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OPERATOR'S MANUAL

REAR EXTENSION ARMS

KWT 550 (E, EP)
KWT 650 (E, EP)
KWT 651 (E, EP)
CAMEL 900 (EP)
KOLIBER 400 (EP)
KOLIBER 450 (EP)

MOWING HEADS

KW 110
KW 111
KW 125
KW 126
KW 140
KW 141
LAMA 101 (P)
LAMA 120
LAMA 121 (HD)
LAMA 140
LAMA 141

Serial no.

IN347USA012
2018.05.10
EDITION NO. 12

Translation of the original manual

DO NOT
START THE DRIVE UNLESS
THE MOWING HEAD IS
IN ITS WORKING
POSITION

DO NOT
OPERATE THE MACHINE
WITH UNAUTHORIZED
PERSONNEL PRESENT WITHIN
170' / 50 M FROM THE MACHINE

NOTE:
Keep this manual for future use.

Well-proven design with thousands of machines in regular use in many countries and quality materials used ensure high durability and reliability of SaMASZ machines.

We congratulate you on the purchase of your new SaMASZ machines and wish you much pleasure and the very best work results through the years to come.

Table of contents **page**

1. IDENTIFYING THE MACHINE

Data plate is attached on both extension arm and mowing head and placed as provided in **Fig. 1**, **Fig. 2** and **Fig. 3**.

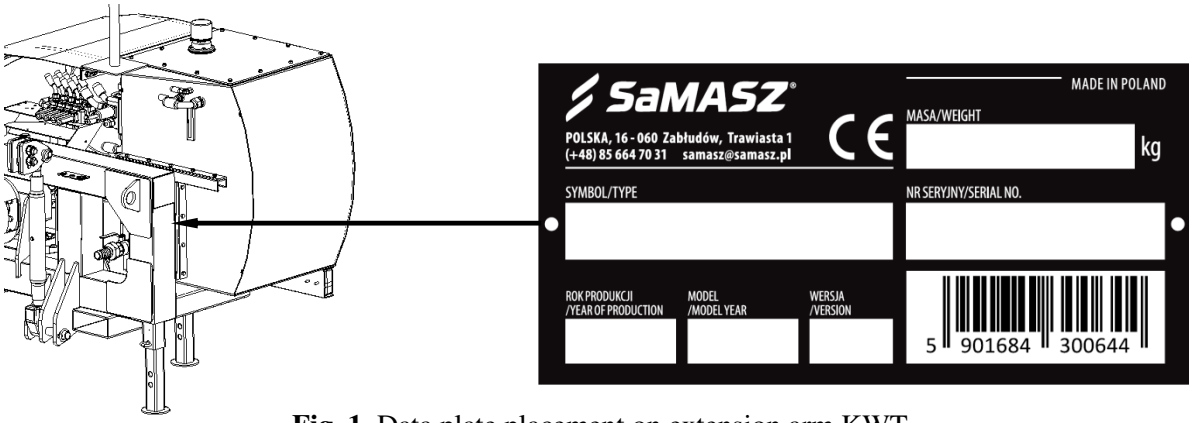


Fig. 1. Data plate placement on extension arm KWT

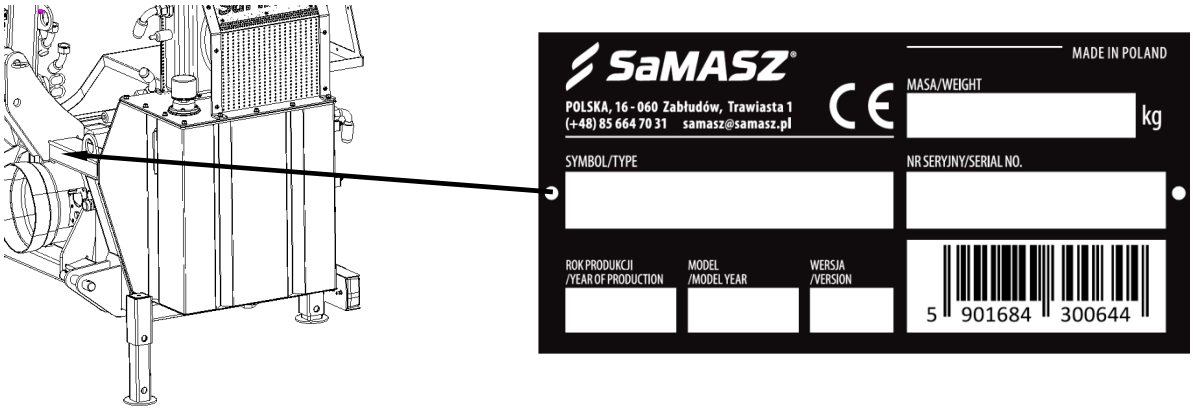


Fig. 2. Data plate placement on extension arm KOLIBER 400

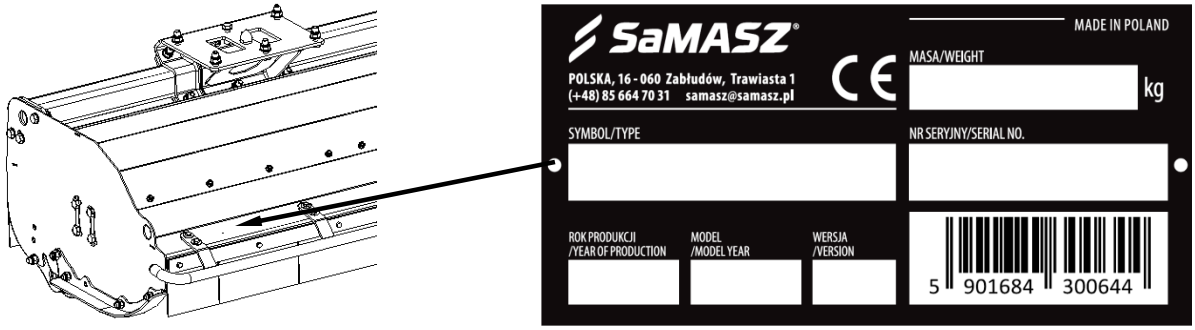


Fig. 3. Data plate placement on mowing head

Data plate includes:

- full name of the manufacturer,
- id number,
- machine symbol,
- date of manufacture,
- version number,
- machine's weight,
- quality management sign,
- CE marking means, that the machine is conform with Directive 2006/42/EC and harmonized standards,
- country of manufacture,
- bar code.

NOTE:
Should the contents of the herein manual be unclear, ask the manufacturer or your dealer for more detailed information on the machine.

2. INTRODUCTION

- This operator's manual should be considered the machine's basic equipment and should be kept for further reference. If the machine is handed over to another user, it should be serviceable, and include this operator's manual, CE declaration of conformity and its required basic equipment.
- Before operating the machine its user must familiarize himself with this manual as well as current work safety rules.
- The machine is manufactured according to international safety rules.
- Respecting recommendations herein shall ensure use safety.
- Should you have any questions relating to the operation and service of the machine, please contact the manufacturer.

GENERAL PRECAUTION

When operating the machine always respect warnings and safety rules marked with this sign.

NOTE:

Operating the machine without reading the contents of the manual, and by unauthorized personnel, children in particular, is strictly forbidden.

3. INTENDED USE

The extension arm can be equipped with mowing heads offered by the SaMASZ co. Machine are designed for treatment of land drainage ditches in particular as well as mowing of road shoulders, shredding thinner, small shrubs, weeds, etc. of moderate concentration as well as mowing road shoulders, slopes, counter-slopes and ground at tractor's right side. Moreover the machine can be used to trim hedges both in vertical and in horizontal position. Extension arms work properly on grass (and other plants) with height up to 1.0 m.

Extension arms are mounted on tractors of adequate power (**Tab. 1, Tab. 2, Tab. 3**). Mounting the arm is performed on rear 3-point linkage, with which are farming tractors equipped as standard. Rear PTO must be set on 540 rpm (upon special order 1000 rpm). When operating a tractor with 1000 rpm PTO shaft adjust the rpm so that the shaft rotates at 540 rpm. Thus the operation becomes economic.

CAUTION!

With such setting make sure the PTO shaft rpm is no higher than 540 rpm.

WARNING!

Do not use the machine for purposes other than those listed in this manual. Otherwise it will be classified as misuse and could release the manufacturer from responsibility for any damages. The machine should be used, serviced and repaired only by personnel familiar with its characteristics and with safety regulations. Tampering with the machine may release the manufacturer from responsibility for any resulting malfunctions or damages.

CAUTION!

Basing on experience, upon driving onto single shrub with section up to approx. 1 in / 2 cm, the tractor should be stopped for a while, until the machine shreds the shrub at the ground, and then slowly with intervals drive forward, so there occurs no cutterbar locking.

3.1. Technical data

SaMASZ manufactured extension arms are adjusted to operate with numerous mowing heads and feature the following parameters shown in **Tab. 1, Tab. 2, Tab. 3** and **Tab. 4**.

Tab. 1. General specification of extension arms

Extension arm type (without mowing head)	**KWT 550**	**KWT 650**	**KWT 651**	**KOLIBER 400**	**KOLIBER 450**	**CAMEL 900**
Extension arm operating reach [ft in / m]	16′ 3″ / 4.95	19′ / 5.80	19′ / 5.80	10′ 10″ / 3.30	12′ 6″ / 3.80	26′ 3″ / 8.0
Min. tractor weight with heads KW 125, KW 126, KW 140, KW 141, LAMA 101 (P), LAMA 140, LAMA 141 [lbs / kg]	9921 / 4500*	12,125 / 5500*	12,125 / 5500*	–		
Min. tractor weight with heads KW 110, KW 111, LAMA 120, LAMA 121 [lbs / kg]	8818 / 4000*	11,023 / 5000*	11,023 / 5000*	–		
Min. tractor weight with heads LAMA 120, LAMA 121[lbs / kg]	–			5291 / 2400*	6393 / 2900*	16,535 / 7500*
3-point linkage category	II					
PTO rpm [rpm]	540 – standard / 1000 - upon special order					
Min. tire load capacity index	140 A8			125 A8		173 A8
Transport diameters height×width×length [ft in / m]	11′ 6″x6′ 5″x3′ 1″ 3.50x1.95x0.95			8′ 10″x5′ 11″x2′ 7″ 2.7x1.8x0.8	9′ 6″x6′ 3″x2′ 7″ 2.9x1.9x0.8	13′ 1″x6′ 3″x3′ 11″ 4.0x1.9x1.2
Minimal tractor power [HP]	from 80	from 90		from 55		from 120
Drive and control (in standard)	hydraulic		electric	hydraulic		
Weight [lbs / kg]	2326 / 1055	2513 / 1140	2756 / 1250	1168 / 530	1279 / 580	3020 / 1370
Oil level [L]	220	220	220	150	150	220
Pump output [kW]	33 (180 bar) / 38 (210 bar)					
Pump capacity [L/min.]	90					

* The basic mass of the tractor, without additional loads.

Tab. 2. General specification of mowing heads KW

Mowing head type	**KW 110**	**KW 111**	**KW 125**	**KW 126**	**KW 140**	**KW 141**
Operating width [ft in / m]	3′ 7″ / 1.10	3′ 7″ / 1.10	4′ 1″ / 1.25	4′ 1″ / 1.25	4′ 7″ / 1.40	4′ 7″ / 1.40
Number of knives [pcs]	10	12	10	14	12	16
Max. diameter of shredded shoots [in / cm]	3″ / 8	3″ / 8	3″ / 8	3″ / 8	3″ / 8	3″ / 8
Required pump delivery rate [L/min]	90 ÷ 100					
Hydraulic pressure [bar]	210					
PTO rpm [rpm]	540					
Drive and control	hydraulic					
Weight [lbs / kg]	639 / 290	551 / 250	584 / 265	595 / 270	728 / 330	639 / 290

Tab. 3. General specification of mowing heads LAMA

Mowing head type	**LAMA 101 P**	**LAMA 120**	**LAMA 140**	**LAMA 121**	**LAMA 141**	**LAMA 121 HD**
Operating width [ft in / m]	3′ 3″ / 1.00	3′ 11″ / 1.20	4′ 7″ / 1.40	3′ 11″ / 1.20	4′ 7″ / 1.40	3′ 11″ / 1.20
Number of knives [pcs]	30	20	24	20	24	20
Max. diameter of shredded shoots [in / cm]	1″ / 2	1″ / 2	1″ / 2	1.5″ / 3.5	1.5″ / 3.5	1.5″ / 3.5
Required pump delivery rate [L/min]	90 ÷ 100					
Hydraulic pressure [bar]	210					
PTO rpm [rpm]	540					
Drive and control	hydraulic					
Weight [lbs / kg]	551 / 250	408 / 185	452 / 205	540 / 245	584 / 265	595 / 270

Summary and scheme of operating reach of each extension arm with mowing heads along with marking are provided in **Tab. 4, Fig. 4** and **Fig. 5.**

