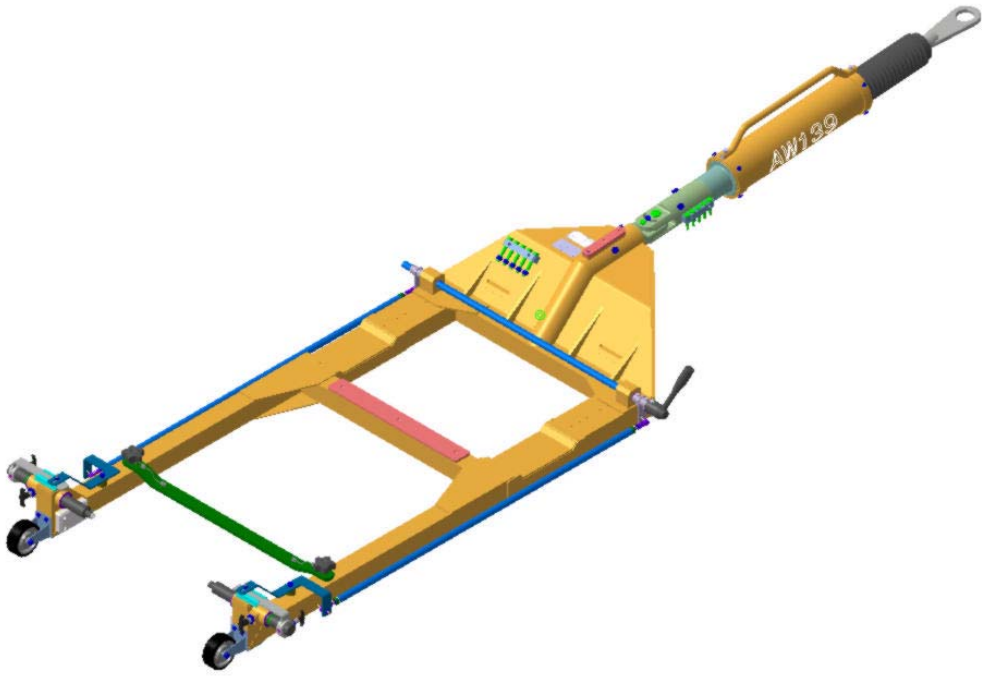
PEC ITALIA S.r.l.

OPERATION AND MAINTENANCE MANUAL

PEC-0139-MAN-0017-00

P/N 3G0910G00231

TOW BAR ASSY for AW139 with FLIR LEOSS/WESCAM and PAD/SKI



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CHANGES REGISTER

Rev.	Date	Affected pages	Change reasons
00	24/01/2022	All	First issue

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1 SCOPE

1.1 APPLICABILITY

This document is applicable to the system **TOW BAR ASSY for AW139 with FLIR LEOSS/WESCAM and PAD/SKI, P/N 3G0910G00231.**

1.2 OBJECT

The object of this document is the Operation And Maintenance Manual for the system **TOW BAR ASSY for AW139 with FLIR LEOSS/WESCAM and PAD/SKI, P/N 3G0910G00231.**

1.3 TARGET

The main target is to show and describe the system's main elements and to give information regarding the function, correct use and maintenance aspects for the system **TOW BAR ASSY for AW139 with FLIR LEOSS/WESCAM and PAD/SKI, P/N 3G0910G00231.**

2 DOCUMENTS

2.1 APPLICABLE DOCUMENTS

Applicable documents are listed in the following table.

REF	REFERENCE DOCUMENT	TITLE
[1]	PEC-0139-GEN-0006-00	Fascicolo Tecnico della Costruzione TOW BAR ASSY for AW139 with FLIR LEOSS/WESCAM and PAD/SKI
[2]		
[3]		

Table 1 Applicable documents

2.2 STANDARD

REF	REFERENCE DOCUMENT	TITLE
[1]	2006/42/CE	Directive On Machinery

Table 2 Standard

2.3 SYMBOLS AND ACRONYMS

The main acronyms used in the document are listed as follows:

P/N	Part Number
Tow Bar Assy	TOW BAR ASSY for AW139 with FLIR LEOSS/WESCAM and PAD/SKI
NLG	Nose Landing Gear

In addition, in the document specific symbols are used to indicate the type of indication the operator is required to pay attention. The meaning of the above mentioned symbols is described as follows.

 **Warning**	Information or procedure that, if not strictly executed, may cause injury or death of persons.
 **Caution**	Information or procedure that, if not strictly executed, may cause damage or destruction of the equipment and systems concerned.
 **Notice**	Information or procedure of particular importance that it's worth to be highlighted.

3 USE AND STORAGE OF THE MANUAL

This manual should be considered as part of the machine to which it must be added.
Operators should be properly trained and prepared; is absolutely necessary that before the first use and the putting into service of the machine, the operators should have read and learnt the indications, precaution and usage and maintenance procedures written in this manual.

3.1 TO WHOM THE MANUAL IS ADDRESSED

This manual is addressed to the personnel assigned to the use of the machine (Operator) and for the technicians assigned to the machine ordinary maintenance (Maintainer).
This manual is addressed to the managerial, in charge and operative staff of the equipment where the machine is used.

3.2 PURPOSE OF THE INFORMATION CONTAINED IN THIS MANUAL

The Manual is needed to give all the necessary information for a correct usage of the machine placed on the market:

- General description of the main components and functions
- Technical characteristics
- Warnings regarding residual risks related to the machine usage
- Parts illustration
- Operative procedures
- Indications related to maintenance, transportation and storage

3.3 LIMITS OF USE OF THE MANUAL

It should be noted that the Manual can never entirely replace the final user experience; the personnel should have received proper specific training.
Regarding the use of the machine this Manual gives information and instructions that add, but are not intended to substitute, integrate or modify general or specific rules, prescriptions, decrees and laws in force at the place where the machine is used.

3.4 WHERE AND HOW TO KEEP THE MANUAL

The Manual should always be available for consultation near the machine and stored in a protected, dry place, away from the sun's rays and heat sources.

3.5 UPDATES

This Manual is the technical state-of-the-art at the time of the machine construction.

4 IDENTIFICATION

4.1 CE LABEL

The Tow bar assy complies with the requirements of the standard [1] of paragraph 2.2 and the CE marking is applied. The CE mark and information regarding the manufacturer are reported by CE plate attached to the equipment.

Figure 1: CE Label

4.2 LEONARDO HELICOPTERS DIVISION LABEL

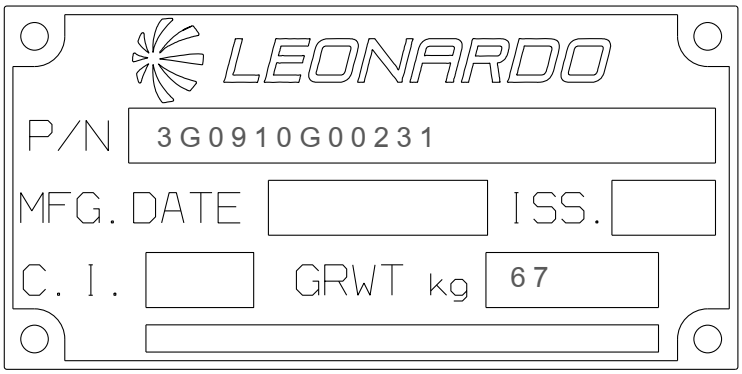

Figure 2: Leonardo Helicopter Division label

5 GENERAL INFORMATION AND TECHNICAL DATA

The TOW BAR ASSY has been designed to allow the safe towing of the AW139 (also when the FLIR LEONARDO LEOSS/WESCAM is installed, avoiding clashes with FLIR, during towing and during steering phases of towing) with aircraft maximum design gross weight of 6800 Kg.

The TOW BAR ASSY has been designed to allow the coupling of tow bar assy with Nose Landing Gear, with NLG Slump Pad and with NLG Snow Ski, and to allow the connection with a tow truck.

The machine is identified by P/N **3G0910G00231.**

The TOW BAR ASSY systems consists of the following major components in Figure 3

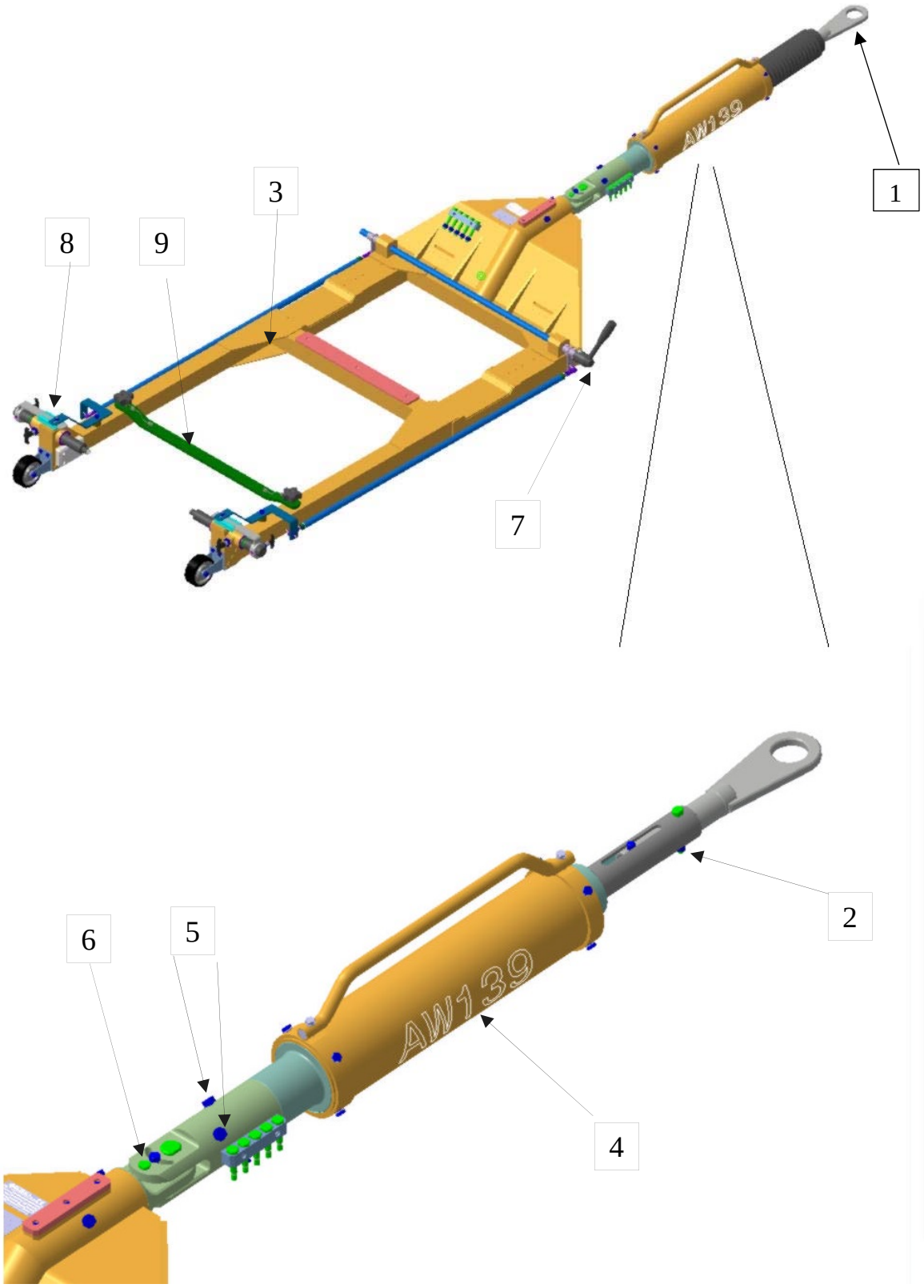

Figure 3: Tow bar assy

List of elements in Figure 3:

