

safe use and maintenance

IMPORTANT: This manual should be kept at a safe, well known and easily accessible location throughout the AP working life.

Translation of the " ORIGINAL INSTRUCTIONS "

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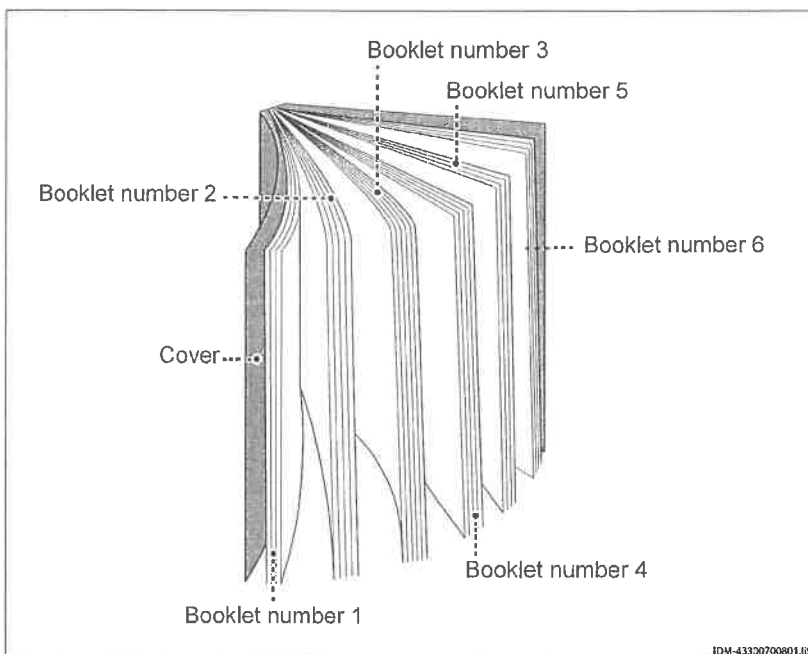
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USER'S MANUAL MAKE-UP

The manual is organised in modular booklets, assembled in a personalised manner to supply all the information corresponding to the user's aerial platform.

The list contains a short description of the different booklets which – put together – reflect the complete information describing the configuration of the user's aerial platform (AP).

- **Booklet 1 – General and safety information:** it contains the information necessary to identify the aerial platform and to use the manual, and all the information regarding safety.
- **Booklet 2 – Aerial Platform general description:** it contains information on its main functions and characteristics.
- **Booklet 3 – Stabiliser description:** it contains information on the functions and functional characteristics of the machine stabilisers. There can be different types of stabiliser (vertical, slanting etc.) which can be 'combined' in the aerial platform (AP) design and set-up phases.
Aerial Platforms (APs) installed on covered body vehicles can be set up to have or not have stabilisers.
The list shows the main types of stabiliser that can be fitted to the aerial platform.
 - **Booklet 3a – Vertical stabiliser description.**
 - **Booklet 3b – Slanting stabiliser description.**
 - **Booklet 3c – Description of "Type 2" articulated stabilisers.**
 - **Booklet 3d – Description of "Type 1" articulated stabilisers.**
 - **Booklet 3e – Extensible stabiliser description.**
- **Booklet 4 – Basket description:** it contains information regarding the characteristics of the basket – which can be made from fibreglass or metal tubing with different carrying capacities (one person, two persons etc.).
- **Booklet 5 – AP controls description:** it includes information about the basket controls which may be lever, joystick or electric type controls.
- **Booklet 6 – Additional technical information:** it contains information regarding any additional units installed on the AP.



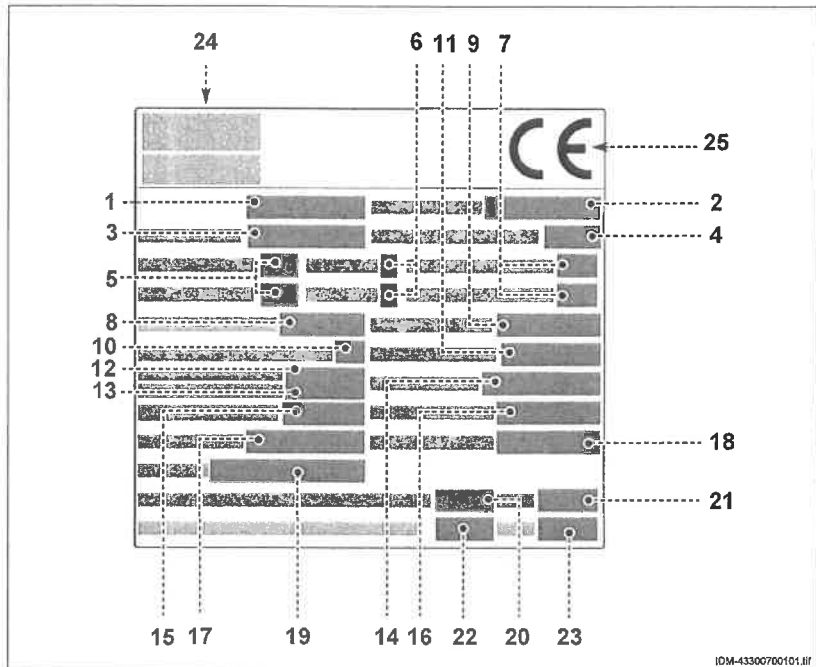
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MANUFACTURER AND AP IDENTIFIER.

The pictured machine identification plate is fitted on the AP.

This list contains the information specified in the machine (AP) identification plate.

- 1) **Model of the machine:** it shows the AP identifying code.
- 2) **Factory number:** it shows the AP identification number. The same number is printed on the tower.
- 3) **Year of manufacture**
- 4) **Weight (kg):** it shows the total assembly weight.
- 5) **Max capacity in basket:** it shows the maximum carrying capacity for the basket, including the weight of the carried persons and the weight of the equipment.
- 6) **Max number of persons:** it shows the maximum number of persons allowed in the basket.
- 7) **Max horizontal force:** it shows the value of the maximum thrust that an operator in the basket can apply horizontally (for example, the force necessary to drill a hole in a wall).
- 8) **Max wind speed:** it shows the maximum wind speed value above which it is forbidden to use the AP.
- 9) **Hydraulic diagram code:** it shows the hydraulic diagram identifying number.
- 10) **Max carriage tilt:** it shows the maximum tilt angle beyond which it is forbidden to use the AP.
- 11) **Wiring diagram code:** it shows the wiring diagram identifying number.
- 12) **Reach limiting device code:** it shows the device identifying code.
- 13) **Moment limiting device code:** it shows the device identifying code.
- 14) **Basket code (WP):** it shows the basket identifying code.
- 15) **Hydraulic pressure:** it shows the hydraulic system maximum operating pressure value.
- 16) **Pump delivery rate:** it shows the maximum delivery rate of the hydraulic system control pump.
- 17) **Vehicle (make, model):** it shows the identifying details of the vehicle on which the AP is installed.
- 18) **Stabiliser feet code:** it shows the identifying code of the installed stabilisers.



- **Routine maintenance:** set of operations required to maintain the AP in good working order. These operations are normally planned by the manufacturer, who also decides the skills and operating procedures required.
- **Unscheduled maintenance:** set of operations required to maintain the AP in good working order. These operations are not planned by the manufacturer and should be carried out by the maintenance engineer.
- **Authorised workshop:** selected and formally appointed by the manufacturer or the manufacturer's agent to carry out routine and unscheduled maintenance on the AP.
- **Ground operator:** a technician authorised by the manufacturer or the manufacturer's agent – trained and selected among experts fulfilling all the necessary requirements to provide assistance and supervision during the use of the AP and carry out emergency/rescue procedures. He/she should also be trained and authorised to carry out basket operator tasks.
- **Basket operator:** a technician authorised by the manufacturer or the manufacturer's agent – trained and selected among experts fulfilling all the necessary requirements to safely set up, stabilise and operate the AP. He/she should also be trained and authorised to carry out ground operator tasks.
- **Mobile aerial platform:** mobile machine designed to transport people to their work stations (in which they carry out tasks from the work platform) - it being understood that workers can exclusively get in/out of the AP basket while the machine is in its rest configuration.

Important

To simplify the language used and make it more immediately comprehensible, in this user's manual the mobile aerial work platform will be identified by the acronym AP.

- **Work platform:** platform equipped with controls enabling the operator to move to different heights and carry out operations from the platform.

Important

To simplify and standardise the term "work platform" according to the terminology commonly used by the operators, in this user's manual the term "basket" will be used.

- **Vehicle:** transport vehicle having requirements and characteristics suitable for the installation and use of the mobile aerial platform (AP).
- **Dangerous area:** any area within and/or next to the AP in which personal health and safety are at risk.

- NEVER use the AP in case of electric storms with a risk of lightning or when the wind speed exceeds the maximum permitted speed. Windy conditions may be a cause of AP instability.
- NEVER use the AP in extreme temperature conditions. Frost and snow may hide dangers and negatively impact the operator's control abilities. Excessively high temperatures may alter asphalt conditions.
- NEVER use the AP in poor visibility or night-time conditions. The equipment working range should be adequately lit in order to minimise risks.
- NEVER use the AP to service electric lines or electrically live appliances which, if not properly insulated, might be dangerous high voltage electricity conductors.
- NEVER use the AP with the basket in areas implying the risk of impacts, trapping or crushing for the operators.
- NEVER use the AP with the basket in contact with fixed or mobile areas, rested or thrusting against objects, in confined spaces or in the presence of obstacles.
- NEVER use the AP to work below the stabilisers' bearing plane.
- NEVER use the AP without having suitably marked off the equipment working range, particularly the areas reserved for vehicle and pedestrian traffic.

Incorrect uses linked with operating procedures

- NEVER use the AP to carry out lifting, loading and unloading operations nor to transport persons and/or materials.
- NEVER use the AP to carry out lifting, loading and unloading operations nor to transport persons and/or materials.
NEVER use the AP as a stand from where to watch shows or events of any kind.
- NEVER use the AP unless the basket has been correctly levelled.
- NEVER use the AP near obstacles which might prevent stabilisers from being fully extended.
- NEVER use the AP to carry out operations implying the risk of fire or explosion.
- NEVER use the AP without having first securely stopped the vehicle to prevent sudden unwanted movements.
- NEVER use the AP by placing devices in the basket in order to increase the working height or outreach.
- NEVER apply to the basket or other AP parts any elements which might increase the surface exposed to draughts (flags, billboards, etc.).
- NEVER stabilise the AP if the vehicle wheels are not correctly positioned; comply with the instructions contained in the user manual.
- NEVER use the AP with deactivated or altered safety devices.

INFORMATION ON RESIDUAL RISKS

The employer, after informing the operators about how to use the AP and any incorrect and not recommended uses, must also specify the RESIDUAL RISKS connected with AP use.

Even if all the protective measures integral with AP design and construction are applied, the following RESIDUAL RISKS will still persist.

- During AP operation, the ground operator must NOT stand on the vehicle bed or within the equipment work range to prevent impact or crushing risks.
- During AP operation, the emergency controls must be padlocked, must not be used and must be supervised by the ground operator. Emergency controls should only be used by the ground operator in the event of actual emergencies threatening the operator in the basket.
- NEVER check the safety devices by using the ground controls if there is an operator in the basket.
- NEVER level the basket unless it is in its stand-by (rest) position.
- NEVER climb into/out of the basket unless it is in its stand-by (rest) position.
- NEVER load authorised tools or materials in the basket unless it is in its stand-by (rest) position.
- Any up/down movements, loading and unloading operations etc. involving the basket should ONLY be controlled if it is on stand-by and correctly resting on the ground.

GENERAL SAFETY INFORMATION

- In designing and manufacturing the machine, the manufacturer has taken special care to ensure the health and safety of the persons interacting with the AP.
- In addition to ensuring compliance with the applicable legislation in force, the manufacturer has applied all 'good workmanship' rules to manufacturing the machine.
- The information contained in the manual is provided to make the operators fully aware of risks and prevent accidents. However, caution must be used at all times. Safety also depends on the AP operators' conduct throughout the machine working life.

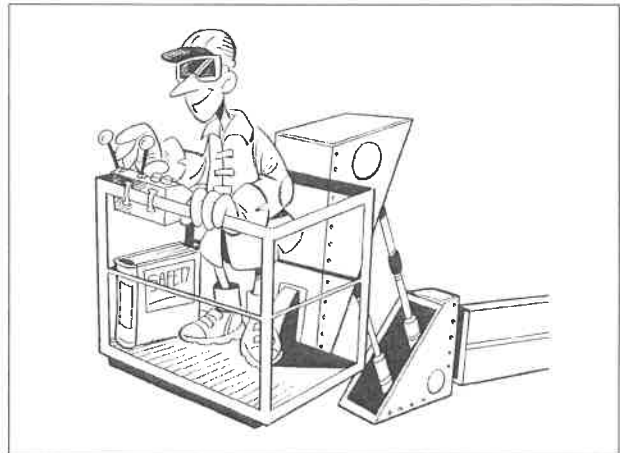


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- Only carry out any type of servicing during the AP working life if you are suitably and specifically qualified and skilled. Doing otherwise may cause risks for personal health and safety.



- While operating the AP, only wear the protective clothing and/or personal protective devices recommended in the user's manual supplied by the manufacturer and those prescribed by the applicable industrial health standards.



HANDLING AND INSTALLATION SAFETY INFORMATION

- Lift and handle the machine by fully complying with the instructions contained in the AP data plates and user's manual.
- Carry out lifting and handling after having worked out a "safety plan" to ensure the safety of all the persons concerned. In consideration of the unique constructive characteristics of your AP, should you have any doubts, please contact the manufacturer for complete information.
- Only carry out lifting and handling operations (loading, transport, unloading etc.) if you are suitably and specifically trained and qualified and familiar with the handling equipment used.



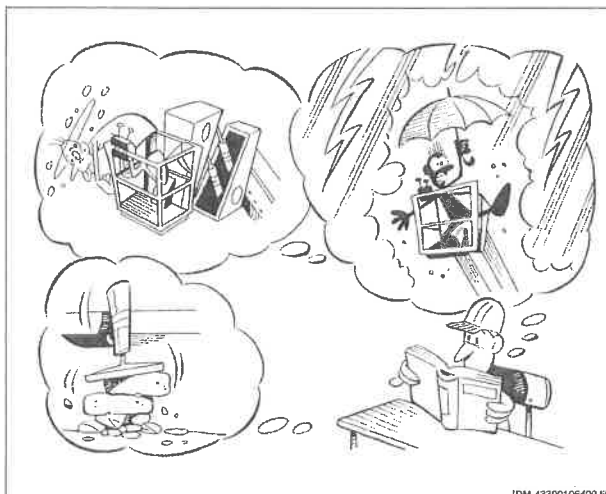
USE AND OPERATION SAFETY INFORMATION

- In addition to being specifically trained and informed on AP operation, the users must be suitably skilled to carry out their assigned tasks and physically and mentally fit to work without causing any risks for personal health and safety and to prevent damages to property.

Before authorising any operators to use the AP, the employer must train and educate them on NOT RECOMMENDED AP uses and persisting RESIDUAL RISKS.

The employer must supply the training material used to the trained operators and must suitably document all the completed training activities, so that he can produce evidence in case of litigation.

Operator training may also be supplied by specialised organisations. Training experts should be chosen who can issue a special training certificate on AP use, acknowledged by the national/regional supervisory authorities in charge.



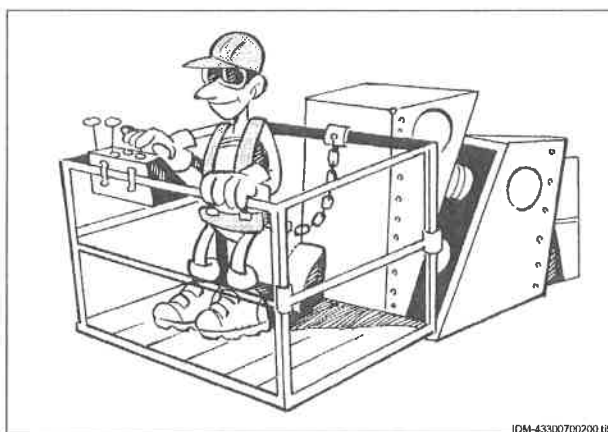
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- After reading through the manual, carry out a few simulations to become familiar with the various control functions and prevent unwanted or dangerous manoeuvres.
- Check the efficiency of all the AP safety devices; this is especially important after the first start-up, when operating the machine after prolonged inactivity, when environmental conditions change etc. Carry out the inspection and maintenance activities recommended by the manufacturer and described in Booklet 2.
- Become familiar with the stop and emergency devices and controls necessary to lower the basket in an emergency.
- Evaluate the environmental and climatic conditions in the work area (ambient temperature between 0°C and +40°C, etc.), to establish whether it is possible to work in safe conditions.
- Do not use the AP with wind speeds in excess of 45 Km/h (6° Beaufort), as there is a risk of machine overturning.
- Do not enlarge the AP surface by attaching billboards, flags etc. to prevent the risk of overturning also at wind speeds lower than the maximum permitted wind speed.

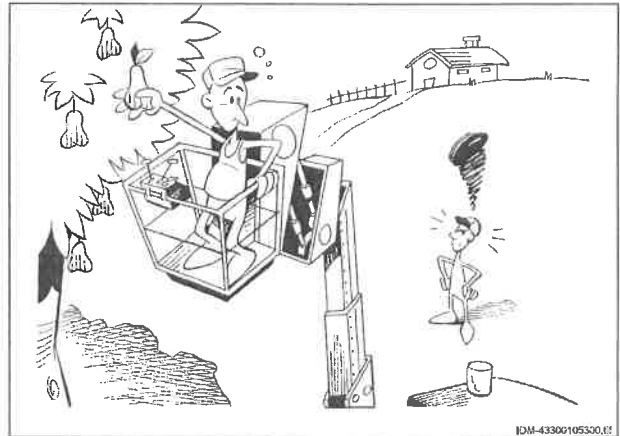


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- Before using the AP, check that it is correctly stabilised and that the vehicle is safely parked (parking brake fully engaged). Use the special safety wedges under the vehicle wheels and any other precautions to prevent unwanted movements.
- Only climb into the basket after having correctly levelled and stabilised the AP and ensured that the ground operator is present and adequately positioned. The operator may only use the basket after having correctly levelled it.
- Do not climb into the basket unless special authorisation and training have been received. Only access the basket by using the special ladder.
- Use a special footboard if the tread to reach the bottom rung of the access ladder is too high.
- Before climbing into the basket, make sure that all the passage and stopping points are free from any residues, dry and not slippery to minimise any falling and slipping risks.
- Do not use the emergency ground controls unless you have been specially authorised and trained to do so. Operating these controls is exclusively permitted in case of accidents or emergencies. Before obtaining access to the controls, ensure that all the passage and stopping points are clean, dry and not slippery to prevent slipping or falling and always wear the special, type-approved safety harness.
- Do not get into/out of the basket when this is not in its rest position.
- Do not overload the basket beyond the maximum permitted capacity with working equipment or other devices. Check that the basketed footboard is clean and free from any residues.
- Always wear the special, type-approved safety harness before climbing into the basket. When inside the basket, securely close the access point and hook up the harness (adjustable with a cord to be kept short) to the special points to prevent the risk of falls.
- Prevent the AP from touching both fixed objects (walls etc.) and moving objects (lifting equipment etc.) during operation.
- Never work with the AP or AP parts supported or under pressure by any other structures not part of the AP.



- Do not use the AP as a lifting device. Only use it for the purposes recommended by the manufacturer. Using the AP for not recommended purposes may cause personal injuries and damage to property.



- Do not use the AP without having first installed and checked the efficiency of the safety devices; do not tamper with any device or try to exceed its recommended performance, to prevent causing personal injuries and considerable damage to property.

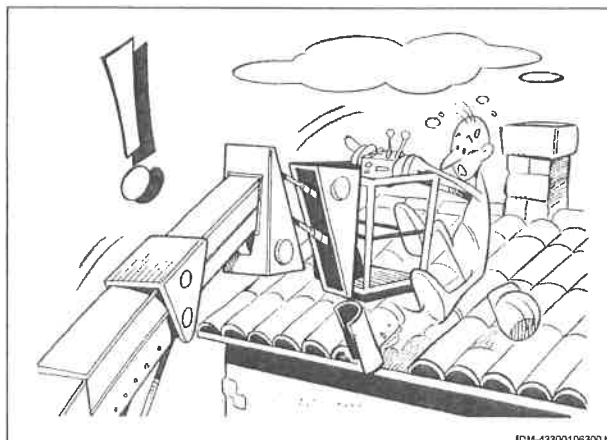


- The AP has been designed and built to include technical solutions and safety devices preventing the risk of overturning. The presence of these devices, however, will not relieve operators of their obligation not to load the basket when it has been lifted off the ground. In this condition, exceeding the working limits (always controlled by the safety devices) may imply that any (however temporary or accidental) overloading causes immediate machine overturning or structural collapse. The operator is responsible for avoiding any overloading condition that could imply this severe risk.



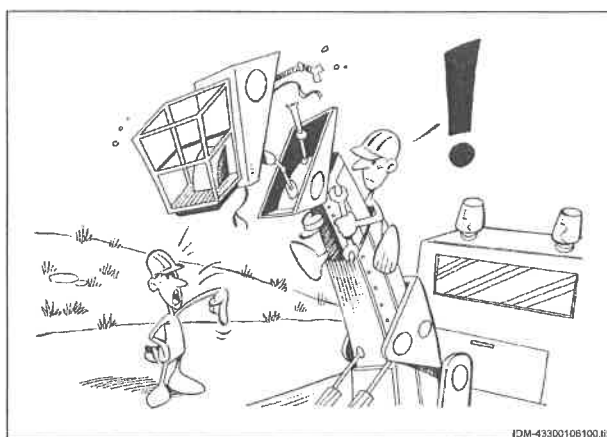
- Do not keep the engine on inside poorly ventilated buildings. Adopt all the required precautions to prevent high exhaust fume concentrations.

- The maintenance and adjustment operations to be carried out by the operator should be completed in accordance with the procedures described in the user's manual and in suitable working environments, to guarantee compliance with safety requirements. To service AP areas that are not easily accessible or dangerous, provide for special safety conditions in compliance with the applicable industrial accident prevention rules.



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- Before carrying out any AP maintenance or adjustment operations, adopt all the recommended safety precautions and, if judged necessary, alert all the working personnel or other personnel nearby.
- Mark and restrict access to the areas surrounding the AP maintenance or servicing area and prevent access to any controls which, if accidentally actuated, could cause health and safety risks.
- The tools and equipment used should not show signs of wear. Use the oil and grease types recommended by the manufacturer to ensure trouble-free AP operation up to the required safety standards.
- Do not carry out any modifications, adjustments (including settings) or repairs significant enough to alter the AP performance or safety conditions. If significant changes are required that might affect the AP stability, strength etc. contact the manufacturer to obtain its previous approval.
- NEVER cross or stop within the AP working range. Record all performed maintenance actions and introduced upgrades in the equipment "log book".
- During AP operation, do not carry out any operations (welding, use of naked flames etc.) that might imply fire or explosion risks.



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- According to the WEEE (Waste Electric and Electronic Equipment) directive, the user, during the decommissioning phase, is expected to separate electric and electronic waste parts and dispose of them to specialised collection centres, or to return them to the seller still assembled, upon purchasing new products.
- All the parts and components that are supposed to be collected and disposed of separately are marked with a special symbol.
- Illegal disposal of Waste Electric and Electronic Equipment (WEEE) is punished according to the law provisions in force locally.
- To implement the European directives (2002/95/CE, 2002/96/CE, 2003/108/CE) in the Italian territory, a Law Decree (n. 151 of 25 July 2005) has been issued providing for fines up to 2000+5000.

WARNING AND INFO SIGNS

Safety and warning signs are affixed to the mobile aerial platform (AP). To know the location of the various signs check the Booklet corresponding to each working assembly.

This list contains a description of each safety and warning sign.

Warning signs

- **Risk of serious injury to lower limbs;** keep away from stabiliser feet and mobile structural parts.
- **Risk of serious injury to upper limbs:** keep away from moving and protruding parts.
- **Risk of serious bodily injury:** keep away from stabiliser feet and mobile structural parts.
- **Falling objects;** do not drop objects from the basket.
- **Danger**
- **Risk of electrocution:** do not touch interior of live parts.



- **Do not use:** use of ladders or other devices to extend reach from the basket is forbidden.



- **Access forbidden:** it is forbidden to enter or stop within the AP working range.



Safety info signs

- **PPD obligation:** the safety harness must be worn and hooked up as recommended during AP use and operation.



- **Machine greasing points**



- **Hooking point;** to lift aerial platform only (i.e. vehicle and counter-frame excluded).



- **Personal protection gear compulsory;** Wear adequate protection.



- **Use of guards compulsory;** check that guards and screens are properly in place.



Info signs

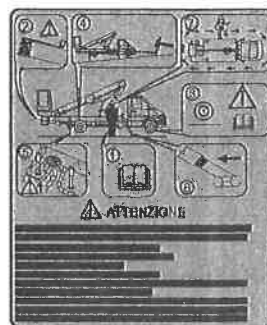
- Mobile aerial platform (AP) electric system grounding point.



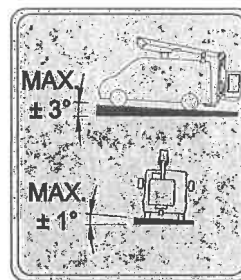
- Blue-coloured "check" plate to check the reach range limiting device or working range limiting device.



- Important stabilisation information.



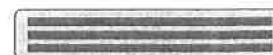
- Warning on maximum permitted tilting during the stabilisation phase.



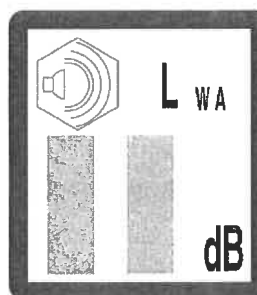
- Important information for operator regarding use of the platform.