Tab. 4. Operating reach of extension arm with mowing head

Operating reach of extension arm with mowing head [cm]							
	A	**B**	**C**	**D**	**E**	**F**	**G**
KWT 550 / KW 110	**570**	440	370	110	640	290	190
KWT 550 / KW 111	**580**	450	380	110	640	290	190
KWT 550 / KW 125	**570**	450	370	130	640	290	190
KWT 550 / KW 126	**595**	465	395	130	660	290	190
KWT 550 / KW 140	**580**	450	380	150	650	290	190
KWT 550 / KW 141	**610**	480	410	140	680	290	190
KWT 550 / Lama 120	**580**	450	370	120	650	290	190
KWT 550 / Lama 140	**600**	470	390	140	670	290	190
KWT 550 / Lama 121	**590**	460	390	120	650	290	190
KWT 550 / Lama 141	**610**	480	410	140	680	290	190
KWT 550 / Lama 101 P	**550**	420	340	100	620	200	190
KWT 550 / Lama 121 HD	**590**	460	390	120	650	290	190
KWT 650 / KW 110	**660**	530	460	110	720	300	190
KWT 650 / KW 111	**670**	540	470	110	720	300	190
KWT 650 / KW 125	**660**	530	460	130	720	300	190
KWT 650 / KW 126	**685**	565	485	130	750	300	190
KWT 650 / KW 140	**670**	540	470	150	730	300	190
KWT 650 / KW 141	**700**	580	500	140	760	300	190
KWT 650 / Lama 120	**670**	540	465	120	730	300	190
KWT 650 / Lama 140	**690**	560	485	140	750	300	190
KWT 650 / Lama 121	**680**	550	480	120	740	300	190
KWT 650 / Lama 141	**700**	580	500	140	760	300	190
KWT 650 / Lama 101 P	650	320	460	100	720	190	190
KWT 650 / Lama 121 HD	**680**	460	480	120	650	290	190
KWT 651 / KW 110	**625**	530	410	110	720	300	190
KWT 651 / KW 111	**635**	530	420	110	720	300	190
KWT 651 / KW 125	**625**	530	410	130	720	300	190
KWT 651 / KW 126	**650**	545	435	130	740	300	190
KWT 651 / KW 140	**635**	540	420	150	730	300	190
KWT 651 / KW 141	**665**	560	450	140	750	300	190
KWT 651 / Lama 120	**630**	540	415	120	730	300	190
KWT 651 / Lama 140	**650**	560	435	140	750	300	190
KWT 651 / Lama 121	**645**	540	430	150	730	300	190
KWT 651 / Lama 141	**665**	560	450	140	750	300	190
KWT 651 / Lama 101 P	625	320	410	620	200	190	420
KOLIBER 400 / LAMA 120	**410**	310	270	120	455	220	-
KOLIBER 400 / LAMA 121	**420**	320	280	120	455	220	-
KOLIBER 450 / LAMA 120	**460**	345	315	120	502	250	-
KOLIBER 450 / LAMA 121	**470**	355	325	120	502	250	-
CAMEL 900 / LAMA 120	**900**	690	650	120	960	520	-

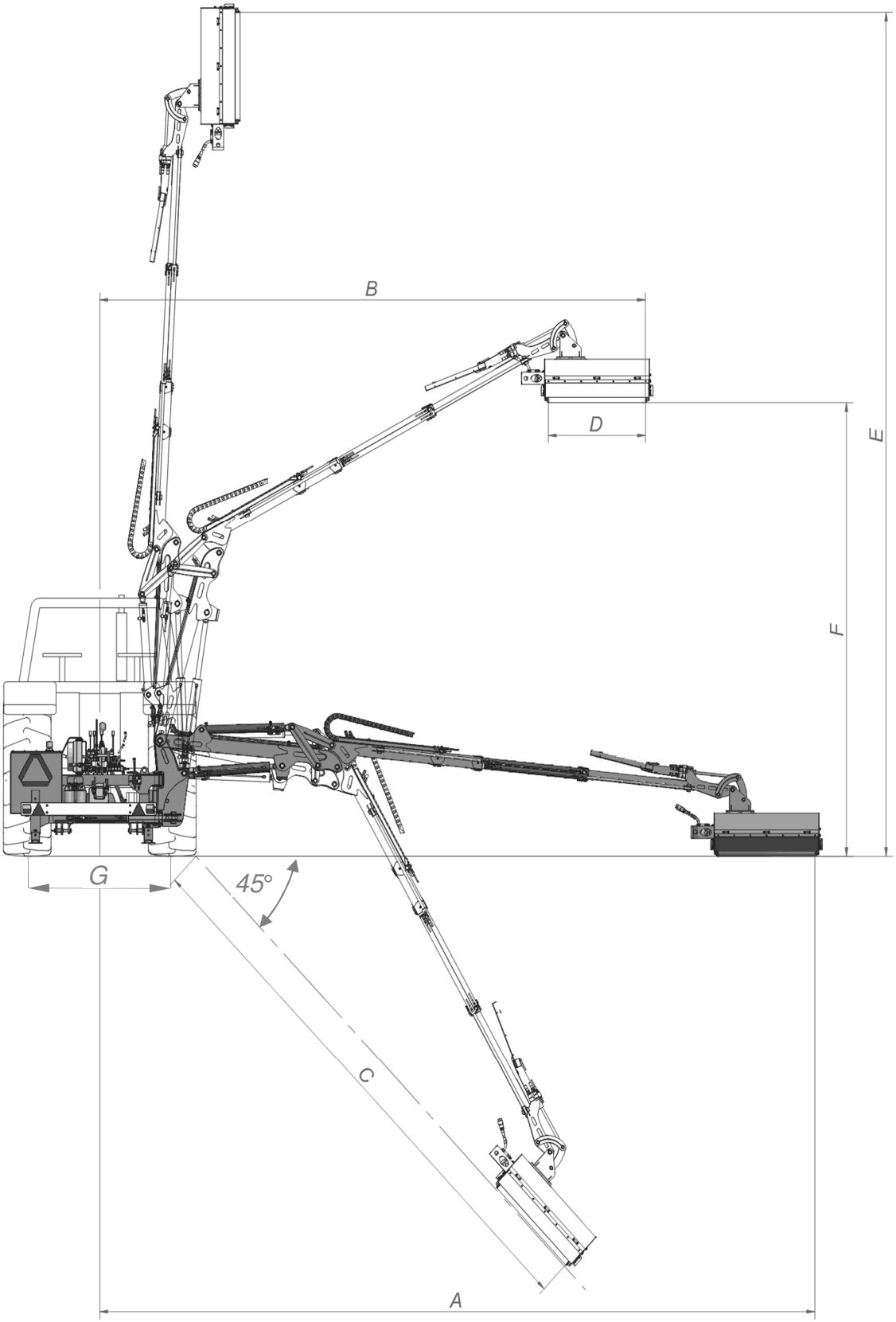


Fig. 4. Scheme of operating reach of extension arm with mowing head with marking type: KWT 550/650, KWT 651 and CAMEL 900

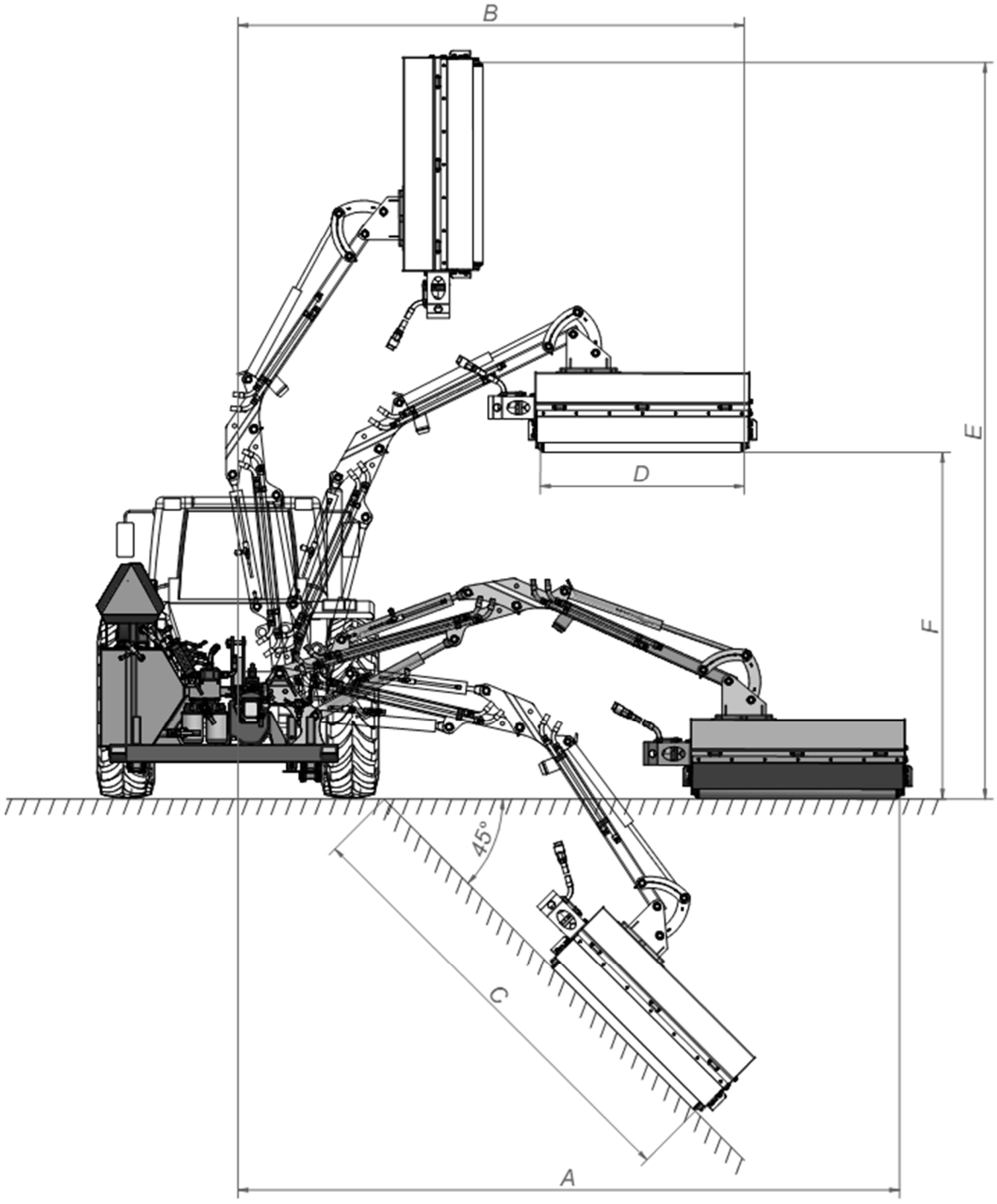


Fig. 5. Scheme of operating reach of extension arm with mowing head with marking type: KOLIBER 400

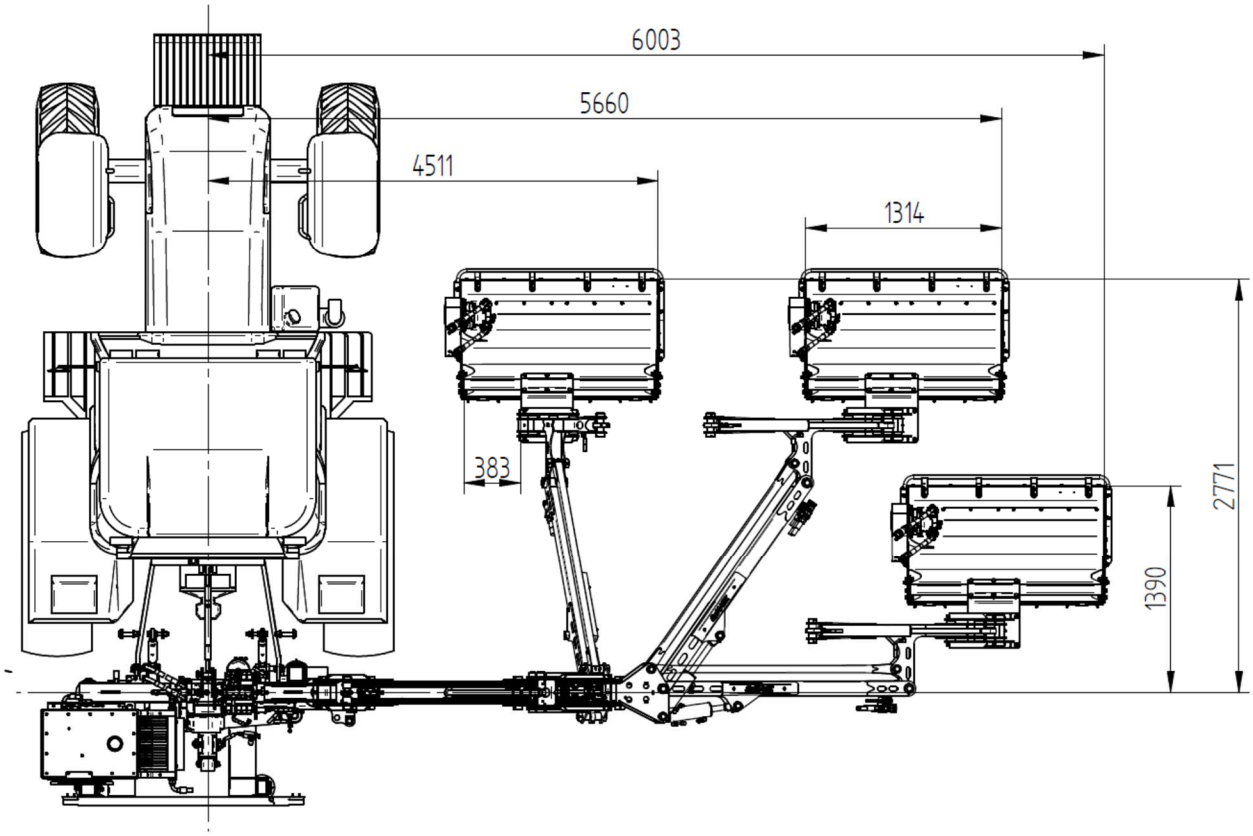


Fig. 6. Operating reach of extension arm KWT 651 with mowing head to the right of tractor

3.2. Design and working principle

3.2.1. Extension arm

Extension arm comprises basic assemblies shown in **Fig. 7 – Fig. 11**.