1. Towing eye
2. Axial safety pin
3. Main structure
4. Shock absorber unit
5. Joint
6. Lateral safety pin
7. Locking - unlocking device
8. Coupling device
9. Stiffener

Technical characteristics

Part Number TOW BAR ASSY	**3G0910G00231**
Tow Bar Assy Mass	Approximately 67 kg
Overall lenght	3365 mm
Overall width	1121.1 mm
Overall height	447.56 mm
Tow Bar Assy safety pin axial breaking load	1500 kg
Tow Bar Assy safety pin lateral breaking load	60 kg

Table 3 Tow Bar Assy technical characteristics

6 INSTRUCTIONS ON THE MACHINE FUNCTIONALITIES

The purpose of the TOW BAR ASSY is to connect a towing vehicle to the aircraft to move it on level ground. The tow bar is attached to the aircraft NLG or to the NLG Slump/Snow Pad when is installed.

In the following paragraphs the main functionalities of the machine are listed.

6.1 TOW BAR ASSY TRANSPORTATION

In order to allow movement and transportation, the tow bar assy is provided with a handle and 4 wheels. The handle can be used for the correct positioning during the installation on the NLG and on the Tow truck but also for transportation. The first couple of wheels (in aft position) are pivoting wheels, allowing the steering operation, whereas the forward couple of wheels are fixed. The wheels have been designed in order to be used only for transportation, while during the utilization they doesn't work. The tow bar has got an eye shaft according to norm STANAG 401.

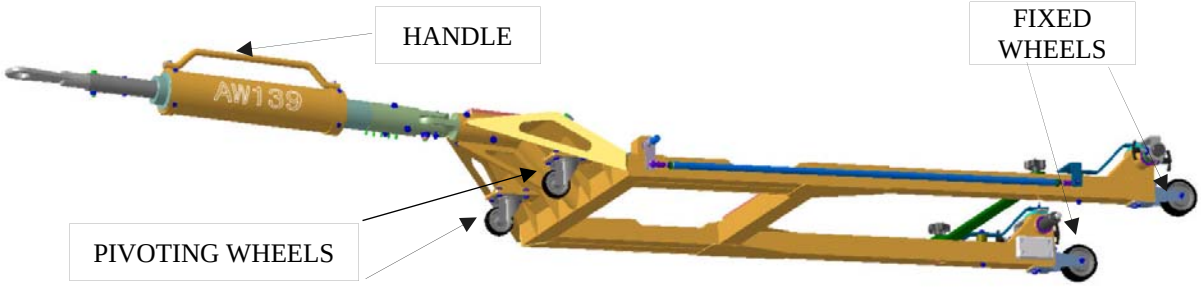

Figure 4: Tow bar assy: wheels and handle

Caution	Use the handle only for transportation and installation purpose. Don't lean on the handle except for the above mentioned situations.

Caution	Don't leave alone the Tow Bar Assy on an inclined surface.

6.2 SHOCK ABSORBER UNIT

The machine is provided with a spring system that avoid extra or unwanted impulsive loads during starting and breaking phase of the towing, or in general during the towing.

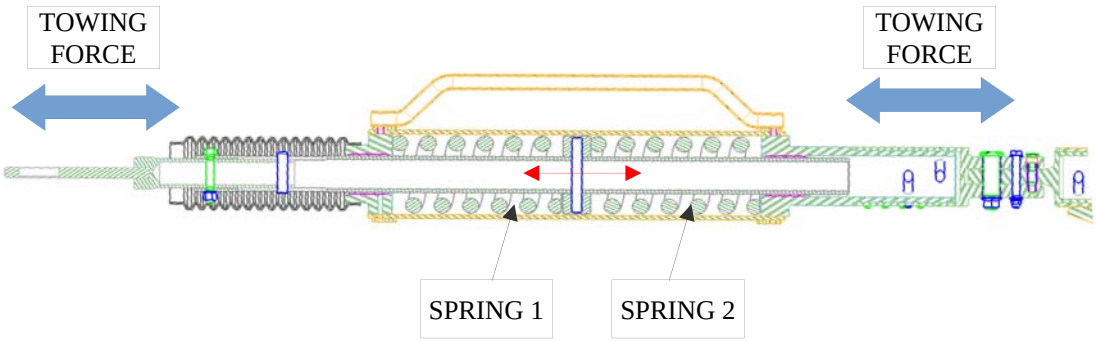

Figure 5: Shock absorber longitudinal section

As per Figure 5, both ends of the shock absorber unit are connected by means of a piston which slides in a cylinder.

Two compression springs reacts to the relative displacement of both ends, in both directions, due to the towing force.

In nominal operational conditions, the towing force compresses spring 1 while spring 2 extends. In case of breaking actions (the towing force reverse the direction), the spring 2 will go into action by compressing as the spring 1 extends.

6.3 SAFETY PINS AXIAL/STEERING

The Tow Bar Assy is provided with 2 safety pins.

These 2 safety pins are deputed to act in 2 different situations:

Axial Overload

Steering overload

(a) Axial Overload: this load can happen in case of excessive braking force, excessive starting force or in case of emergency conditions. When the axial load overcomes a pre-defined value, the axial safety pin breaks: this breaking releases a part of the piston, making it free to axially move. The part of the piston which is free to move is provided with end stroke to prevent its separation, making it mechanically safe.

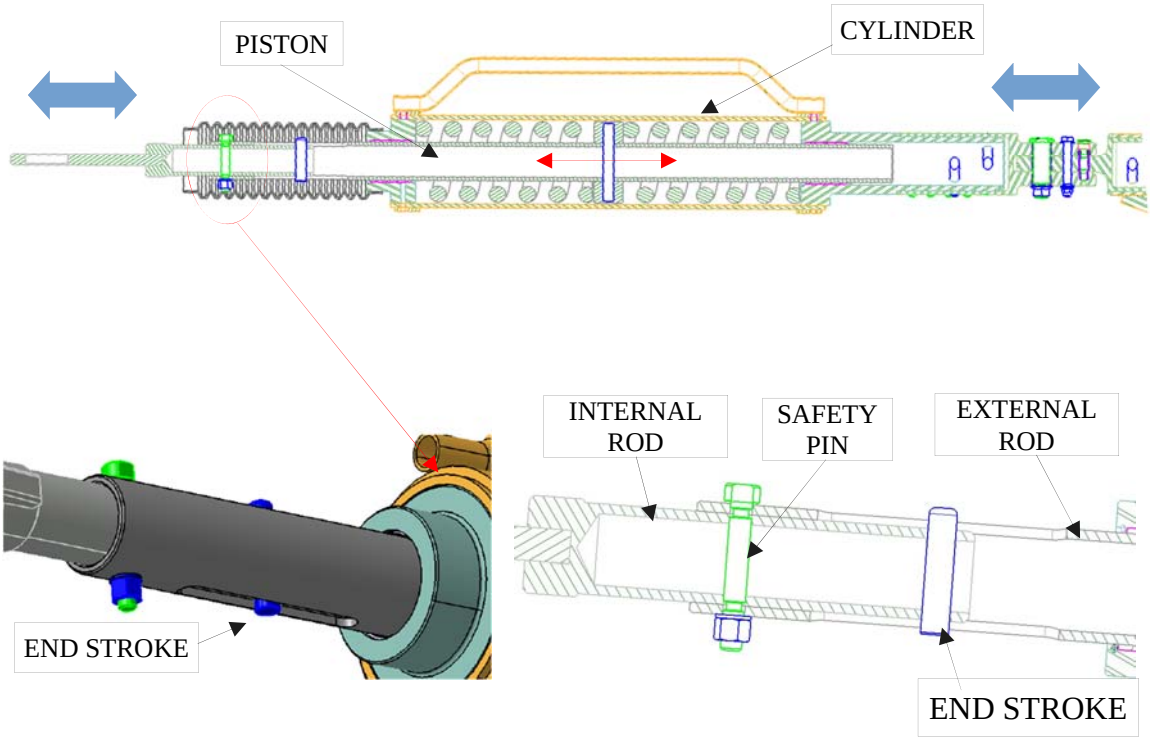

Figure 6: Tow Bar Assy longitudinal section: axial safety pin detail

As per Figure 6, the piston that slides inside the cylinder and that transfers the towing force, consists of 2 parts: an internal rod and an external rod. Both rods are connected by means of the safety pin. When overload conditions are reached, the safety pin breaks and the internal rod becomes free to axially move with respect the external rod.

A suitable pin fixed to the internal rod acts as an axial end stroke and allows the axial sliding between the internal and external rods, preventing relative rotation.

Caution	If during the Towing operations, overload conditions have been overcome, the safety pins break. It's mandatory for the operator to stop the operations, by reaching safety conditions and gradually stopping the towing truck.

Caution	Keep at safe distance from the machine during the towing operations.

The tow bar assy is provided with a series of spare safety pins, in order that they can be substituted whenever necessary. In particular, it is possible to substitute the safety pin using one of the 5 spare pins (with related washers and nuts) that are stored on the tow bar assy (see Figure 7).