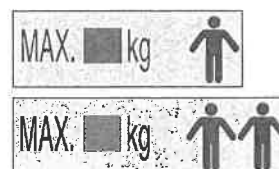
- Main instructions for vehicle use by the operator.



- Indicates guaranteed level of sound power.



- Maximum load allowed in the basket.



- Information on basket levelling during work





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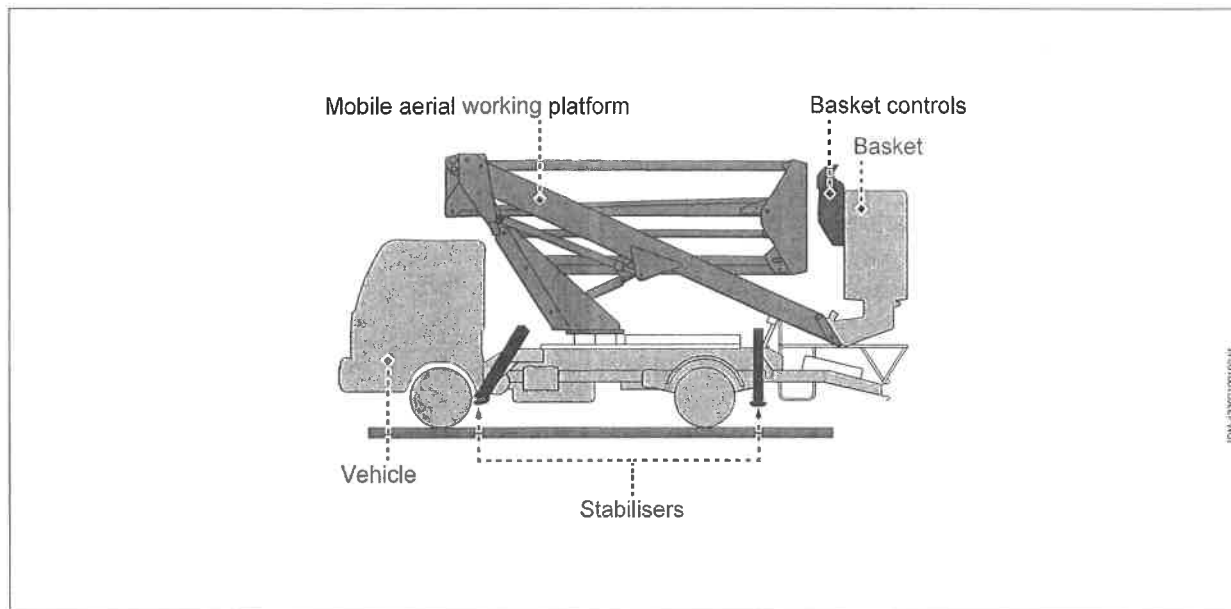
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GENERAL MACHINE DESCRIPTION

The information contained mainly concerns the subframe (fixed to the vehicle), tower and main and telescopic booms of the AP. No information is contained regarding the stabilisers, basket and installed controls, as these parts are described in special sections. The picture shows the main units making up the mobile aerial platform.



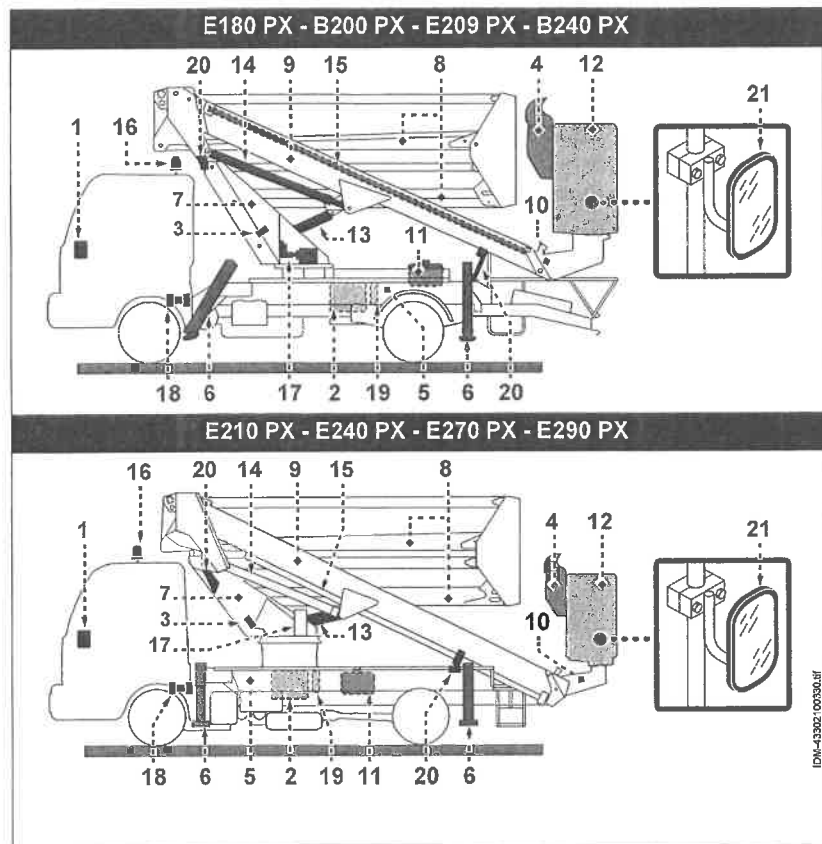
- The mobile aerial platform (AP) belonging to the series "PX" is a machine designed and built to lift persons allowing them to easily work from given heights above ground level.
- The AP belonging to the series "PX" from as early as in the design phase can be built to be set up on different types of road vehicle. According to both the vehicle and the AP characteristics, the final set-up can include different types of stabiliser.
- The AP belonging to the series "PX" can be built according to a number of models, different by a few constructive characteristics (e.g. the telescopic element extension cylinder) and maximum working height that can be reached.

DESCRIPTION OF MAIN MACHINE PARTS

These pictures show (in a general manner) the different AP models with their differential constructive characteristics.

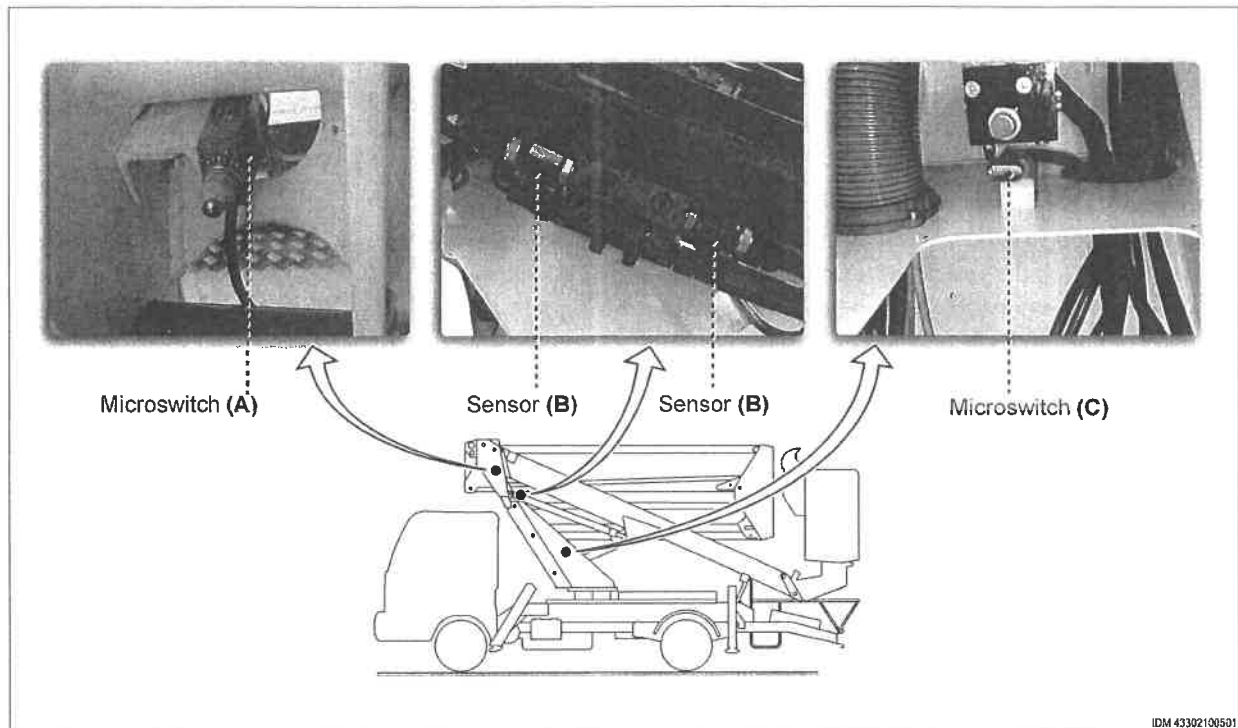
This list contains a description of the main machine parts and functions.

- 1) **Cab controls:** they are used to control the hydraulic system and vehicle indicator devices.
- 2) **Stabiliser locking station:** equipped with all the controls necessary to ensure machine stabilisation.
- 3) **Emergency ground control station:** equipped with all the devices to be used by the ground operator to start emergency rescue procedures when needed.
- 4) **Basket control station:** equipped with all the controls needed by the basket operator to carry out all working manoeuvres. There can be different types of control (lever, joystick controls etc.).
- 5) **Subframe:** the AP load-bearing structure, complete with stabilisers, fixed to the vehicle chassis.
- 6) **Stabilisers:** connected to the structure of the subframe and used to control machine stabilisation. There can be different types of stabiliser (vertical, slanting etc.).
- 7) **Tower:** a structure fixed to the subframe, equipped with a turntable and hydraulic gearmotor to control rotation of the AP.
- 8) **(Top and bottom) articulated boom;** it is the connecting element between the swivel turret and the main boom.:
- 9) **Main boom:** it is driven by a hydraulic cylinder. It is equipped with telescopic booms supporting the basket.
- 10) **Telescopic boom:** it consists of extensible elements. The extensible element movement is controlled by an assembly consisting of a hydraulic cylinder and chain transmission.
- 11) **Oil reservoir:** it contains the oil needed to actuate the hydraulic controls.
- 12) **Basket:** it contains the operators and working equipment. It can be made from tubular steel, aluminium or fibreglass (see booklet 4).
- 13) **Hydraulic lifting cylinder:** used to control the movement of the articulated boom.
- 14) **Hydraulic lifting cylinder:** used to control the movement of the main boom.



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- 2) **Moment limiting device:** it consists of a number of elements automatically detecting the reach value according to the load in the basket, in order to prevent machine tipping over or structural overload (the presence of this device is specified in the log book).



Important

The moment limiting device enables to increase the horizontal reach values when load in the basket decreases. It is therefore strictly forbidden to add more load after the basket has been lifted off its rest position.

- **Microswitch (A):** it detects the main boom lifting cylinder maximum extension.
- **Electric sensor (B):** it detects the maximum permitted pressure inside the lifting cylinder of the main boom.
- **Microswitch (C):** it detects the minimum extension of the lifting cylinder of the main boom (main boom folded in).

The device is also operated if the basket is mistakenly loaded when the boom has already been extended (it is, however, always forbidden to load the basket when this has been raised off ground level).

Important

Every oscillation in the load or structure actuates the system in advance. The largest reach is obtained at once by operating the extension of the telescopic elements gently (all other movements instead generate stronger oscillations).

When the maximum allowed value is reached, the following is stopped:

- the extension of the telescopic elements
- the descent of the main boom

Important

Every oscillation in the load or structure actuates the system in advance. The largest reach is obtained at once by operating the extension of the telescopic elements gently (all other movements instead generate stronger oscillations).

When the maximum allowed value is reached, the following is stopped:

- the extension of the telescopic elements
- the descent of the main boom

Important

Retracting the telescopic elements of the main boom reactivates the moment limiter device at once

Regularly perform maintenance of the AP (see page 55), and in particular, lubricate all articulated parts and telescopic elements and replace the hydraulic system oil and filter whenever required (see page 71 - 72).

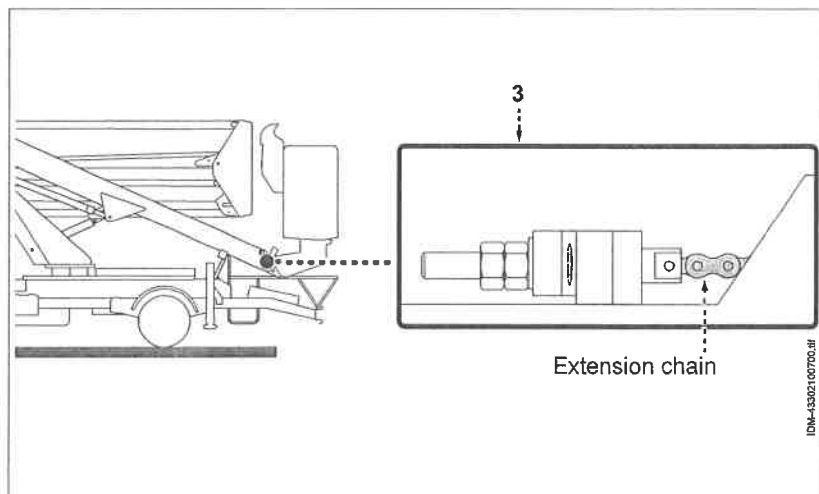
Important

Failure to correctly perform maintenance may affect device sensitivity.

Telescoping chain monitoring devices

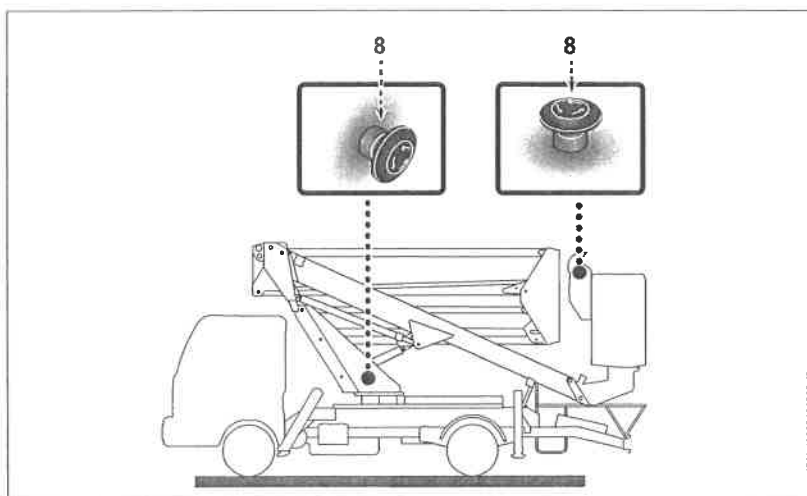
3) **Extension chain monitoring device (if available):** it detects any break or loosening of the extensions chains and can be designed in different ways:

- Detecting system including a microswitch, spring or rod
- Visual detecting system with rod



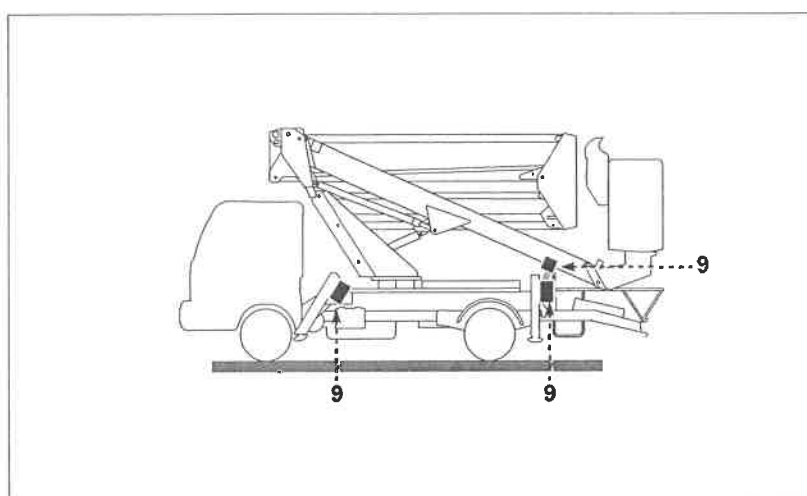
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- 8) **Emergency stop push-button**: it is operated to immediately stop all AP movements. After having restored normal operating conditions, the emergency button must be released to authorise AP restart.



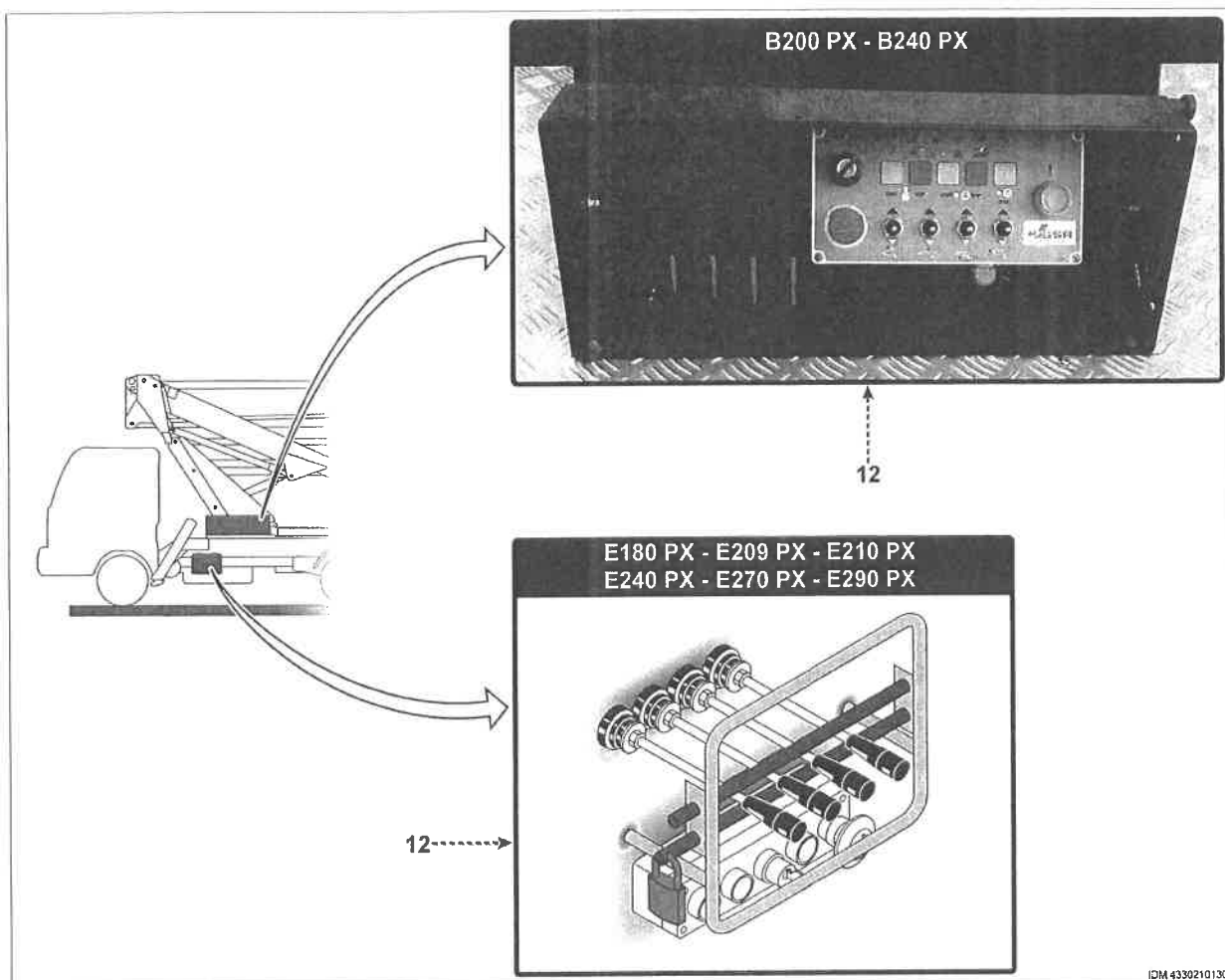
- 9) **Boom/stabiliser interlocking device**: it only enables to use the AP after it has been stabilised. It consists of several microswitches located on the stabilisers and on the boom support at rest, connected to lighted indicators to signal the various conditions.

- **(Red) indicator light**: when lit, it signals that the stabilisers and/or booms have not been fully retracted to their rest and transport positions (See page 27 and booklet 3).
- **Warning light (green light)**: when lit, it indicates that the stabilisers and booms are fully folded in their rest and travelling position (see page 27).
- **Warning light (blue light)**: when lit, it indicates that the stabilisers are correctly positioned (See the booklet 3).



Important

When the booms are not in their rest configuration, the (blue) indicator light will be always lit.



12)(Padlocked) emergency ground controls: the emergency levers and controls are all key-lockable to prevent one or more of the following occurrences.

- unauthorised access to control levers
- any dangerous interference during routine use of basket

! Danger Warning

To use these controls it is necessary to open the cover; the machine will go to emergency mode and the ground operator may only take action if the following conditions are observed:

no operators in the basket

the emergency ground control operator has been trained and is authorised to control these movements
with the vehicle engine off and by exclusively using the emergency pump

Any other use is potentially dangerous.

i Important

After you have finished using the controls, immediately padlock the emergency ground controls to be able to restore normal operation.

must be carried out.

15) Main safety solenoid valve: it controls the AP safety circuits. It is suitably sealed by the manufacturer to prevent tampering and ensure efficient operation of the devices connected to it. Any alteration or service carried out on the solenoid valve should be recorded in the log book. A complete check on the safety systems provided must be carried out.

! Danger Warning

Every time that the solenoid valve is tampered with, e.g. because it is operated manually or the seal breaks, the system safety may be affected. The operator is requested to immediately stop using the AP and ask experienced and authorised engineers to restore correct operation.

! Caution Attention

While the AP is working, the electric coil of the solenoid valve is normally live and can reach high temperatures.

i Important

A power cut will cut the solenoid valve and consequently stop the AP.

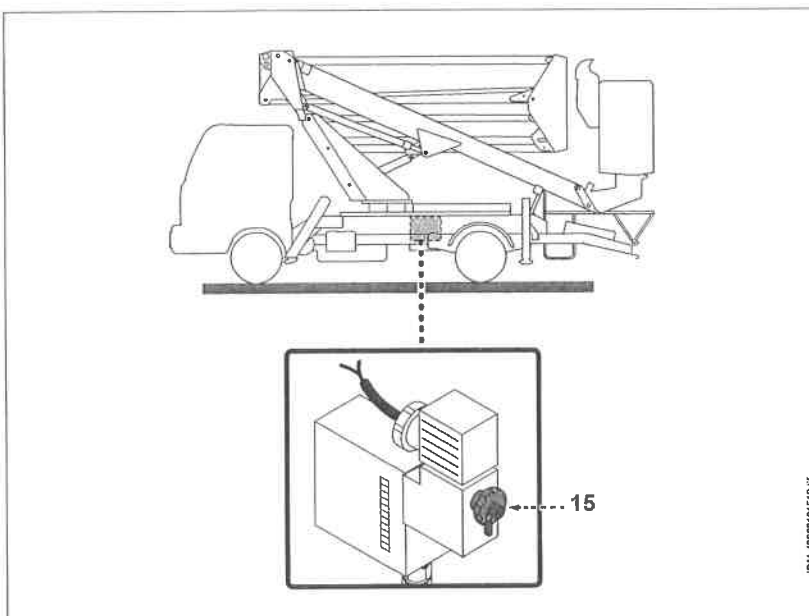
Collision preventing devices

16) Machine/vehicle collision preventing device (if available): it prevents the risk of collision with vehicle parts (driver's cab, bumpers etc.). When the pre-set limit is reached, the articulated boom movement and tower rotation are disabled and the red warning lights provided in the basket control station (see booklet 5) and emergency ground control station (see page 29) light up.

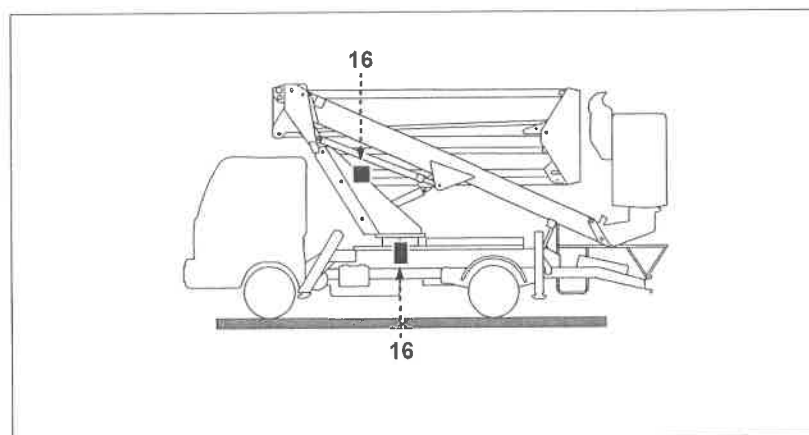
The only permitted manoeuvres are those aimed at moving the platform away from the area of collision.

i Important

Moving away (or moving closer) manoeuvres should be performed gradually, paying attention not to hit any vehicle parts.



