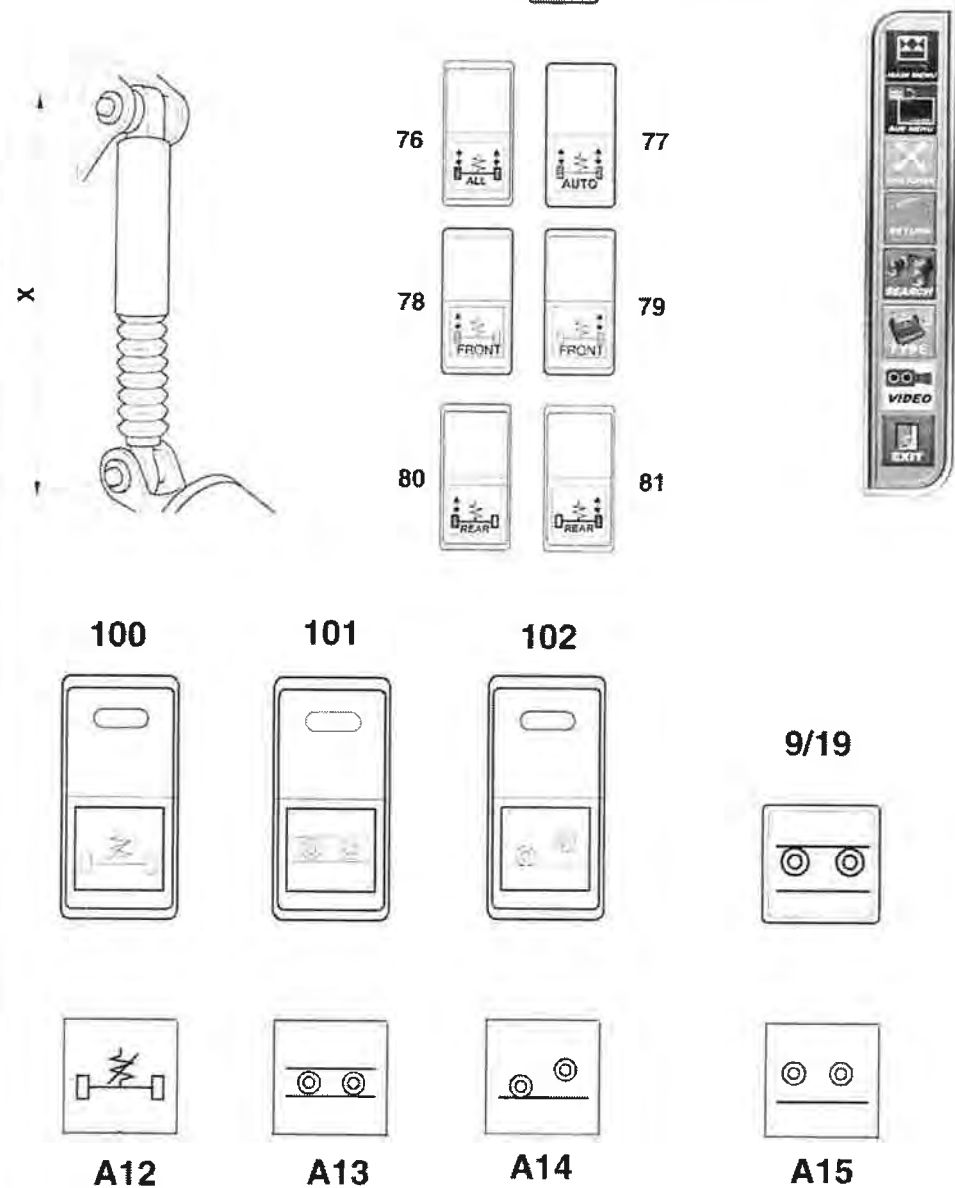
Using the "AUTO" (77) button the road travel level is set automatically.

The road travel level is the condition for normal driving operation.

All suspension cylinders are located in the road travel position.

The individual suspension travel is - 110 / +110 mm (+ 4.3 / - 4.3 in).

The requirement for smooth functioning is a level, even road surface (no potholes, no lateral gradient).