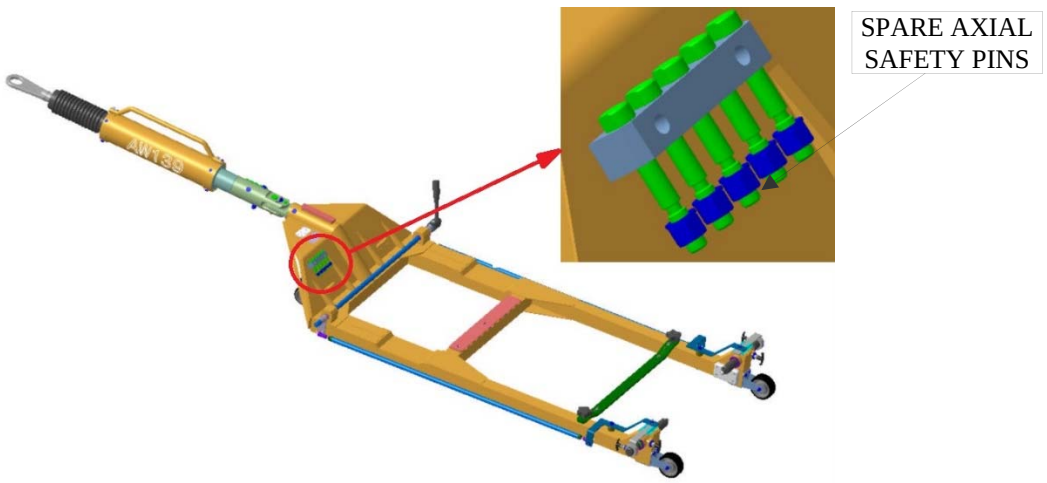

Figure 7: Spare axial safety pins detail

Warning	Never remove an installed safety pin during the operations with the tow bar assy.

(b) Steering overload: this load can happen in case of excessive loads induced by the landing gear locking during steering or in case of emergency conditions. When the steering load overcomes a pre-defined value, the steering safety pin breaks: this breaking allows the free rotation of the shock absorber part, connected to the towing truck, with respect the main structure. The new rotation degree of freedom is provided with end strokes pin to prevent its separation, making it mechanically safe.

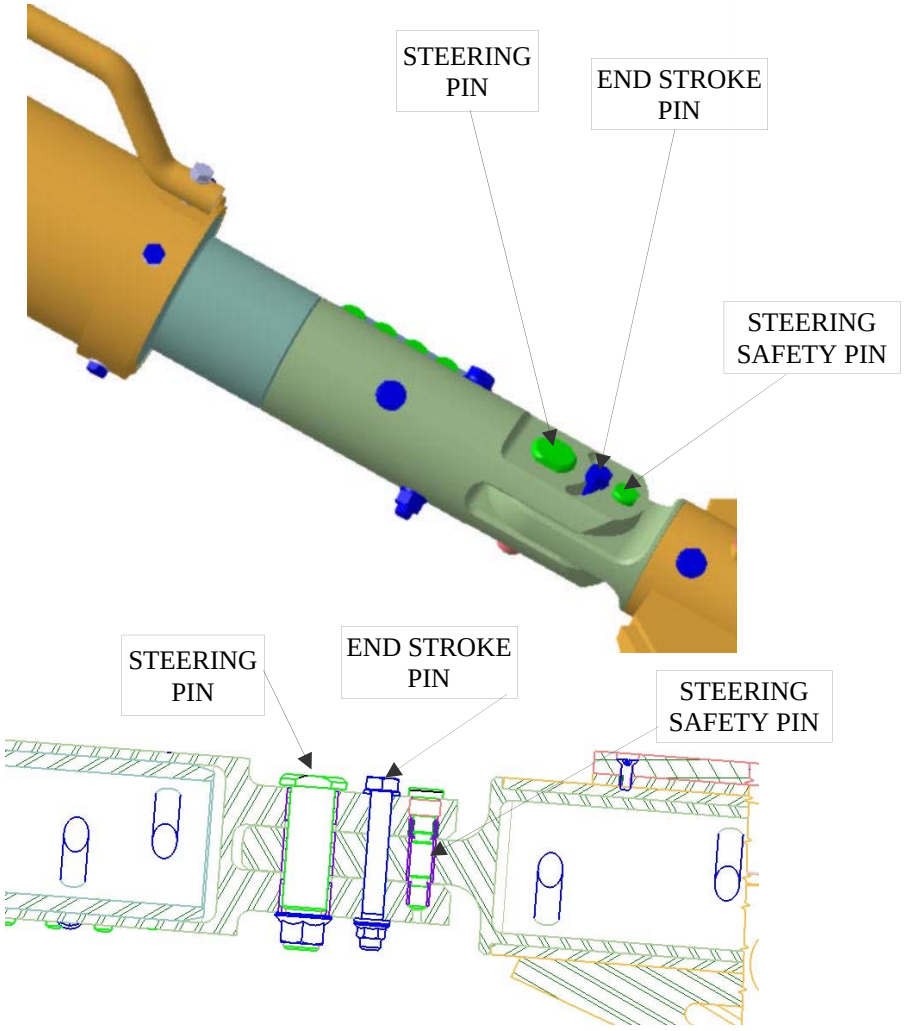

Figure 8: Tow Bar Assy longitudinal section: steering safety pins detail

As per Figure 8, the shock absorber, connected to the towing truck, and main structure are linked by a steering pin that transfers the towing force. The steering safety pin locks the relative rotational movement between both members. When overload conditions are reached, the steering safety pin

breaks and the shock absorber rend and the main structure end becomes free to rotate with respect the steering pin. A suitable pin fixed to the main structure end acts as a rotational end stroke allowing the relative rotation between the main structure and the shock absorber up to a certain angle.

Caution	The primary function of the steering safety pin, other than avoid overloads, is to warn the operator that, during the aircraft towing and steering, the overload conditions have been overcome. It's mandatory for the operator to stop the operations, by reaching safety conditions and gradually stopping the towing truck.

Caution	Keep at safe distance from the machine during the towing operations.

The Tow Bar Assy is provided with a series of spare steering safety pins, in order that they can be substituted whenever necessary. In particular, it is possible to substitute the steering safety pin using one of the 5 spare pins (with related washers) that are stored on the tow bar assy (see Figure 9).

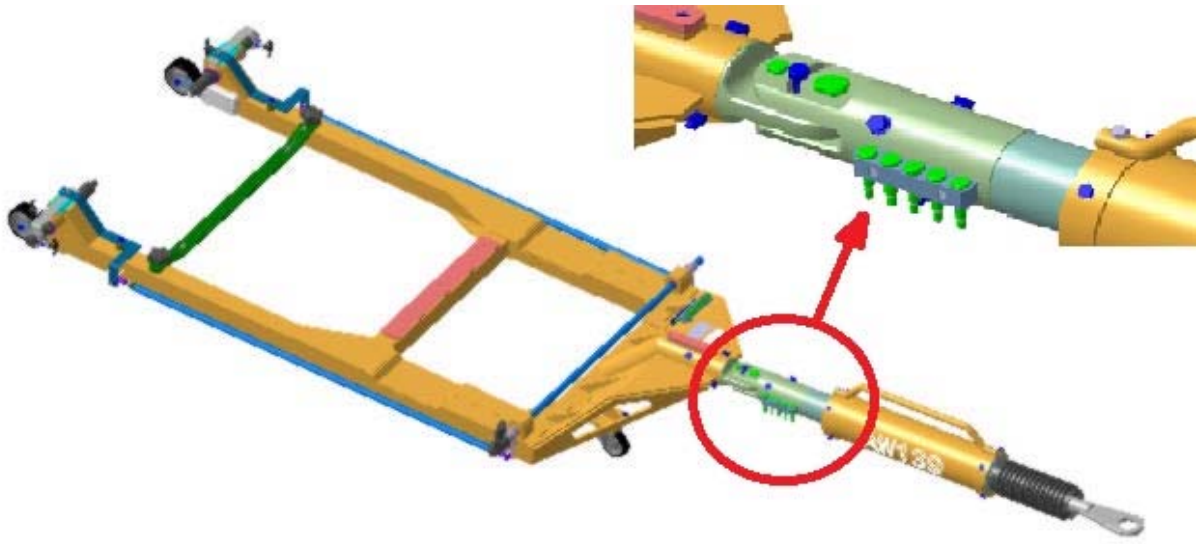

Figure 9: Tow Bar Assy longitudinal section: spare steering safety pins detail

Warning	Never remove an installed safety pin during the operations with the tow bar assy.

6.4 LOCKING/UNLOCKING SYSTEM WHIT HELICOPTER

The Tow Bar Assy is provided with a locking / unlocking device which allows an easy and safe coupling between the Tow Bar Assy itself and the helicopter landing gear. The system is composed by a levers mechanism which can be manually actuated by means of a handle. The handle is placed on the right side of the tow bar assy, and it drives, by means of a transmission bar, 2 coupling devices placed on right and left side of the tow bar assy.

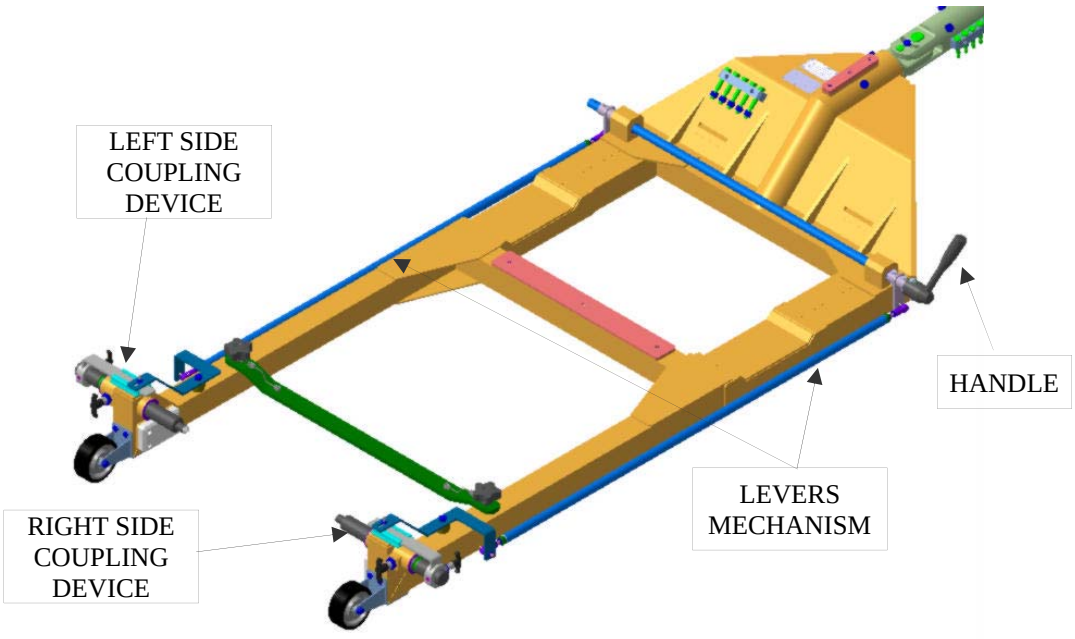

Figure 10: Tow Bar Assy: locking device

The handle rotation actuates the levers mechanism and the coupling devices.