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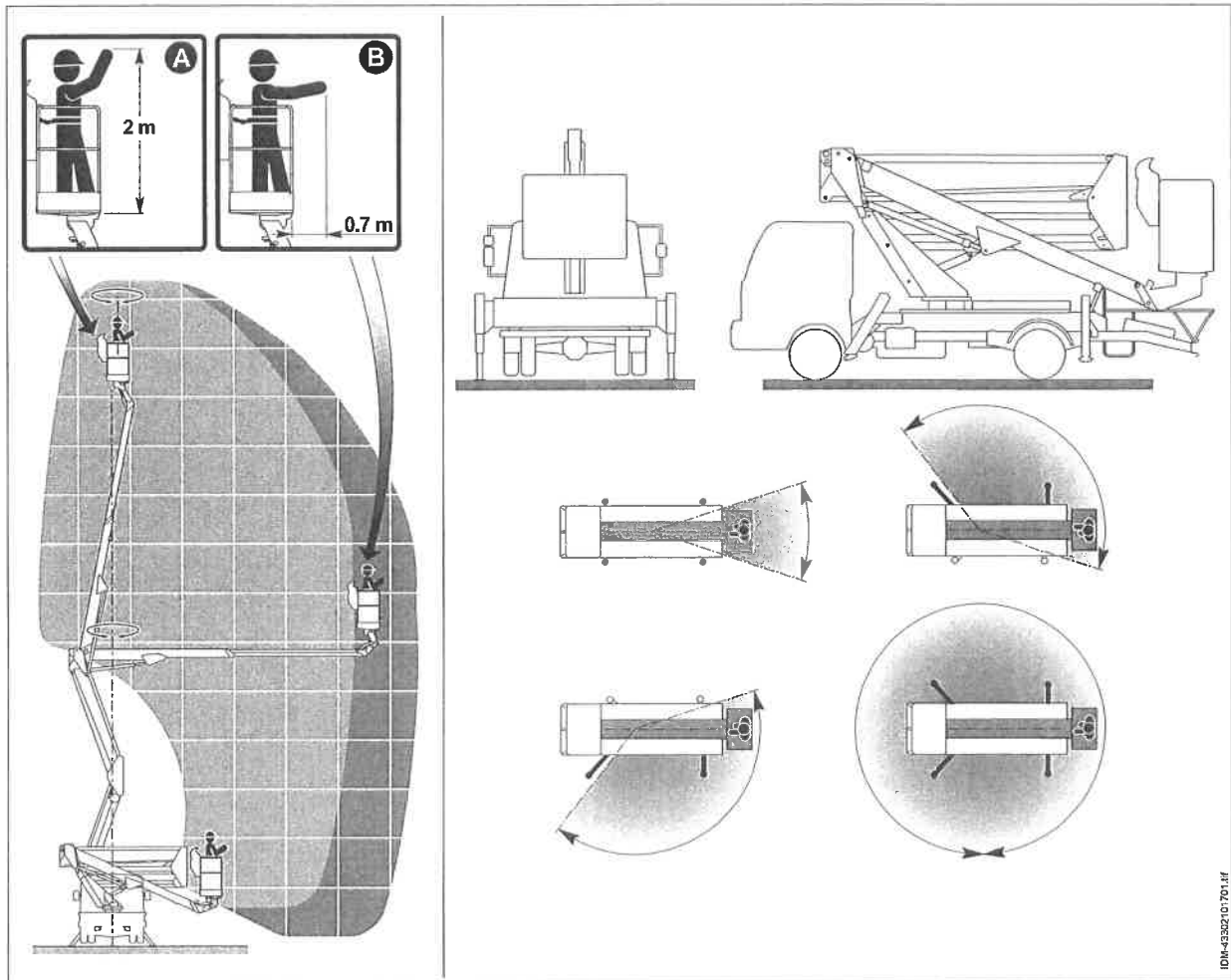
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Table 4: Vibration level

Description	Measured value
Vibration transmitted to the operator's body	<0,5 m/s ²

WORKING AREAS AND PERMITTED GRADIENT

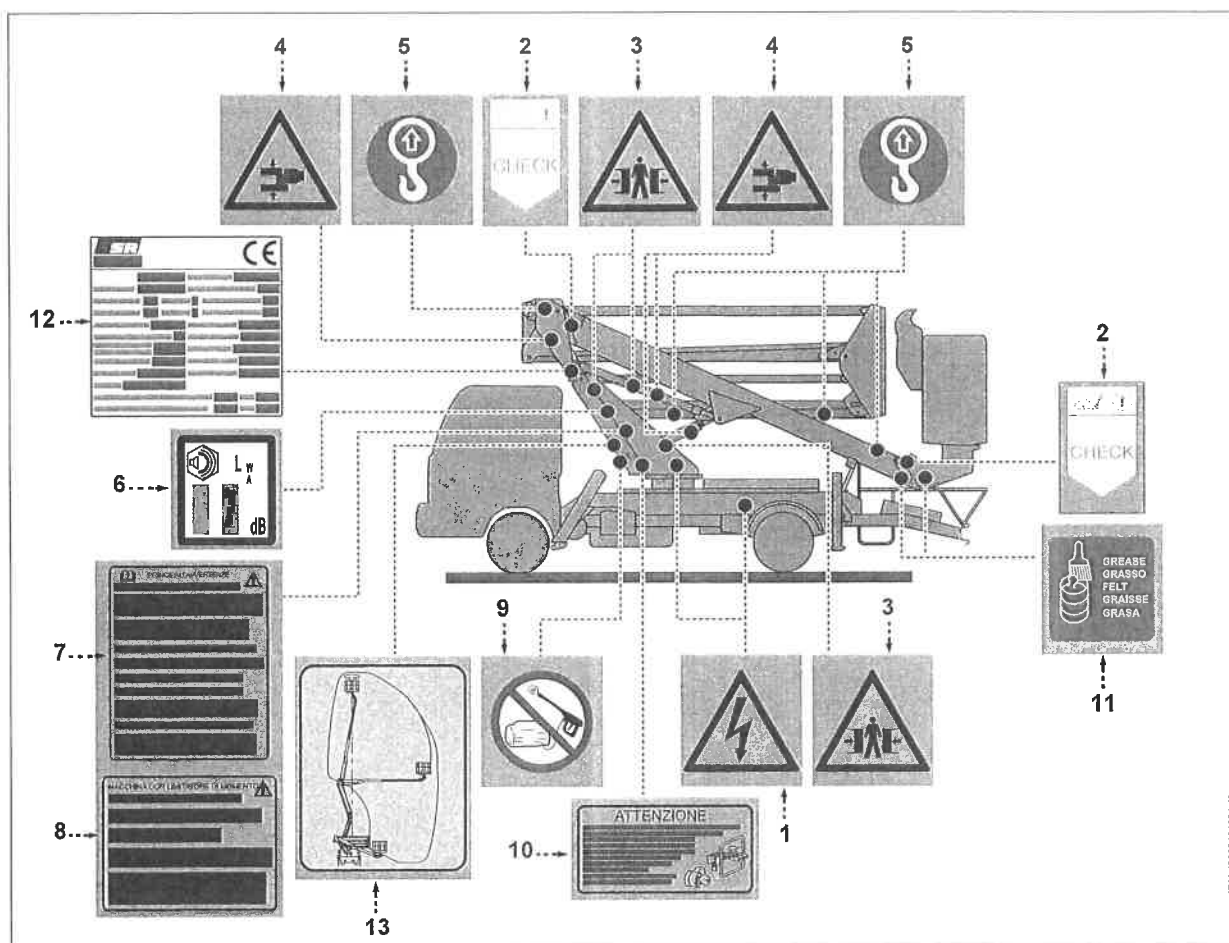
The picture shows (in a general way) the AP working areas (for additional information check the diagram contained in the log book).



The work chart curve shows the position which can be reached by the operator's hand leaning out vertically (case (A)) or longitudinally (case (B)).

SAFETY AND INFORMATION SIGN POSITION.

The picture shows (in a general way) the positioning of the safety and information signs provided on the machine. Each sign is accompanied by a description



- 1) Risk of electrocution: do not touch interior of live parts.
- 2) Yellow-coloured "check" plate to check the load limiting device
- 3) Risk of serious bodily injury: keep away from stabiliser feet and mobile structural parts.
- 4) Risk of serious injury to upper limbs: keep away from moving and protruding parts.
- 5) Hooking point; to lift aerial platform only (i.e. vehicle and counter-frame excluded):.
- 6) Indicates guaranteed level of sound power.
- 7) Important information for operator regarding use of the platform.
- 8) Information on moment and/or reach limiter.
- 9) Do not use: do not use pressurised water cleaning devices.
- 10) Use of the emergency keyed selector switches.
- 11) Indicates grease spreading area.
- 12) Manufacturer and AP data plate.
- 13) Work chart: it shows the AP working areas.

INSTRUCTIONS FOR HANDLING AND INSTALLATION

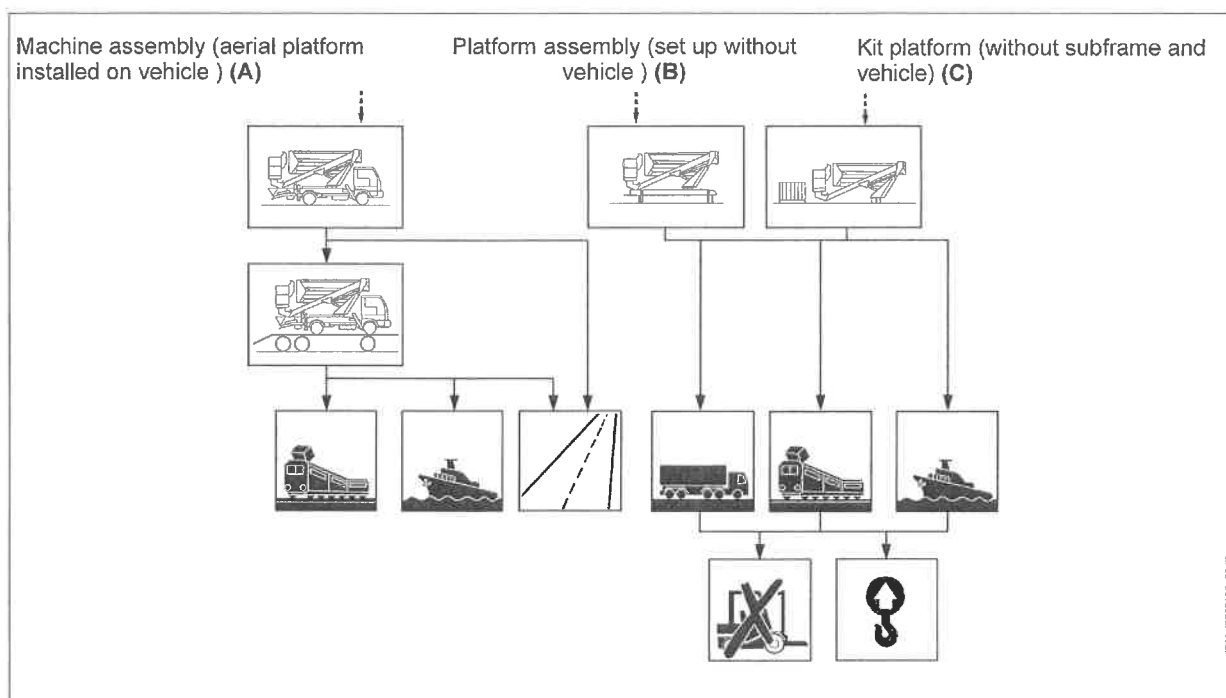
Important

Carry out handling and loading by following the directions supplied by the manufacturer and shown on the machine, next to the driver's seat and in the instructions for use.

The personnel in charge of carrying out operations must, if necessary, organise a "safety plan" to protect the safety of all the persons concerned.

PACKING AND UNPACKING

According to the type of supply, mobile aerial platforms (APs) can be delivered in the configurations listed here below; in any case, they are delivered complete with all the documentation necessary for type approval and/or set-up and starting up.



A) Complete machine (platform fitted out on vehicle): no packaging.

B) Platform complete with chassis attachment frame (without vehicle): depending on the means of transport, some parts may be protected and packaged.

C) Kit platform (without subframe or vehicle): according to the type of transport chosen, some of the machine parts can be specially protected and packaged. The machine will come with a crate containing its accessories.

All information regarding loading/unloading is given on the platform itself or on the packaging.

When removing parts from packaging check that everything is in good condition and that no components are missing.

TESTING AND ISSUE OF CERTIFICATION

- If the mobile aerial platform (AP) is installed on the vehicle directly by the manufacturer, the machine is started up by the manufacturer himself or one of his dealers according to EEC regulations and the applicable national regulations in force.
- If installation on the vehicle is carried out by an authorised dealer/installer, starting up is conditional upon another compliance test to be carried out on the AP already and definitively installed on the vehicle.
- The authorised dealer/installer must, in any case, ensure the machine complies with all national safety and road circulation regulations.
- Until technical and road circulation regulations are standardised throughout the EEC it is forbidden to use the machine in another EEC country (i.e. other than the country where it was originally put into service) without first updating the technical documentation and obtaining confirmation from the manufacturer and the local authorities that the machine may be used and driven on the highway in compliance with the laws of the EEC country to which the machine is to be transferred.

REGULATION/ADJUSTMENT INSTRUCTIONS

Important

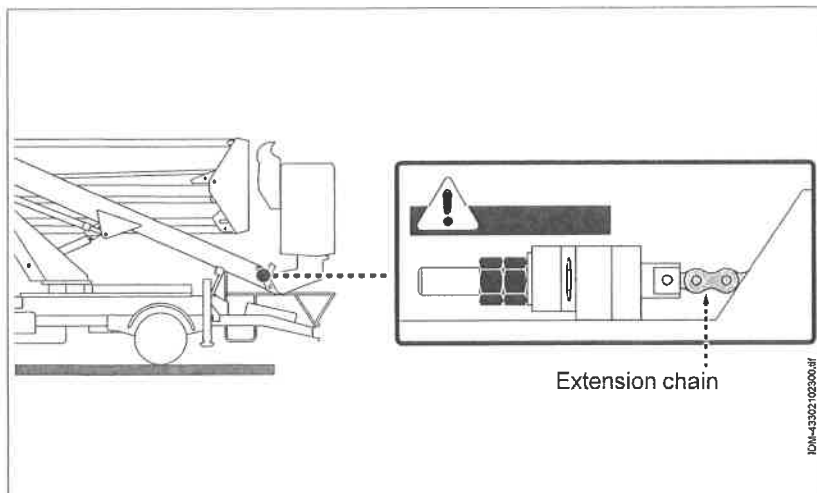
Before carrying out adjustments of any kind, operate all the safety devices provided on the machine and consider alerting all the personnel working on/near the machine. If necessary, clearly mark the neighbouring areas with special signs and prevent access to any device which, if operated, may create dangerous conditions.

ADJUSTING BOOM TELESCOPING CHAINS

Adjust the chain tension by means of a torque wrench at 9 Nm torque.

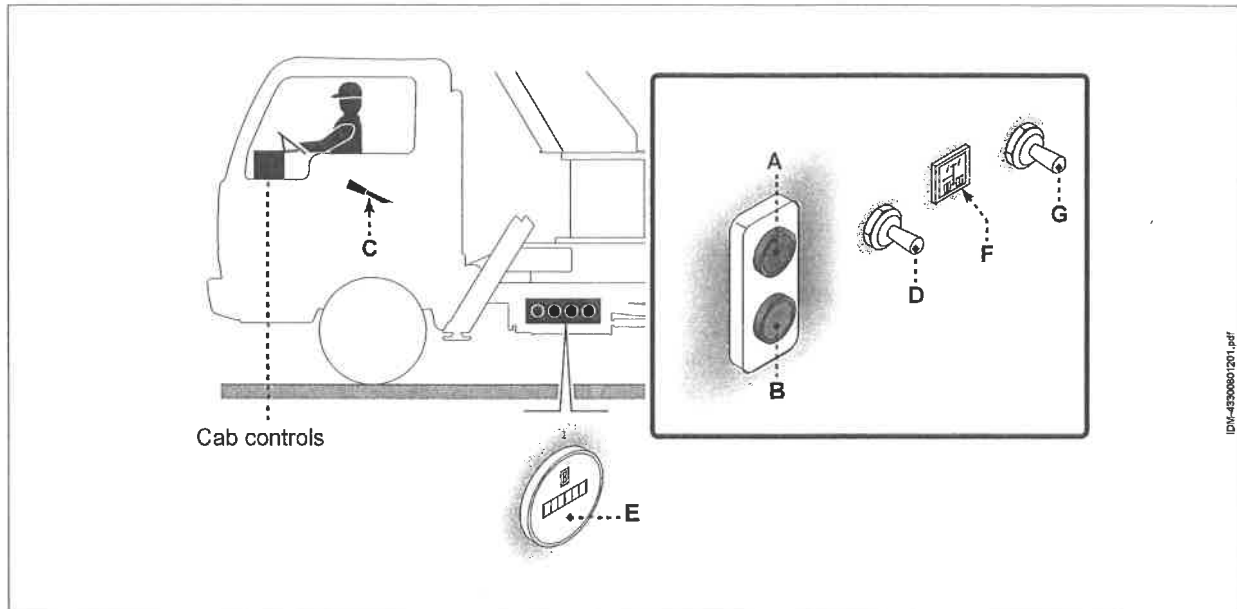
Important

Do not tension the chain too much to avoid quick component wear.



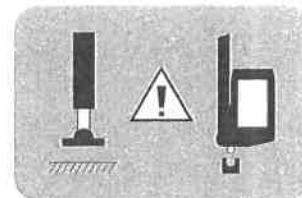
DESCRIPTION OF DRIVE CAB CONTROLS

The picture shows (in a general way) the control station installed inside the vehicle driver's cab, which must be used by the operator to start the work cycle.



A symbol is provided next to each device showing each control function. The information on the symbol is consistent with the control action. This list contains a description, function and symbol corresponding to each control installed in the cab.

A) (Red) indicator light: when lit, it signals that the stabilisers and/or booms have not been fully retracted to their rest and transport positions.



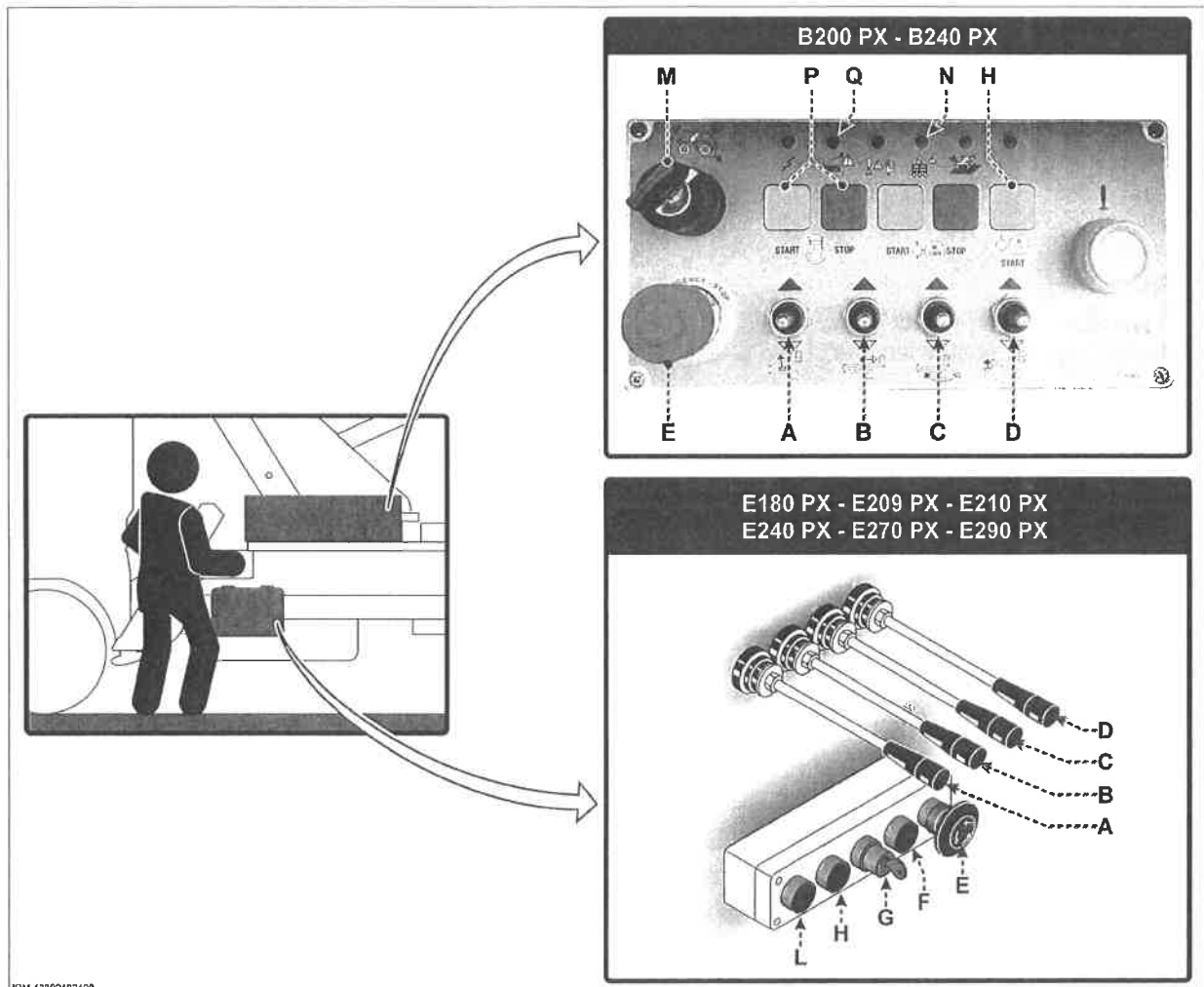
B) Warning light (green light): when lit, it indicates that the stabilisers and booms are fully folded in their rest and travelling position.



C) Power take-off engagement lever: it is used (with the clutch pedal depressed) to engage the hydraulic system pump. This control is available if the switch (G) is not installed.

EMERGENCY GROUND CONTROLS DESCRIPTION

The picture shows (in a general way) the control station installed on the AP which must be used in special situations only (see page 46).

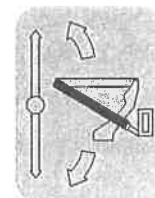


The control station is suitably protected to prevent any unwanted actuation.

A symbol is provided next to each device showing each control function. The information on the symbol is consistent with the control action.

This list contains a description, function and symbol corresponding to each control installed on the AP machine.

A) Lever: used to control the main boom.



Danger Warning

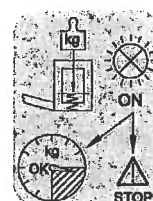
Unlocking the key selector switch should exclusively be done in an emergency, by specially trained personnel and to allow the basket operator to manoeuvre the machine all the way down to ground level. After this occurrence, the machine may not be used again before restoring normal operation.

H) **Button (where available):** used to start the electric pump for rescue operations in an emergency.



L) **Flashing warning light (red light) (where available):** this light, in conjunction with a sound alarm, warns that the AP has stopped because of a basket overload.

The sound alarm and indicator light are only provided if the AP is equipped with a basket loading sensor.



Important

To enable AP restart after a stop due to basket overloading, the excess weight must be removed.

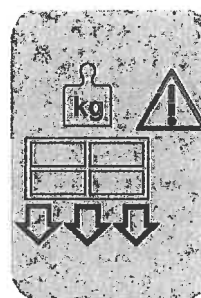
M) **Key selector switch:** it is used to activate the emergency ground control station, it automatically de-activates the in-basket control station.

Danger Warning

Unlocking the key selector switch should exclusively be done in an emergency, by specially trained personnel and to allow the basket operator to manoeuvre the machine all the way down to ground level. After this occurrence, the machine may not be used again before restoring normal operation.

N) **Flashing warning light (red light) (where available):** this light, in conjunction with a sound alarm, warns that the AP has stopped because of a basket overload.

The sound alarm and indicator light are only provided if the AP is equipped with a basket loading sensor.



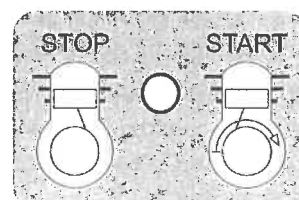
Important

To enable AP restart after a stop due to basket overloading, the excess weight must be removed.

P) **Buttons:** they are used to turn the vehicle engine on or off.

Caution Attention

The operator, in addition to being authorised, trained and fully documented, before using the AP must simulate (from his emergency ground control station) certain manoeuvres to identify the main functions and controls, in order to prevent accidental sudden and dangerous movements.



- Do not protrude any weights beyond the perimeter of the basket and do not load anything on the basket parapet to avoid shifting the bary-centre.
- Do not overload the basket beyond the maximum permitted capacity with working equipment or other devices. Check that the basket foot-board is clean and free from any residues.

Danger Warning

The operators must carefully check the basket capacity also as a function of the AP working configuration. It is also important that access to the basket and basket loading only occur when the AP has been perfectly stabilised and is in its rest position. Failure to observe these rules can lead to serious injury and/or damage.

KEY STAGES FOR MACHINE USE

Proceed as follows:

1. Choose the work area where you intend to park the vehicle, check the maximum gradient of the terrain and check that it is firm and that there are no holes, manhole covers or electrical/telephone lines.
2. Before using the AP, check that it is correctly stabilised and that the vehicle is safely parked (parking brake fully engaged). Use the special safety wedges under the vehicle wheels and any other precautions to prevent unwanted movements.

Important

The use of suitable safety stop devices to prevent unwanted vehicle movement and correct maintenance to ensure parking brake efficiency (according to the vehicle's use and maintenance manual instructions) are necessary to guarantee safe AP working conditions

3. Switch on the vehicle engine, put the gear in neutral, press the clutch and engage the power take-off (the corresponding yellow indicator light in the cabin controls will light up and a sound alarm will be actuated too, if available, to indicate that the PTO has been engaged).

Danger Warning

With the gear change lever on neutral and the PTO engaged, NEVER engage any vehicle gears to avoid damaging any machine parts and/or cause unwanted movements.