1- Lifting and lowering cylinder
2- Lifting and lowering cylinder
3- Long boom
4- Head cylinder
5- Mounting eye
6- Mowing head
7- Rotor
8- Support leg
9- Hydraulics with oil tank
10- Multiplier
11- Linkage
12- Telescopic extension arm
13- Telescope's cylinder
14- Gauge plate cylinder
15- Control panel
16- Joystick
17- Closed housing

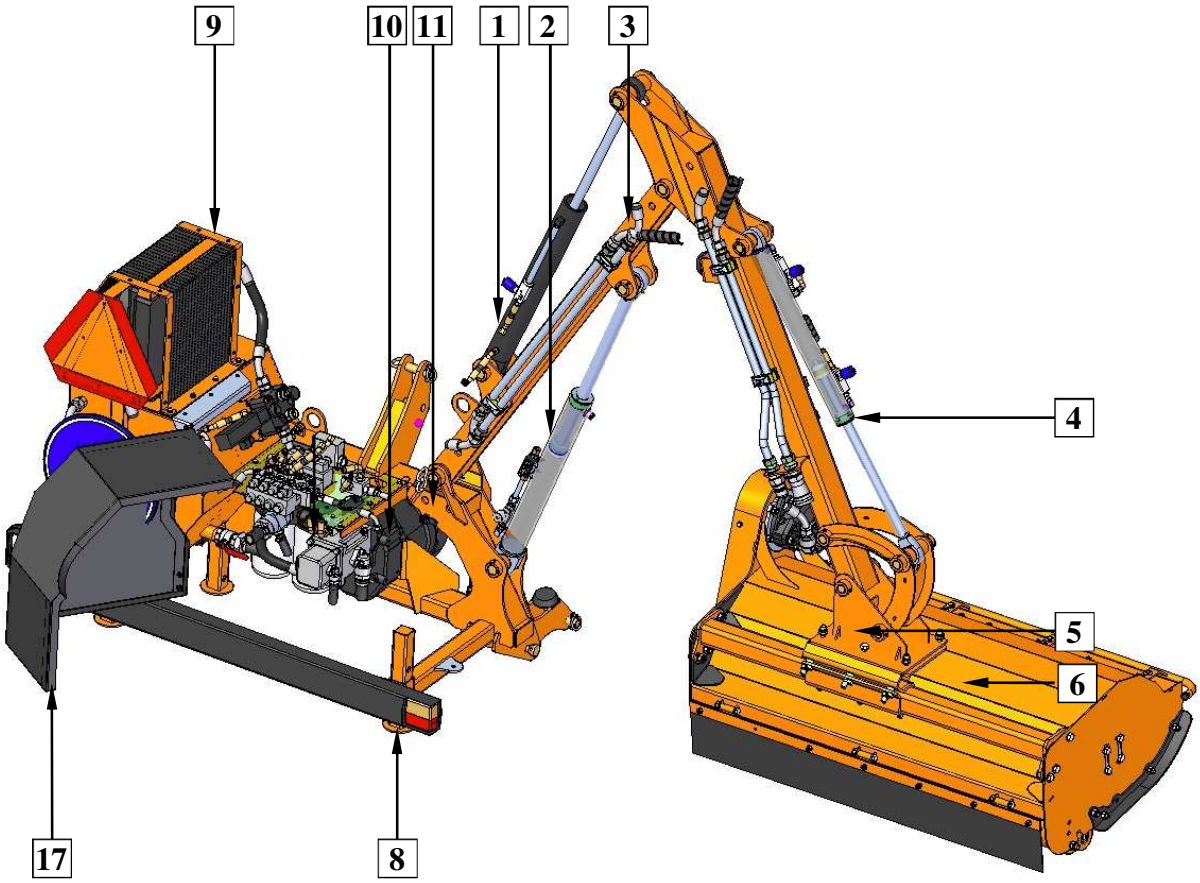


Fig. 7. Overview of Koliber extension arm

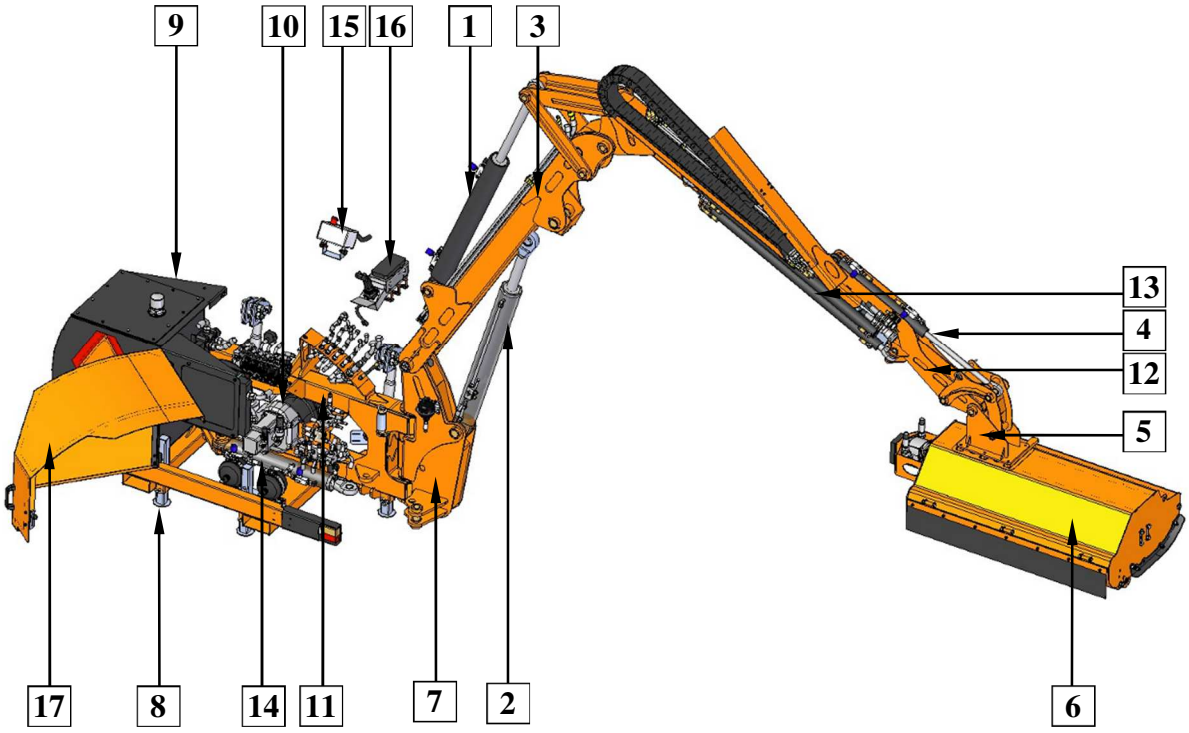


Fig. 8. Overview of CAMEL extension arm

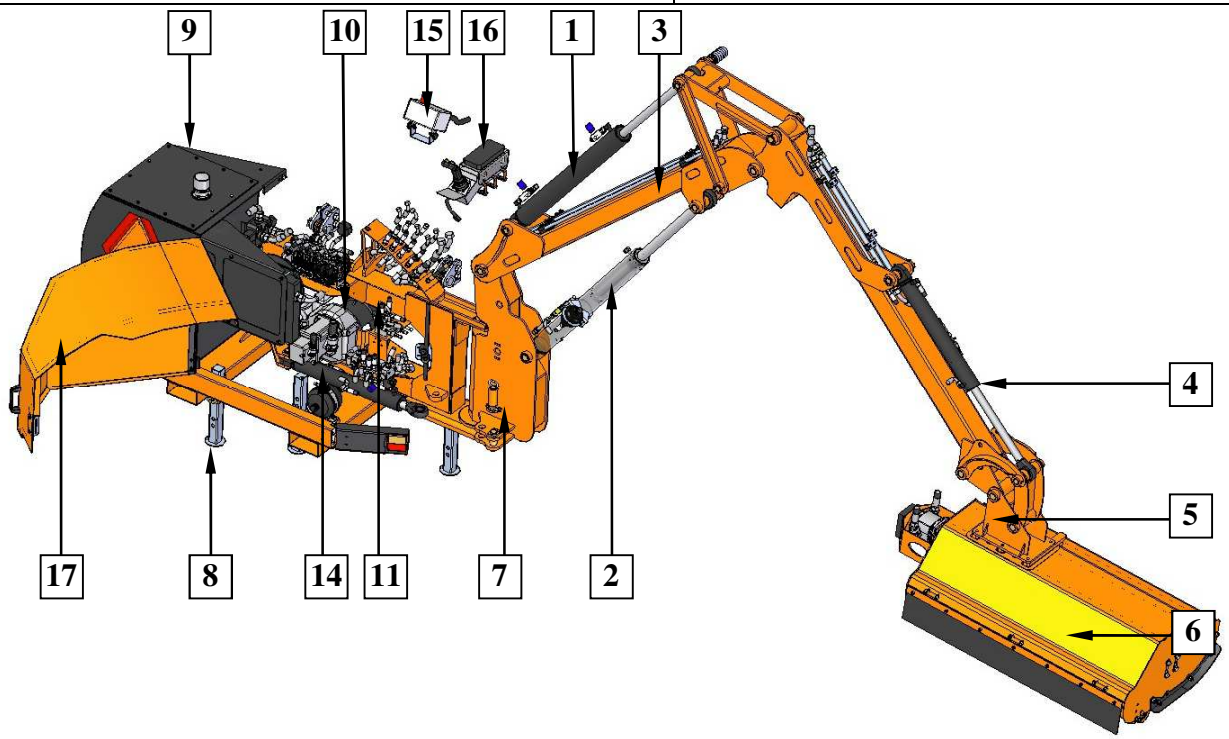


Fig. 9. Overview of KWT 550 extension arm

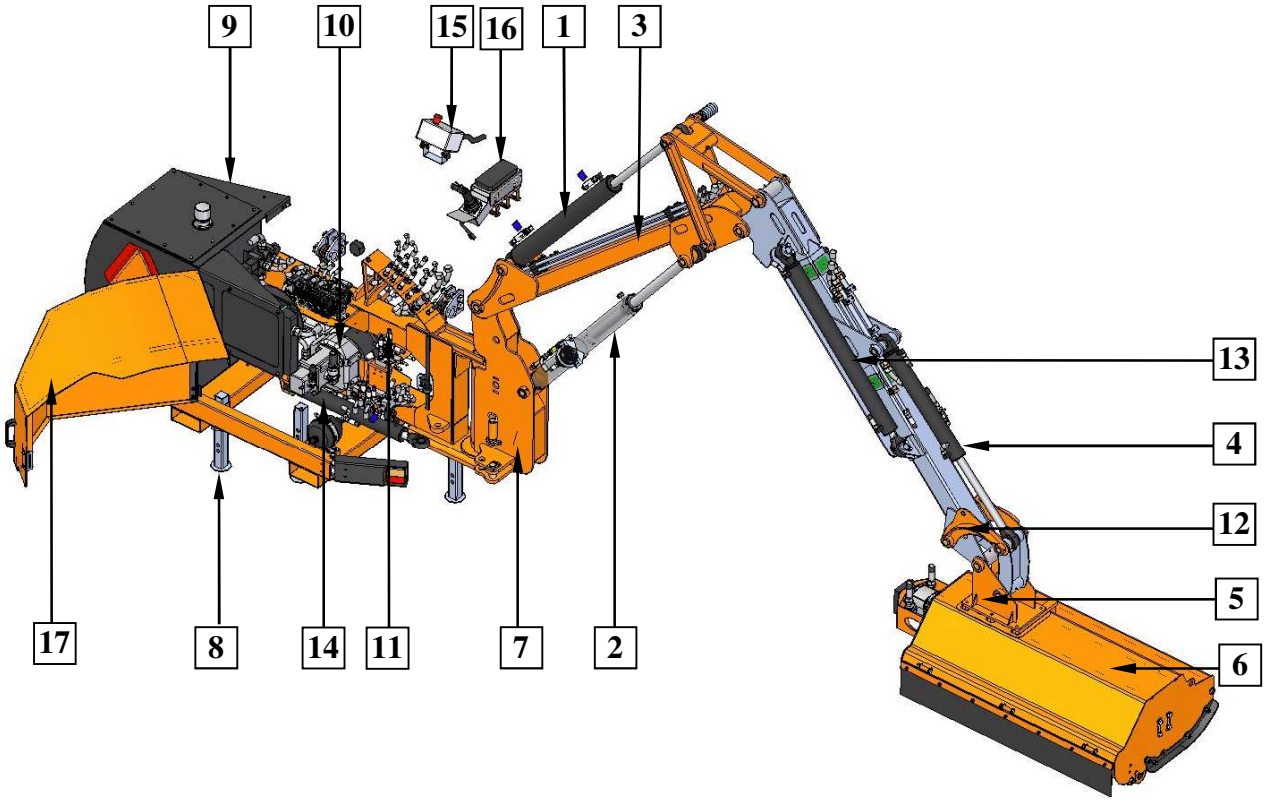


Fig. 10. Overview of KWT 650 extension arm

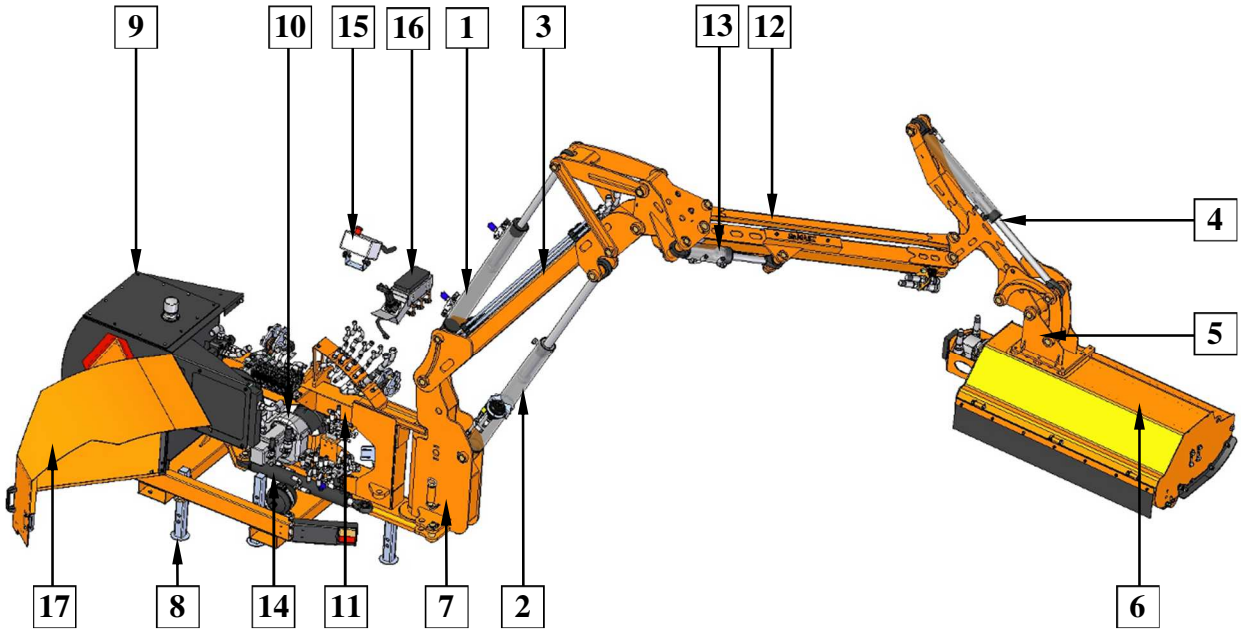


Fig. 11. Overview of KWT 651 extension arm

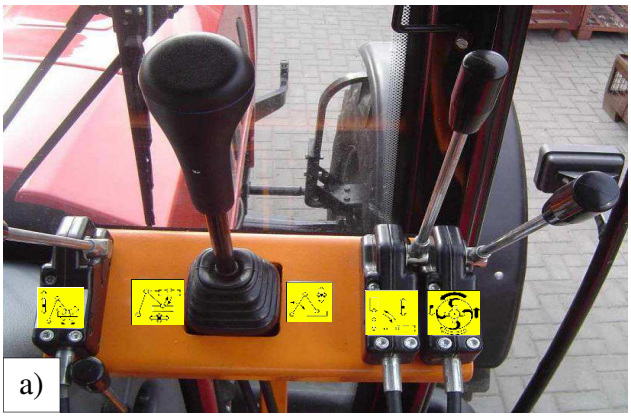
Extension arm is equipped with independent hydraulics with oil cooler and oil tank (**9**). Rotor's drive and extension arm control is possible owing to own hydraulic pumps assembly driven by multiplier (**10**), transmitter's shaft without coupling and tractor's PTO. Controlling extension of telescopic extension arm is done directly from the tractor's hydraulics (KWT 650, CAMEL 900 with mechanical control) by means of telescope actuator (**13**), and extension arms are moved with hydraulic actuators (**1** and **2**).

Controlling operation of extension arms is performed from tractor's cabin with use of control panel (**15**), equipped with a cylinder control handle and a joystick (**1, 2, 4** and **14**). With use of corresponding handles, the operator can set position of machine's movable assemblies.

Use of cylinder (**14**) controlled rotor (**7**) enables extension arm to be set in transport position. Working extension arms are protected against overloads by gauge plate cylinder (**14**) equipped with sweep valve (item 6.5.7). While head's cylinder (**4**) acts as head's rotation (**6**).

CAUTION!

Extension of telescopic extension arm causes shifting of centre of gravity of the set (tractor, machine) what may cause alternation of its stability. It is recommended to extend the extension arm just above the ground.



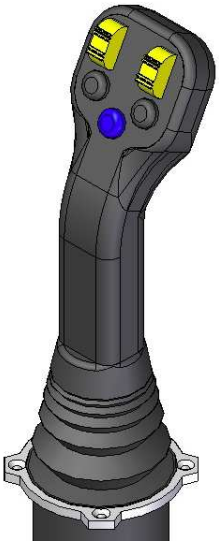


Fig. 12. Machine's control panel with option: a) **mechanical** (KWT 550/650, CAMEL 900, KOLIBER 400/450), b) **electrical** (KWT 550 E, KWT 650 E, KWT 651 E, KOLIBER 400EP/450 EP), c) **electrical proportional** (KWT 550 EP, KWT 650 EP, KWT 651 EP, CAMEL 900 EP)

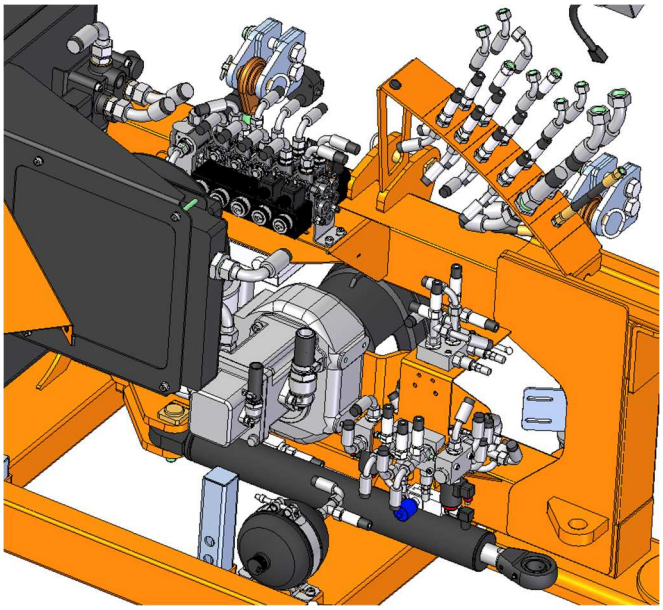


Fig. 13. Hydraulics with oil tank and KWT mower radiator

Fig. 14. Multipliers with hydraulic pumps

3.2.2. Mowing head