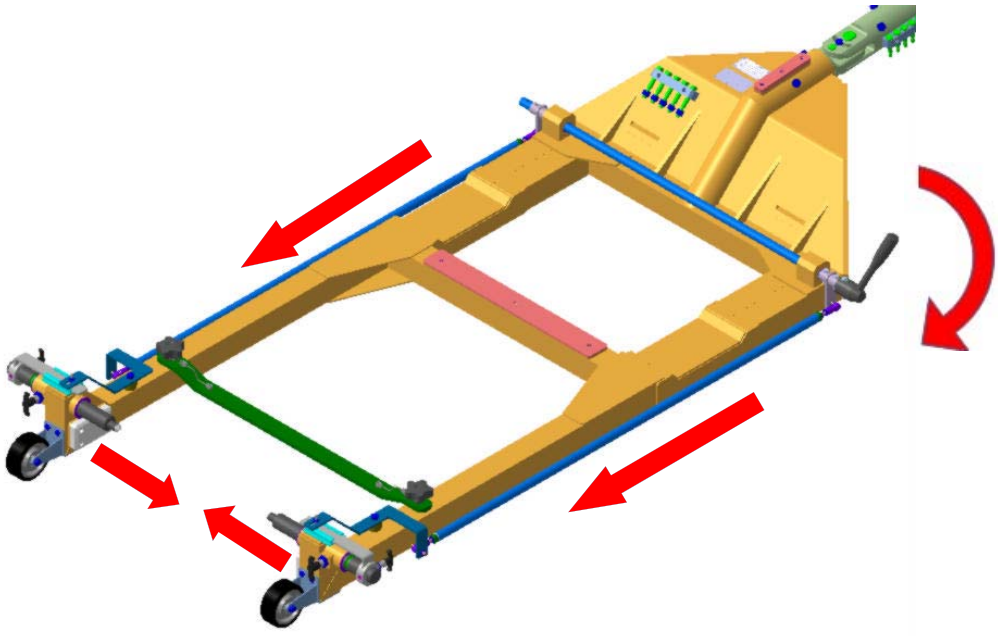

Figure 11: Tow Bar Assy: locking device actuation

The coupling device is composed by the following elements:

- Actuation lever: it is the final part of the levers mechanism and is responsible for the axial shifting of the coupling shaft to engage/disengage with the nose landing gear. This lever is fastened with the levers mechanism by one side and the other side is connected to the coupling shaft.
- Coupling shaft: it is the fixing elements between the nose landing gear and the tow bar assy. It has got a series of grooves that allows the setting of configuration and the fixing when engaged / disengaged by means of 2 manually actuated pins:
  The first configuration pin is used to configure the coupling device for each nose landing gears configuration, changing the relative position of the shaft coupling
  The second fixing pin is used to lock/unlock the coupling device with respect to the main structure. The fixing pin prevents accidental movements or disengagement of the coupling shaft. Both pins are locking type pins and have two manually set positions: lock and unlock.

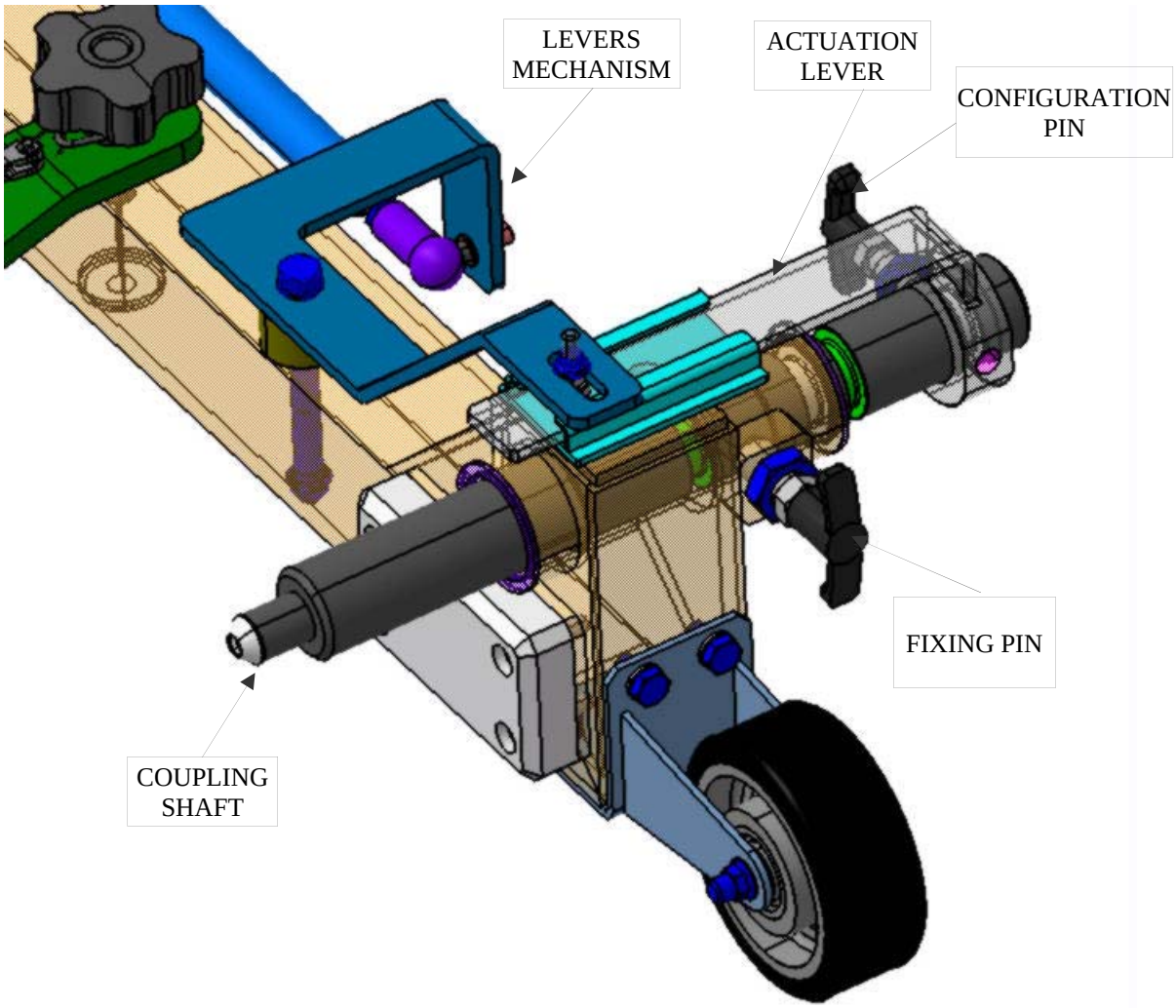

Figure 12: Tow Bar Assy: coupling device detail

In Figure 12, one of the two coupling device is shown.

Caution	Be always sure that all the manually actuated pins are in the desired/needed positions. Before the handle actuation, always check the pins positions.

Here are reported the configurations of the coupling devices and a useful nomenclature.

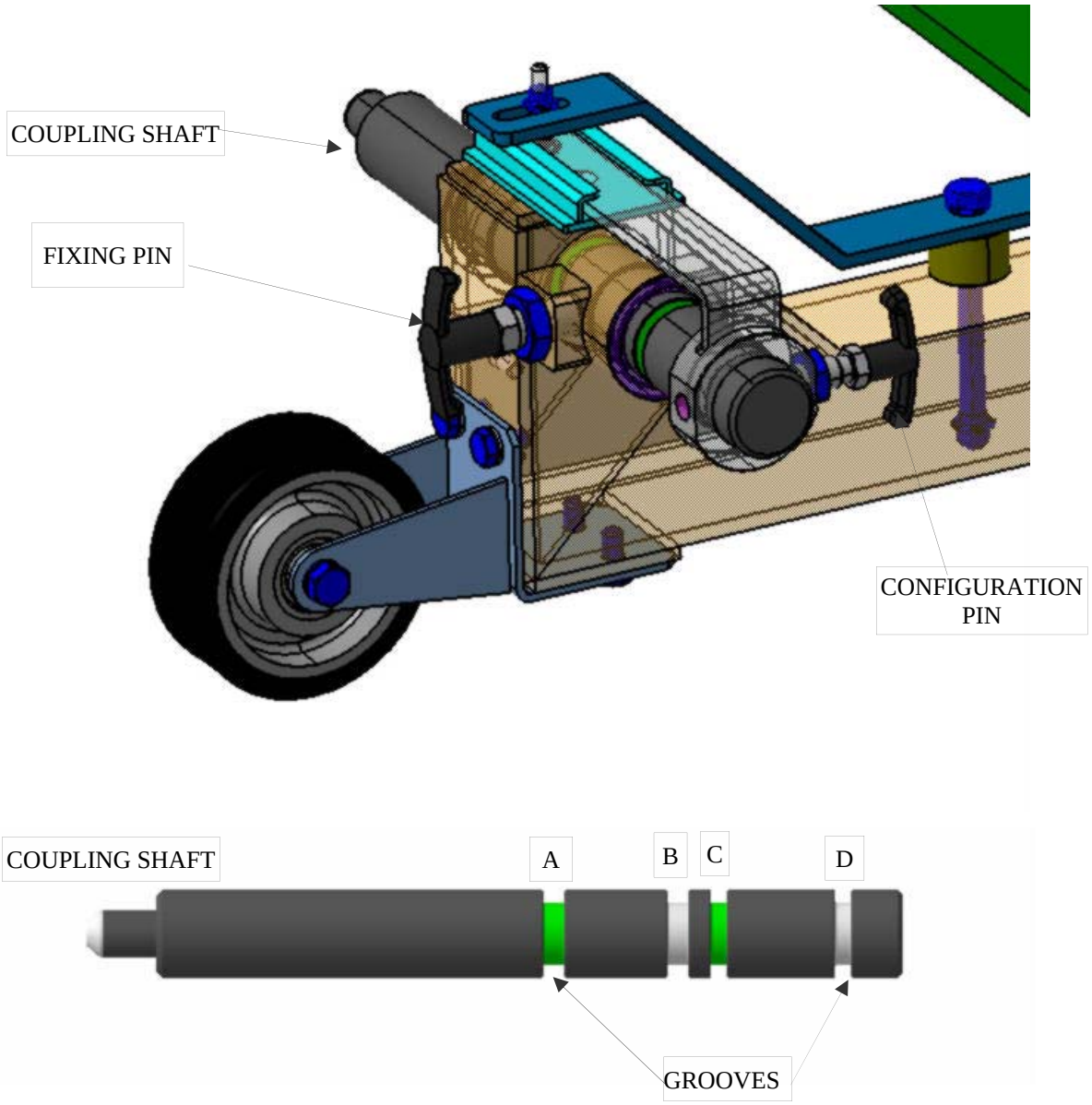

Figure 13: Tow Bar Assy: coupling device nomenclature

A) Configuration without PAD/SKI

Fixing the configuration pin in the white colored groove D determines the configuration of the landing gear latch without PAD/SKI.

The following pictures show the conditions to obtain the correct locking / unlocking with the landing gear without PAD/SKI.