### “Manual” Setting of the Level

Using manual setting of the level, the individual suspension circuits can be set independently of each other. Any level in the entire range of suspension travel (between 0 and 220 mm or 0 and 8.6 in) is adjustable.

Manual level setting is only possible when standing still (parking brake applied, transmission “in neutral”).

Starting position:

- Set the crane on level and even ground, apply the parking brake; transmission in “neutral”!
- Set the engine speed to approx. 1500 U/min (rpm).

### Function of the dual buttons (78, 79, 80, 81)

- Press dual button in pos. “A”: the corresponding **suspension** circuit is raised
- Press dual button in pos. “B”: the corresponding **suspension** circuit is lowered.

### Setting the Suspension Circuits (Four-circuit System)

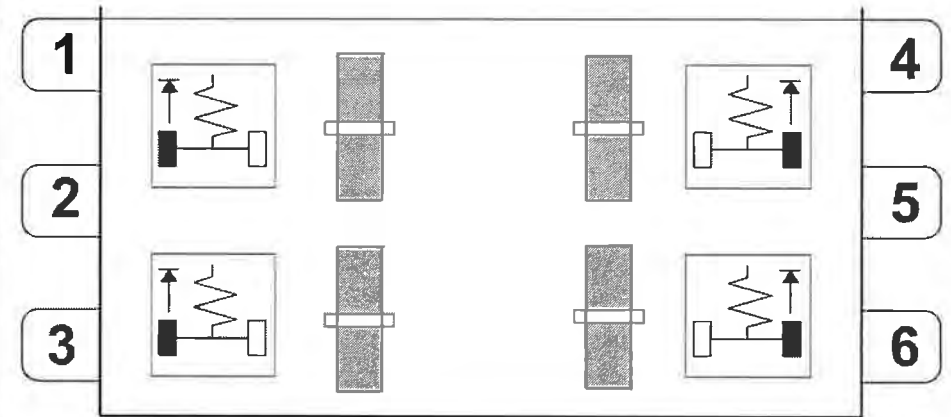
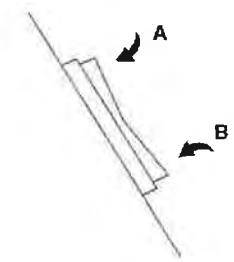
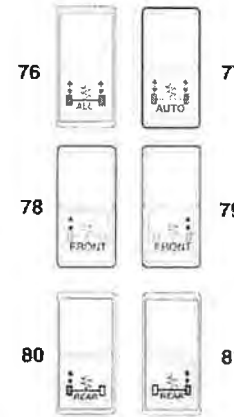
The suspension circuits can be reset using the “Raise / lower” function of the dual buttons (78, 79, 80, 81).

To level the crane quickly and/or evenly, different (or all) circuits must be filled or emptied at the same time.

It is not possible to set circuits in different directions (filling one circuit while emptying another) at the same time.

### Suspension circuit 1 (front right)

- Press double button (79A):  
”raise level” (extend suspension cylinder)
- Press double button (79B):  
”lower level” (retract suspension cylinder)



### Suspension circuit 2 (rear right)

- Press double button (81A):  
"raise level" (extend suspension cylinder)
- Press double button (81B):  
"lower level" (retract suspension cylinder)

### Suspension circuit 3 (front left)

- Press double button (78A):  
"raise level" (extend suspension cylinder)
- Press double button (78B):  
"lower level" (retract suspension cylinder)

### Suspension circuit 4 (rear left)

- Press double button (80A):  
"raise level" (extend suspension cylinder)
- Press double button (80B):  
"lower level" (retract suspension cylinder)

### Information for setting the overall level:

The difference with this compared to the individual settings is that all suspension circuits can be reset together using key (76). Any possibly existing level differences remain.

Press / hold key (76A) = raise total level

Press / hold key (76B) = lower total level.

Control: on the display (43) in menu point 4.1 Suspension level".