All mowing heads (KW, Lama) adjusted to operate with extension arms have similar construction. Construction scheme of mowing head is provided in **Fig. 15.**

Operating assembly of extension arm is a mowing head (**6**), which comprises flail bar (**20**) with flail knives (**21**) for different purposes (item 6.4), screwed with mounting bolts (knife type depends of kind of surface mowed (grass, bushes, hay, cornstalks). Flail shaft (**20**) of mowing head is driven by hydraulic engine (**23**). Ground following bar (**22**) features mowing height adjustment function (item 6.3). It is protected with metal sheet guards from each side. Cutterbar can be rotated in relation to linkage axis by approx. 230°.

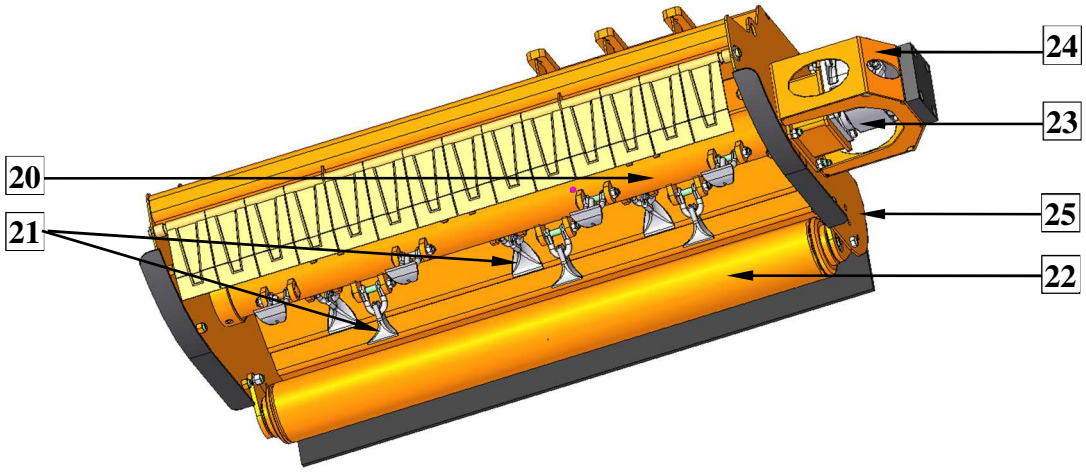


Fig. 15. Overview of mowing head

20 - Flail bar
21 - Flail knives
22 - Ground following bar
23 - Hydraulic pumps' engine
24 - Engine guard
25 - Housing

Lama 121/141 head comprises flail shaft (**20**) with flail knives (**21**) of different application (Section 6.4) mounted with mounting screws (knife type depending on type of material cut: grass, shrubs, straw, corn stalks). Flail shaft (**20**) of mowing head is driven by hydraulic motor (**23**) through belt gear (**24**) with v-belt. Ground following roller (**22**) has mowing height adjustment function.

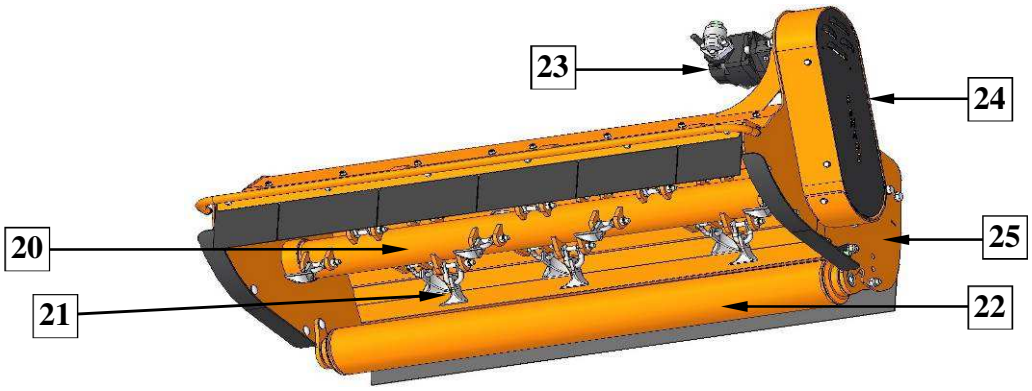


Fig. 16. Overview of mowing head Lama 121/141

20 - Flail bar
21 - Flail knives
22 - Ground following bar
23 - Hydraulic pumps' engine
24 - Belt gear
25 - Housing

Lama 101P (**Fig. 17**) – mowing head with ejection comprises flail shaft (**20**) with flail knives (**21**) mounted with mounting screws. Alike KW and Lama heads, the flail shaft (**20**) of mowing head is driven by hydraulic motor (**23**). Ground following shaft (**22**) has mowing height adjustment function (Section 6.3). Ejector (**19**) comprises a fixed and a movable part, and the latter is controlled with hydraulic motor driven directly from the tractor's hydraulics.

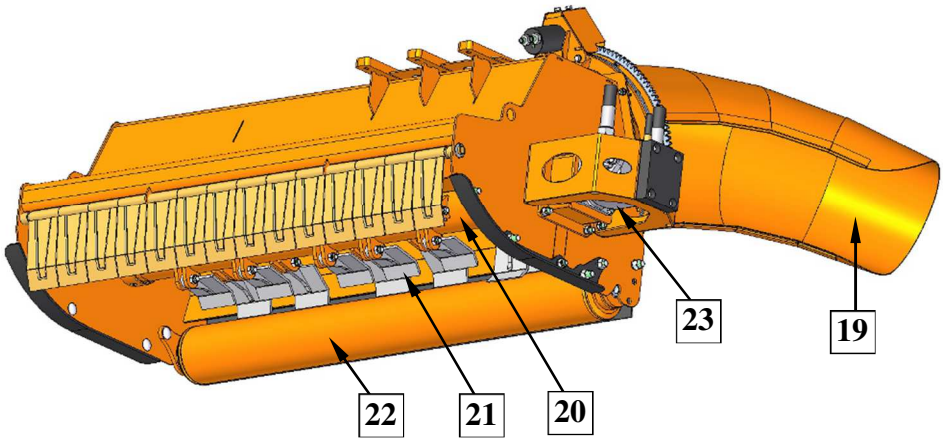


Fig. 17. Overview of Lama 101P mowing head with ejection

19 - Ejector
20 - Flail bar
21 - Flail knives
22 - Ground following bar
23 - Hydraulic pumps' engine

KW 111/126/141 (**Fig. 18**) – mowing head consists of flail shaft (**20**) with flail knives (**21**) dedicated for various purposes (flail type depends on the type of cut material: grass, bushes, straw, corn stalks). Machine is equipped with adjustable counter-knife (**25**). Flail shaft is powered by hydro-motor (**23**) and power is transferred through speed-belt gear (**24**). Slide bar is a part of the machine and the plate mount (**27**) can be easily adjusted. Ground shaft (**22**) has a cutting height adjustment function.