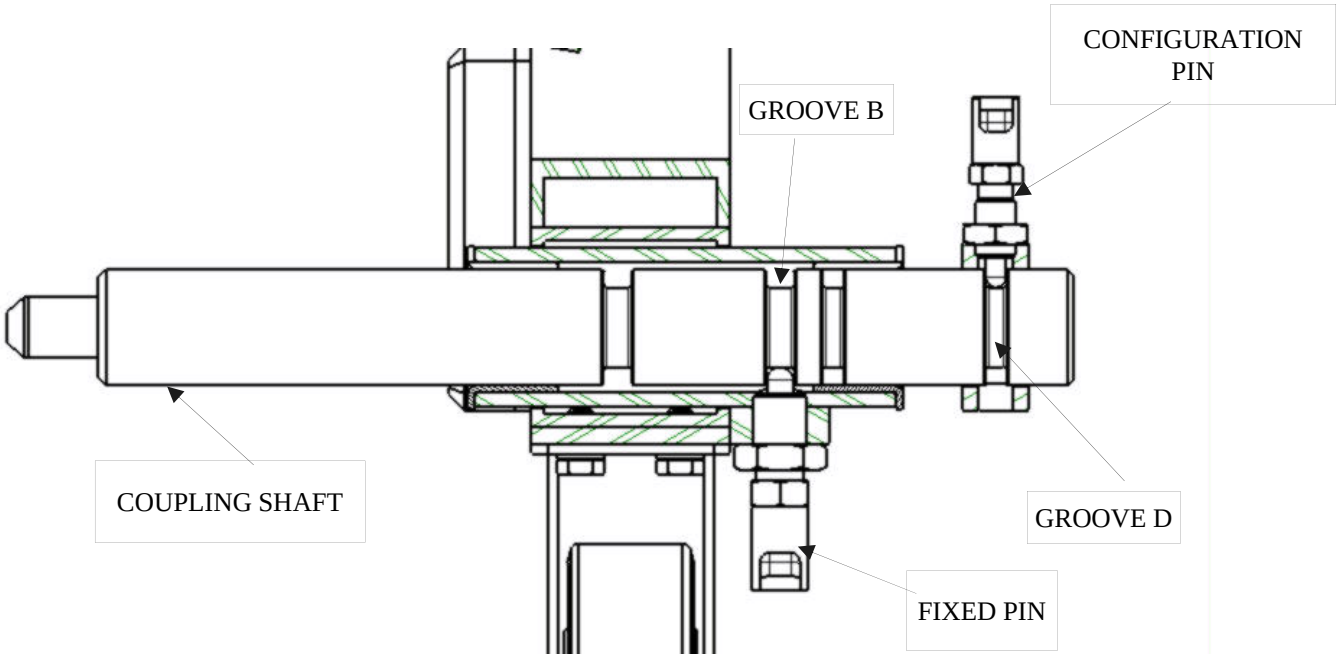

Figure 14: Tow Bar Assy: coupling device set for landing gear without PAD/SKI

B) Configuration with PAD/SKI

Fixing the configuration pin in the green colored groove C, determines the configuration of the coupling device for the landing gear with PAD/SKI.

The following pictures show the conditions to obtain the correct locking / unlocking with the landing gear with PAD / SKI.

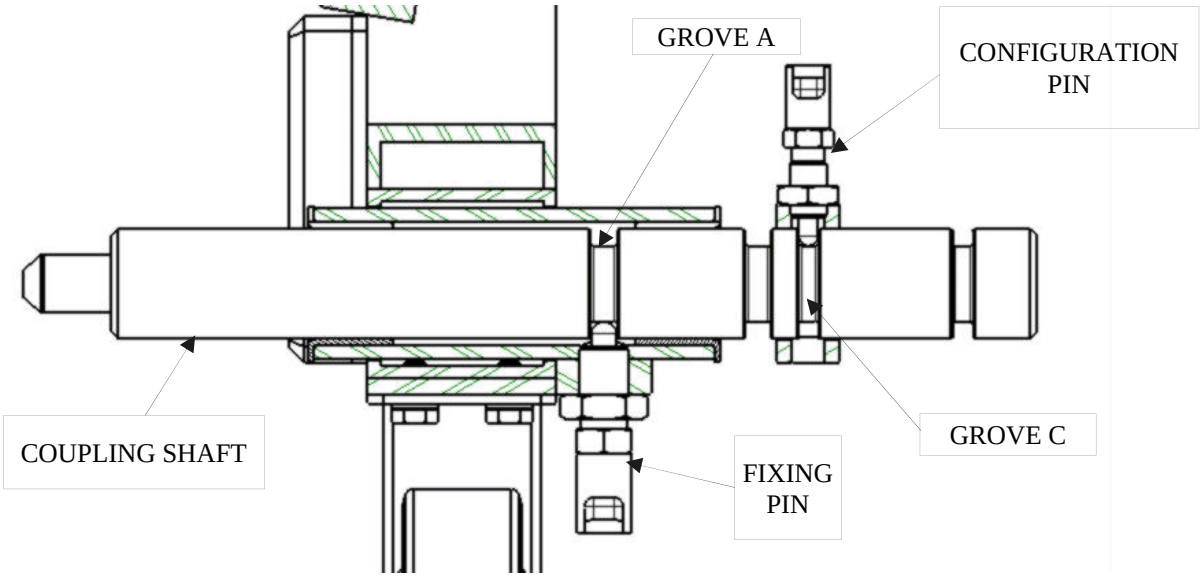

Figure 15: Tow Bar Assy: coupling device set for landing gear with PAD/SKI

6.5 STIFFENER

The tow bar assy to correctly perform its function, is provided with a removable stiffening bar. This stiffener is a kind of tie rod that is fixed by removable knobs to the main structure. The necessity to have this removablestiffener is related to the shape of the PAD / SKI.

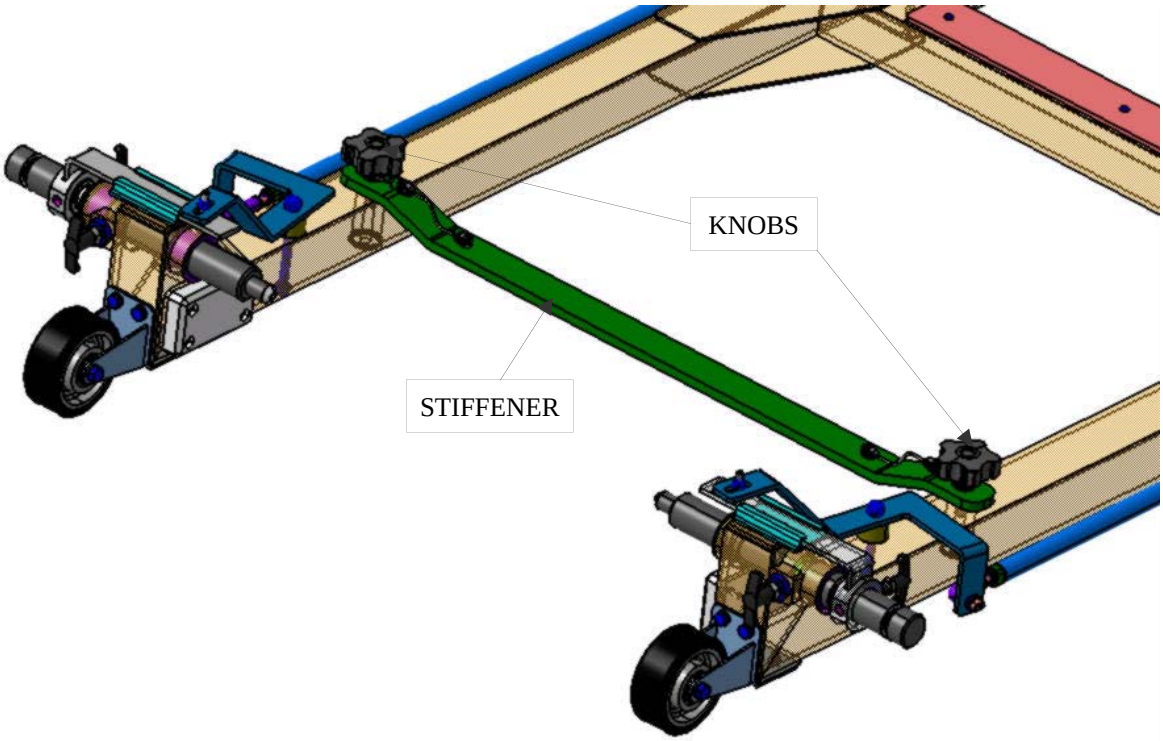

Figure 16: Tow Bar Assy: Stiffener

7 OPERATING INSTRUCTIONS

In the following paragraphs indications regarding operating instructions are reported; in particular for:

7.1. Tow Bar Assy installation without PAD/SKI;

7.2. Tow Bar Assy installation with PAD/SKI;

7.3. Configuration change;

7.4. Safety pins replacement;

 Caution	Before the utilization it is mandatory to follow the procedure reported in paragraph 10.2 “Preparations and checks before the usage”.

 Caution	During the usage of the fixture it is forbidden to register / regulate the shock absorber and the locking device.

The installation of the tow bar assy should be realized in order that both the tool, the towing truck and the helicopter are on a same plane and possibly not inclined.

 Caution	Don’t leave the tow bar assy fixed to the helicopter for an undefined time and without supervision to avoid damages and dangers.

Here are listed the main steps to be followed to perform a correct installation of the tow bar assy.

7.1 TOW BAR ASSY INSTALLATION WITHOUT PAD/SKI

1. Fixing the configuration pins in the white colored groove D, (see Figure 14).

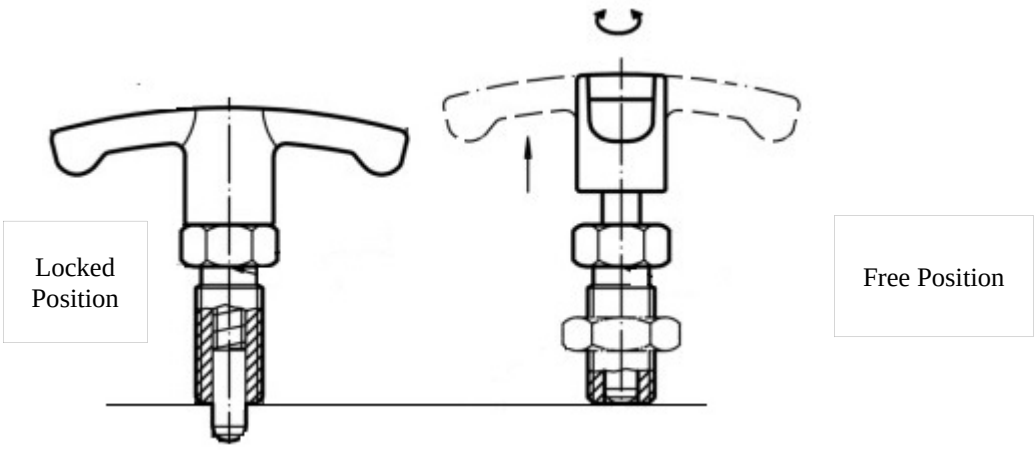

Figure 17: Configuration pin: Locked and free position

2. Make sure that the fixing pin are not engaged and the couplings shaft are free to move.
3. Transport the tow bar assy near the helicopter landing gear, with the coupling devices in front of the helicopter, using the wheels fixed to the main structure and the handle placed on the shock absorber cylinder.