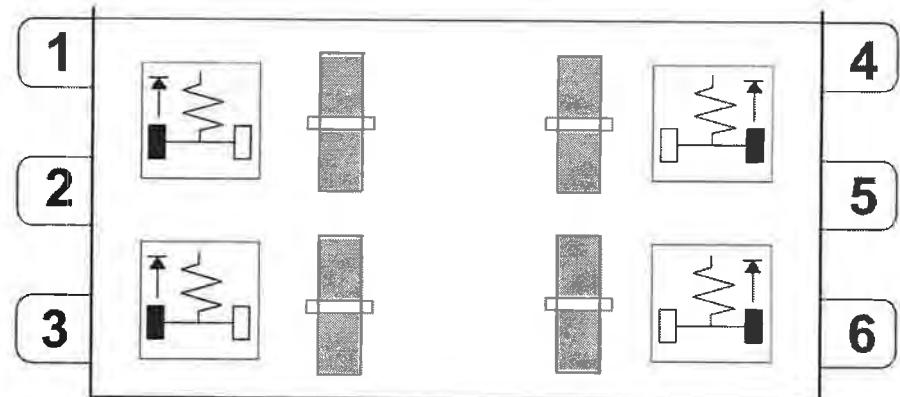
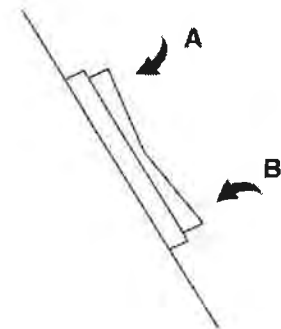
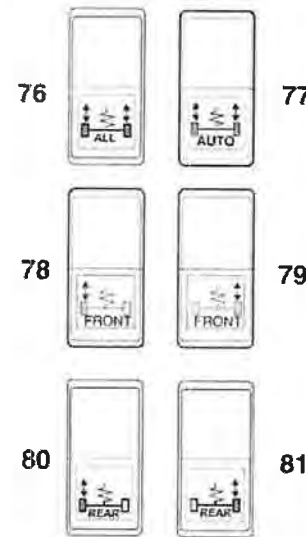
**With the manual level setting, the suspension cylinders can be extended / retracted up to the stop ("in a block"). In this case make sure that the pressures shown at the middle position are not exceeded. It is prohibited to drive suspension cylinders that are set to "in a block".**

### Setting the Suspension Circuits (Three circuit System)

The suspension circuits are normally set in the four circuit system (road travel).

However, the setting can also be made in the three circuit system (off-road travel).

You must then make sure that both front circuits react together; even if only one of the assigned dual buttons (78, 79) is pressed.





## Monitoring the Hydraulic Suspension

### Monitoring the Pressure

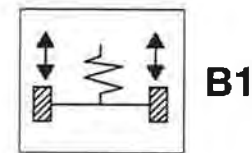
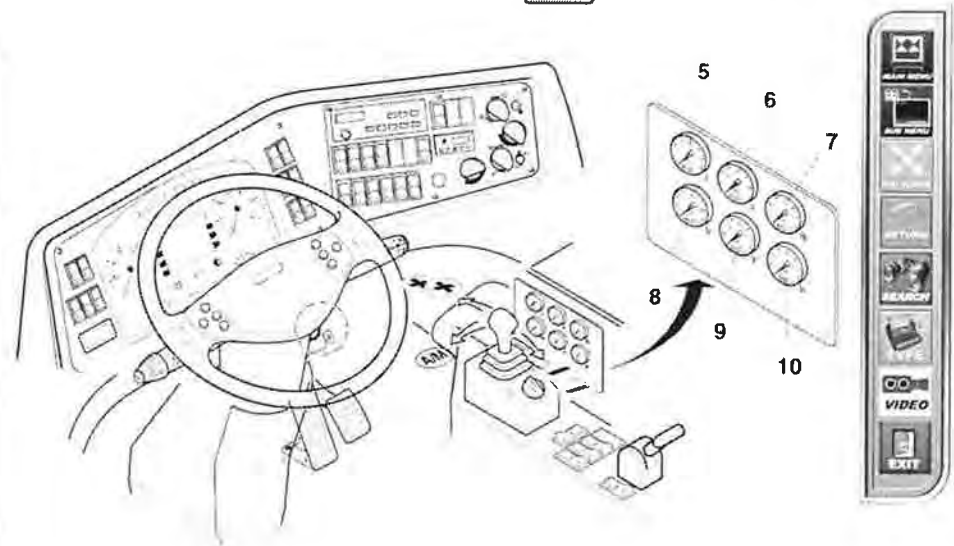
For constant control of the pressure in the hydraulic suspension, there are corresponding pressure gauges (items 5–10) in the driver's cab.