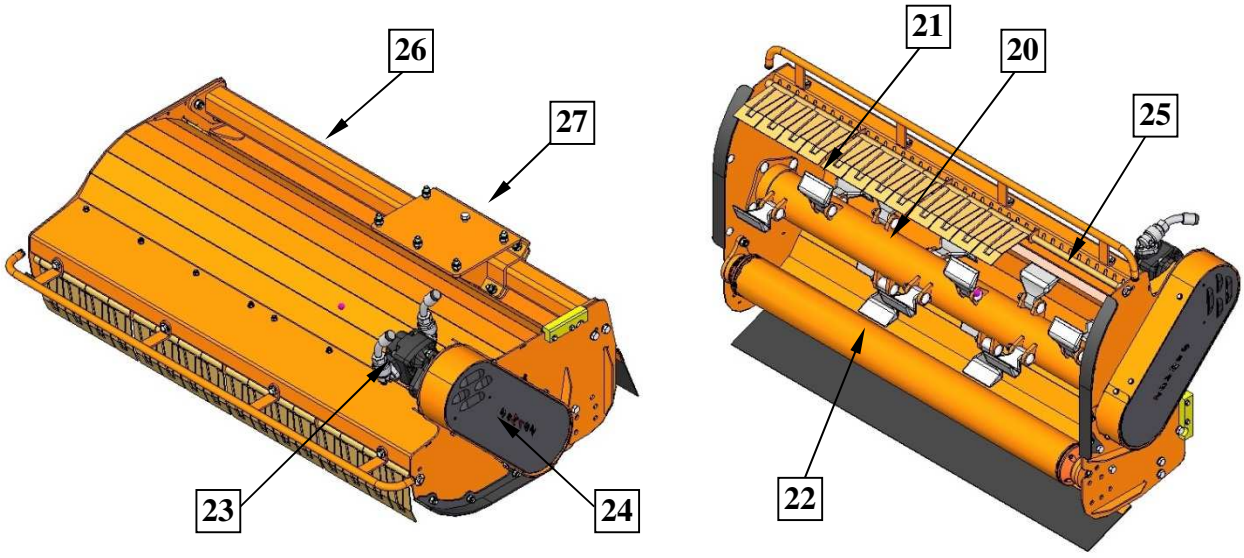


Fig. 18. Overview of mowing head KW 111/126/141

20 – Flail bar
21 – Flail knives
22 – Ground following bar
23 – Hydraulic pumps' engine
24 – Belt gear
25 – Counter-knife
26 – Side beam
27 – Plate mount

3.2.3. Mounting mowing heads

Lama 121(HD)/141 and KW 111/126/141 heads are attached to an extension arm with a standard single or 4 optional types of fittings available, which enable different manners of mounting the head (**Fig. 19**).

Fittings are of the following types:

1. **The basic is a rigid fitting, simple and light, attached to an extension arm with 6 screws M14 (SaMASZ-standard).**
2. Swivel fitting, mounted with 6 screws M14 (SaMASZ-standard) to an extension arm, enables the head to be swivelled every 15° in 4 positions.
3. Swivel push-in fitting, enabling quick coupling/releasing of the head to/from the extension arm and allowing the head to be swivelled every 15° in 4 positions.
4. Mounting for ground-following linkage, connected to extension arm with 6 bolts M14.
5. Mowing head ground-following linkage. Extension for mechanical ground following with 260mm travel. Mounted on extension arm with 6 bolts M14 (SaMASZ standard).

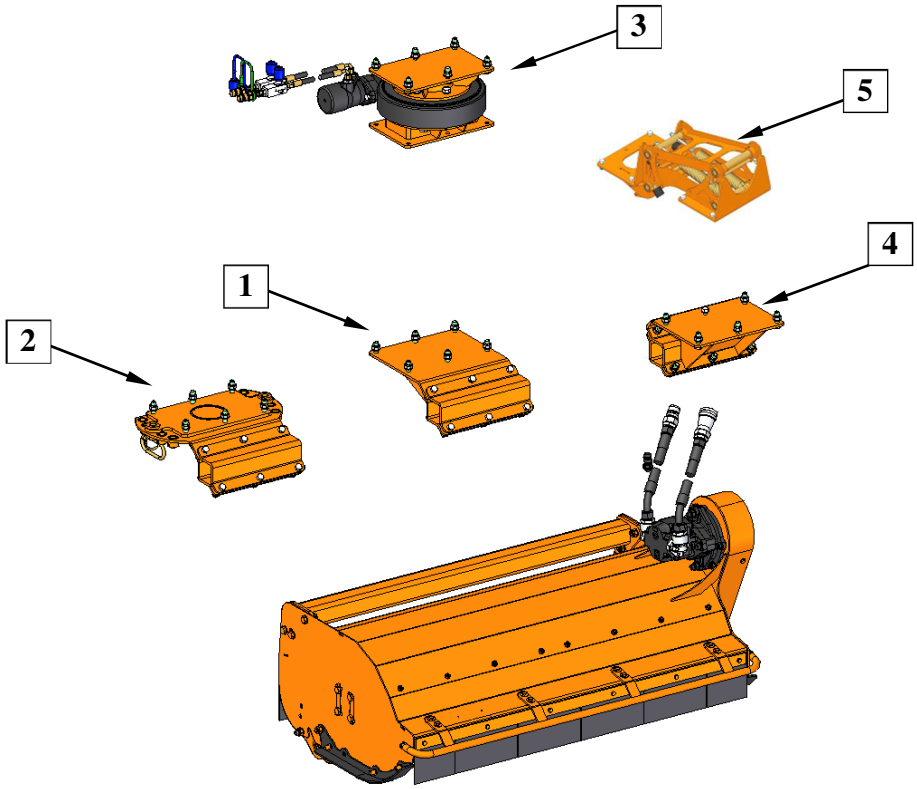


Fig. 19. Types of head mountings Lama 121/141 and KW 111/126/141 – 1 - Fixed mounting, 2 – Rotary mounting, 3 – Hydraulic turntable, 4 – Mounting ground following linkage, 5 – Mowing head ground-following linkage

3.3. Characteristics of hydraulics of extension arm

Cable-type steering

(Subject: KWT 550/650, CAMEL 900, Koliber 400/450)

Geared pumps power two independent circuits: machine's drive circuit with capacity of 100 l/min and hydraulic cylinders' drive circuit with capacity of 21 l/min. In machine's drive circuits wires have ∅16 mm diameter, while in cylinders' control circuit ∅10 mm. Control of oil circulation is possible owing to hydraulic distributors (**3, 6**). Oil tank (**4**) of adequate capacity. In extension arm-type mower's hydraulic engine's drive circuit there is suction oil filter (**5**). On gauge plate cylinder (**8**) there is sweep valve (**7**) mounted to protect the machine's extension arms from getting overloaded (**Fig. 20**) – applies only to KWT 550, KWT 650 and CAMEL 900. Koliber 400 and Koliber 450 instead of gauge plate cylinder (**8**) both have overload breaker. Hydraulic cylinders (**8-11**) with throttle choke valves (**12**) control the extension arm.

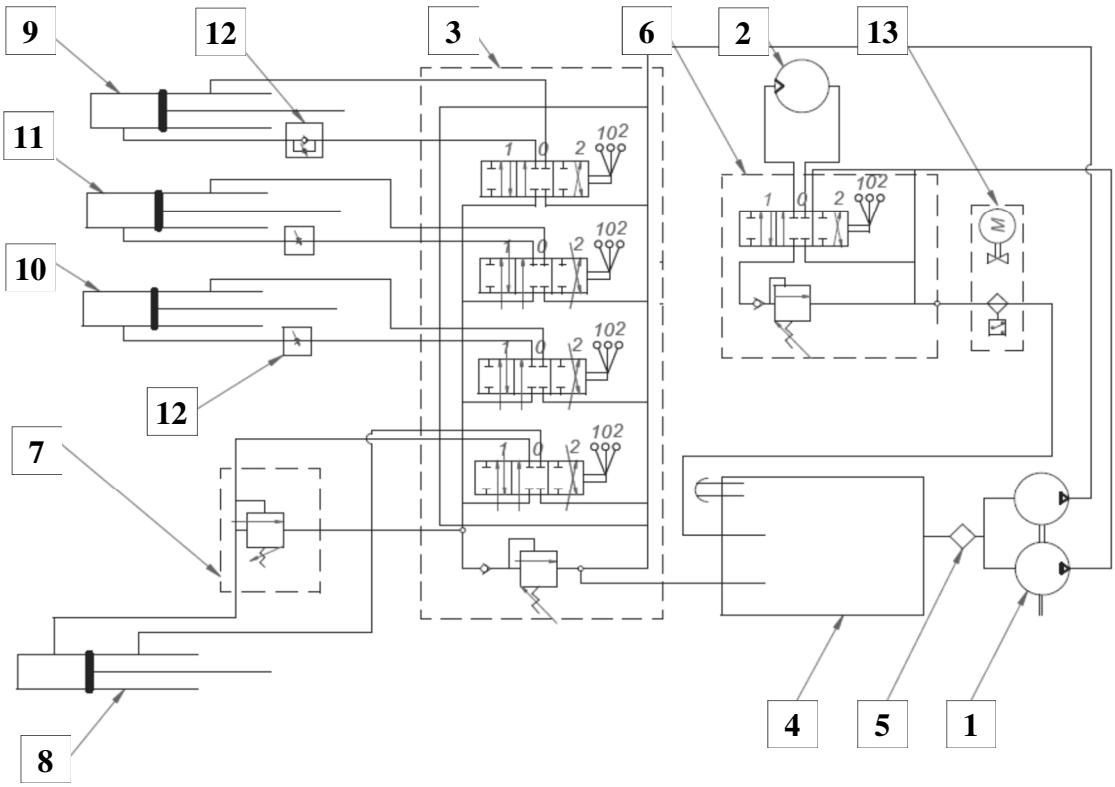


Fig. 20. Extension arm-type mower's hydraulic drive diagram

1 – Hydraulic pumps
2 – Hydraulic pumps' engine
3 – Four-section distributor
4 – Oil tank
5 – Suction filter
6 – Single-section distributor
7 – Sweep valve
8 – Gauge plate cylinder
9 – External extension arm cylinder
10 – Internal extension arm cylinder
11 – Cutterbar cylinder
12 – Throttle check valve
13 – Cooler

Electric / electric-proportional steering

(Subject: KWT 550 E/EP, KWT 650 E/EP, KWT 651 E/EP, Koliber 400 EP, Koliber 450 EP and CAMEL 900 EP)

Geared pumps power two independent circuits: machine's drive circuit with capacity of about 100 l/min and hydraulic cylinders' drive circuit with capacity of 21 l/min (42 l/min. - EP). In machine's drive circuits wires have ∅16 mm diameter, while in cylinders' control circuit ∅10 mm. Control of oil circulation is possible owing to hydraulic distributors (**3, 6**). Oil tank (**4**) of adequate capacity. In extension arm-type mower's hydraulic engine's drive circuit there is suction oil filter (**5**) with capacity of 70 l/min. On gauge plate cylinder (**8**) there is sweep valve (**7**) mounted to protect the mower's extension arms from overloading (**Fig. 21**) Hydraulic cylinders (**9-12**) with throttle choke valves (**13**) control the extension arm.

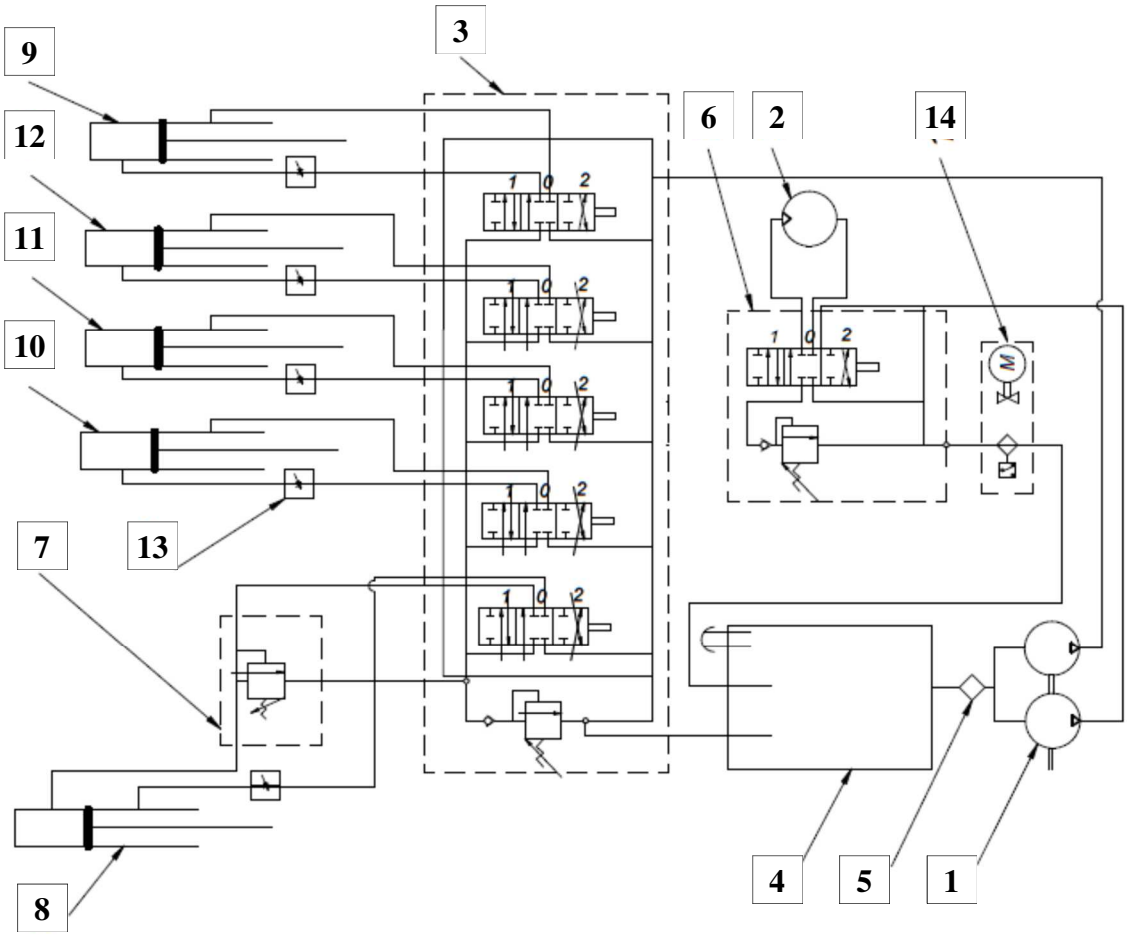


Fig. 21. Diagram of proportional hydraulic drive of the extension arm

1 - Hydraulic pumps
2 - Hydraulic pump engine
3 - 5-section divider
4 - Oil tank
5 - Suction filter
6 - Single-section distributor
7 - Sweep valve
8 - Gauge plate cylinder
9 - Hydraulic cylinder of cutting unit
10 - Hydraulic cylinder of arm extension
11 - External arm cylinder
12 - Internal arm cylinder
13 - Throttle check valve
14 - Cooler