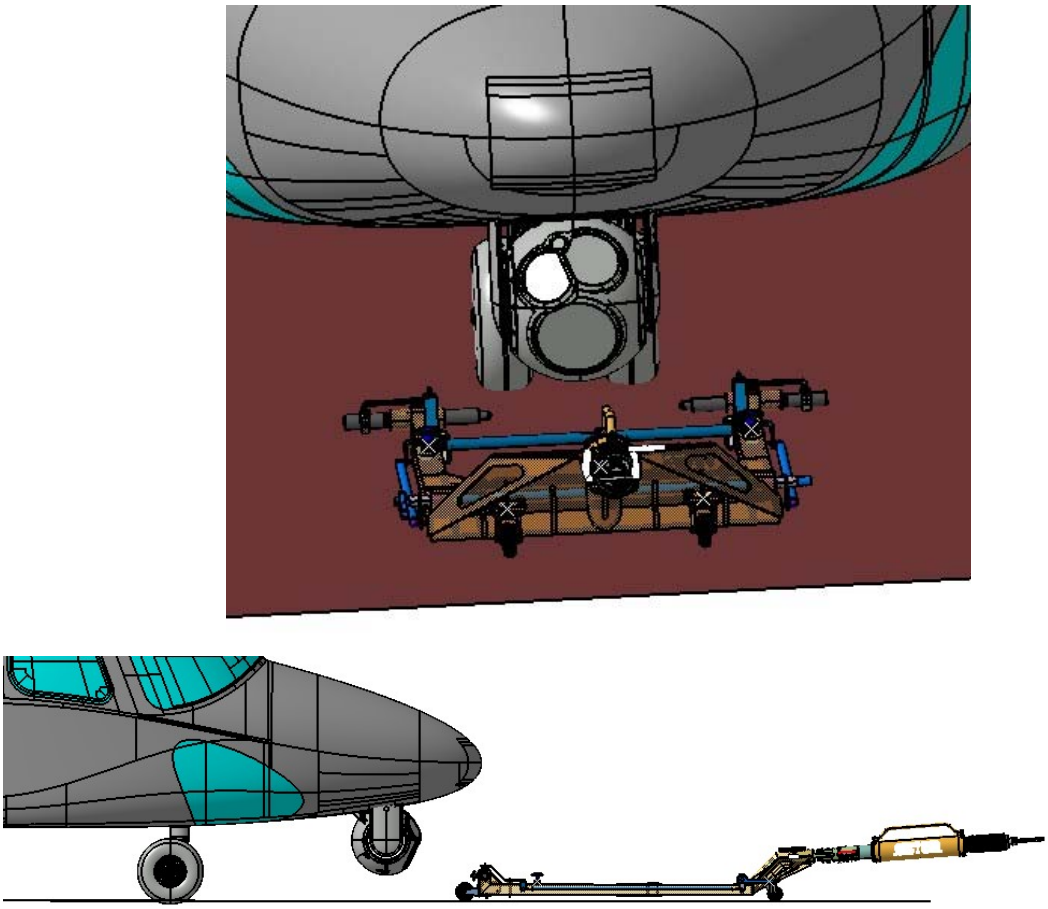

Figure 18: Tow Bar Assy: initial alignment to the helicopter

4. Move the tow bar assy under the helicopter until both couplings shaft are nearly aligned with the corresponding landing gear tow eyes.

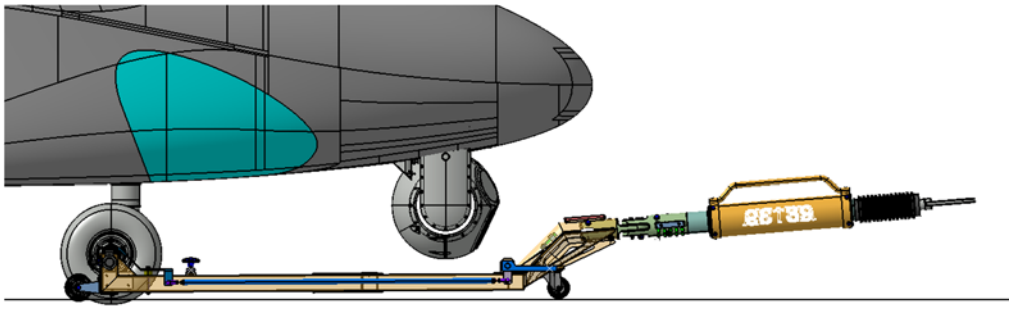

Figure 19: Tow Bar Assy: coupling shafts alignment with landing gear towing eyes

5. Press the tow bar assy in the forward part of it (near the shock absorber) and make the tow bar assy rotate about the pair of wheels placed in the forward part towards the ground to rotate the tow bar assy around the pair of front wheels. This causes the rear of the tow bar assy to rise and the couplings shaft to approach the landing gear eyelets.

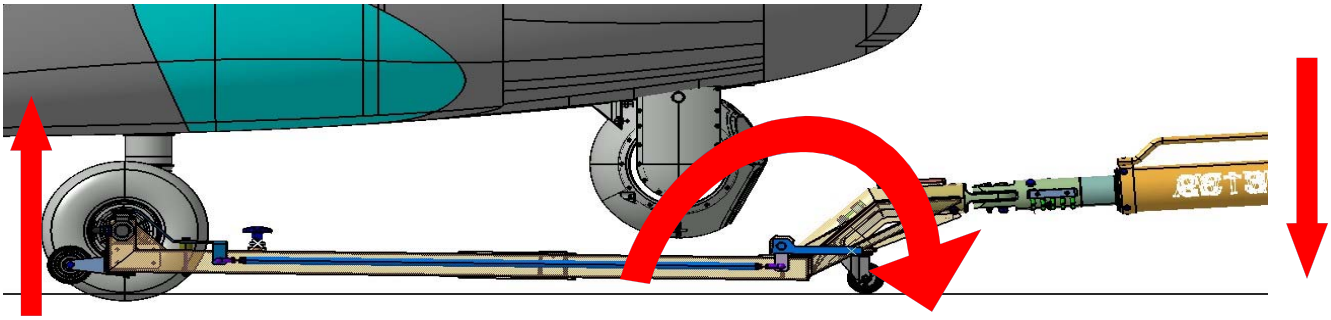

Figure 20: Tow Bar Assy rotation

Caution	Check that the aft fixed wheels are not touching the floor when the coupling shafts are fixed to the landing gear.

6. Align the coupling shafts axes to the landing gear towing eyes: in this position rotate the actuation handle placed in the right side of the tow bar assy until the coupling shafts are in working position (see Figure 21).

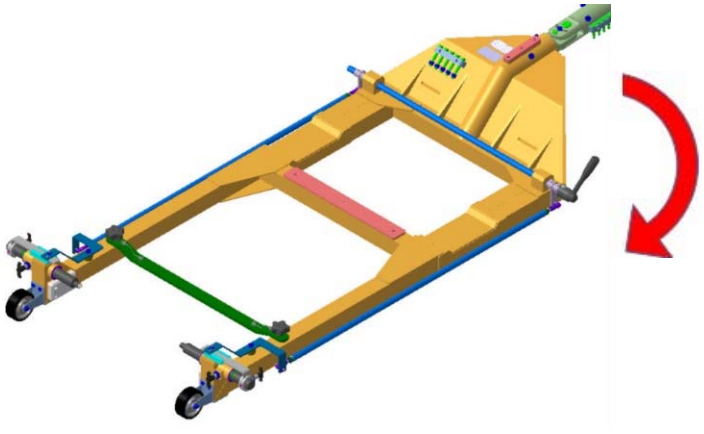

Figure 21: Handle rotation

Caution	Make sure that the fixing pin has automatically entered into the groove. Always check the correct positioning and coupling of the fixing pins. This can be done by trying to move the handle, if this is not possible then the fixing pins are engaged.

7. Bring the tow truck close to the towing eye
8. Using the handle on the shock absorber cylinder (see Figure 4), lift the tow bar assy connecting the towing eye to the interface on the tow truck.

Caution	Always check that the height of the towing eye installed on the tow truck is at maximum 370 mm from the ground and that the aft pair of wheels of the tow bar assy doesn't touch the floor.

Caution	Check that the attachment of the towing eye device with the tow bar has a minimum height from the ground of 320 mm.

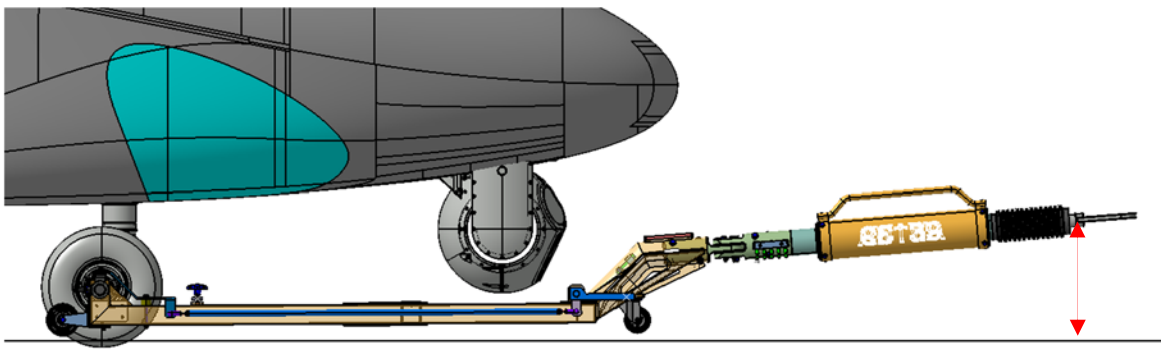

Figure 22: Tow Bar Assy completely installed

7.2 TOW BAR ASSY INSTALLATION WITH PAD/SKI

1. Fixing the configuration pins in the green colored groove C (see Figure 15 and Figure 17).
2. Make the operating steps from 2 to 3 of the paragraph 7.1.
3. Remove the stiffener by unscrewing the supplied knobs. See Figure 16.
4. Rotate the handle located on the right side of the tow bar assy until the inner end of the coupling pins are flush with the structure of tow bar assy, this avoids possible interference with the PAD / SKI (see Figure 23).