*The desired value of the suspension pressure can only be determined precisely after the suspension cylinders have been leveled. With a 12 t (26.4 kip) axle load, the suspension pressure should be approximately 105 bar / approx. 1524 psi (average value) and can be different for each suspension circuit.*

*If the suspension system is switched to "road travel", the suspension pressure can fall on one side and rise on the other side of the vehicle when driving around corners.*

**If the suspension pressure in one of the suspension circuits drops quickly during road travel, and / or the level changes noticeably (display B1 is illuminated), then there is a dangerous fault.**

**In this case you must stop the mobile crane, find the cause of the fault and rectify it.**



## Level Control, Level Indicator

Level control of the suspension circuits takes place on the display (43) in the driver's cab. The current level of the individual suspension circuits is indicated with symbols under menu point

### 4.1 "Suspension level".

- Symbol (A): suspension circuit I (front, right)
- Symbol (B): suspension circuit III (rear, right)
- Symbol (C): suspension circuit IV (front, left)
- Symbol (D): suspension circuit VI (rear, left)

A level indicator has been assigned to each suspension circuit which consists of fixed vertical bars (1) and a "piston" (2) which moves up and down as the level goes up or down.

### At the road travel level

the bar (1) is coloured green and the "piston" (2) is located in the middle - in accordance with the road travel position of the suspension cylinders.

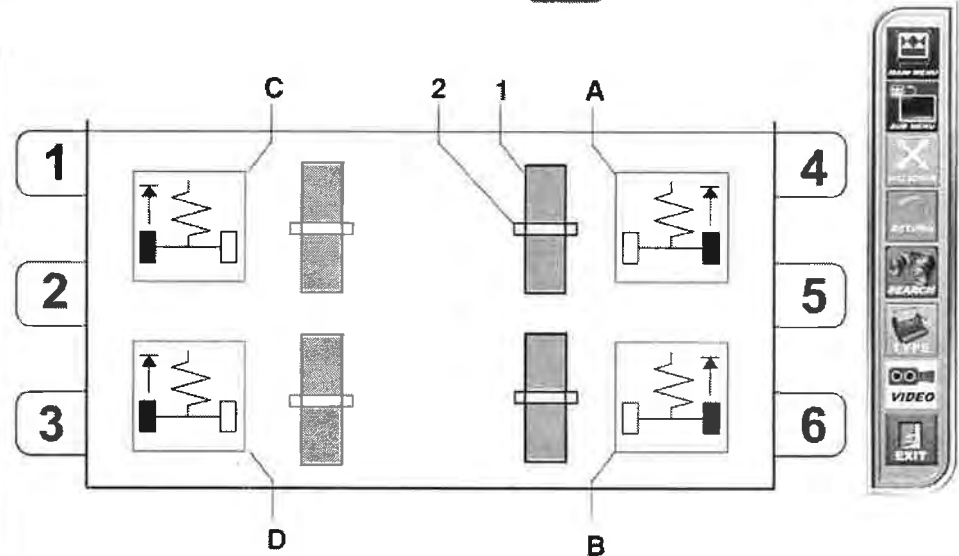
### In all intermediate positions

outside the road travel level the bar (1) is coloured yellow and the "piston" (2) moves further upwards or downwards.

*Carry out a level check on level, even ground with the wheels facing straight ahead.*

*Deviating suspension circuits must be reset.*

**If constant deviations occur, the suspension must be checked by our customer service.**



### to lock the suspension

The hydraulic suspension system must be blocked for driving in an erect mode.

**When driving in the transport position (on the road and construction site) the hydraulic suspension may not be blocked.**

**If the suspension were blocked, it would cause great damage to the chassis at speeds > 5 km/h (3 mph)!**

### Activating the Suspension Block

... Before Driving in an Erect Mode

**Driving in the erect condition always means driving without load!**

**Driving with load is prohibited!**

*Before supporting the crane on outriggers:*

- Align the crane horizontally ("level").
- Activate switch "Hold axles"(101), display (A13) is illuminated.