3.4. Standard equipment and spare parts

Machines are sold with the following standard equipment:

- warranty card,
- operator's manual with spare part list and declaration of conformity,
- control panel,
- extra cutting knives – 2 pcs,
- PTO shaft,
- warning plate with combined lights and reflectors,
- warning triangle,
- plate C-10 Drive at the left of the sign,
- spray paint (150 ml).

Tab. 5. Recommended PTO shaft for mounting the machine to a tractor

Extension arm type	Power	Length	Torque	Symbol	Clutch	Manufacturer	Remarks
	HP	mm	Nm				
KWT CAMEL KOLIBER	35	2′ 2″-2′ 11″ 660-900	460	7G3N066CE007007MA		Bondioli & Pavesi	

Shaft end without clutch – Connect from tractor's side

Shaft end without clutch – Connect from mower's side

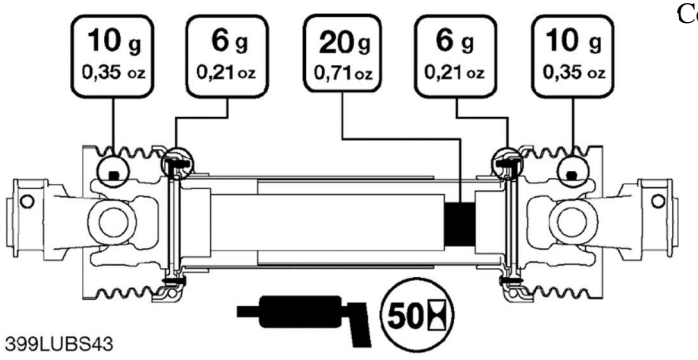


Fig. 22. PTO shaft lubrication. Mounting directions

NOTE:

PTO shaft lubrication frequency must be respected. Points shown in **Fig. 22** shall be lubricated every 50 hours. PTO shaft shall also be lubricated prior to and after period of longer idleness.

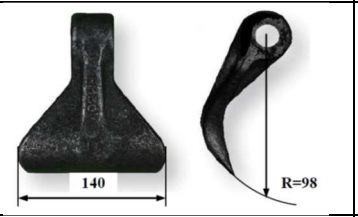
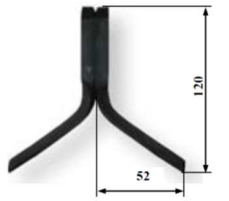
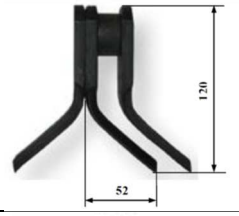
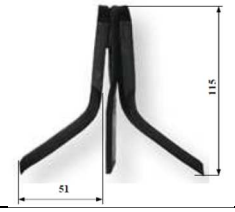
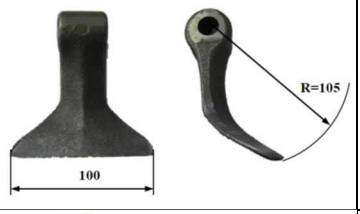
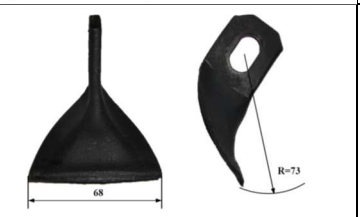
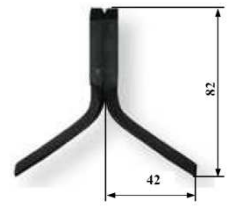
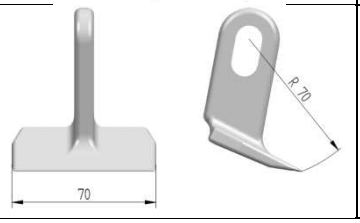
PTO shafts of other brands with equivalent technical parameters may be used on the SaMASZ permission.

3.4.1. Flails applied in mowing heads

In order to ensure proper operation of mowing head, if excessively worn flails should be replaced. Relevant reference for flail could be found in mower parts catalogue.

The table below shows knives that can be mounted in SaMASZ mowers.

Tab. 6. Types of flail knives

Flail knives		Lama	KW
KNIFE TYPE I Application: grass, shrub, stalks, remnants after trimming, stubbles		–	**Standard** in KW 110/ 125/140
KNIFE TYPE II Application: grass, shoots, stalks, shrub, remnants after trimming, hay		**Option** in Lama 121 HD	**Option**
KNIFE TYPE III Application: grass, shoots, stalks, shrubs, remnants after trimming, hay		**Option** in Lama 121 HD	**Option**
KNIFE TYPE IV Application: grass, shoots, stalks, shrubs, remnants after trimming, hay		**Option** in Lama 121 HD	**Option**
KNIFE TYPE V Application: grass, stubbles, branches, shrubs		**Standard** in Lama 121 HD	**Standard** w głowicy KW 111/ 126/141 **Option** in KW 110/ 125/140 ver. 3
KNIFE TYPE VI Application: grass, shrub, stalks, remnants after trimming, stubbles		–	**Option** in KW 111/ 126/141
KNIFE TYPE VII Application: grass, plant stalks		**Standard** **Opcja** in Lama 121 HD	–
KNIFE TYPE VIII Application: grass, plant stalks, bushes, shoots, smaller branches		**Option**	–
KNIFE TYPE IX Application: grass, plants stalks, smaller bushes, branches		**Option**	–

4. SAFETY PRECAUTIONS

4.1. Safety rules and regulations

- Front axis of the tractor should be balanced to enable its steering. If necessary, use front wheel weights.
- In order to keep steering conditions, make sure that impact on the front axis is at least 20% of the complete impact on the tractor.
- The machine cannot be used if the tractor has not been properly balanced,
- Any operation with the hydraulic lift lever should be done from the operator's seat; never operate the lever from outside of the tractor.
- For tractors equipped with EHR, control with hydraulic lift is done with a button located outside the tractor's cabin. When operating, please exercise particular caution.
- When mounting the machine on a tractor, risk of wounding is likely. It is recommended that operator wears protective gloves.
- Use PTO shaft with CE marking.
- Do not operate without safety guards. Neither operation with damaged nor raised guard is allowed (risk of stones, etc. being thrown out). Damaged safety curtain should be replaced.
- Start mowing only when the tractor PTO reaches its nominal 540 rpm value or 1000 rpm – depending on the type of machine (See section 3.1).
- DO NOT exceed 600 PTO rpm or 1050 rpm (See section 3.1).
- Please make sure that no unauthorized personnel remains within the danger area of at least 164 ft (50m). Keep particular caution when operating near roads and in stony areas.
- Perform any maintenance and adjustment work only when the drive is disconnected and rotor has stopped completely.
- When driving on public roads always comply with local traffic regulations, especially on the warning lights.

CAUTION!
Make sure to perform any service and repair operations with the tractor drive shut off and after all rotating parts have stopped completely.

WARNING:
Keep children away from the machine when operating and idle.

- Check bolts and other fasteners regularly. Do not operate with damaged or worn fasteners.
- Condition of flail knife mounting and bolts should be checked regularly (loose bolts and worn openings in the mounting brackets). Damaged or worn knives must be replaced in pairs.
- Do not leave a running tractor without supervision. Before leaving the tractor turn off the engine and remove the ignition key
- If any break in the machine operation occurs, turn off the drive
- Tractor cooperating with the machine should be equipped with a driver's cabin
- Machine should not be operated when the tractor-machine aggregate is not well balanced
- Never start the machine if any people or animals are around the machine
- Always follow safety labels describing hazards, and warning signs placed on the machine
- Before starting the tractor make sure that each drive is disconnected and control levers for hydraulics are in neutral position
- Do not drive the machine backwards when operating
- Never get onto the machine
- Never stand between the tractor and the machine, unless the tractor-machine aggregate is protected against moving with the tractor's parking brake
- Any inspections and adjustments may be conducted only when the machine is disconnected from the tractor and on the ground
- For repairs or adjustments to be done under the machine make sure to secure it against falling using a proper support

- If any part of the machine needs to be replaced, use only original spare parts according to spare part list
- Pay particular attention to PTO shaft guards and machine and tractor spline shaft guards. Never operate with damaged guards
- Inspect hydraulic hoses on regular basis and if any damage is found or their service life expires, replace them. Service life for a hydraulic hose should be no longer than 5 years.
- Never repair damaged hydraulic hoses using a tape.
- When connecting hydraulic hoses to tractor's hydraulic connectors make sure, that either tractor or machine hydraulics are pressure free.
- When servicing hydraulic unit, always wear protective gloves and eyewear. Hydraulic oil leaking under pressure (16MPa) may permeate through the skin and cause its infection thereafter. If this is the case, immediately visit a doctor.
- The machine should be stored under a roof and in such way so as to effectively prevent animals and people from being injured
- Before starting the machine, make sure there are no animals underneath the guard
- Before operating the machine, make sure all safety devices are in place and working. If not working or damaged have them replaced
- Before any maintenance, assembly, disassembly works and when parking position the machine on a solid ground and secure it against accidental movements.
- When cleaning the machine, use personal protective equipment for health protection.
- Do not leave agricultural machinery on slopes or other descents without providing protection against free runaway.
- When operating on a stony field or nearby roads there is a risk of throwing out stones or other objects which may pose a danger for passing-by vehicles on the road or for passers-by. Therefore keep the safe distance.
- If any break in the equipment operation occurs, turn off the drive. Before leaving the tractor turn off the engine and remove the ignition key, leave the cabin and make sure there are no unauthorized personnel in the cabin and close the door.
- The operator is not allowed to leave the tractor while driving.
- In case of a major failure, stop the machine's drive, turn off the tractor's engine and remove the ignition key. Next, please contact technical service, and if accident (i.e.: road accident) occurs, respect first aid rules and call appropriate authorities.
- Keep the machine clean, so as to avoid a risk of fire.
- Pay particular attention to both PTO shaft and spline shaft guards. Never operate with damaged guards.
- Rotating spring tines and other rotary elements present a danger to health and life of persons present nearby the machine. Do not touch any moving machine parts
- Check pressure in the machine wheels regularly.
- In the event of any break in the equipment operation, turn off the drive.
- In the event of a fatal failure, please call for technical service, and if an accident (in this case: road accident) occurs, respect first aid rules and contact responsible services.

4.2. Operator's qualifications

To provide safe machine operation each person being the machine operator must meet the following requirements:

- Operator should hold driving license, have ability to drive vehicles safely and know road traffic rules.
- Operator must be in proper physical condition to be able to operate the machine.
- Operator must not be under the influence of alcohol, drugs and medicines, which all have influence on vehicle driving and machine operation.
- Operator should be familiarized with this manual and follow its provisions.

- Operator should be familiar with working principles of both the tractor and the machine, and be able to recognize and avoid hazards resulting from operation of the aggregate.

4.3. Conditions of mounting machine on tractor

- Before attachment, be sure that the tractor and machine hitches are compatible and that the tractor's hitch load capacity is adequate for the machine which is to be mounted or attached.
- Before mounting the machine, examine the technical condition of the machine's hitch assembly and tractor's 3-point linkage.
- Use only genuine cotter pins to mount the machine on a tractor.

4.4. Transport

- Any change in the machine's position are only possible when no unauthorized personnel is around (children in particular).
- When transported the machine should always be set in transport position. (see chapter 5.2).
- Prior to putting the machine to transport position make sure, that the tractor PTO is disconnected and all the rotating parts in complete standstill.
- Always adjust your driving speed to the current road conditions and according to local traffic rules.
- Permissible speed of 25 km/h cannot be exceeded.
- Allow no person and object to remain on the machine when driving or transporting.
- When taking turns pay particular attention and consider the machine's weight and dimensions.