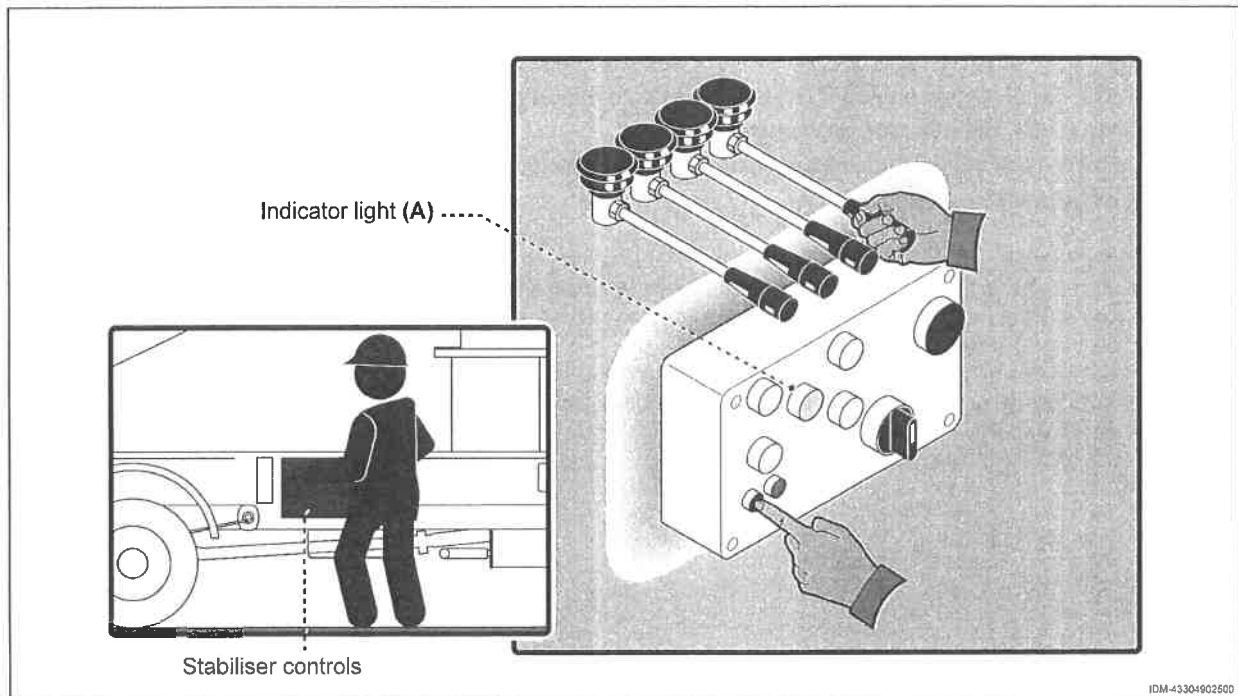
4. Turn on the signal light (if available) (see page 27).

Caution Attention

Do not enter/stay in the vehicle driver's cab during AP operation, to prevent the risk of being trapped inside or actuating controls that might cause sudden vehicle movement or damage the vehicle.

5. Ensure that there aren't any persons inside the vehicle then lock the vehicle doors with the key.
6. Carry out stabilisation of the machine (see page 34).
7. Obtain access to the control stations: one operator in the basket to operate the AP (page 41) and the other operator at ground level to control emergency and/or rescue operations if necessary.

STABILISATION WITH FIXED STABILISERS



Proceed as follows:

1. Ensure that there aren't any persons inside the vehicle then lock the vehicle doors with the key.
2. Lower the stabilisers gradually and evenly until the weight of the vehicle is resting on the ground (see booklet 3).
Adjust the front stabilisers first not to overload the machine front axle and not to damage the rear stabilisers.

Note: some models may be equipped with a 'sequencing' device forcing the operator to lower the front stabilisers first and then the rear stabilisers. This device, however, is not active when the stabilisers are retracting, therefore, in this phase, fully fold in the rear stabilisers first, and then the front stabilisers.

Note: in the event of "slanting" stabilisers these should be extended until the green strip is visible to guarantee a correct resting surface.

Important

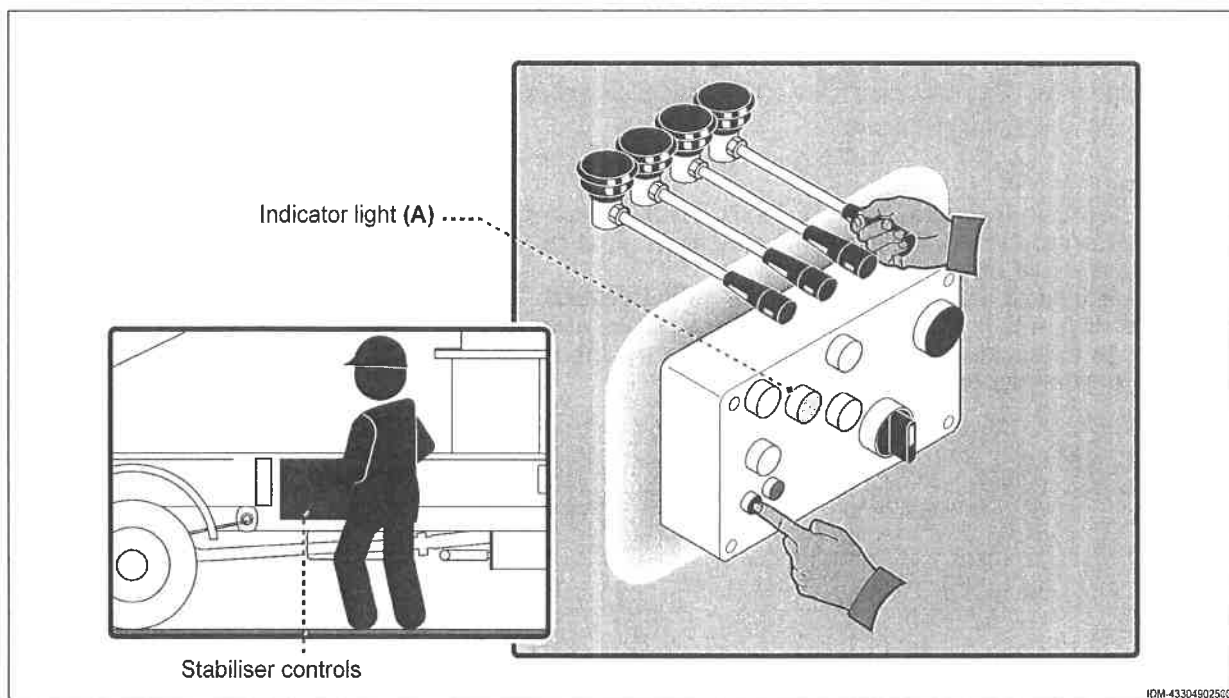
In the event of articulated or extensible stabilisers, compatibly with the vehicle electric circuitry, a "door protection device" may be provided to prevent stabiliser movement when the doors are open.

3. Check that all the stabilisers are correctly positioned.

Danger Warning

Check that the stabiliser feet are resting on the ground stably. Make sure any supports inserted between stabiliser feet and ground are stable.

STABILISATION WITH EXTENSIBLE STABILISERS



Proceed as follows:

1. Ensure that there aren't any persons inside the vehicle then lock the vehicle doors with the key.
2. Fully extend the stabilisers and lower them gradually and evenly until the weight of the vehicle is resting on the ground (see booklet 3).
Adjust the front stabilisers first not to overload the machine front axle and not to damage the rear stabilisers.

Note: some models may be equipped with a 'sequencing' device forcing the operator to lower the front stabilisers first and then the rear stabilisers. This device, however, is not active when the stabilisers are retracting, therefore, in this phase, fully fold in the rear stabilisers first, and then the front stabilisers.

Important

In the event of articulated or extensible stabilisers, compatibly with the vehicle electric circuitry, a "door protection device" may be provided to prevent stabiliser movement when the doors are open.

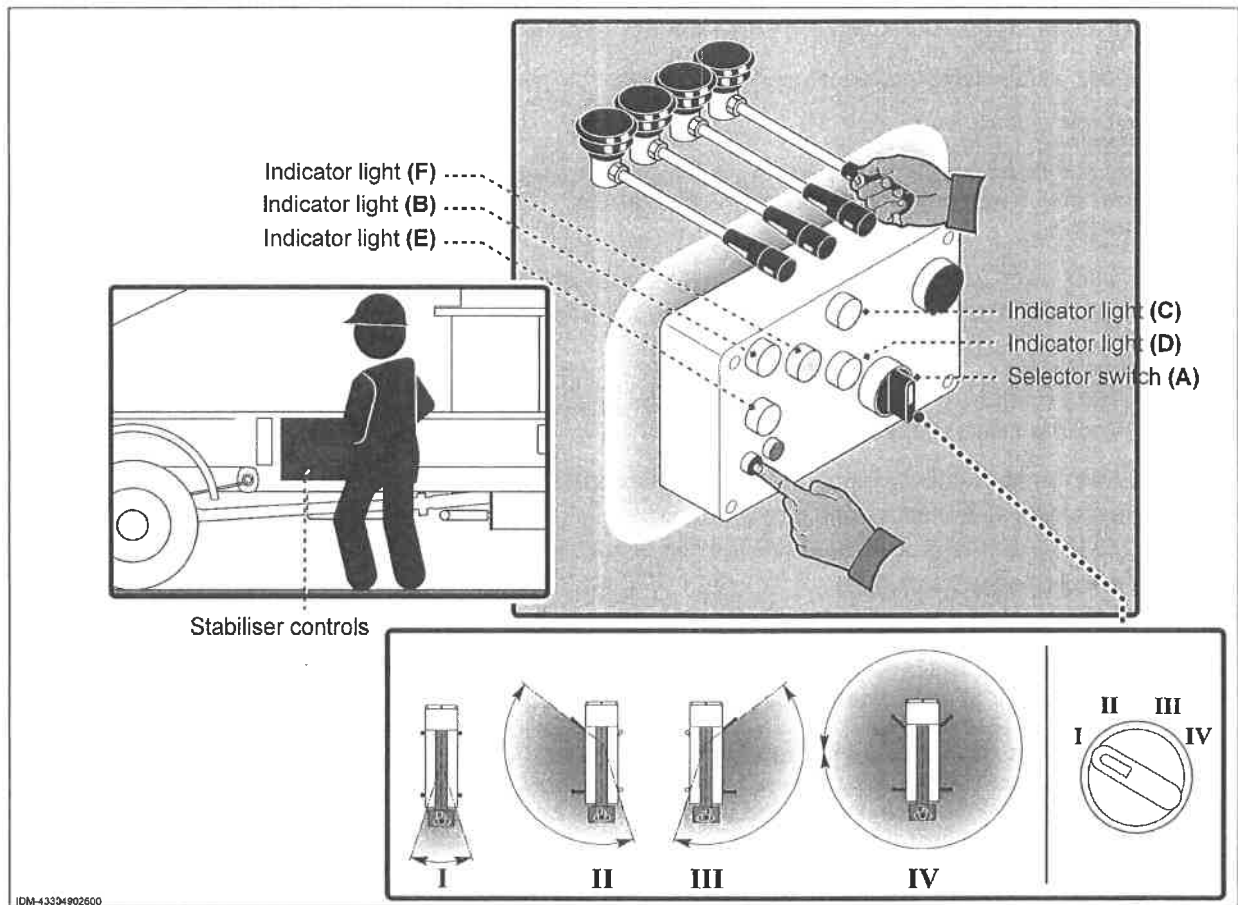
3. Check that all the stabilisers are correctly positioned.

Danger Warning

Check that the stabiliser feet are resting on the ground stably.
Make sure any supports inserted between stabiliser feet and ground are stable.

4. Lower stabilisers further gradually and uniformly until the vehicle wheels are lifted from the ground, simultaneously level the vehicle.

VARIABLE STABILISATION WITH EXTENSIBLE STABILISERS



Proceed as follows:

1. Ensure that there aren't any persons inside the vehicle then lock the vehicle doors with the key.
2. Work the selector (A) to select an operating sector and stabilisation mode.

Caution

If the cross members of the stabilisers must be extended, check that there are no obstacles in their manoeuvring area.

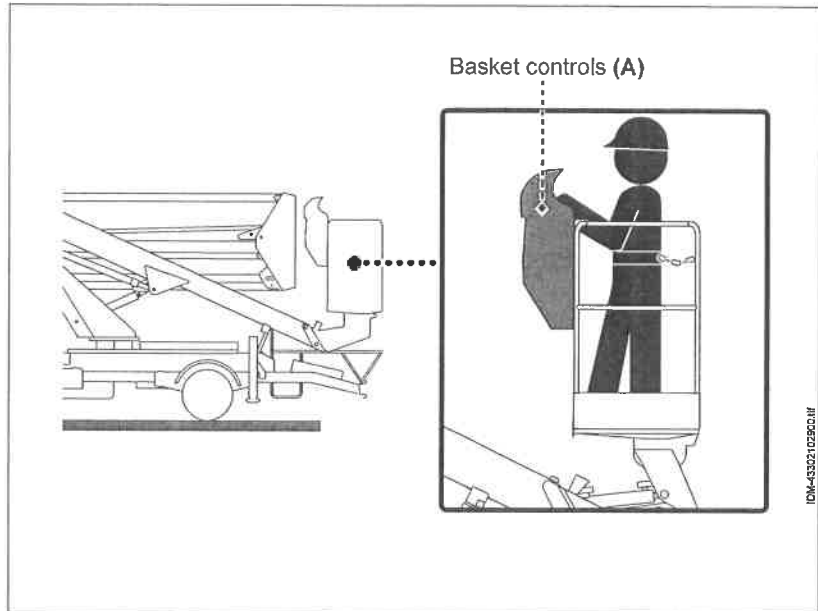
3. Fully extend the stabilisers and lower them gradually and evenly until the weight of the vehicle is resting on the ground (see booklet 3).
The indicator lights (B-C-D-E) (where available) light up when the cross members of the stabilisers are fully extended.
Adjust the front stabilisers first not to overload the machine front axle and not to damage the rear stabilisers.

Note: some models may be equipped with a 'sequencing' device forcing the operator to lower the front stabilisers first and then the rear stabilisers. This device, however, is not active when the stabilisers are retracting, therefore, in this phase, fully fold in the rear stabilisers first, and then the front stabilisers.

GAINING ACCESS TO BASKET CONTROLS

Proceed as follows:

1. Load the basket with any tools needed to carry out work and make sure they do not exceed the allowed weight as indicated on the ID plate and technical specifications.
2. Wear the recommended personal protective devices (safety harness, headgear etc.).
3. Go to the in-basket control station.
4. Close the access passage to the basket (with the safety gravity barrier correctly lowered or the safety gate closed and locked) and hook the safety harness (adjusted with a retaining cord to be kept short) to the special fixing points.



Danger Warning

Always carry out this operation to prevent the risk of falling out of the basket.

5. Make sure the ground operator is at the emergency control station.
6. Check for correct levelling of the basket or level it if necessary (see the booklet 5). After completing this operation, lock the basket levelling lever before carrying out any other operation.

Caution Attention

This operation must necessarily be carried out before any other operation.

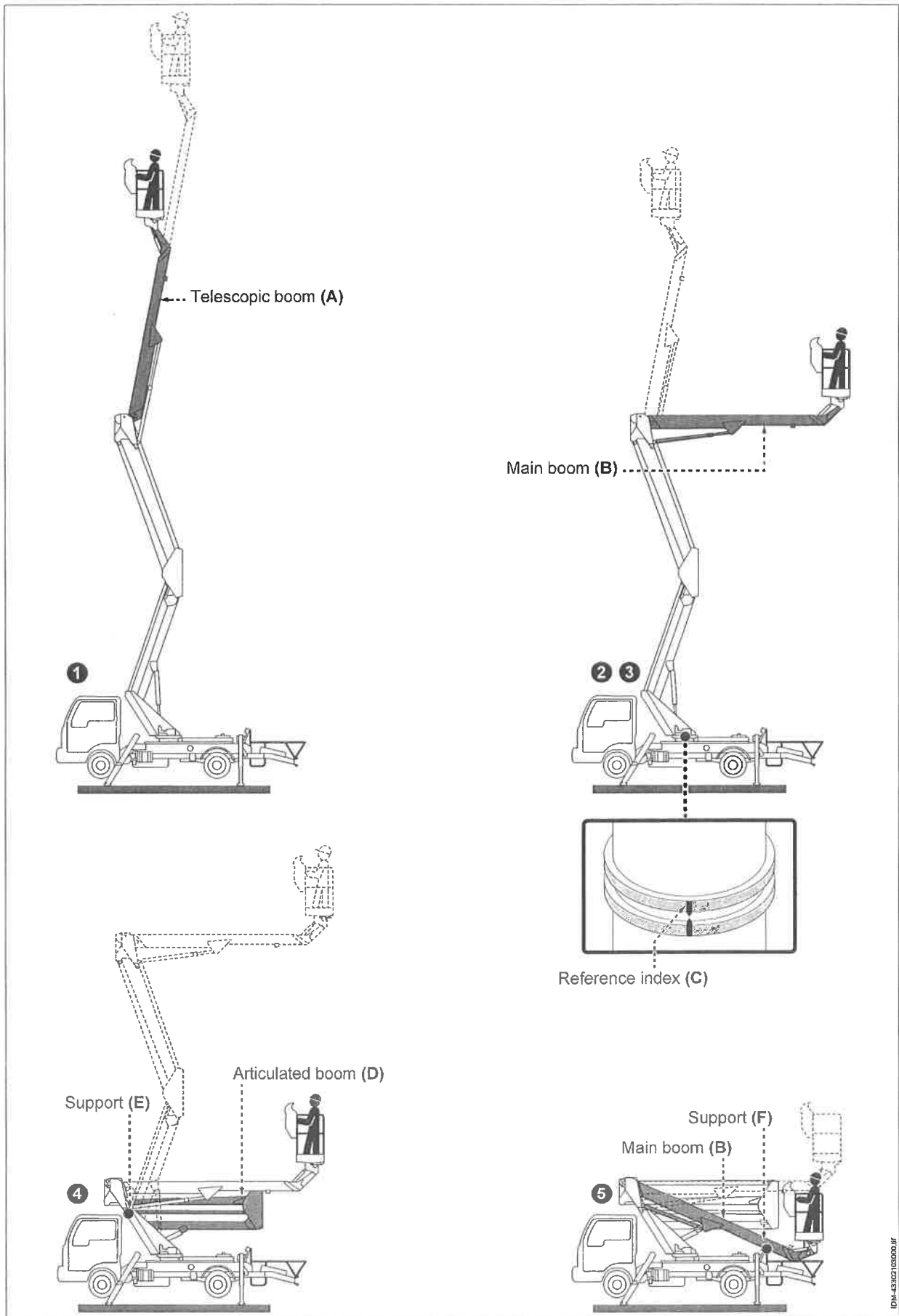
The basket levelling system is equipped with compensating and safety valves which ensure continuous basket trim control.

Whenever the basket trim is to be manually adjusted, the platform is to be closed and the basket must be brought to its rest position again. The lever allowing for proper basket levelling can only be released and operated in this position.

Caution Attention

It is forbidden to use the AP with the basket not correctly levelled. Levelling is correct when the basket footboard is horizontal, notwithstanding the vehicle angle at ground level.

7. Work the controls in the basket (A) to control the main boom and lift the basket (see the booklet 5).
8. Work the controls in the basket to reach the required position from which to work in the best possible conditions (see the booklet 5).



Important

In case of extensible stabilisers with variable stabilisation, turn the selector switch (M) to its position "IV" (see booklet 3). In this way, it will be possible to fold in the stabilisers whatever the previous stabilisation mode selection.

3. Work the switch (B) to turn off the signal light (C) (where available) and either the switch (D) or the lever (E) to disengage the power take-off.
4. Check that the warning lights (F-G) are off and that the warning light (L) is on.
Before moving the vehicle always inspect the perimeter to check that the vehicle can be driven safely on the public highway.

DRIVING ON THE PUBLIC HIGHWAY

- Vehicles may be driven on the public highway if they are properly type-approved and the driver has a valid driving license.
Before driving the vehicle secure any parts that might cause sudden, unexpected movement, check that nothing is protruding beyond the allowed maximum outline and, if necessary, affix warning signs.

Danger Warning

Check that no loads or objects are on the AP and in particular, in the AP basket which might fall off during road travelling and affect the health and safety of persons or damage the machine or other property.

- Before driving off always make sure the power take-off is disengaged and that the relative warning light is off.

Danger Warning

Driving with the power take-off engaged can seriously damage the vehicle. The manufacturer cannot be held liable for damage caused by failure to observe this regulation.

- Check that the emergency stop controls (in the emergency ground controls and in-basket controls) have been suitably de-activated.
- During travelling on roads, on bumpy ground the telescopic booms might extend slightly, the main boom and/or the stabilisers might move from their transport position etc. All such occurrences are signalled by a warning (red) light coming on in the cab (see page 27). When this happens, the operator should stop safely by the roadside to control full telescopic boom folding, reposition the main boom to its transport configuration, fold the stabilisers all the way in etc. and generally adopt all the necessary precautions to prevent dangerous conditions.

Danger Warning

In any case, travelling on roads is not allowed when the AP is not in its transport position.



Caution Attention

Should the basket operator be unable to interact with the ground operator (because he has been taken ill, is unconscious etc.), the rescue operations can only be carried out with the help of public emergency services and experienced maintenance engineers.

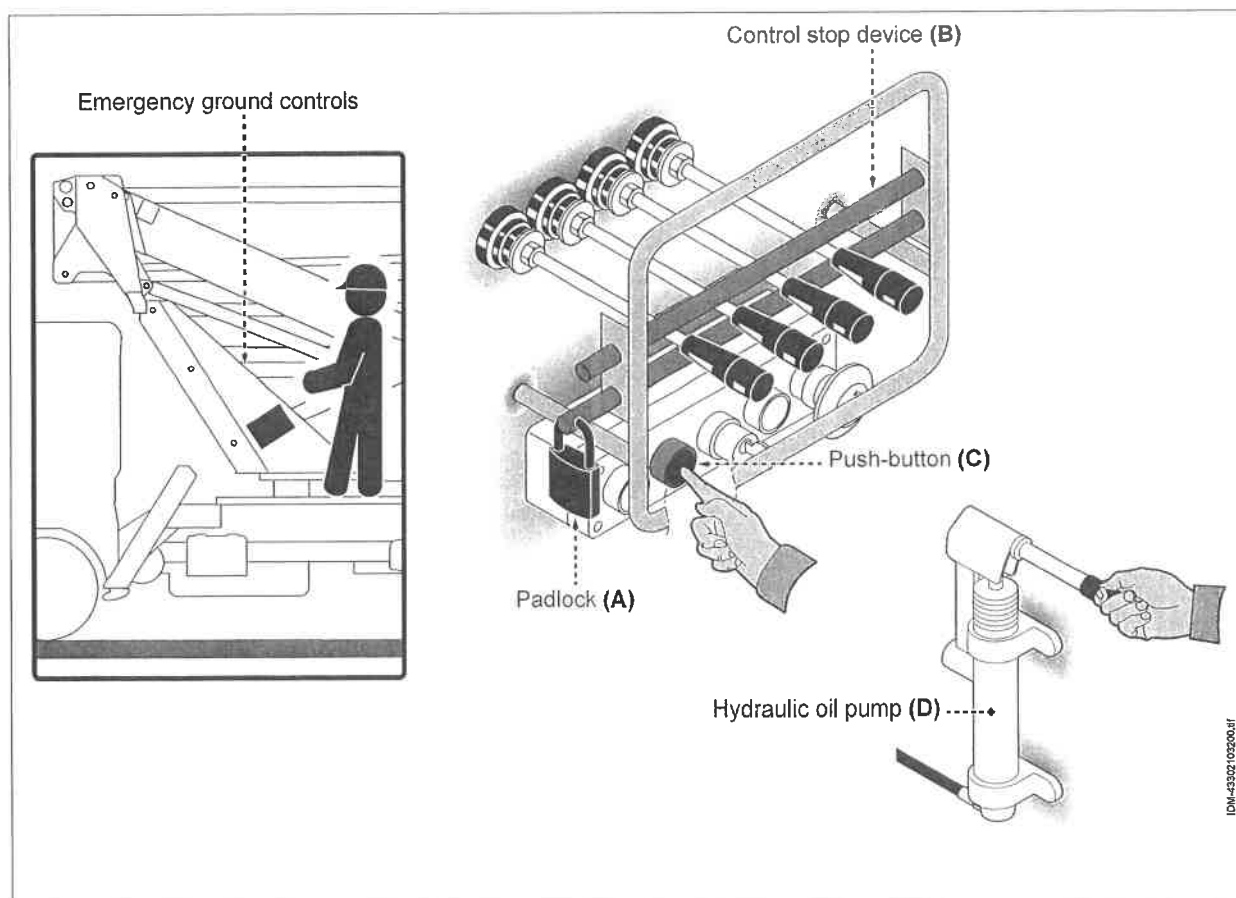
Rescue procedures may need to be carried out under the following circumstances.

- Power supply failure (pump, engine, combined power source etc.) (see page 47).
- A safety device has tripped (or there has been a circuit failure) (see page 8).
- Main feed line pipe burst (see page 48).
- Bursting of a compensating hydraulic pipe used for levelling of the basket (see page 49).

Failure of the power supply (main pump or motor failure)

Proceed as follows:

1. Start the vehicle engine.
2. The padlock (A) and control stop device (B) are locked.



3. Operate the required control (e.g. to lower the main boom) and subsequently operate the emergency hand pump (D) or the push-button (C) to control the emergency electric pump (if available).

Caution Attention

This operation may only be carried out by an experienced maintenance engineer. If the emergency pump is operated before operating the required control, oil may come out of the damaged pipe and be released to the environment.

Important

The emergency motor pump will only run for 3 minutes. Beyond that time there is a risk of it overheating or the battery running down.

4. Fully retract the telescopic boom and if necessary, lower the articulated boom and main boom so that the operators in the basket can leave it safely.
5. Replace the damaged hose/pipe so that work can be recommenced safely.

Caution Attention

Never recommence work unless you are absolutely certain that safety conditions have been fully restored.

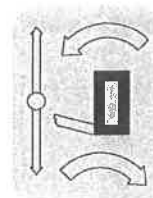
Bursting of a compensating hydraulic pipe used for levelling of the basket

In most such cases, the basket operator can carry out the basket lowering to the ground procedure.

- Operate the basket levelling lever installed on board (after first releasing the lock device) to manually maintain the basket horizontal alignment (see the booklet 5).

Danger Warning

This procedure is exclusively authorised to lower the basket to the ground in an emergency and must be followed by normal operation resetting. Any other use is not recommended.