*All axles remain in the prescribed position*

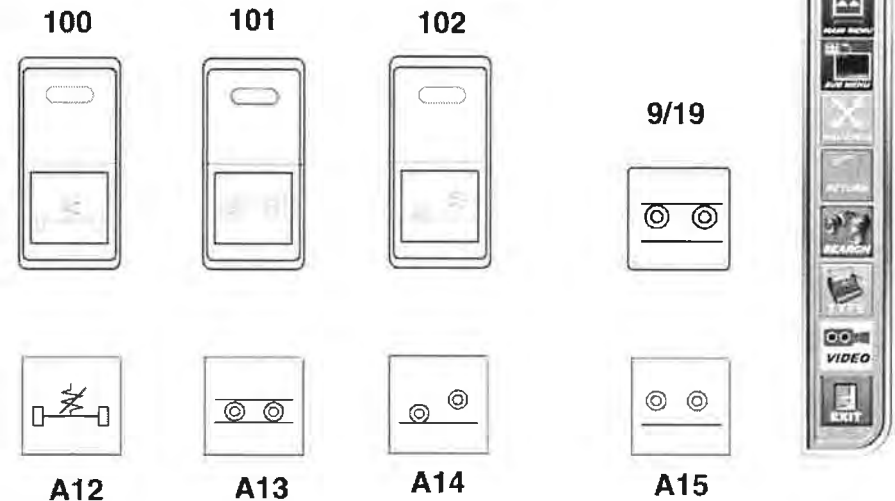
*The crane can be lowered onto the wheels after it has been supported on outriggers for driving in the erect condition by retracting the vertical outrigger cylinders.*

*The crane is aligned horizontally and the suspension cylinders are in the road travel position.*

Before driving in the erect mode:

- The regulations for ground characteristics and road slope (see section 6) must apply.
- Extend the outrigger struts and hold the outrigger feet just above the ground.
- Before the crane is lowered onto the wheels – for driving in the erect/configured condition, all suspension cylinders must be in the road travel position.

*This is always guaranteed if the axles which are level are set to "Hold axles" before extending the outriggers.*



**Bring the crane into state "Driving when configured"; to do so:**

Starting position:

The crane is supported on outriggers.

Switch (101) "hold axles" is activated; display (A13) lights up.

1. Retract outrigger cylinders slowly and evenly until the wheels of all axles are pressed evenly on the ground.

Pressure check at the pressure gauge (5 to 10) in cab.

2. Switch off "Hold axles" with switch (101).

The display (A13) goes out.

3. Switch on "Lock suspension" with switch (100).

The display (A12) is illuminated.

4. Check the level of the crane (horizontal alignment) optically.

The suspension cylinders of all axles must be approximately in the road travel position.

The clearance between the fastening eyes on the suspension cylinder (dimension "X") is then 630 mm (24.8 in).