4.4.1. Putting the machine onto another vehicle for transport

Both the carrier and the driver shall be responsible for the machine transport safety. Any equipment and parts must be properly secured for transport. To put the machine onto another vehicle safely, please follow these rules:

- it is recommended to transport extension arms using a forklift truck (**Fig. 23**),
- the machine should be seized by any lifting device only in places indicated on the machine by the catch sign (**Fig. 23**),
- for lifting the machine, lifting devices with hoisting capacity bigger than the machine weight shown in data plate should only be used. It also concerns ropes and chains used for lifting,
- transport belts, belt suspensions, ropes cannot be damaged. Whenever damages to these parts are spotted replace these with new ones,
- when mounting slings, chains, handles etc. always pay attention to setting the machine's centre of gravity properly,
- to catch machines, pick ropes of adequate length, so that the angle between them is no greater than 120°, and the angle between the strand and the vertical is no greater than 60°,
- collapsible elements should be locked in transport position,
- when putting the machine onto another vehicle, no unauthorized personnel shall be permitted to remain within the danger area,
- the machine on the vehicle trailer should be protected from shifting.

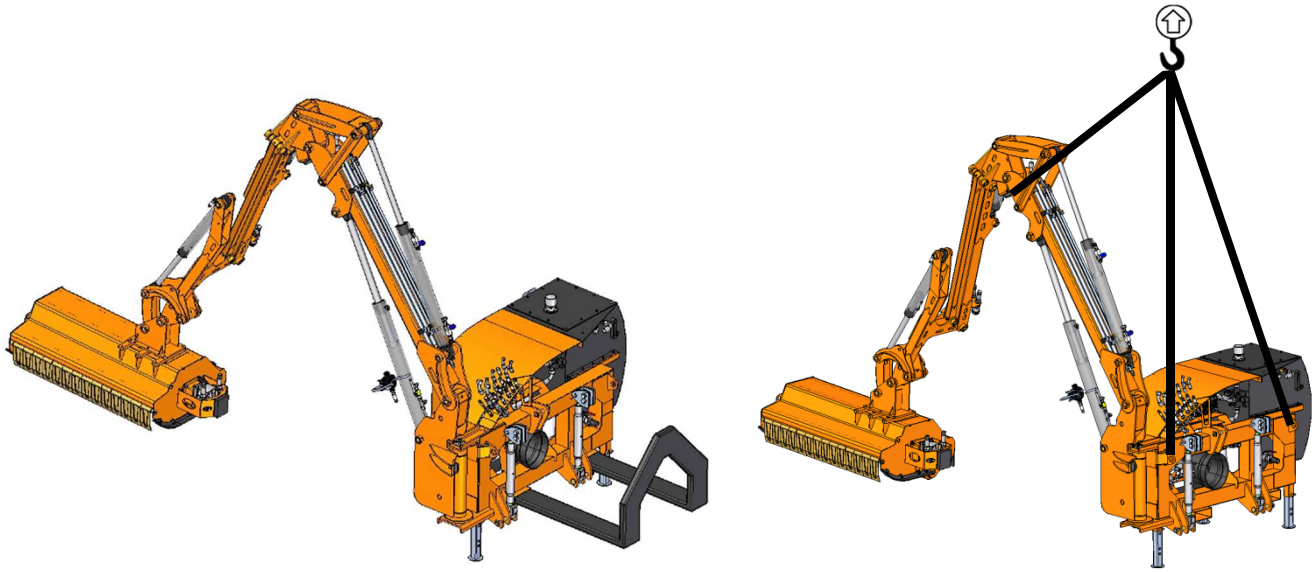


Fig. 23. Method of loading extension arms

WARNING!
Securing the maneuver area and providing safety for operation performed is the responsibility of the person in charge of moving of the machine.

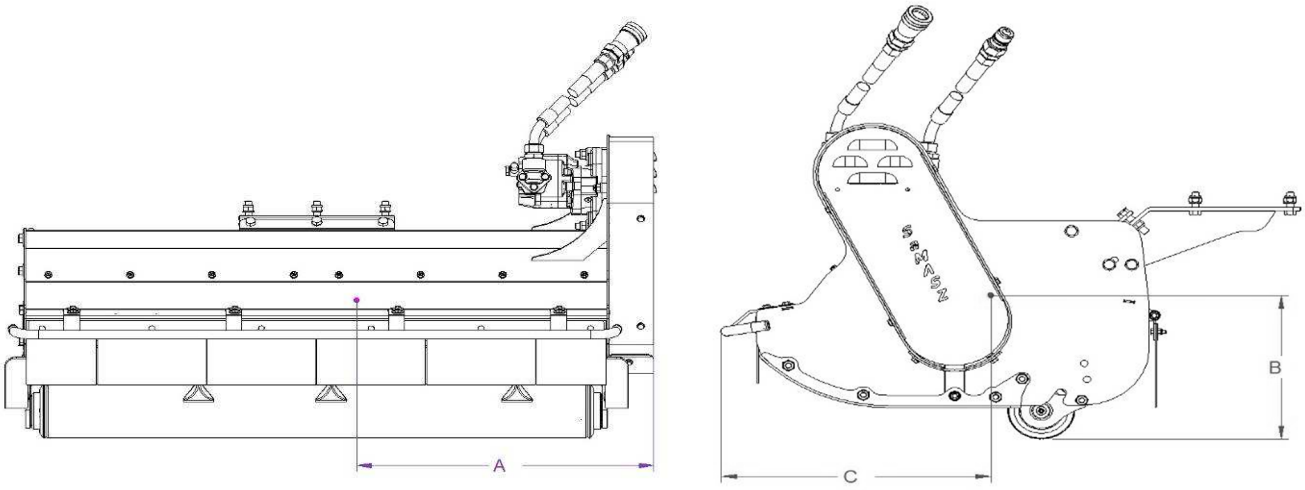


Fig. 24. Location of center of gravity for mowing heads

Tab. 7. Location of centre of gravity for mowing heads

Dimension [mm]	Type of mowing head					
	KW 110	KW 111	KW 125	KW 126	KW 140	KW 141
A	780	605	870	670	980	780
B	280	300	280	300	280	275
C	480	520	480	520	480	520

Dimension [mm]	Type of mowing head					
	LAMA 101 P	LAMA 120	LAMA 121	LAMA 121 HD	LAMA 140	LAMA 141
A	590	800	660	690	890	760
B	360	240	340	350	240	340
C	500	400	540	490	400	540

4.5. Working parts

- Prior to operating the machine check flail knives condition.
- Worn or damaged knives should be replaced immediately with new ones.

WARNING!
When replacing working parts, always use protective gloves.

4.6. PTO shaft

- Before operating learn provisions found in bar manufacturer's manual placed on the bar.
- PTO shafts recommended by the machine's manufacturer shall only be used.
- In order to operate safely use only fully technically fit, undamaged PTO shafts. Damaged PTO shaft shall be repaired or replaced with new one.
- Before any operation make sure whether PTO rpm have proper rotational direction.

4.7. Hydraulic assembly

- Elastic hydraulic hoses should be checked regularly and if any damage occurs or they expire, replace with new ones. Replaced hoses must conform with the manufacturer's technical requirements.
- Prior to performing service works at hydraulics the tractor's engine should be stopped and ignition key taken out.
- It is not acceptable to adjust sweep valves on factory set distributors.
- Do not drain oil onto the ground, to the sewage system, into rivers or lakes. Only tight tanks should be used for temporal storing of used oils.
- Used oils contain substances harmful for the natural environment and should be delivered to a proper used oil treatment plant.
- Thermostat turns ventilator for cooling oils for temperature over 60ºC on, if oil is heated up to 80º interrupt work and find cause of high temperature.
- Scotch tape shall never be used to repair damaged hydraulic hoses.
- When connecting hydraulic hoses to tractor hydraulic connectors make sure, that either tractor or machine hydraulics are pressure free.
- When operating hydraulic unit, always wear protective gloves and eyewear. Leaking hydraulic oil under pressure (16 MPa) may permeate through the skin and cause an infection. If experienced, immediately visit a doctor.
- Caution! Hydraulic assembly is under pressure! Hydraulic oil under pressure may permeate through skin and cause serious injury, therefore skin and eyes should be protected in particular. In case of injuries caused by a liquid under pressure, call a doctor immediately.
- Hydraulic hoses can be connected to tractor's hydraulics, provided that both the tractor’s and the machine's hydraulic assemblies are not under pressure. To remove the pressure from the hoses just simply restart the tractor's hydraulic valves several times, once the tractor is off.
- When controlling for hydraulic assembly's malfunction and looking for oil leaks, it is forbidden to touch any potential leaks until the entire assembly is under pressure.
- **Note! It is recommended to use hydraulic oil featuring oil purity class 9 - 10 in accordance with NAS 1638.**

When using hydraulic hoses:

- Avoid stretching the hoses when operating.
- Do not allow hydraulic hoses to get deflected.
- Do not expose hydraulic hoses to contact with any sharp edges.
- If damaged or worn, replace the hoses with new ones.
- Useful life for hydraulic hoses is 5 years from their production date.

4.8. Residual risk

Despite the fact, that SaMASZ Sp. z o.o. company − the manufacturer of the machine takes the responsibility for the machine design and manufacturing, in order to eliminate hazard, certain risk when operating the machine is unavoidable.

Major source of risk results from the following operations:

- operation of machine by minors and operators not being familiarized with operator's manual,
- operation of machine by personnel under influence of alcohol or other abusive substances,
- failure to keep caution while transporting and moving the machine during operation,
- transport of personnel on the machine,
- presence of personnel and animals within the machine operating range,
- service and adjustment operations with engine running.

1. Risk of being caught or pulled in

This risk occurs when repositioning of the machine, or working on the machine while the rotating elements are in motion and with guards removed.

During operation, maintenance or adjustment works on the machine always use protective gloves, covered footwear, protective clothing without loose elements, such as belts etc. Always observe the warnings placed on the machine.

When operating, maintenance and regulation works are conducted always wear protective gloves, footwear and clothing with no loose parts, belts, etc. Always comply with warnings placed on the machine.

2. Risk of injury, abrasion and damage of skin

This risk occurs when replacing working parts with sharp edges, cleaning the machine and removal of any clogging and jams. For any repair and maintenance works always wear safety gloves.

3. Danger of liquid ejection out of hydraulics

When connecting hydraulic hoses to and from the tractor hydraulic connectors make sure, that either tractor or mower hydraulics are pressure free.

When operating hydraulic unit, always wear protective gloves and eyewear. Check the hydraulics hoses regularly.

NOTE:
Present residual risk results mainly from erroneous actions of the machine's operator and failure to follow the instruction manual.

4. Prohibited actions

Bear in mind the following prohibited actions when operating the machine:

- Do not unblock the machine, make any adjustments or repairs when the machine is operating,
- Never change the sequence of operation and maintenance works specified in the operator's manual,
- Never operate the machine when its working condition is poor or its safety guards are damaged,
- Never get your limbs close to machine's rotating parts,

- During repair and maintenance works on the machine always comply with the descriptions included in the operator's manual, while making sure the tractor's drive is turned off,
- Before any works, focus your attention solely on the tasks to do,
- Never operate the machine being under influence of alcohol, drugs, or strong medicines,
- Wear clothing that is not too loose, or too tight. Too loose clothing elements may be pulled in by the machine's rotating parts,
- Make sure the machine is not operated by children no handicapped people.

When describing residual risk, the machine shall be considered a machine, which until the moment of production launching had been designed and manufactured in accordance with the state of the art at the day of the manufacture.

WARNING!
Residual risk may occur if specified instructions and forbidden actions are not respected.

4.8.1. Residual risk assessment

Keep the following recommendations:

- read operator's manual thoroughly,
- make sure no person remains on the machine when operating and driving,
- make sure no person remains within the machine's operating range,
- before any adjustment, maintenance and lubrication works on the machine, make sure its engine is turned off,
- repair works on the machine can be done by properly qualified and skilled personnel only,
- before operating the machine, carefully read the operator's manual,
- make sure that no children and unauthorized personnel stays around the machine

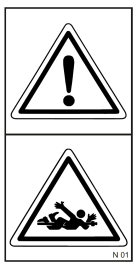
When the risk of exposing to noise cannot be avoided or eliminated by any group protective means or organization of work, employer (farmer) must:

1) provide the operator with individual means of noise protection, if the noise level in work place exceeds 80 dB.
2) provide the operator with individual means of noise protection and supervise the correctness of its use, if the noise level in work place reaches or exceeds 85 dB.

4.9. Safety labels and their meaning

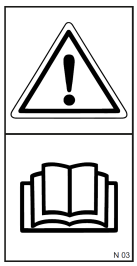
IMPORTANT:

a) All warning labels should be clean and legible,
b) Lost or damaged labels must be replaced,
c) New labels can be ordered at the Manufacturer.



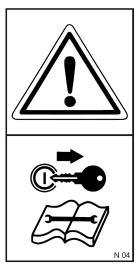
N-01

Exercise particular caution when PTO shaft is rotating



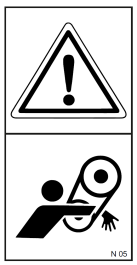
N-03

Read the operator's manual before use



N-04

Before any service or repair disconnect the power supply



N-05

Caution: belt transmission, be extremely careful!