Caution Attention

Never recommence work unless you are absolutely certain that safety conditions have been fully restored.

1. Start the vehicle engine.
2. In the event of vehicle engine breakdown, press the buttons (in the emergency ground controls and in-basket controls) to control the emergency electric pump (where available) or alternatively, use the emergency hand pump (A)

Important

The emergency electric pump should perform a single AP ground recovery cycle. It is equipped with safety devices to prevent overheating, therefore, several stops may be necessary during one AP ground recovery cycle.

3. Fully retract the telescopic boom and lower the articulated arm and main boom so that the operators in the basket can leave the basket safely.
4. Find and eliminate the cause of the problem so that work can be recommenced safely.

Caution Attention

Never recommence work unless you are absolutely certain that safety conditions have been fully restored.

Bursting of a compensating hydraulic pipe used for levelling of the basket

In most such cases, the basket operator can carry out the basket lowering to the ground procedure.

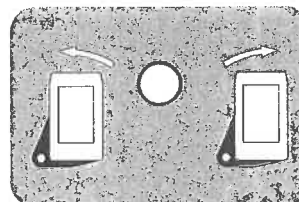
- Operate the basket levelling key selector switch installed on board to manually maintain the horizontal alignment of the basket (see booklet 5).

Danger Warning

This procedure is exclusively authorised to lower the basket to the ground in an emergency and must be followed by normal operation resetting. Any other use is not recommended.

Caution Attention

Never recommence work unless you are absolutely certain that safety conditions have been fully restored.



Important

This action performed on the safety solenoid valve (see page 17) will break the safety seals located on the solenoid valve or the group protective guard.

3. An experienced maintenance worker must obtain access to the solenoid valve unit (C) on the tower (on the vehicle roof in the event of covered body machines), adopting all the necessary precautions to prevent the risk of falls (see page 54) and, after removing the guard, manually operate the solenoid valves first to fully retract the telescopic boom (if possible) and then lower the basket to the ground so that the operators in the basket can safely leave the basket.

The safest manoeuvre to prevent any tilting risk is to fold in the retractable elements of the telescopic boom.

Important

To know which movements are controlled by the solenoid valves check the hydraulic diagram.

4. Correct the cause of the failure before resuming work in safe conditions (restored by experienced and authorised technicians)

Danger Warning

The described operation can only be performed by skilled maintenance engineers.

Any tampering with the solenoid valves (including the main safety valves (Y1-Y1G)) (for example, manual operation) will override the safety devices. For this reason, these operations should always be carried out using extreme caution and only for the purpose of bringing basket operators safely back to ground level.

Important

Before resuming work all the safety seals must be restored.

Caution Attention

Never recommence work unless you are absolutely certain that safety conditions have been fully restored.

To manually operate the solenoid valves proceed as recommended.

1. Turn the control (D) in the direction indicated by the arrow "+" (printed on the handle) all the way to the limit stop.
2. Press the individual solenoid valve buttons (use a suitable tool if necessary) to control boom movements one by one.

If the emergency electric pump only is available

No power input makes it impossible to use the emergency electric pump. Emergency manoeuvres should only be performed with the help of police/fire squads and experienced maintenance engineers.

MAINTENANCE SCHEDULE



Important

Maintain the machine in excellent efficiency conditions and carry out maintenance operations according to the manufacturer's schedule. Regular maintenance will help you obtain the best performances, prolonged working life and constant compliance with the applicable safety requirements.

Table 5: Recommended maintenance schedule

Frequency	Component	Type of action	Tasks	Page
Every day	Main units and structure	General check and efficiency check	Check all the fixings, signs of wear, oxidation, abrasion, general condition and safety conditions	
	Hydraulic connections	Check for oil leaks	Tighten connections	
	Attachment components	Check they are in good condition		
	Hydraulic system pipes	Oil leaks and wear check	Visual inspection If breaks are detected, replace the part.	
	Indicator/warning lights	Check efficiency	Check the warning lights	
	Emergency stop button	Check efficiency		64
	Battery	Check the fluid level	Check the fluid level inside the battery and top up if necessary (Check the vehicle user's manual).	
	Emergency electric pump	Check efficiency	Operate for a few seconds	62
	Hydraulic system	Pressure check	Check that the pressure reading on the pressure gauge is consistent with the recommended values (see the "log book").	
	Oil reservoir	Check oil level	Check the oil level via the special indicator and top up if necessary.	72
	Emergency circuit bypass key selector switch, emergency ground controls and main safety solenoid valve	Check efficiency	Check that the emergency ground controls are efficient and safely locked with a key and that the main safety solenoid valve and key selector switch are locked and sealed	12 65
	Working range limiting device	Check efficiency	Check parts efficiency and carry out a few tests to check the device efficiency.	62
	Moment limiter	Check efficiency	Check parts efficiency and carry out a few tests to check the device efficiency.	63

Table 5: Recommended maintenance schedule

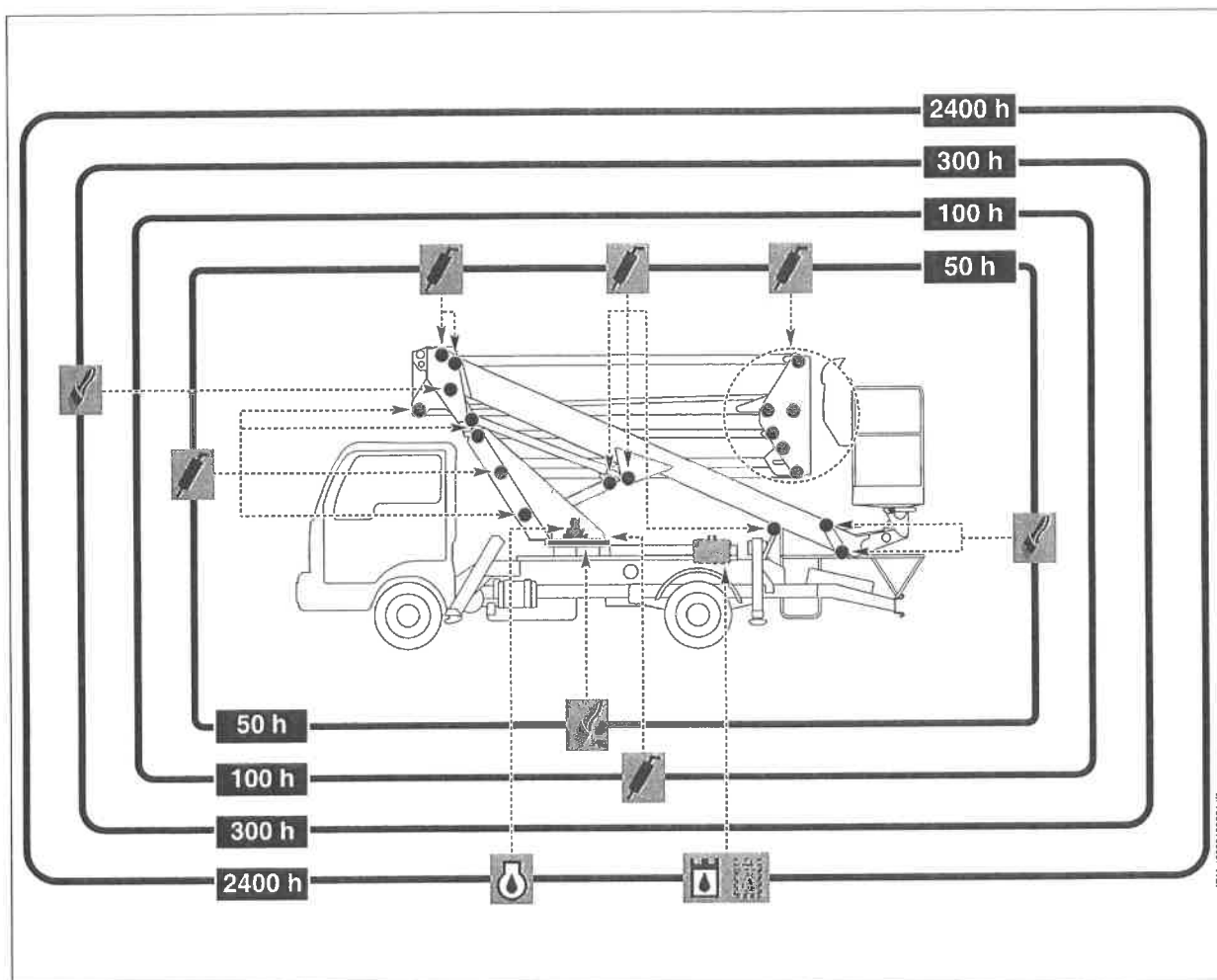
Frequency	Component	Type of action	Tasks	Page
Every 300 hours or 6 months of operation	Fuses	Check efficiency	Replace if necessary	
	Working range limiting device	General efficiency check and inspection	Contact an authorised workshop	
	Controls	Check efficiency	Contact an authorised workshop	
	Reducer	Check oil level	Top up if necessary	73
	Sliding shoes	Check clearance (0,1mm)	Adjust clearance	61
	Rubber, plastic or metal components	Check for wear	If wear signs are detected, replace the part	
	Fixing parts (nuts and bolts)	Efficiency and tightening check	Contact an authorised workshop	
	Oil-hydraulic actuators (cylinders, gearmotors etc.)	Check speed	Contact an authorised workshop	
Every 1200 hours or 12 months of operation	Electrical components (cables, junction boxes etc.)	Check efficiency	In case of failure, replace the part	
	Power take-off/ hydraulic pump unit	Check for proper engagement and efficiency	Contact an authorised workshop	
	Pinion-turntable	Adjustment	Contact an authorised workshop	
	Hydraulic cylinders	Check for oil leaks and rod wear	Contact an authorised workshop	
	Main units and structure	General check and efficiency check	Check all the fixings, signs of wear, oxidation, abrasion, general condition and safety conditions Contact an authorised workshop	
	Moment limiter	General efficiency check and inspection	Contact an authorised workshop	
Every 2400 hours or 24 months of operation	Oil reservoir	Oil replacement		72
	Reducer	Change oil (when non permanent)		73
Every 40000 work cycles 10 years of operation	The entire machine	Complete overhaul and structure analysis	Contact an authorised workshop	


Important

To ensure a machine working life of over ten years, extraordinary checks must be conducted on structural integrity, number of completed cycles and residual life

DIAGRAM OF LUBRICATION POINTS

Lubricate indicated parts as per schedules and instructions.



Key



Hydraulic system
oil
Hot weather



Hydraulic system
oil
Temperate clima-



Reduction gear
lubrication oil



Inject grease



Spread with grea-
se

Table8: Tightening torques for large lead nuts and bolts with surface treatment

Screw/bolt size	Pitch	Load-resisting cross-section	Tightening torque (Nm)					
			4.8	5.8	6.8	8.8	10.9	12.9
M42	4,50	1120	1601,25	2001,57	2401,88	3202,51	4503,53	5404,23
M45	4,50	1310	2005,51	2506,89	3008,26	4011,02	5640,50	6768,60
M48	5,00	1470	2405,51	3008,14	3609,77	4813,03	6768,32	8121,98
M52	5,00	1760	3099,96	3874,95	4649,93	6199,91	8718,63	10462,36
M56	5,50	2030	3838,14	4797,68	5757,21	7676,29	10794,78	12953,73
M60	5,50	2360	4754,64	5946,30	7131,96	9509,28	13372,43	16046,91
M64	6,00	2680	5746,17	7182,71	8619,25	11492,34	16161,10	19393,32
M68	6,00	3060	6939,64	8674,55	10409,46	13879,28	19517,74	23421,29

Note: Friction coefficient 0,10

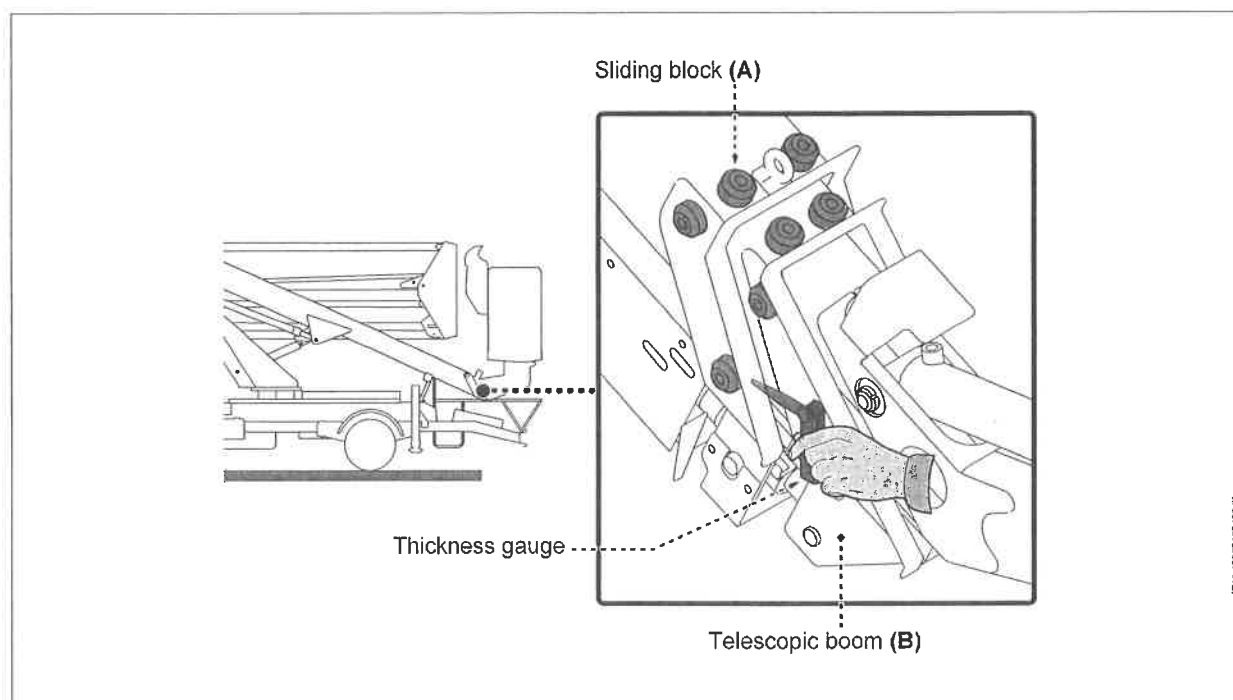


Important

These values have been obtained experimentally: for actual applications it is advisable to check them by field tests.

SLIDING BLOCK CHECK

Check the clearance between the sliding blocks (A) and the telescopic booms (B) by using a thickness gauge (the clearance should be up to 0,1 ± 0,2 mm).



Caution Attention

Keep the sliding blocks correctly adjusted and lubricated to ensure smooth sliding and not to damage the matching surfaces.

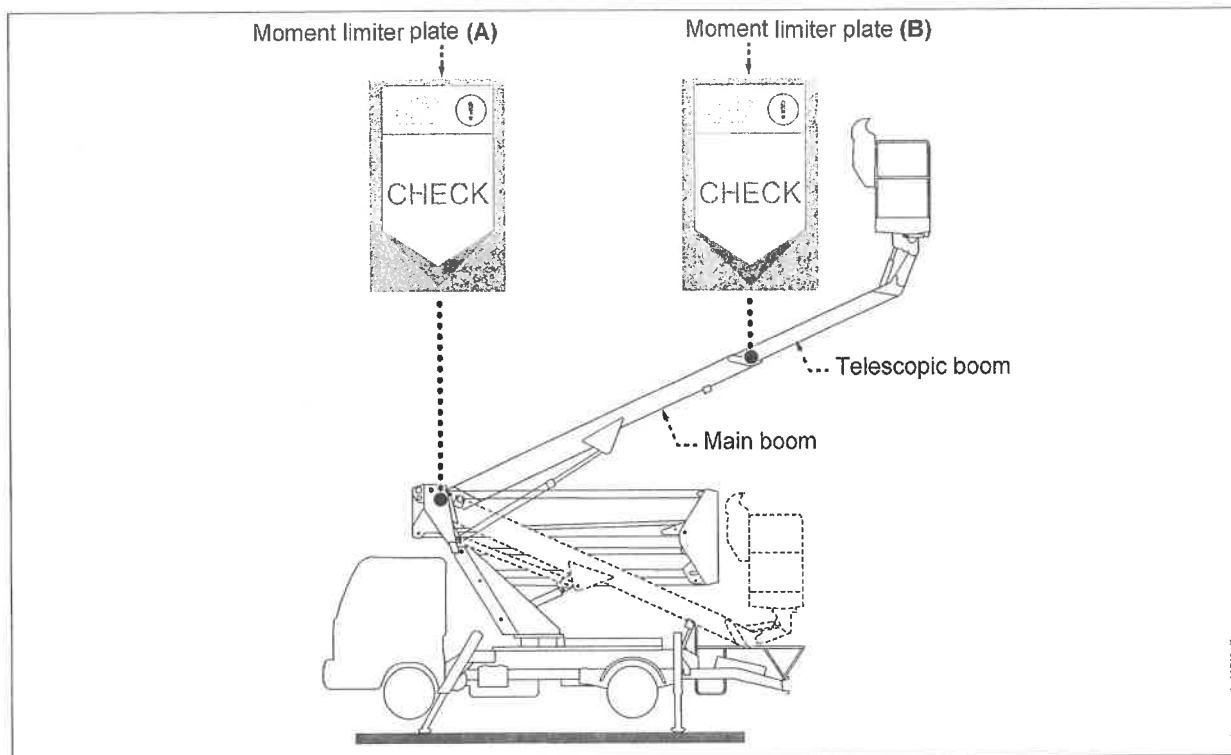
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CHECKING THE MOMENT LIMITER OPERATION

Danger Warning

Carry out this operation by using the emergency ground controls, with the machine stabilised and without any operators in the basket.



Proceed as follows:

Invalid information for the model B240 PX - E240 PX.

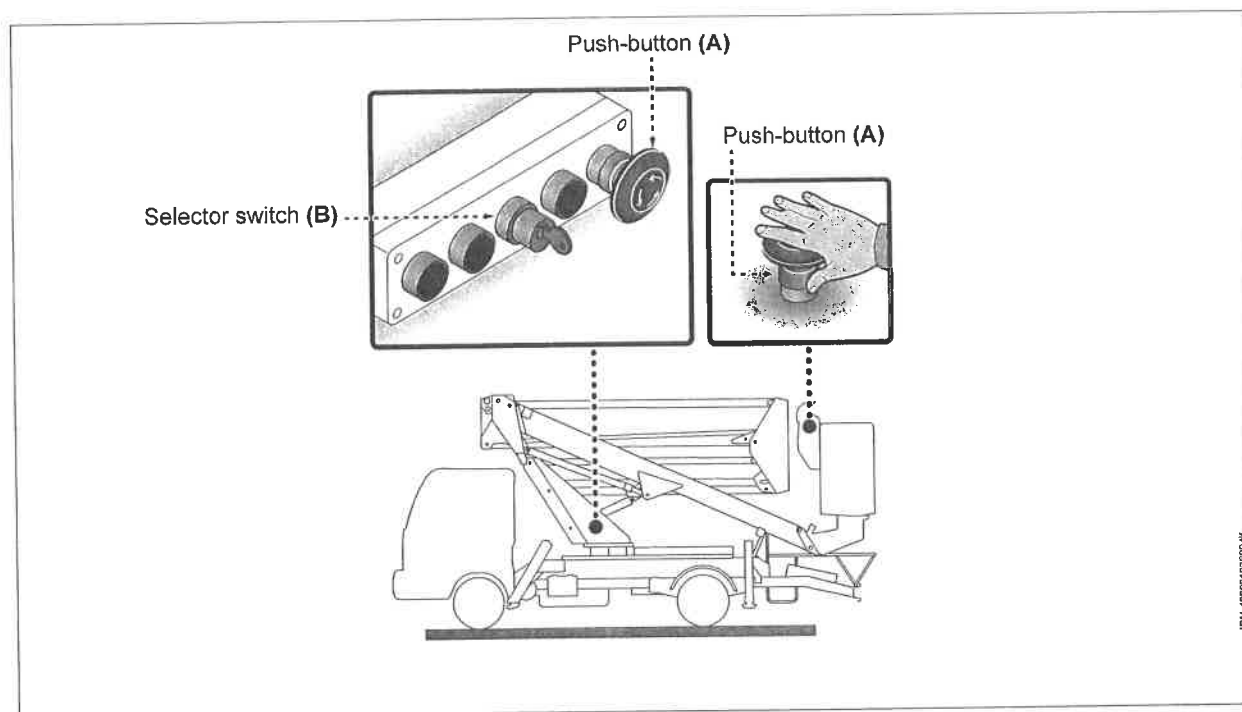
1. Keep the boom along the vehicle without rotating the turret.
2. Load the basket with an overall weight corresponding to the maximum allowed capacity as indicated on the plate.
3. Lift the boom (without rotating it) to the prescribed angle to check the (yellow coloured) "check" plate (A) position reference.
4. Extend the main boom to the limit point fixed by the reach limiting device and made visible by the (yellow coloured) "check" plate (B) on the telescopic boom.
5. Check that the "check" (A-B) plates and the corresponding reference marks coincide.

Danger Warning

If there is no matching contact an authorised workshop.

6. Check the descent release device; retract the extensible elements of the telescopic boom by approximately 0.5-1 metre to allow lowering of the main boom. Repeat this operation several times until the operating angle of the descent release device is reached, allowing the main boom to be lowered to the ground without having to fold in the extensible elements of the telescopic boom.

CHECKING THE KEY-OPERATED SAFETY CIRCUIT DISABLE SWITCH ON THE EMERGENCY CONSOLE



Proceed as follows:

1. Press the emergency buttons (A) of the basket controls (see the booklet 5) and of the emergency ground controls (see page 29).
2. Rotate and hold the selector switch (B) in position and move the platform.

Danger **Warning**

If the platform fails to respond to controls contact an authorised workshop.

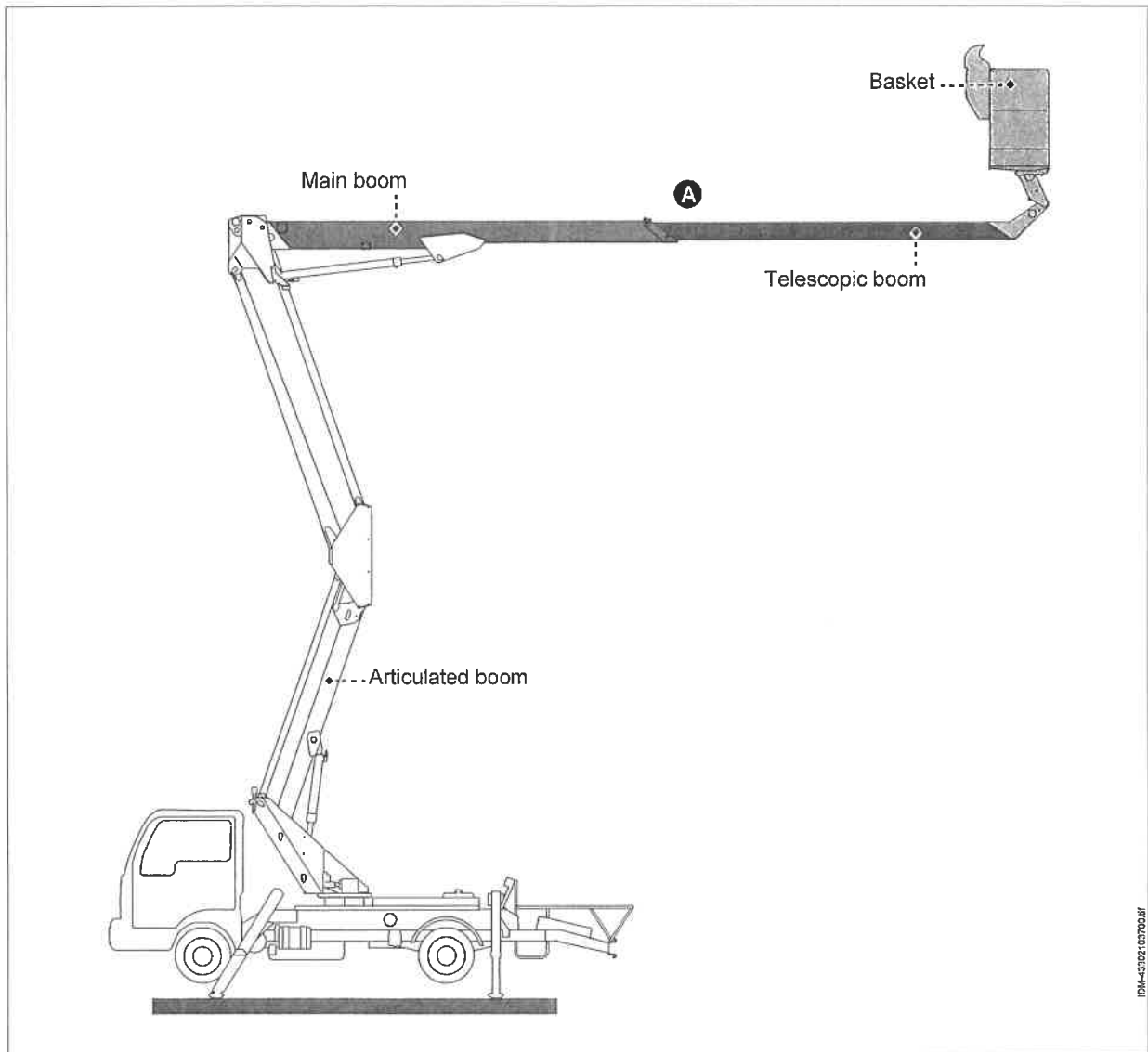
SAFETY SENSOR AND MICROSWITCH CHECK

Carry out the following checks.