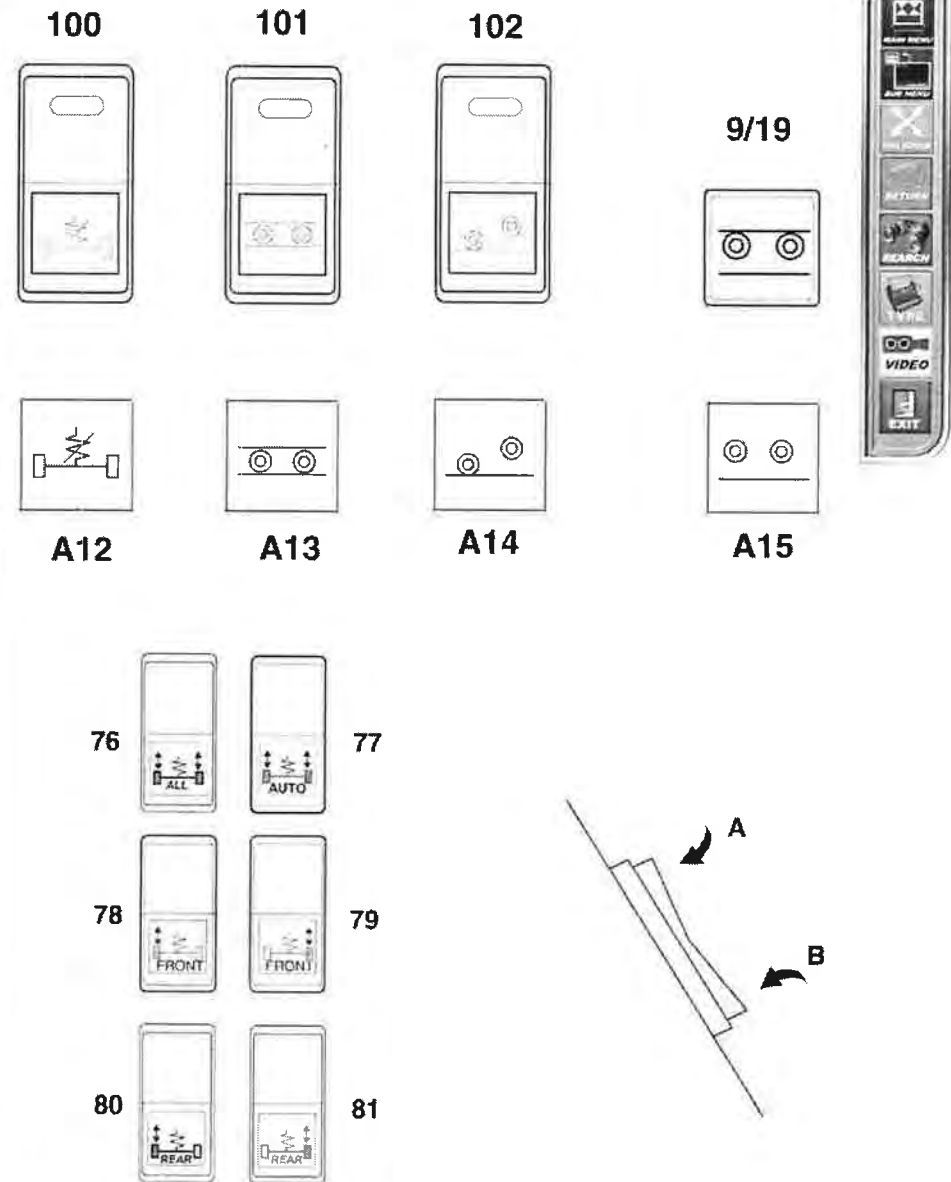
**If the crane is not level, extend the outrigger cylinders again and support the crane lightly on the outriggers.**

**Fill up the corresponding suspension circuit by pressing buttons (78A, 80A) for the left-hand side or (79A, 81A) for the right-hand side.**

The suspension may only be filled up to a maximum suspension pressure of 270 bar (3919 psi).

**An attempt to fill the suspension up to higher pressures can cause the suspension to sag.**

5. Then extend the outrigger cylinders until the crane is standing free on its wheels; check that it is aligned horizontally. Outrigger plates just above the ground!



Repeat this procedure until the crane is horizontally aligned and level with the outrigger cylinders retracted.

Observe the road travel position of the suspension cylinders.

The suspension cylinders must be in the road travel position.

The clearance between the fastening eyes on the suspension cylinder (dimension "X") is then 630 mm (24.8 in).

**The suspension pressure should be monitored continually.**

**If the pressure in one of the suspension circuits rises up to 300 bar (4354 psi), stop the crane immediately and extend outrigger cylinders until the load is taken off the wheels.**

**Make sure the crane is evened out by resetting the hydraulic suspension and / or correcting the boom position.**

**If the crane is driven further there is a risk of the crane TIPPING or of AXLE BREAKAGE !**

### Height Adjustment

The level of the suspension circuits can – in the context of the suspension travel – be adjusted up or down. This can be helpful,

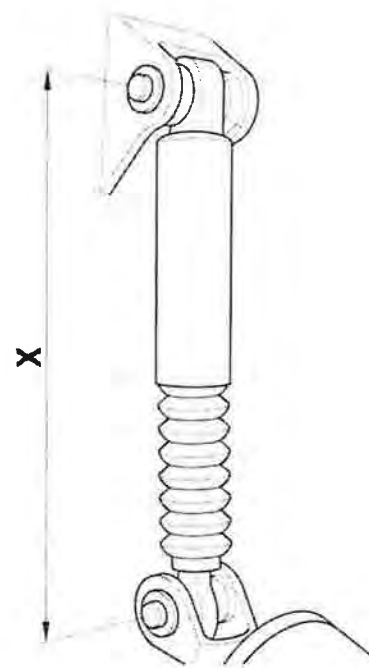
for example

- if the height clearance is too low;
- if more ground space is required;
- if the mobile crane is stuck on terrain;
- before retracting the outriggers.