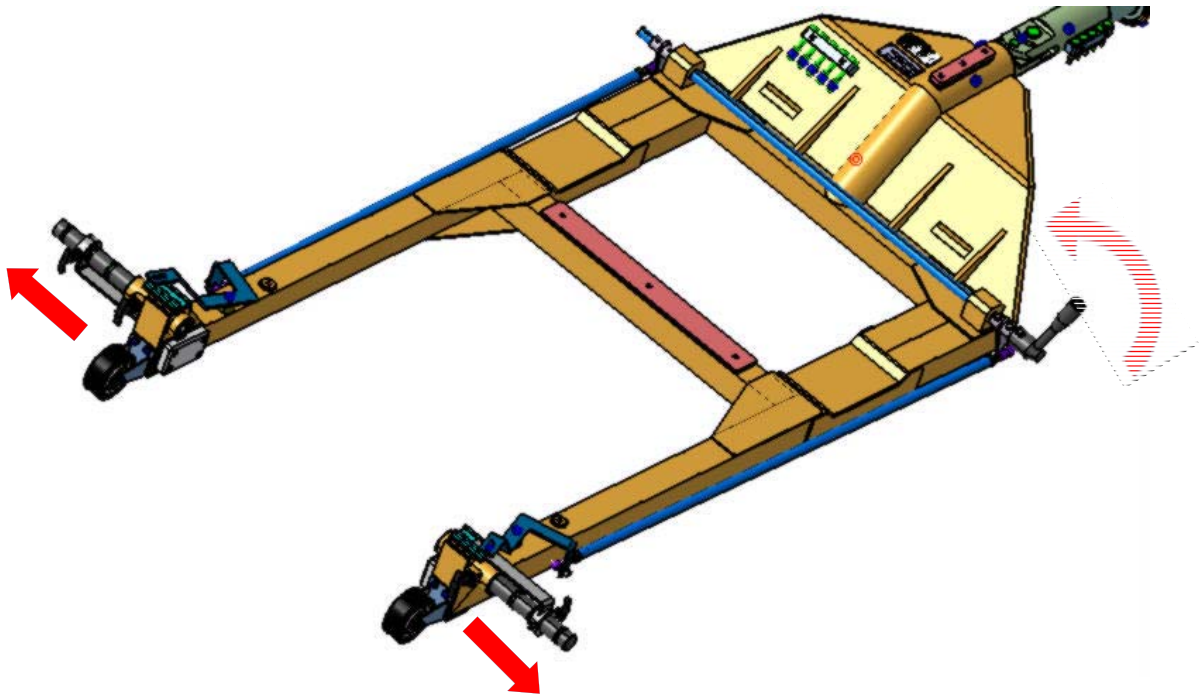

Figure 23: Tow Bar Assy, handle rotation

AVVERTENZA	Make sure that the distance between the two coupling pins creates a free space of at least 650 mm.

5. Make the operating steps from 4 to 6 of the paragraph 7.1.
6. Install the stiffener, fix it with the the supplied knobs.
7. Make the operating steps from 7 to 8 of the paragraph 7.1.

7.3 CONFIGURATION CHANGE

In order to adapt the coupling device to the landing gear with or without the PAD / SKI, it is necessary to set the coupling shafts before the use.

Once the needed configuration is known it's necessary to set the actuation levers placed on the coupling devices as per indications on chapter 6.4.

The setting of a coupling shaft should be done as follows (refer to Figure 14):

- Pull the knob of the configuration pin and rotate it by 90° (pin disengaged, see Figure 17).
- Pull the knob of the fixing pin and rotate it by 90° and move the coupling shaft so that it is free to move.
- Manually move the coupling shaft and change its position to the desired position (white groove if without SKI / PAD, green groove with SKI / PAD) in correspondence of configuration pin.
- Rotate by 90° the knob of configuration pin and make the pin enter the groove on the coupling shaft

 Caution	Make sure that the configuration pin is engaged in the desired groove.

7.4 SAFETY PINS REPLACEMENT

When the breaking loads are overcome, the tow bar assy doesn't allow to perform its primary function, even though the system still remain safe, and needs the substitution of the safety pin, either the axial safety pin or the steering safety pin.

The breaking of a pin is the signal of reaching critical loads conditions. Due to that reason, the operator that is driving the towing truck should safely stop the transportation and the substitution of the safety pin has to be done.

When the payload is secured, the substitution of the safety pin can be done according to the following steps.

a) Axial safety pin replacement

Move the internal rod of the shock absorber just enough the broken parts of the axial pin can be removed.
Remove the residuals of the broken pin, verifying and look for each part (safety pin, washer, nut).
Take a new pin, together with its washer and nut, from the storage on the main structure (see Figure 7).
Align the holes between the internal and external rod and install the new pin, the washer and nut.
Properly fasten the nut.

b) Steering safety pin replacement

Rotate the shock absorber about the steering pin.
Remove the residuals of the broken pin, verifying and look for each part.
Take a new pin, from the storage on the main structure (see Figure 9).
Align the holes between the main structure and the shock absorber end and install the new pin.
Properly fasten the pin

8 SAFETY NOTES

 Warning	The transportation with the Tow Bar Assy should not exceed 6 km/h.

 Warning	During handling, do not exceed the maximum steering angle of 30 °.

 Warning	The Tow Bar Assy machine should be used by officially authorized personnel only.

 Warning	The Tow Bar Assy machine should be used for the functions for which it has been designed (see chapter 7)

 Warning	Whenever the Tow Bar Assy machine is interfaced with other fixtures / equipment it’s necessary to verify the correctness and effectiveness of the connection made.

 Warning	The Tow Bar Assy machine can sustain an axial load of 1500 kg and a steering load of 60 kg before the relative safety pin breaks. Do not use the Tow Bar Assy after the breaking of one or both safety pins.

 Warning	Before carrying out the towing operations it's necessary to verify the correct fixing of each part.

 Warning	Before carrying out handling or transportation it's necessary to verify there are not obstacles.

 Warning	During the towing operations only the authorized personnel should be near the machine. All the operators should keep outside the working zone.

9 GENERAL WARNINGS FOR SAFE USE

The use of the equipment for any operation other than those mentioned in this document is strictly prohibited, unless explicitly authorized by PEC Italia s.r.l.'s technical office.
Before starting to operate, all operators must be properly trained on the operation of the equipment, on assembly and on safety, and especially on the contents of this manual.
Particular attention must be paid during handling, and only experienced personnel trained on residual risks are allowed to approach for possible accompaniment and positioning.
Operators must be learned on the residual risks associated with the use of the equipment and must be prepared on measures to prevent any damage to themselves, third parties, property and the environment in general.
The department manager, who uses the equipment, must ensure that its personnel is trained and must verify compliance with the requirements and instructions, and make sure that the use of the equipment meets the requirements of this manual.

9.1 GENERAL INDICATIONS

- PEC ITALIA S.r.l. declines any responsibility resulting from incorrect use of the equipment.
- Always follow the safety rules and instructions contained in this manual.
- Do not let people unrelated to work approach the unit; the use of the equipment is allowed only to operators qualified for the various operations. These operators must be physically and intellectually suitable people, not under the influence of alcohol, drugs or drugs.

9.2 INDICATIONS FOR USE

- Before starting work, check for any visible defects on the various parts of the equipment.
- Connection and handling must be carried out by expert operators equipped with gloves, safety shoes, helmet and all the individual protections required by law.
- Make sure that no operator, unrelated to the operation, is near the equipment.
- Properly isolate the area subject to the use of the equipment, identify the danger area and make sure it is not accessible to outsiders for the duration of the operations.
- DO NOT USE clothing that can get caught between the parts of the equipment during use (scarves, rings, bracelets, etc.).

- USE overalls, shoes with non-slip soles, protective gloves, helmet.
- The mandatory prescription signs shown in the following Figure must be present in the area of use, which are not to be considered exhaustive as only the Head of the Prevention and Protection Service of the workplace can fully assess the dangers inherent in the area of work.

Figure 24: Compliance signs

9.3 INDICATIONS ON RESIDUAL HAZARDS

Following a careful analysis of the dangers in the design phase, all possible measures were taken to eliminate or minimize the dangers for the operating staff;

- **Risks related to non-compliance with signs:** all operators and people exposed to signs are required to pay attention to the same during all assembly, harness and lifting operations; particular attention must be given to signs indicating personal protection equipment such as shoes, gloves, overalls and helmet and to the signs indicating "suspended loads".

PEC Italia S.r.l. disclaims any liability for the non-presence and observance of the same. The general signs highlighting the dangers are the responsibility of the user of the equipment.

- **Risks deriving from moving parts**: during lifting operations the operator must move outside the dangerous area included in the range of action of the same and must also be constantly checked that no one approaches the area near parts in movement. It is forbidden to transit or stand under suspended loads and in the equipment handling area.
- **Risks related to relative positioning and assembly:** carefully comply with the instructions in this manual.
- **Risks relating to errors or human behaviour:** anyone who operates must be adequately trained, must have read and understood the contents of this Manual;
- **Risks due to the inefficiency of the safety systems**: in order to avoid all the dangers deriving from the inefficiency of the safety systems, make sure to periodically check for correct operation.

10 PREPARATION OF THE OPERATING SITE

10.1 CONNECTION OF THE EQUIPMENT TO THE DEDICATED INTERFACES

The equipment can be interfaced in correspondence of:

- the coupling shafts to the helicopter's nose landing gear when configured alone or with NLG Slump Pad and with NLG Snow Ski;
- the towing eye shaft to the towing truck, for towing operations.

10.2 PREPARATIONS AND CHECKS BEFORE USE

Before each use, the following must be done:

- a visual check of all the connecting parts to highlight incorrect assembly and any defects, residual deformations or signs of wear / damage.
- A check of the end connections, verifying that they are fixed and that the stem cannot move.
- Verification of all the functionalities of the tool, in accordance with what is illustrated in chapter 6.

11 STORAGE

The tow bar assy must be stored in a covered environment with standard conditions to avoid corrosive phenomena. Make sure that the rotating parts are clean and adequately greased before storage. Possibly for long-term storage, it is suggested to cover the machine with a waterproof PVC sheet to avoid the deposit of dust or other impurities.

11.1 PREPARATION FOR THE STORAGE

Apply grease (Ref. MIL-PRF-23827) on the threaded elements and / or pins. Check the state of lubrication and greasing of the moving parts, if necessary restore.

12 MAINTENANCE

It is necessary to perform all routine maintenance operations before using the tool. The procedures to be implemented are indicated below.

 Notice	For maintenance of commercial components, refer to the manufacturers' technical manuals.

12.1 CLEANING

Before each inspection and each use, clean the Tow Bar Assy according to the procedures described below.

Purpose of cleaning

The parts after cleaning must be free from any processing residue or other impurities.