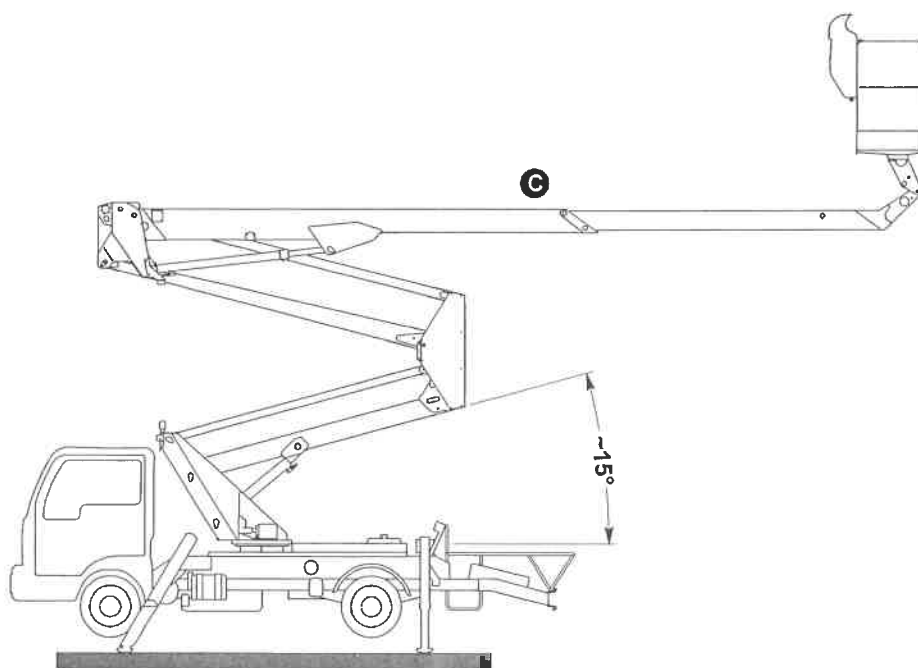
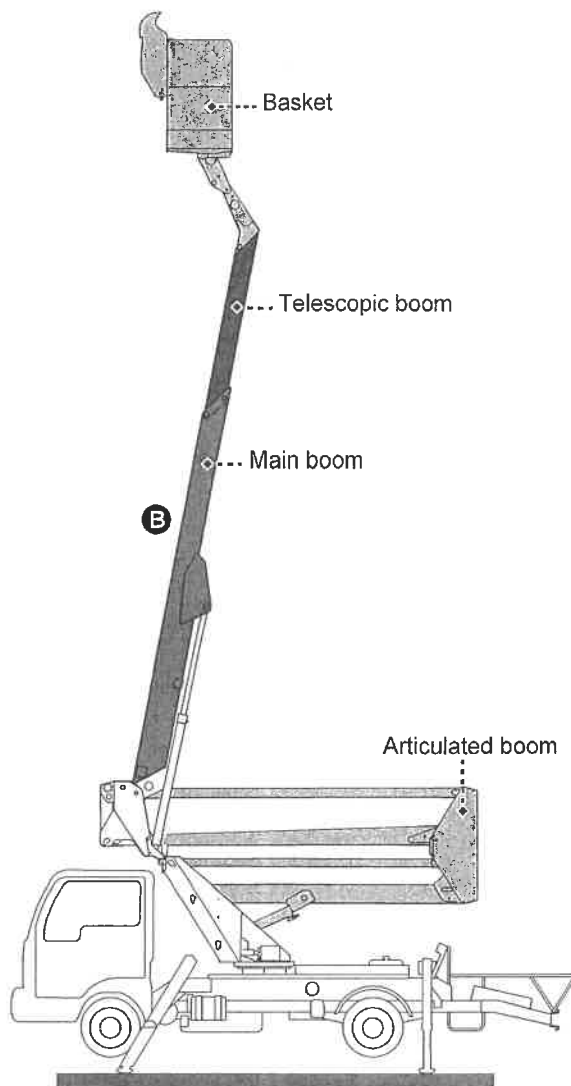
- Check the efficiency of the microswitches and safety sensors
- Check there is no humidity or water inside contacts
- Check for firm fixing of the microswitches and safety sensors
- Check that wiring is in good condition
- Check the operation of the microswitches and safety sensors

Important

In case of fault, repair or replace
If necessary, contact the manufacturer's After-sales Service.



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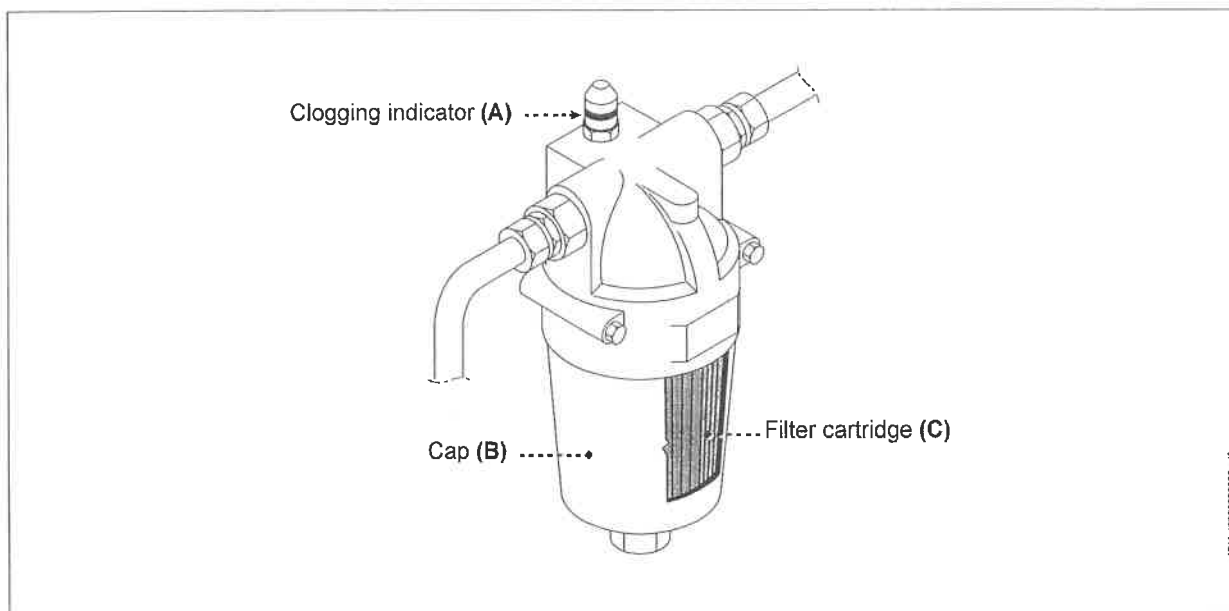


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OIL FILTER CARTRIDGE REPLACEMENT

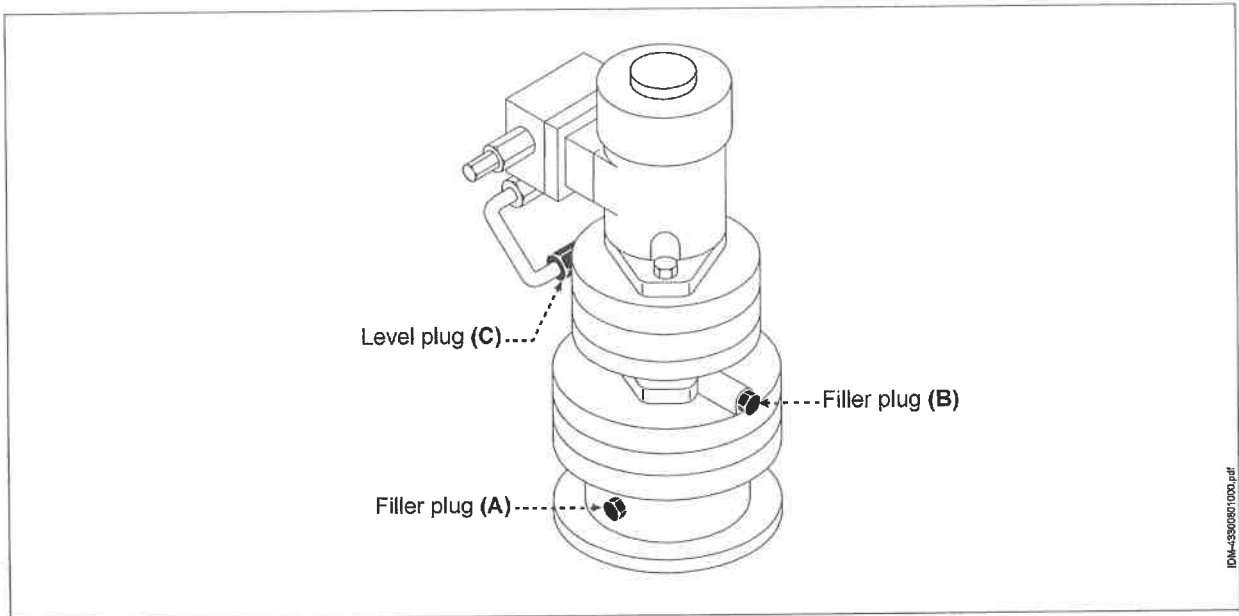
When the filter is clogged replace the filtration cartridge as follows.



1. Check the clogging indicator **(A)** provided on the filter body.
 - white (or green) = ok
 - red = replace the filter cartridge
2. Release system pressure.
3. Make sure a suitable vessel is available to collect oil spillage.
4. Unscrew the lower cover **(B)** of the filter and remove the filtration cartridge **(C)**.
5. Clean the filter support seal surface.
6. Take a new cartridge of the same type: lubricate its seal and the one on the lower cover with a drop of oil.
7. Insert the cartridge **(C)** all the way, screw on the lower filter cover **(B)** and tighten.

REDUCTION GEAR OIL CHANGE

Proceed as follows:



1. Place a suitable vessel under the drain plug (A) of the reduction gear.
2. Remove the filler cap (B), the level cap (C) and the drain plug (A).
3. Clear the caps/plug of all foreign matters.
4. Screw down the drain plug (A) after replacing the relevant seal.
5. Let in the new manufacturer-recommended oil up to the level indicated by the oil leak from the hole of the cap (C).
6. Screw down the level cap (C) and the filler cap (B) after replacing the relevant seals.

i Important

Use oil types having equivalent characteristics to those recommended in the "Lubricant table" (see page 58).

Table 9: Machine operating faults

Problem	Causes	Remedies
When a safety device is operated (moment limiting device, load sensor in basket, etc.) the corresponding indicator lights will not come on	Blown bulbs or LEDs	Replace the bulbs or diodes (LEDs)
After turning on the vehicle engine and engaging the power take-off, the stabilisers cannot be controlled (with the AP at rest)	Burnt fuse	Replace the fuse (located next to the vehicle fuse board) If the problem persists, contact the After-sales Service
Burnt fuse	Short circuit in the machine electric circuit	Identify the electric component that has caused the short circuit and restore normal operating conditions If the problem persists, contact the After-sales Service

Transducer errors

N°	Code	Failure	Causes	Remedies
1	E20	Pressure chamber sensor channel 1 on B4: sensor signal too low	- Short circuit to power negative (too low signal)	- Check wiring - Replace transducer
2	E21	Pressure chamber sensor channel 1 on B4: sensor signal too high	- Short circuit to power positive (too high signal)	
3	E22	Pressure chamber sensor channel 2 on C4: sensor signal too low	- Damaged, broken or malfunctioning transducer	
4	E23	Pressure chamber sensor channel 2 on C4: sensor signal too high		
5	-	Not used		
6	-	Not used		
7	-	Not used		
8	-	Not used		
9	E58	The board has been programmed but initial parameter configuration has not been carried out. The microprocessor is damaged.		

CAN Bus Errors

N°	Code	Failure	Causes	Remedies
10	E79	CAN communication timeout with TAC MkII, channel 1	Communication was active and then stopped.	Check CAN bus connection to the sensor indicated by the error code
11		CAN communication timeout with TAC MkII, channel 2		
12		CAN communication timeout with SP MkII, channel 1		
13		CAN communication timeout with SP MkII, channel 2		
14		CAN communication timeout with PDO 181h		
15	-	Not used		
16	-	Not used		
17	-	Not used		

Category Errors

N°	Code	Fault	Causes	Remedies
32		TAC MkII difference error: excessive difference between channel 1 reading and channel 2 reading.		
33	E60	SP MkII X axis difference error: excessive difference between channel 1 reading and channel 2 reading.		<ul style="list-style-type: none"> - Check CAN bus connection with sensor. - Check transducer. - Contact BPE Electronics.
34		SP MkII Y axis difference error: excessive difference between channel 1 reading and channel 2 reading.		
35	E63	Pressure difference error: excessive difference between channel 1 reading and channel 2 reading. From auxiliary micro.		<ul style="list-style-type: none"> - Check the wiring. - Check transducer(s). - Contact BPE Electronics.

Memory Errors

N°	Code	Fault	Causes	Remedies
36	E70	Internal error: RAM memory error.		
37	E71	Internal error: parameter memory error.		
38	E73	Internal error: firmware/software memory error.		Contact BPE Electronics.
39	E74	Internal error: tables memory error.		
40	E78	Internal error: ALU error.		

Consistency error

N°	Code	Fault	Causes	Remedies
41	EA0	In the Lock limit exceeded mode, risk-increase manoeuvres have been active for a longer time than allowed.		<ul style="list-style-type: none"> - Check the wiring. - Contact BPE Electronics.
42	-	Not used		
43	-	Not used		
44	-	Not used		
45	-	Not used		
46	-	Not used		
47	-	Not used		
48	-	Not used		
49	-	Not used		



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SLANTING STABILISER DESCRIPTION	3b
"TYPE 2" ARTICULATED STABILISER DESCRIPTION	3c
"TYPE 1" ARTICULATED STABILISER DESCRIPTION	3d
EXTENSIBLE STABILISER DESCRIPTION	3e
BASKET DESCRIPTION	4
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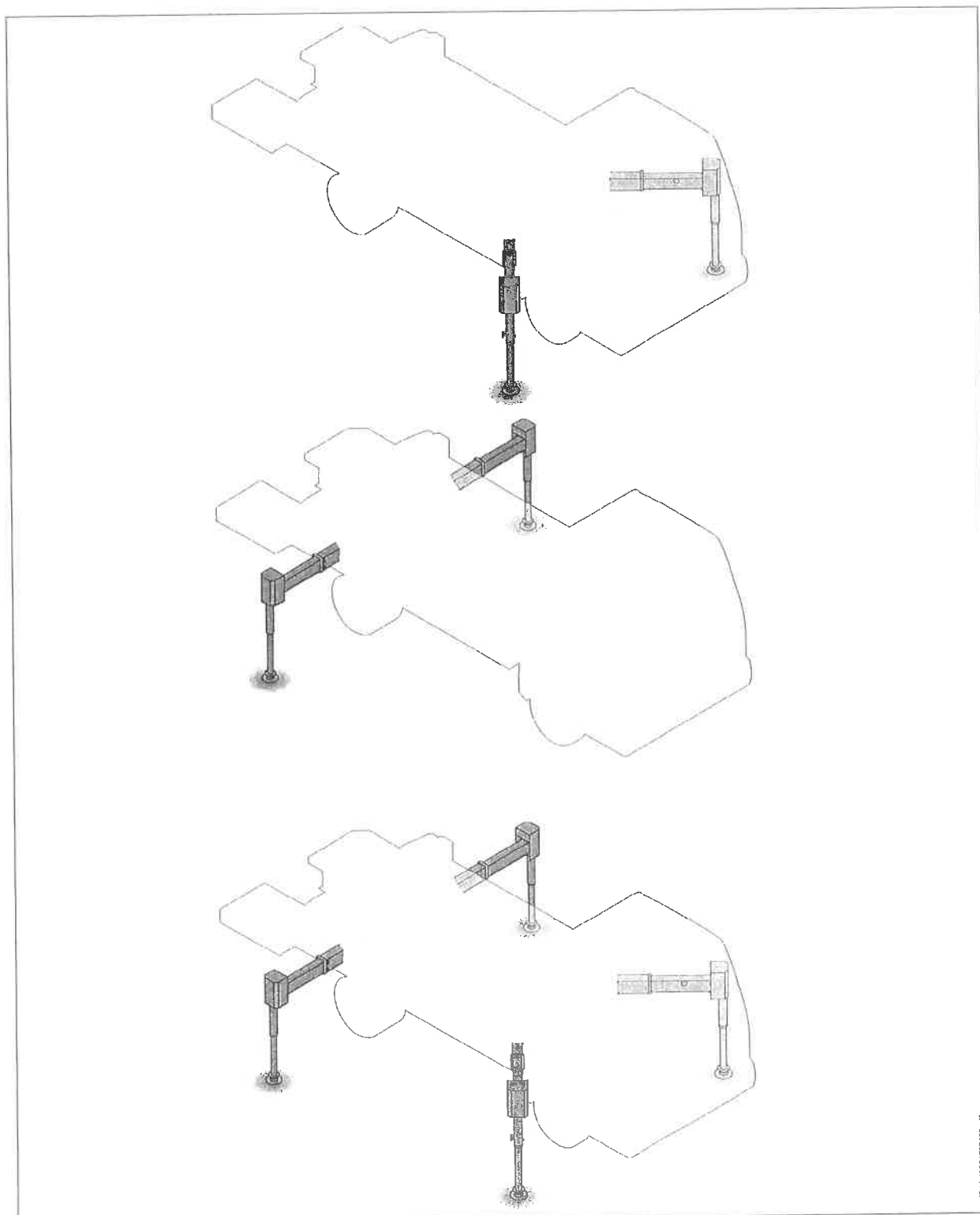
T

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GENERAL DESCRIPTION OF THE STABILISERS

According to the vehicle/AP platform configuration, in the design and construction phase the subframe is completed by adding stabilisers. To ensure safe machine stabilisation, ground contact and vertical and/or lateral extension detecting devices are also provided.

The booklet contains information regarding extensible stabilisers



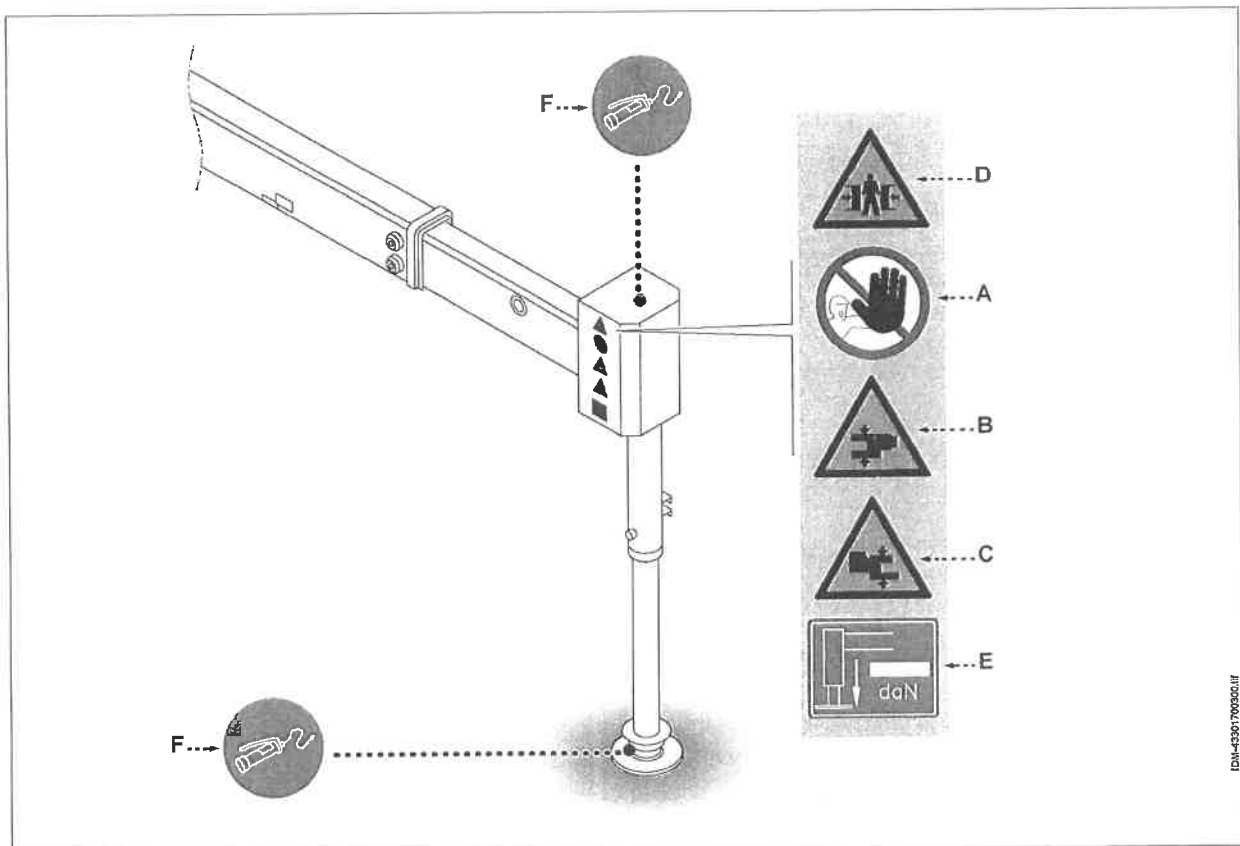


Caution Attention

The stabilisation phase is essentially important to ensure all the required safety conditions during AP use. Despite the presence of the described devices, it is necessary for the operator to always physically check all the existing conditions (wheels raised off ground, ground gradient, presence of drain covers or other obstacles, wind strength etc.) to ensure that the machine is well stabilised.

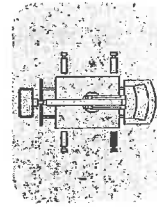
SAFETY AND INFORMATION SIGN POSITION.

This picture shows the position of the safety and information signs located on the stabilisers. A description is provided for each sign.

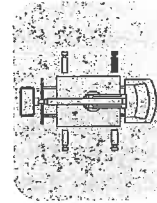


- A) No access; access forbidden to unauthorised persons.
- B) Risk of serious injury to upper limbs: keep away from moving and protruding parts.
- C) Risk of serious injury to lower limbs; keep away from stabiliser feet and mobile structural parts.
- D) Risk of serious bodily injury: keep away from stabiliser feet and mobile structural parts.
- E) Max load on stabiliser.
- F) Machine greasing points

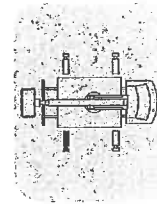
B) Lever: used to actuate the right-hand front stabiliser.



C) Lever: used to actuate the left-hand front stabiliser.



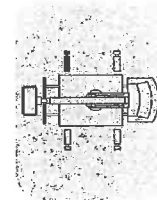
D) Lever: used to actuate the right-hand rear stabiliser.



E) Lever: used to actuate the left-hand rear stabiliser.

Important

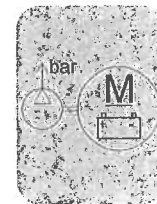
The stabilisers' control lever operation is only enabled if the lever (A) has been actuated and the main boom correctly set to its rest position.



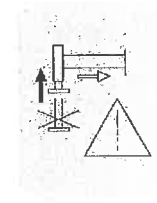
F) Pressure gauge: it detects the hydraulic oil system working pressure.

G) Level: used to check AP levelling during the stabilisation phase.

H) Button (where available): used to start the electric pump for rescue operations in an emergency.

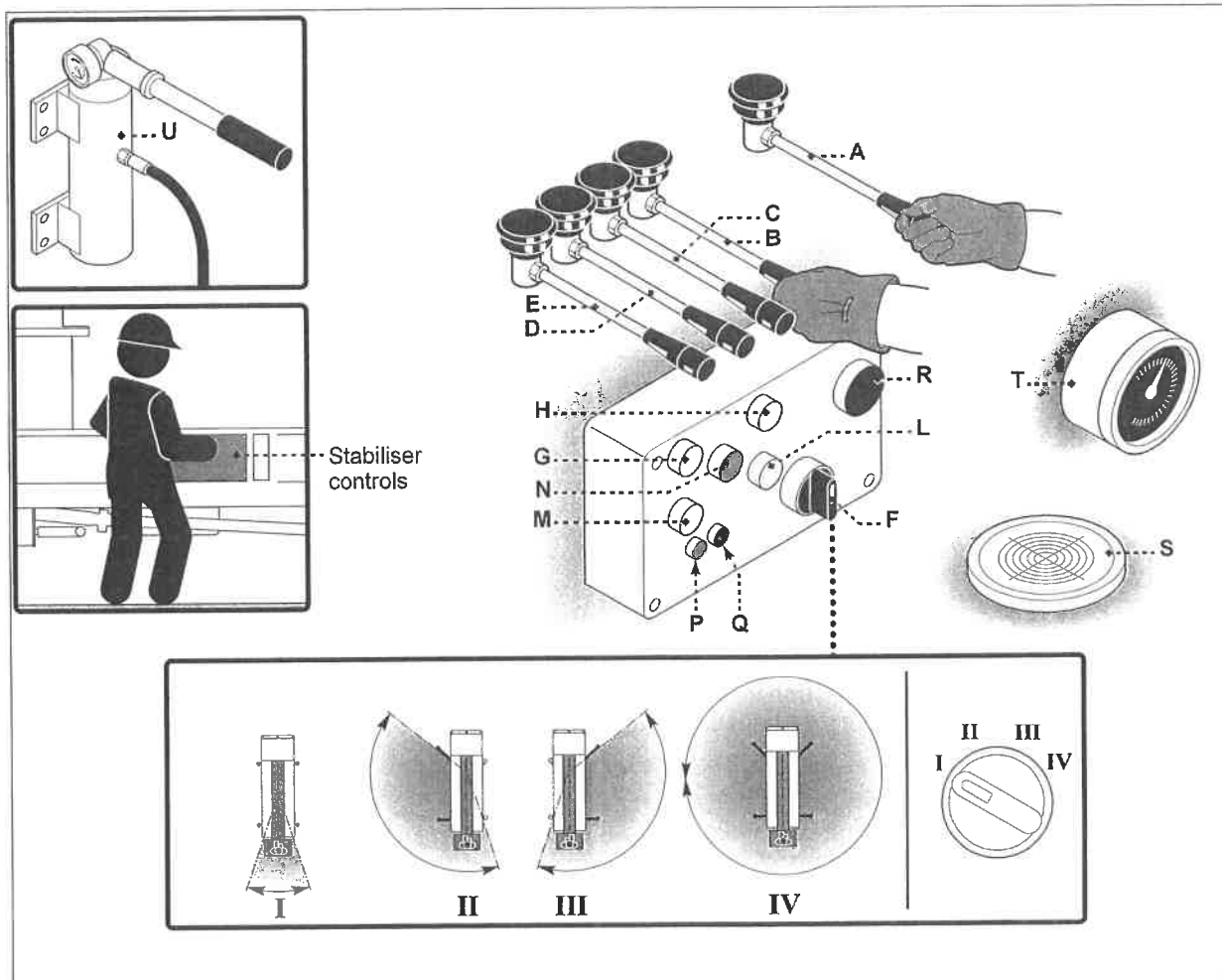


L) (Red) indicator light: when lit, it signals that the stabilisers and/or booms have not been fully retracted to their rest and transport positions.