When adjusting the height, always leave some clearance to the final upper and lower position so that there is a degree of suspension play remaining.

In this state the suspension is only effective in a limited capacity.

**Drive with extreme caution and return the level to normal (road travel level) once the obstacle has been passed.**





### **Raising Axles**

Raise all axles when supporting on the outriggers,.

Raise "Lift axle" in the steering program "Construction site operation", .

### **Hold axles**

Holding axles when supporting on outriggers,.

**Driving the crane in the "Hold axles" position leads to heavy damage to the hydraulic suspension.**

### **DRIVING PROHIBITED!**

**After every special setting:**

- "Activate suspension block"
- "Height setting"
- "Raise axles"

**The hydraulic suspension must be reset for "Driving in the Transport Position".**

### **Lowering Brake Valves in the Basic Suspension Block**

The lowering brake valves are set ex works to ensure slow and even lowering of the suspension.

**The lowering brake valves may only be adjusted by our customer service technicians.**

### Selection of the Operating Modes (Optional) ("Axle Loads 12 t / 26.5 kip" or "Reduced Axle Loads")

Due to special country regulations, it might be necessary to reduce the axle loads under 12 t (26.4 kip) when driving on roads.

In the operating mode "Reduced axle loads" there might be various driving states. Examples:

- driving without main boom
- driving without superstructure
- driving with different axle loads < 12 t / 26.5 kip
- driving with dolly ("dolly operation")

#### Risk of accidents!

**The suspension must always be set to the operating mode in which the mobile crane is driven. The mode may only be switched when the crane is at a standstill.**

**If this instruction is not adhered to, there is increased risk of accidents.**

*When selecting the operating mode "Reduced axle loads", only the hydraulic suspension is set to the changed axle loads. All other components (e.g. braking system and steering) remain unchanged.*

The operating mode is selected using a switch (96) that can be unlocked.

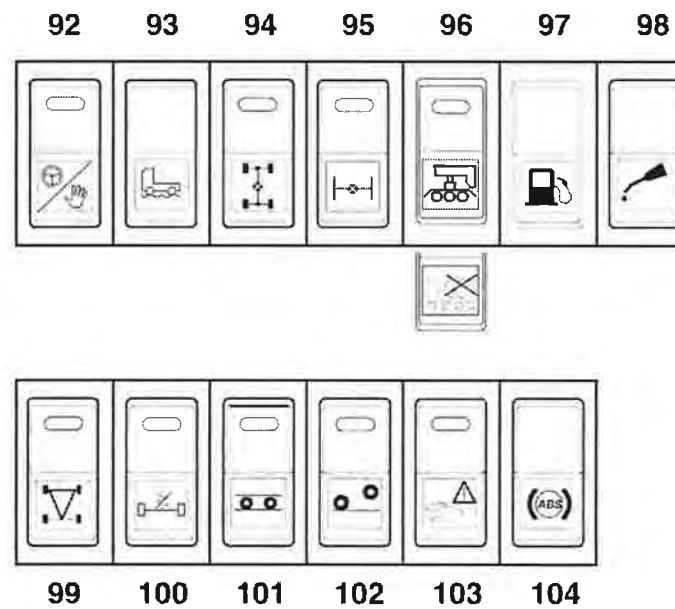
If the switch is in the position "OFF" (switch position "X"), the suspension is in the operating mode "Axle load 12 t / 26.5 kip".

If the switch is in position "ON" (switch position "Y"), the suspension is in operating mode "Reduced axle loads".

**After a new operating mode has been selected, the levels of the suspension circuits must be checked. If required, the level must be reset.**

**If the machine is driven in dolly operation mode, you must follow the "Instructions on dolly operation".**

*The suspension can be blocked in both operating modes (switch 100).*



**NOTES;**