Manual Cleaning

- Carry out a general cleaning of the painted metal surfaces with a soft clean cloth moistened with a cleaning solvent (MIL-PRF-680C, Type II or with similar characteristics).
- Repeat the cleaning process with another cloth without wetting it with solvent.
- Drying. Check that the product has not left stagnation in any cavity. Normally the solvent evaporates in a short time at room temperatures.

12.2 GREASING AND LUBRICATION

Every 12 months and / or when deemed necessary, grease the part of the rod protruding from the shock absorber cylinder, all the bushing and mechanisms with generic lithium grease.
Once the parts have been greased, move to check their functionality.

12.3 CHECKS

Notice	Before each use and at least once a year, carry out a complete check of the machine Tow Bar Assy.

Examine all parts for:

1. Loose parts
2. Worn parts
3. Parts disconnected
4. Evidence of an impact
5. Breakage or flaking
6. Cracks in mechanical elements
7. Wear
8. Distortions
9. Oxidation / Corrosion

Case 1. Simply restore the tightening of the screws, in accordance with EN 1090-2.

Case 2. Replacement of STD worn parts. (Data Screws Etc.) of the type indicated in the drawing Case 3. Restore the binding of the loose part.

Case 4/9. **Take the machine out of service**: Extraordinary maintenance is required. Contact the manufacturer to agree on the necessary interventions for restoring and putting back into service.

12.4 COMPONENTS REPLACEMENT

All and only the parts which may be replaced are listed in chapter 13. The replacement of these parts does not require the application of particular procedures, always and in any case carried out in accordance with the rules of the art.

13 LIST OF SPARE PARTS

1

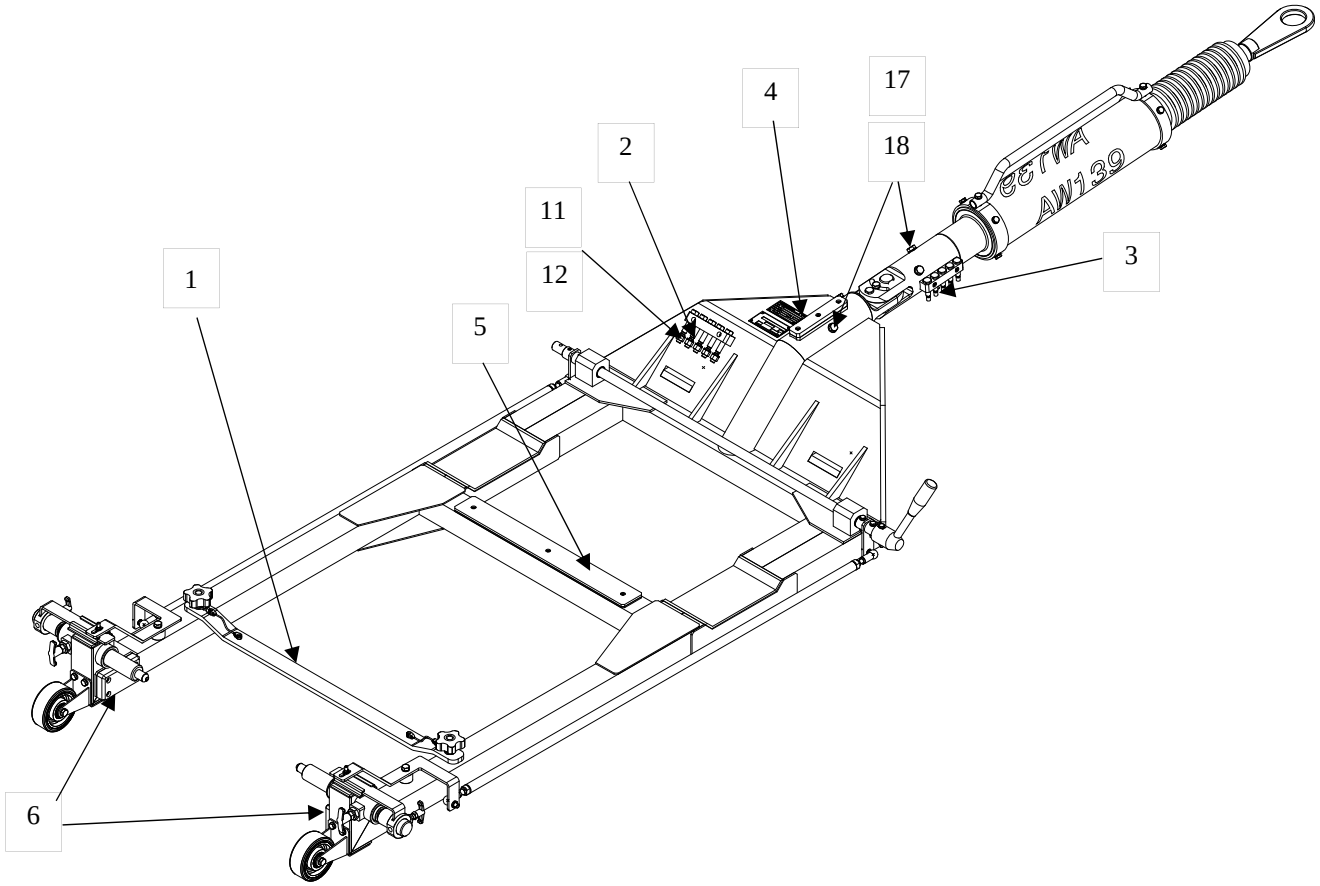

Figure 25: Spare Parts

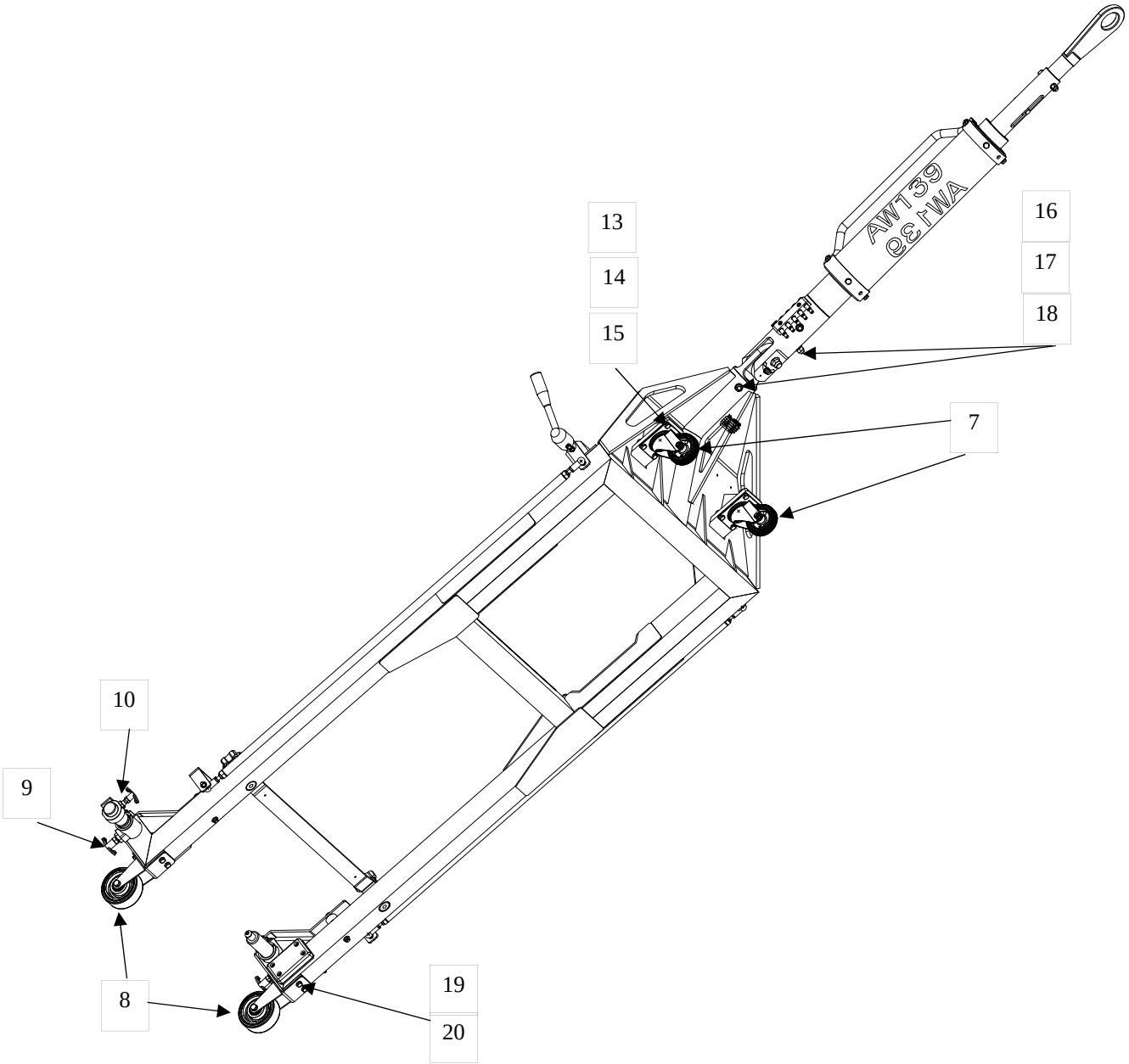

Figure 26: Spare Parts

ITEM	P/N	Description	Supplier	Q.ty
1	PEC-139-015-01-14	Stiffener assy	PEC	1
2	PEC-139-015-02-09	Safety pin	PEC	6
3	PEC-139-015-02-12	Safety pin	PEC	6
4	PEC-139-015-02-35	Pad	PEC	1
5	PEC-139-015-02-28	Pad	PEC	1
6	PEC-139-015-02-31	Pad	PEC	2
7	53-SL-D80	Wheel	CAT. TELLURE ROTA	2
8	642152	Wheel	CAT. TELLURE ROTA	2
9	22110.0936	Index Plunger	CAT. HALDER	2
10	22110.0922	Index Plunger	CAT. HALDER	2
11	MS21044D6	3/8-24 UNJF Self Locking Hexagon Nut		6
12	NAS1149C0633R	Washer		6
13	AN5-6A	Hexagon screw 5/16-24 UNF		8
14	AN315-5R	Plain hexagon nut 5/16-24 UNF		8
15	NAS1149C0563R	Washer 5/16		8
16	AN315-7R	Plain hexagon nut 7/16-20 UNF		4

ITEM	P/N	Description	Supplier	Q.ty
17	NAS1149C0763R	Washer 7/16		4
18	AN7-36	Hexagon screw 7/16-20 UNF		4
19	AN5-4A	Hexagon screw 5/16-24 UNF		8
20	NAS1149C0563R	Washer 5/16		8
21	MS24694-S56	Countersunk screw 10-32 UNF		4

14 ATTACHMENTS

Annex I: 2D Drawing Tow Bar Assy PEC-139-015-01.