DESCRIPTION OF STABILISER CONTROLS WITH VARIABLE STABILISATION

This picture shows (in a general manner) the control station from which stabilisation can be controlled.



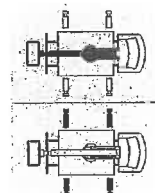
The control station is suitably protected to prevent any unwanted actuation.

A symbol is provided next to each device showing each control function.

The information on the symbol is consistent with the control action.

This list contains a description, function and symbol corresponding to each control installed on the AP.

A) Lever: it is used to enable operation of the stabilisers' control levers. When it is released, the other stabiliser control levers are disabled.

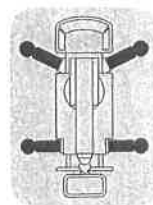


- "IV": Stabiliser cross members extension on both sides

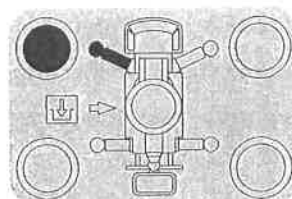


Important

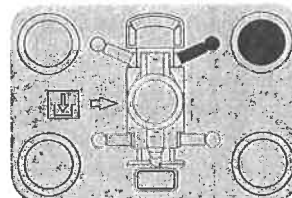
With the selector in this position, it is possible to fold in the stabilisers independently of the previously selected stabilisation mode



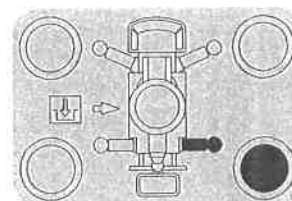
- G) **White warning light (where available):** when lit, it indicates that the left-hand front stabiliser cross member has been fully extended.



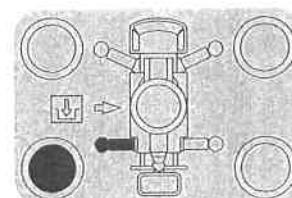
- H) **White warning light (where available):** when lit, it indicates that the right-hand front stabiliser cross member has been fully extended.



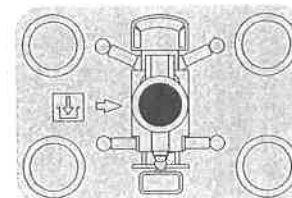
- L) **White warning light (where available):** when lit, it indicates that the right-hand rear stabiliser cross member has been fully extended.



- M) **White warning light (where available):** when lit, it indicates that the left-hand rear stabiliser cross member has been fully extended.



- N) **(Blue) indicator light:** when lit, it signals that all the stabilisers are correctly positioned. In this condition, the basket controls are enabled.

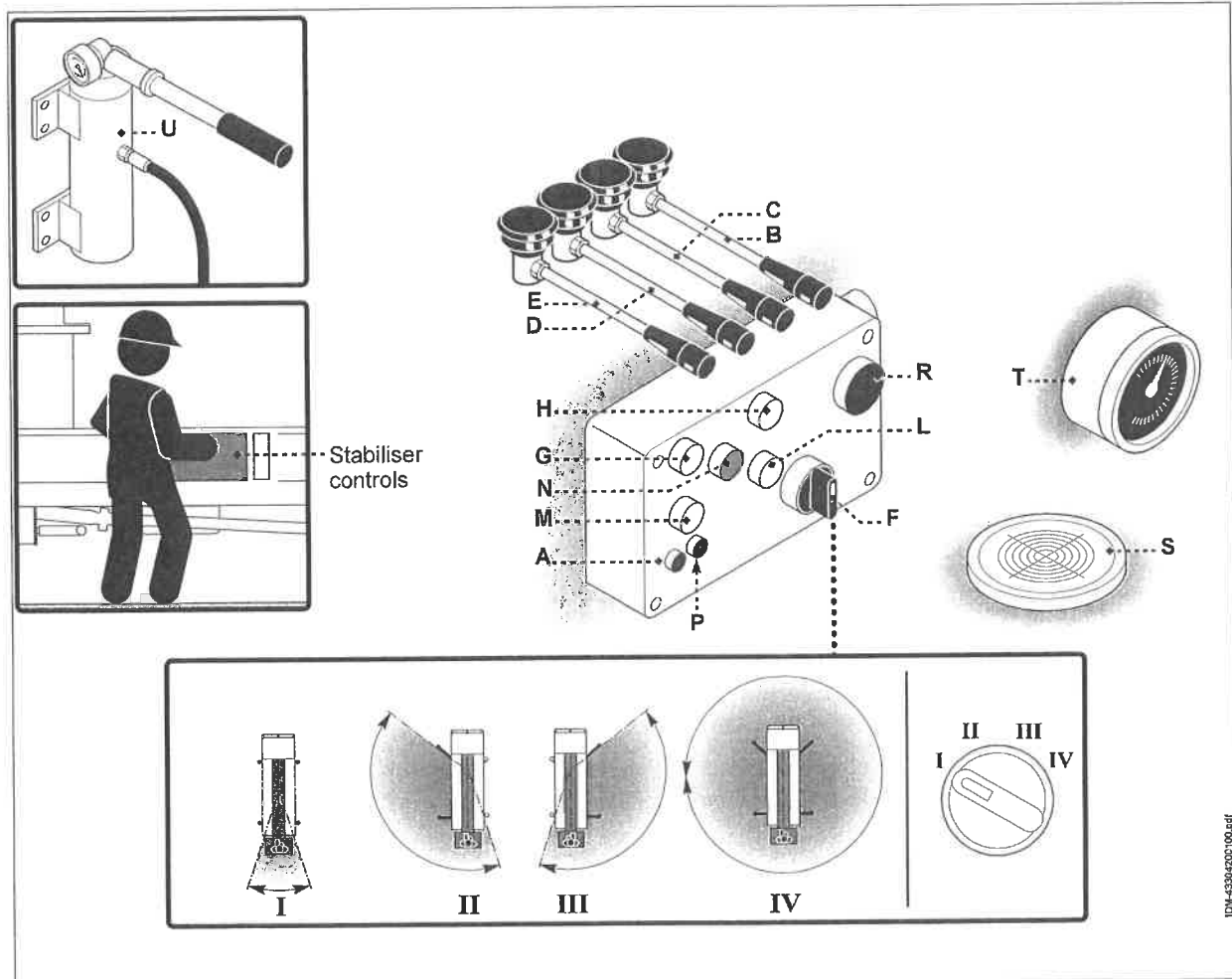


- P) **(Red) indicator light:** when lit, it signals that the stabilisers and/or booms have not been fully retracted to their rest and transport positions.



STABILISER CONTROLS DESCRIPTION WITH VARIABLE STABILISATION (OPTIONAL)

This picture shows (in a general manner) the control station from which stabilisation can be controlled.



The control station is suitably protected to prevent any unwanted actuation.

A symbol is provided next to each device showing each control function.

The information on the symbol is consistent with the control action.

This list contains a description, function and symbol corresponding to each control installed on the AP.

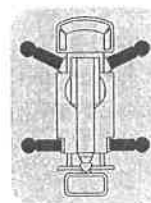
A) Push-button: it is used to enable operation of the stabilisers' control levers. When it is released, the stabiliser control levers are disabled.



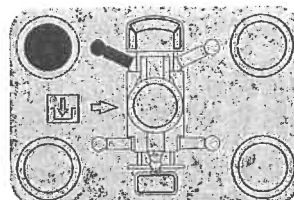
- "IV": Stabiliser cross members extension on both sides

Important

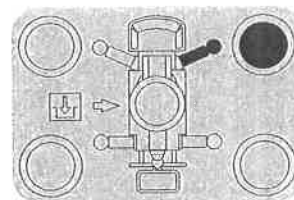
With the selector in this position, it is possible to fold in the stabilisers independently of the previously selected stabilisation mode



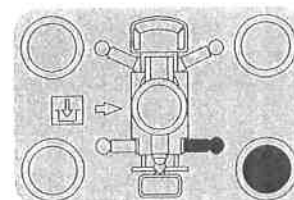
- G) **White warning light (where available):** when lit, it indicates that the left-hand front stabiliser cross member has been fully extended.



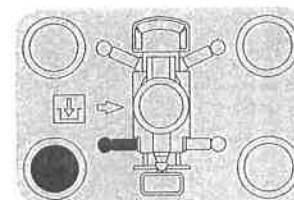
- H) **White warning light (where available):** when lit, it indicates that the right-hand front stabiliser cross member has been fully extended.



- L) **White warning light (where available):** when lit, it indicates that the right-hand rear stabiliser cross member has been fully extended.



- M) **White warning light (where available):** when lit, it indicates that the left-hand rear stabiliser cross member has been fully extended.



- N) **Blue indicator light:** when lit, it indicates that all the stabilisers are resting on the ground.

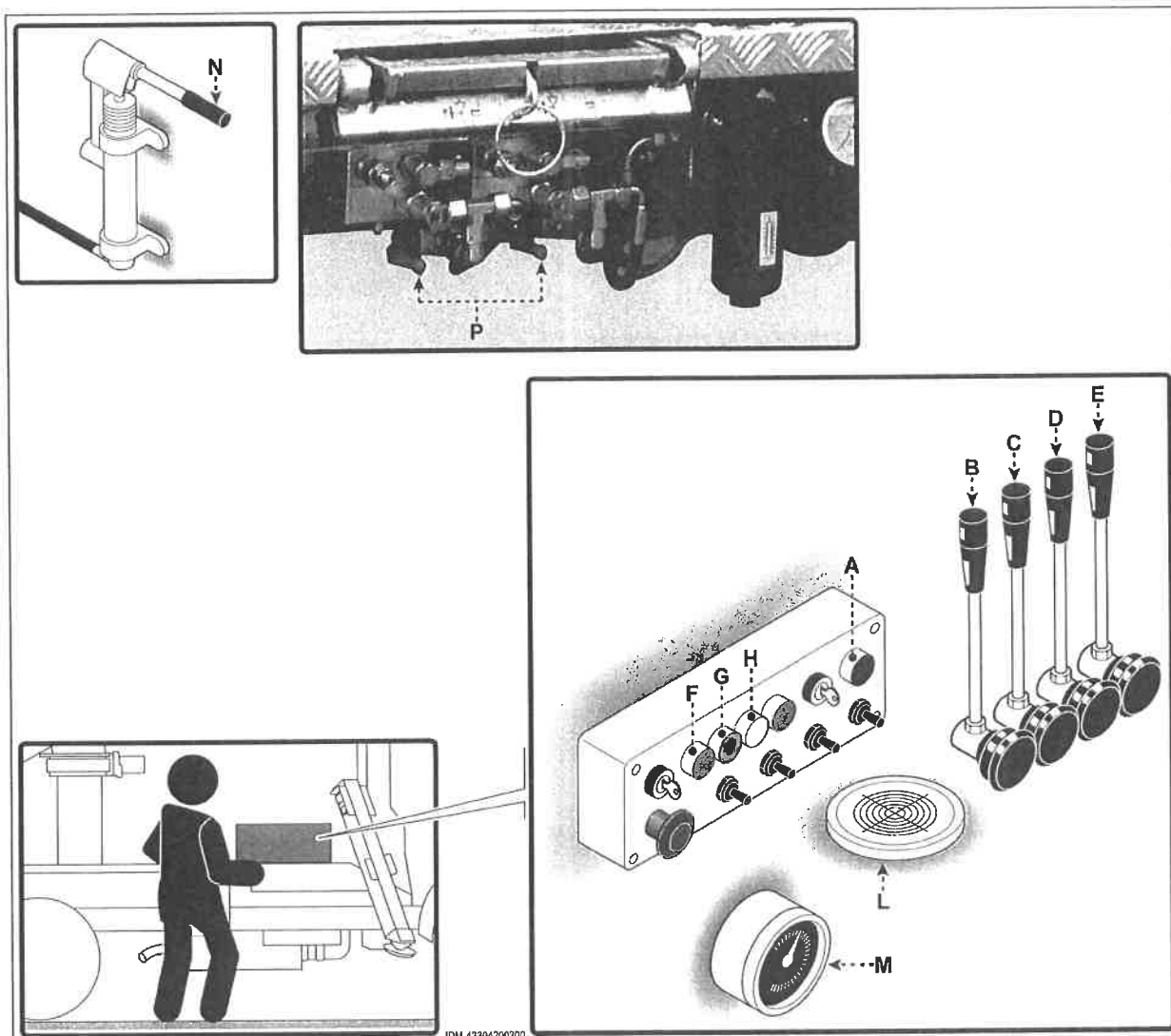


- P) **(Red) indicator light:** when lit, it signals that the stabilisers and/or booms have not been fully retracted to their rest and transport positions.



STABILISER CONTROLS DESCRIPTION (WITH MANUAL SELECTION)

- This picture shows (in a general manner) the control station from which stabilisation can be controlled.



- The control station is suitably protected to prevent any unwanted actuation.
- A symbol is provided next to each device showing each control function. The information on the symbol is consistent with the control action.
- This list contains a description, function and symbol corresponding to each control installed on the AP.

A) Push-button: it is used to enable operation of the stabilisers' control levers. When it is released, the stabiliser control levers are disabled.



N) Emergency pump (if available): used to manually operate the hydraulic oil system for rescue manoeuvres in an emergency.

P) Taps: used to select the type of stabilisation according to the work area.

- Taps closed: reduced work area.
- Taps open: normal work area.



Caution Attention

The operator, in addition to being authorised, trained and fully documented, before using the AP must simulate (from the stabilisers' control station) certain manoeuvres to identify the main functions and controls, in order to prevent accidental sudden and dangerous movements.

MAINTENANCE SCHEDULE



Important

Maintain the stabilisers in excellent efficiency conditions and carry out maintenance operations according to the manufacturer's schedule. Regular maintenance will help you obtain the best performances, prolonged working life and constant compliance with the applicable safety requirements.

Table 1: Recommended maintenance schedule

Frequency	Component	Type of action	Tasks	Page
Every day	Stabiliser lock device	Check efficiency		21
	Warning and info signs	Check they are in good condition and legible	Clean or replace the indicator.	5
	Microswitches and safety sensors	Check they are in good condition	Check the wiring diagrams supplied with the "log book"	4
Every 50 hours or 1 month of operation	Machine greasing points	Lubrication		20
Every 300 hours or 6 months of operation	Sliding shoes	Check clearance (0,1mm)	Adjust clearance	22

LUBRICANT AND HYDRAULIC OIL TABLE

Only use the oil and grease types listed in the table of booklet 2 (General AP description) or other equivalent types.

CHECKING THE STABILISER LOCK DEVICE

To identify any stabiliser lock system faults, tests must be carried out by performing a few manoeuvres. If it is possible to manoeuvre, the stabiliser lock system is not working and it is then **STRICTLY FORBIDDEN** to use the AP.

Here is a list of some of the tests that can be carried out to check the stabiliser lock device efficiency.

- From the basket, without having first stabilised the machine, control basket lifting. If it is possible to control basket lifting, immediately bring the basket back to its rest position and stop the machine.
- From the emergency ground station, without having first stabilised the machine, control basket lifting. If it is possible to control basket lifting, immediately bring the basket back to its rest position and stop the machine.
- With the AP correctly stabilised, slightly lift the basket (by approximately 5 cm) and, from the stabilisers control station, actuate the enabling control and one of the stabilisers' controls. If it is possible to do so, immediately bring the basket back to its rest position and stop the machine.



Important

Only after having contacted an authorised workshop to replace the damaged stabiliser lock device will it be possible to resume AP operation.



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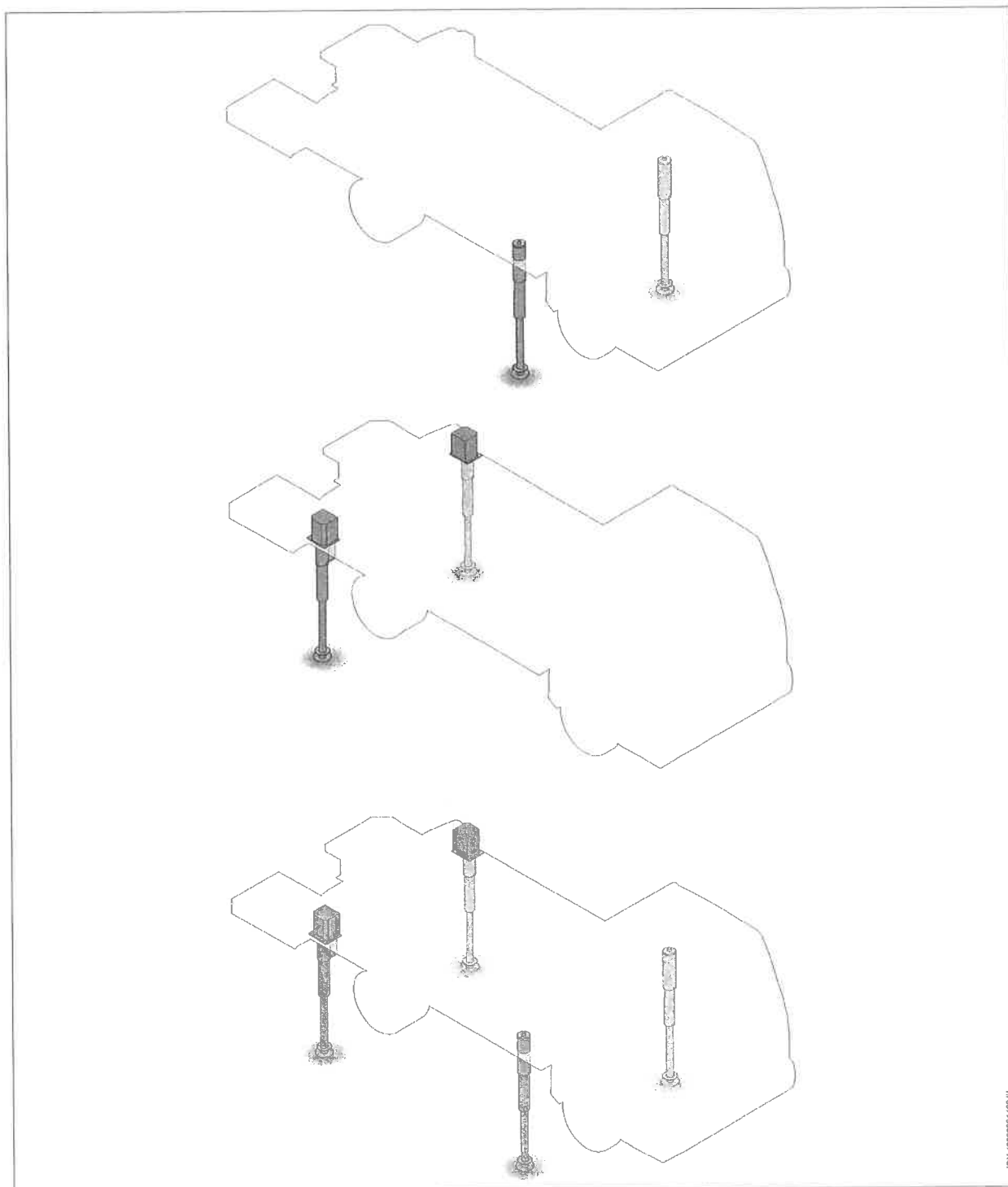
C	Safety devices 4
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GENERAL DESCRIPTION OF THE STABILISERS

According to the vehicle/AP platform configuration, in the design and construction phase the subframe is completed by adding stabilisers. To ensure safe machine stabilisation, ground contact and vertical and/or lateral extension detecting devices are also provided.

The booklet contains information regarding the vertical stabilisers.

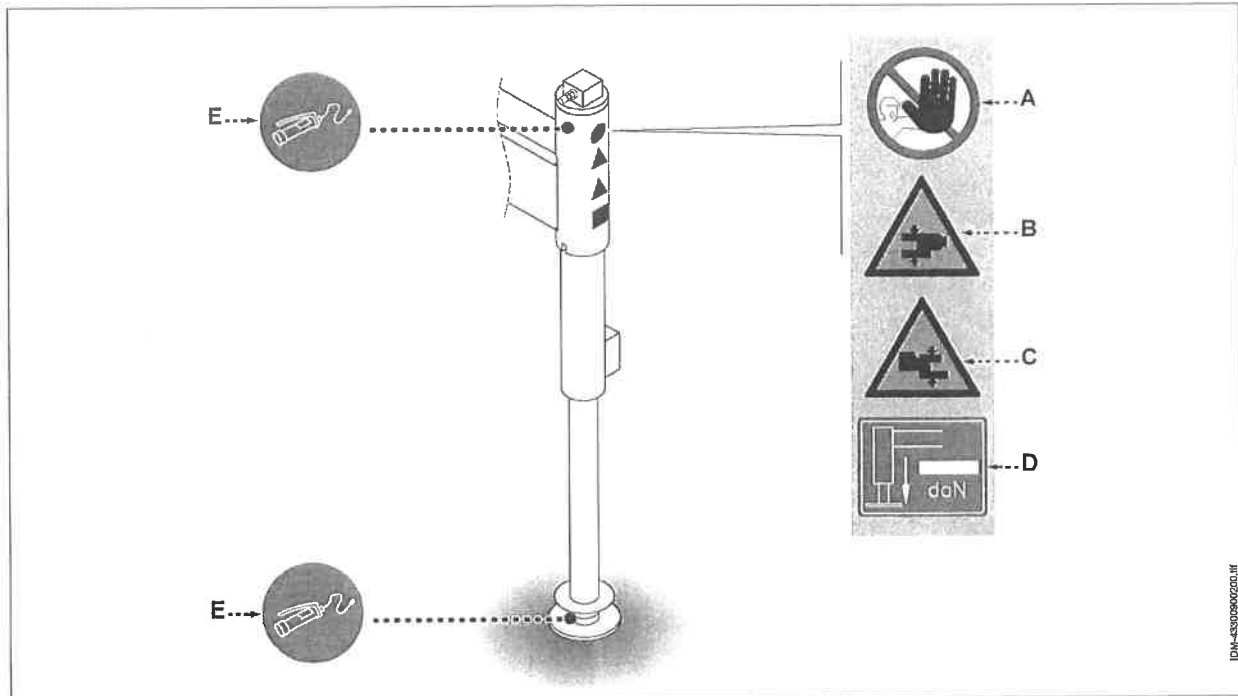


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SAFETY AND INFORMATION SIGN POSITION.

This picture shows the position of the safety and information signs located on the stabilisers. A description is provided for each sign.



A) No access; access forbidden to unauthorised persons.:

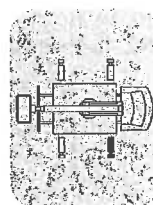
B) Risk of serious injury to upper limbs: keep away from moving and protruding parts.

C) Risk of serious injury to lower limbs; keep away from stabiliser feet and mobile structural parts.:

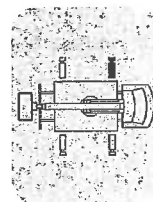
D) Max load on stabiliser.

E) Machine greasing points

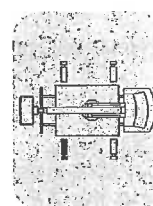
B) Lever: used to actuate the right-hand front stabiliser.



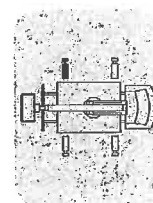
C) Lever: used to actuate the left-hand front stabiliser.



D) Lever: used to actuate the right-hand rear stabiliser.



E) Lever: used to actuate the left-hand rear stabiliser.



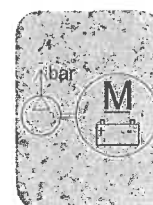
Important

The stabilisers' control lever operation is only enabled if the lever (A) has been actuated and the main boom correctly set to its rest position.

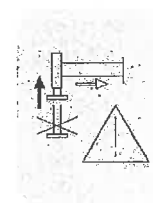
F) Pressure gauge: it detects the hydraulic oil system working pressure.

G) Level: used to check AP levelling during the stabilisation phase.

H) Button (where available): used to start the electric pump for rescue operations in an emergency.

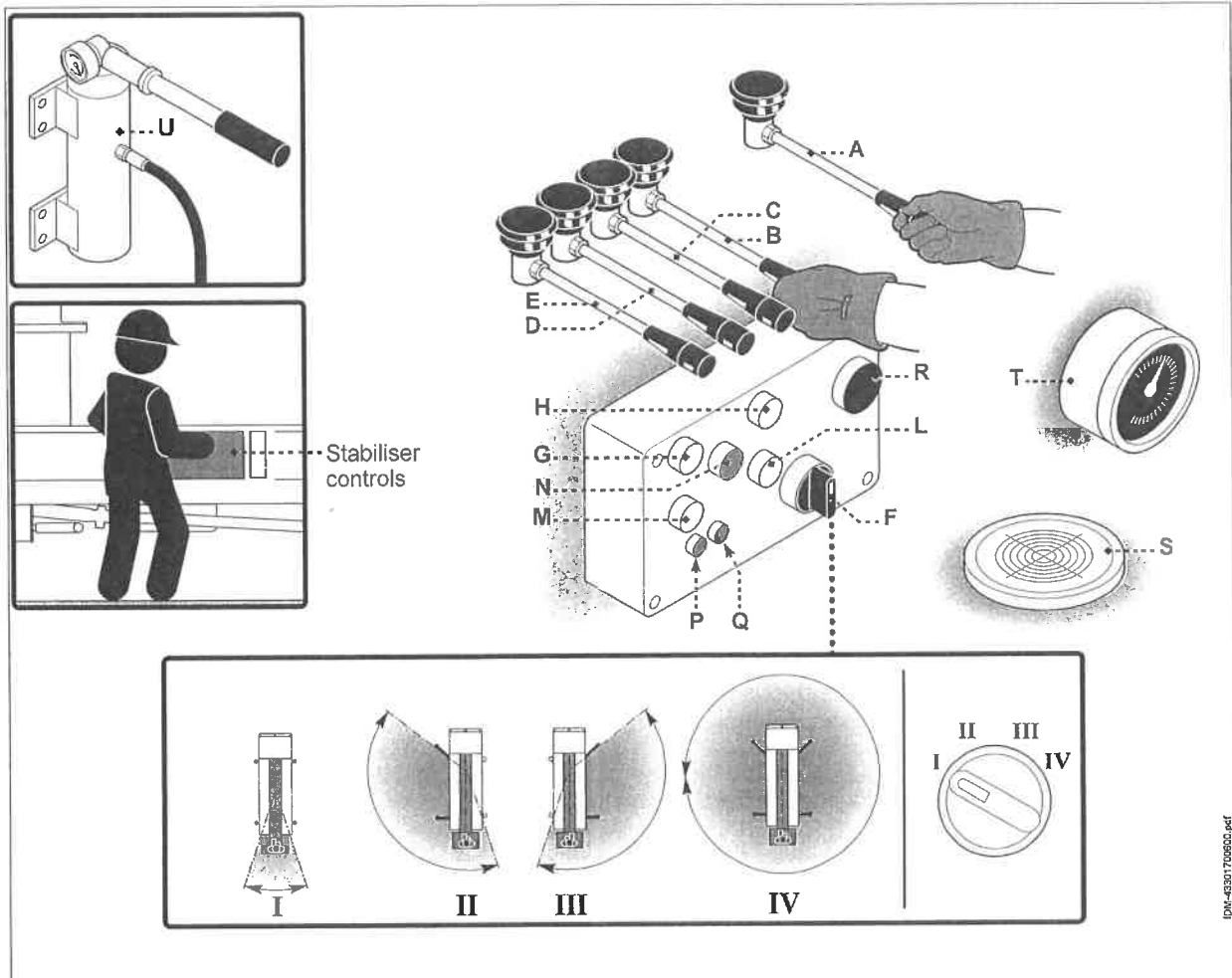


L) (Red) indicator light: when lit, it signals that the stabilisers and/or booms have not been fully retracted to their rest and transport positions.



DESCRIPTION OF STABILISER CONTROLS WITH VARIABLE STABILISATION

This picture shows (in a general manner) the control station from which stabilisation can be controlled.

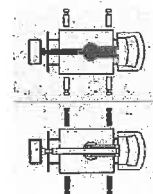


The control station is suitably protected to prevent any unwanted actuation.

A symbol is provided next to each device showing each control function. The information on the symbol is consistent with the control action.

This list contains a description, function and symbol corresponding to each control installed on the AP.

A) Lever: it is used to enable operation of the stabilisers' control levers. When it is released, the other stabiliser control levers are disabled.

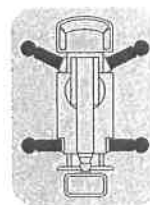


- "IV": Stabiliser cross members extension on both sides

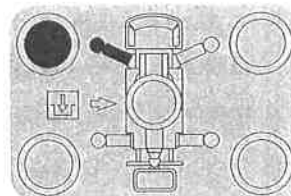


Important

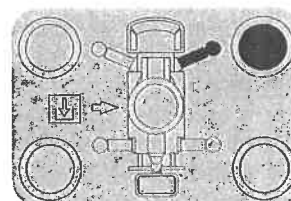
With the selector in this position, it is possible to fold in the stabilisers independently of the previously selected stabilisation mode



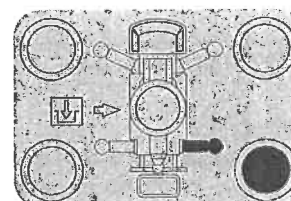
- G) White warning light (where available):** when lit, it indicates that the left-hand front stabiliser cross member has been fully extended.



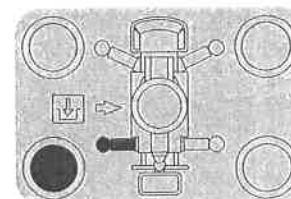
- H) White warning light (where available):** when lit, it indicates that the right-hand front stabiliser cross member has been fully extended.



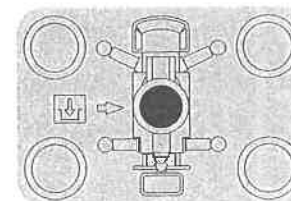
- L) White warning light (where available):** when lit, it indicates that the right-hand rear stabiliser cross member has been fully extended.



- M) White warning light (where available):** when lit, it indicates that the left-hand rear stabiliser cross member has been fully extended.



- N) (Blue) indicator light:** when lit, it signals that all the stabilisers are correctly positioned. In this condition, the basket controls are enabled.



- P) (Red) indicator light:** when lit, it signals that the stabilisers and/or booms have not been fully retracted to their rest and transport positions.

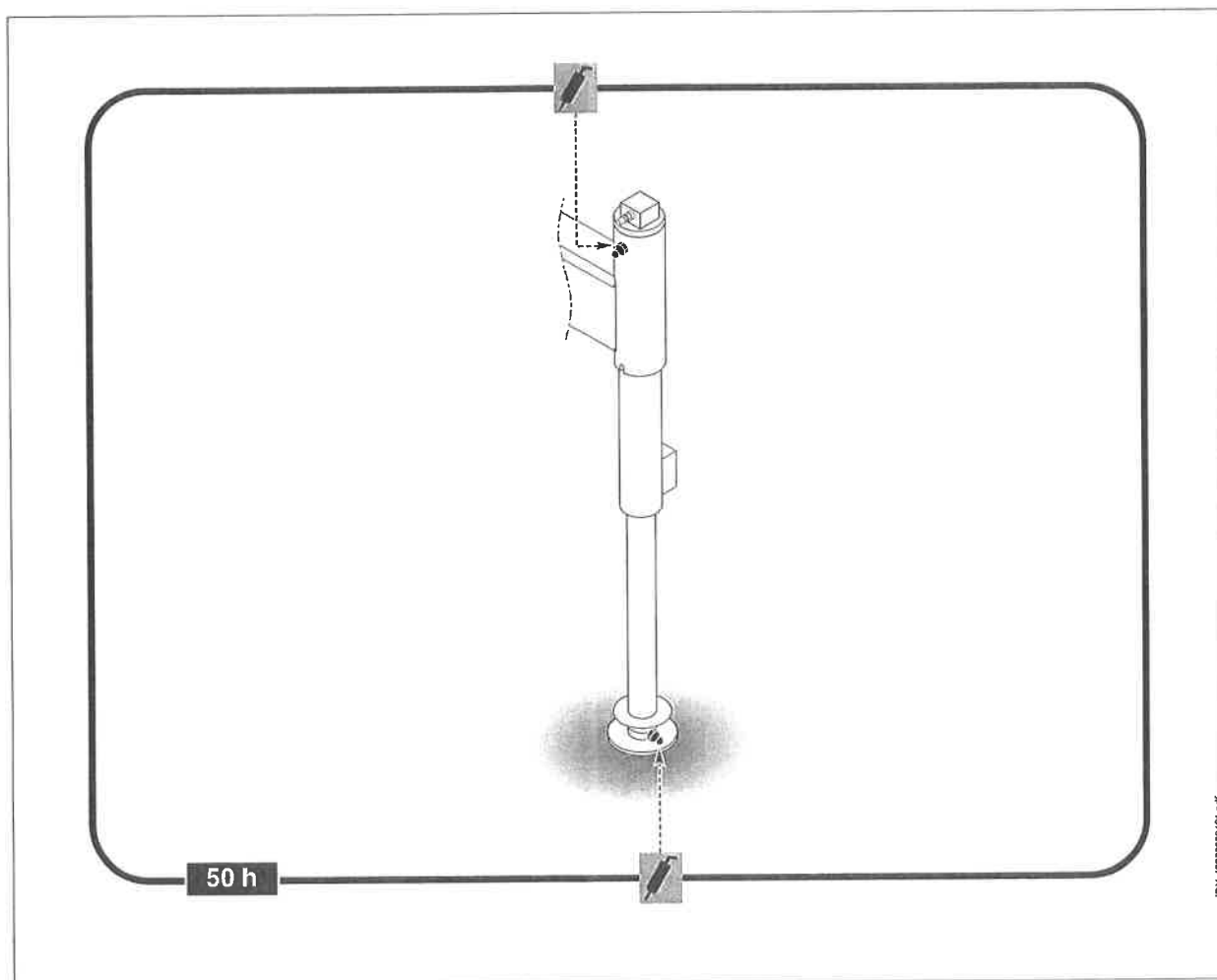


LUBRICANT AND HYDRAULIC OIL TABLE

Only use the oil and grease types listed in the table of booklet 2 (General AP description) or other equivalent types.

DIAGRAM OF LUBRICATION POINTS

Lubricate indicated parts as per schedules and instructions.



Key

Inject grease



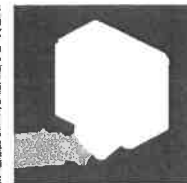
Important

Use the oil and grease types recommended by the Manufacturer. Do not mix oils of different makes or having different characteristics. Do not dispose of spent oil freely in the environment. Dispose of oil in accordance with the applicable rules in the country of use.



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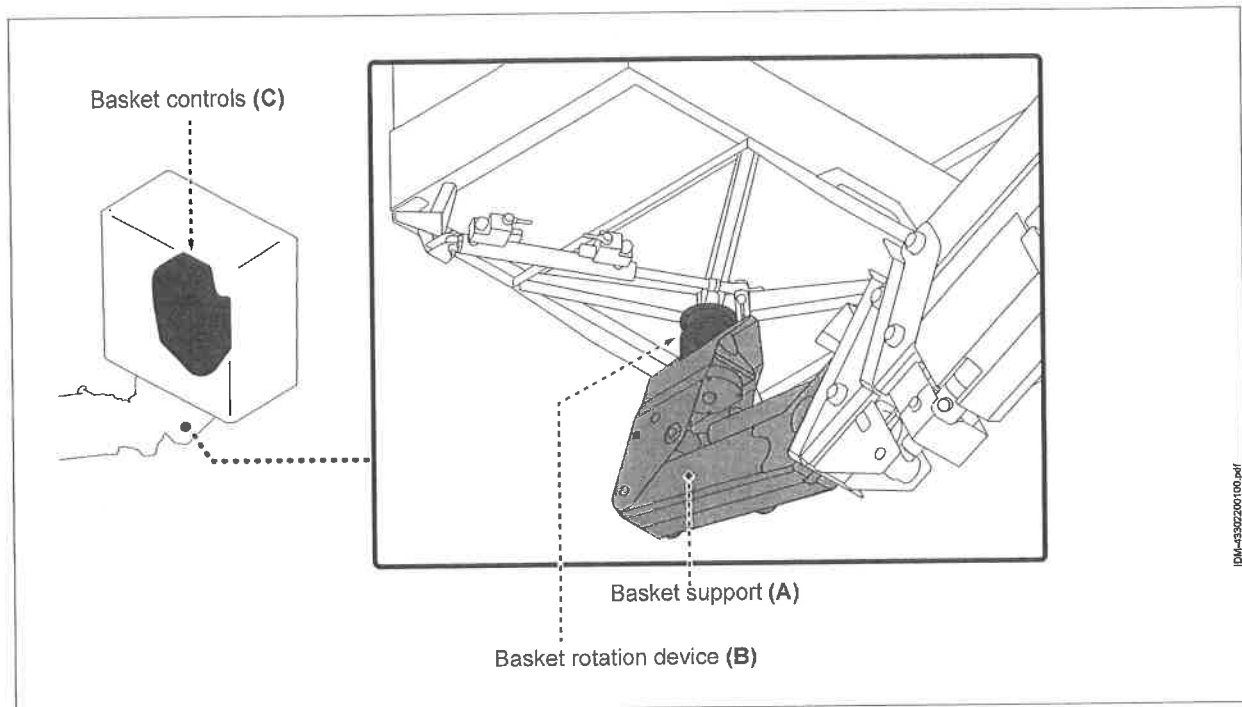
T

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GENERAL BASKET DESCRIPTION

- Each AP is equipped with a working platform (basket) made from tubular metal or fibreglass, allowing the operator (after having completed AP stabilisation) to reach the working areas by using the on-board controls.
- Each basket is designed to transport persons, tools and equipment. The number and maximum weight of the persons and pieces of equipment that can be transported is specified in the data plate fixed to the basket and in the AP log book.



This list contains a description of the main machine parts and functions.

- A) Basket support:** it supports the basket and (via a cylinder integral with the AP hydraulic system) keeps it levelled.
- B) Basket rotation device:** it enables to rotate the basket and can be operated via either a hydraulic cylinder or an electric device.
- C) Control panel:** equipped with all the controls necessary for the basket operator to perform working manoeuvres. A description of the controls and their functions is contained in the booklet 5.

tive alarm conditions. This is signalled by a flashing (red) light coming on simultaneously with a sound alarm. The operator must promptly and gently unload the excess material, restore safety conditions and then re-set the controls.



Caution Attention

The device monitors the vertical loads distributed inside the basket and is thus unable to detect deflected loads, improper loads or any loads different from that for which the machine has been designed. Vice versa, unorthodox or improper loading of the basket may compromise performance of the safety device as a result of strain (even where temporary) of structural parts. Due care and attention is thus required to ensure that this device – which is subject to heavy duty stress – is kept in proper working order.

The concentrated distribution of persons and loads and/or a sudden movement may cause the basket load sensor to be operated considerably earlier.

In any case, the operator is responsible for ensuring compliance with maximum capacity specifications and correct load distribution inside the basket.

- C) **Lock valve:** it quickly stops oil flow (and stops the movement of the hydraulic cylinder on which it is installed) when pressure goes below the pre-set value (e.g. if a pipe bursts). This valve is factory-set and then sealed by the manufacturer and is installed on every hydraulic cylinder exposed to this risk.
- D) **Overpressure valve:** it prevents the operating pressure from exceeding the maximum permitted value. This valve is factory-set and then sealed by the manufacturer.
- E) **Emergency stop push-button:** it is operated to immediately stop all AP movements. After having restored normal operating conditions, the emergency button must be released to authorise AP restart.
- F) **Safety door (if available):** used to obtain access to the inside of the basket. When it is closed and locked, it prevents the risk of operator falls out of the basket.
- G) **Safety gravity barrier (if available):** used to obtain access to the inside of the basket. When it is closed, it prevents the risk of operator falls out of the basket.



Caution Attention

Always wear the special, type-approved safety harness before climbing into the basket. When inside the basket, securely close the access point and hook up the harness (adjustable with a cord to be kept short) to the special points to prevent the risk of falls.

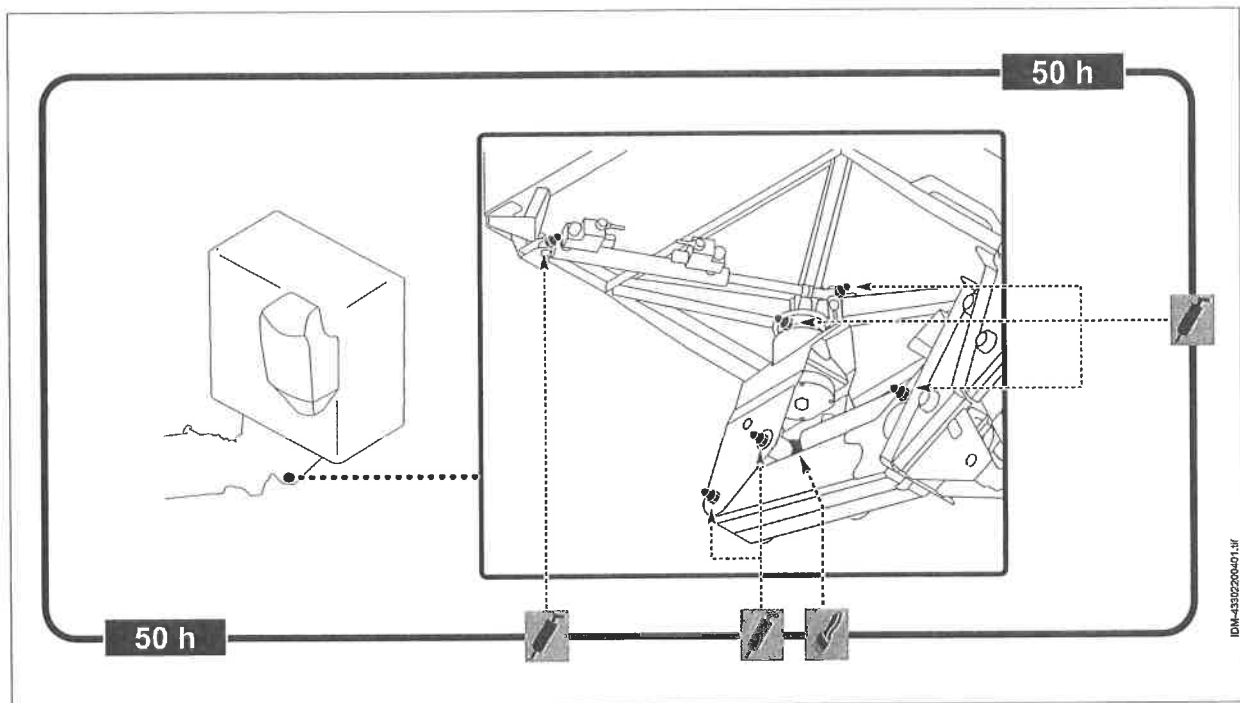
- 6) **Risk of serious injury to upper limbs:** keep away from moving and protruding parts.
- 7) **Personal protection gear compulsory;** Wear adequate protection.
- 8) **PPD obligation:** the safety harness must be worn and hooked up as recommended during AP use and operation.
- 9) **Use of guards compulsory;** check that guards and screens are properly in place.
- 10) **Adjustment and maintenance forbidden:** no servicing in the presence of moving parts.
- 11) **Do not use;** use forbidden to unauthorised persons.
- 12) **Do not use;** do not use above pedestrian throughways.
- 13) **Do not use:** use of ladders or other devices to extend reach from the basket is forbidden.
- 14) **For information on rescue work please read the manual carefully.**
- 15) **Machine greasing points**
- 16) **Danger zone:** keep away from dangerous areas.
- 17) **Maximum load allowed in the basket.**
- 18) **Risk of overturning;** do not exceed permitted basket load.
- 19) **Important information for operator regarding use of the platform.**
- 20) **Information on moment and/or reach limiter.**
- 21) **Information on basket levelling during work**
- 22) **Instructions for use of the basket safety gravity bar (if available)**
- 23) **Instructions for use of the basket safety door (if available).**
- 24) **Risk of serious bodily injury:** keep away from stabiliser feet and mobile structural parts.
- 25) **Risk of serious injury to lower limbs;** keep away from stabiliser feet and mobile structural parts.
- 26) **Risk of serious injury to upper limbs:** keep away from moving and protruding parts.
- 27) **Do not use:** do not use pressurised water cleaning devices.
- 28) **Work chart:** it shows the AP working areas.

LUBRICANT AND HYDRAULIC OIL TABLE

Only use the oil and grease types listed in the table of booklet 2 (General AP description) or other equivalent types.

DIAGRAM OF LUBRICATION POINTS

Lubricate indicated parts as per schedules and instructions.



Key



Inject grease



Spread with grease



i important

Use the oil and grease types recommended by the Manufacturer. Do not mix oils of different makes or having different characteristics. Do not dispose of spent oil freely in the environment. Dispose of oil in accordance with the applicable rules in the country of use.

TROUBLES, CAUSES AND REMEDIES

Check the table contained in booklet 2 (General AP description) to identify and correct any faults or malfunctioning that may occur during normal operation.



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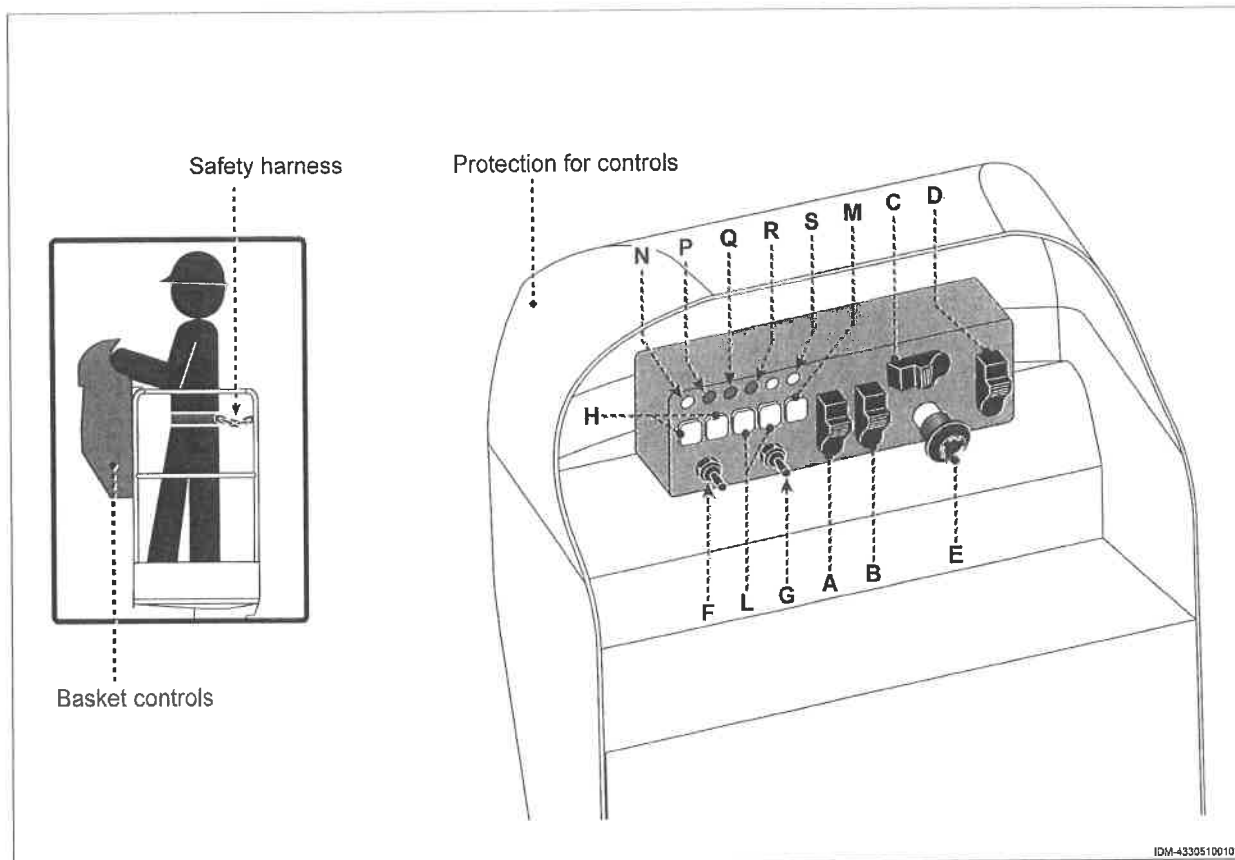
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Control station description 3

CONTROL STATION DESCRIPTION

- The booklet contains information regarding all the controls installed in the basket.
- The picture shows (in a general manner) the control station installed in the basket which must be used by the operator to reach the work positions. The control positions may change according to the various supply configurations.

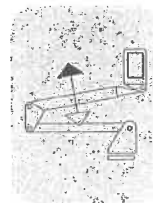


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- The control station is suitably protected to prevent any unwanted actuation.
- A symbol is provided next to each device showing each control function. The information on the symbol is consistent with the control action.

This list contains a description, function and symbol for each control installed in the basket.

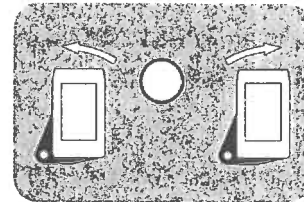
A) Joystick: used to control the main boom.



L) Buttons: manual controls to correct basket levelling.

The controls are ONLY enabled with the platform in its rest configuration.

The basket levelling system is equipped with compensation and safety valves, continuously controlling the basket set-up.



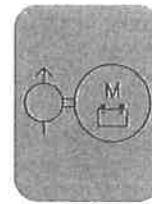
Caution

It is forbidden to use the AP with the basket not correctly levelled. Levelling is correct when the basket footboard is horizontal, notwithstanding the vehicle angle at ground level.

The basket levelling selector switch can be used for emergency operations as is described in booklet2.

M) Button (where available): used to start the electric pump for rescue operations in an emergency.

N) (White) warning light: when lit it indicates that the control panel is powered.



P) Indicator light (red light) (where available): when on, it indicates that all the AP movements have stopped because the load limiting device has reached its limit value (see booklet 2).

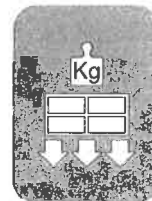


Q) Indicator light (red light) (where available): when on, it indicates that some of the AP movements have stopped to prevent a possible collision between a vehicle part and the platform.



R) Flashing warning light (red light) (where available): this light, in conjunction with a sound alarm, warns that the AP has stopped because of a basket overload.

The sound alarm and indicator light are only provided if the AP is equipped with a basket loading sensor.



Important

To enable AP restart after a stop due to basket overloading, the excess weight must be removed.

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