N-06

Caution: pulling-in parts

N-07

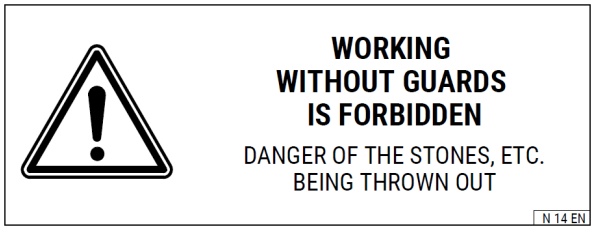
Do not operate the if any personnel remains within 170 ft (50m) from the machine

N-09

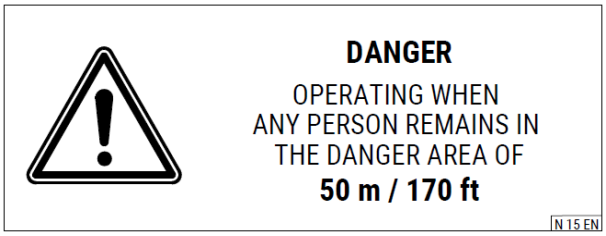
Caution: rotor

N-11

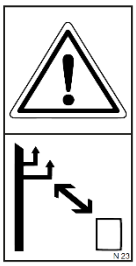
Lubrication points



N-14

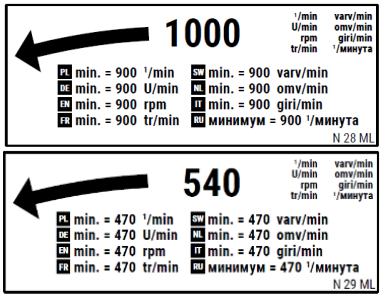


N-15



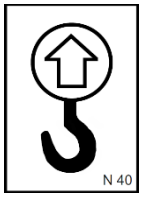
N-23

Caution: power lines



N-28, N-29

Direction of PTO rotation



N-40

Transport holder for machine handling

N-49

Do not get too close to the hoist of the tractor during its operation

N-50

Do not remain in the machine swinging area

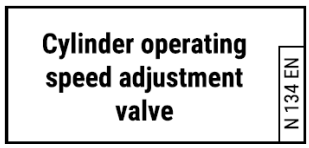
N-55

N-106

Caution: flail knives! Do not get near to operating mower

N-117

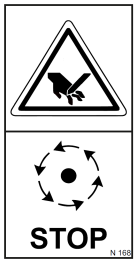
Avoid fluid escaping under pressure



N-134

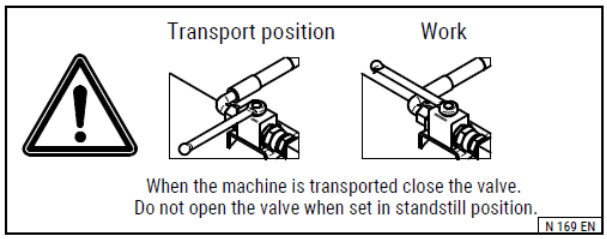
N-167

Presence of any personnel on the machine when driving is forbidden



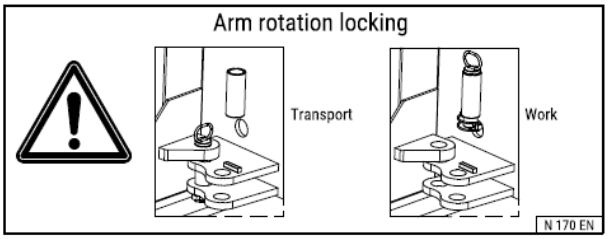
N-168

Do not touch the machine before the rotating parts have not come to a complete standstill



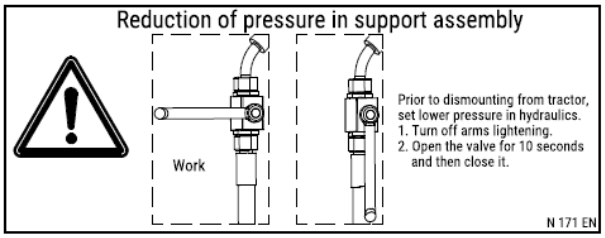
N-169

For: KWT E/EP, CAMEL EP, KOLIBER EP



N-170

For: KWT and CAMEL



N-171

For: KWT E/EP, CAMEL EP, KOLIBER EP

N-210

Risk of foot injury. Keep a safe distance

N-211

Risk of serious body harm! Keep a safe distance

N-204

N-205

N-206

Use the required Personal Protective

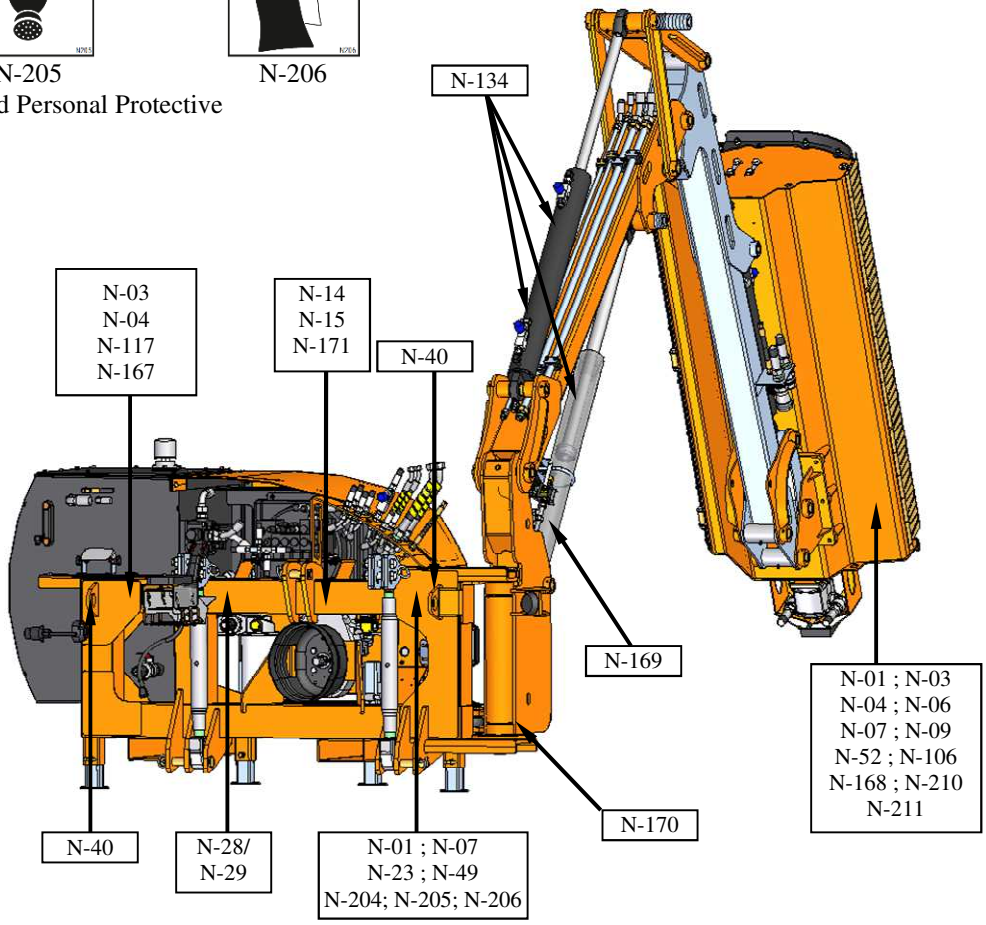


Fig. 25. Placement of warning signs on extension arm with mowing head

5. OPERATION

5.1. Mounting arm on tractor

Extension arm should be mounted on tractor with use of rear 3-point linkage, as provided in **Fig. 27**. Upon complete mounting of arm adjust machine's alignment on even ground with use of upper link (**1**) so that the machine is set horizontally in relation to the ground. Tensioning strands (**2**) must be tensioned and set on the same level. Their use ensures a stable position of the tractor-machine set. The strands are not intended to protect the machine against falling. When using extension arm, hydraulic actuator should be locked. Strands (**2**) should be attached to the tractor depending on the design of hitches on the tractor.

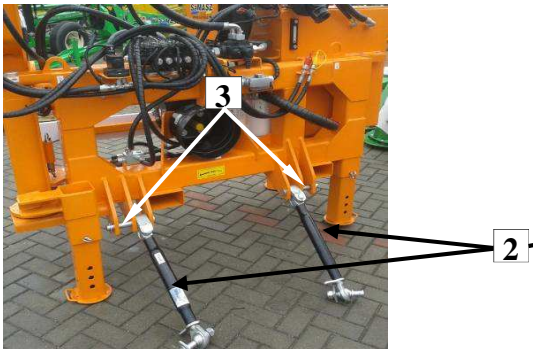


Fig. 26. KWT suspension
3 - Mounting points on tractor's 3-point linkage

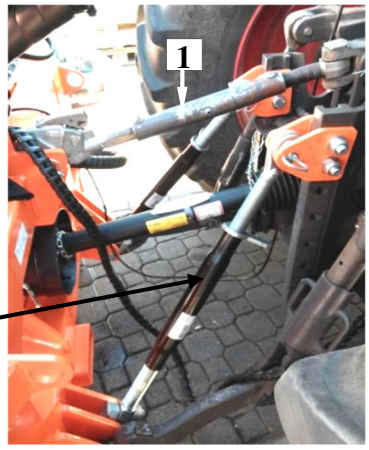


Fig. 27. Machine mounted on tractor's rear 3-point linkage

3-point linkage on the lifting device, on which the machine is supported, must be operative (cannot fall on its own). Additionally it should be locked against accidental falling of lower links on the 3-point linkage.

WARNING!

Do not adjust the tractor's lower strands (lifting/lowering) once the set is stabilized using the tensioning strands. Otherwise both the machine and the tractor could be damaged!

WARNING!

The machine cannot be supported on stabilization links. Instead please use lower links on the 3-point linkage. Failure to follow the above may cause damage to both the machine and the tractor!

Some tractors (e.g. Kubota) have a valve for 3-point linkage cylinder cut-off. After the machine is mounted on such tractor make sure to tighten – lift the links on the 3-point linkage, close the valve and lower the lever for lifting. In tractors without such valve it is recommended to fit one.

5.1.1. Connecting the articulated telescopic shaft (PTO)

Prior to commencing operation, examine and adjust length of PTO shaft, which is designed to mount machine on tractor. In some cases it is possible, that the shaft is too long and therefore needs to be shortened, so that there is adequate tolerance for the shortest possible distance between tractor's shaft and machine's shaft.

NOTE:

If necessary, shorten the PTO shaft according to its operator's manual given by the shaft's manufacturer (**Fig. 28**).

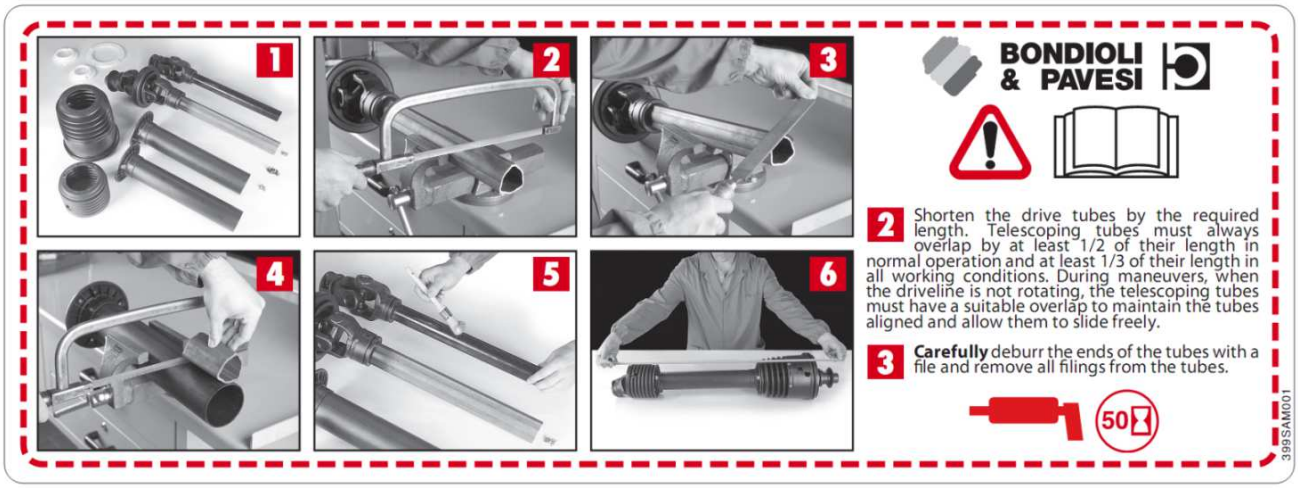


Fig. 28. Instruction of PTO shaft shortening

CAUTION!
The articulated telescopic shaft should remain connected only during machine operation. During transport or any servicing operations the shaft should be disconnected from the PTO of the tractor.

CAUTION!
Use machines with correspondingly designed driving PTO shafts. Before work, safety guards should be inspected whether they (in the tractor, the machine and the PTO shaft) are placed correctly and are not damaged. Damaged or missing parts must be replaced. Make sure that the PTO shaft is mounted properly. Approaching the rotating parts is strictly forbidden, as it may cause serious injuries or even death. For any service and repair works on the shaft and the machine, makes sure that the tractor's engine and its drive is turned off. Before operation, read the operator's manuals of both the machine and the PTO shaft.

NOTE:
PTO shaft's end with friction clutch should be mounted at the machine's side.

5.2. Preparing machine for transport

Control panel should be installed in tractor's cabin. Tractor operating on public road should be equipped with yellow flashing light and warning triangle (**Fig. 29**).

NOTE:

For transport set the arm KWT 651 with working head as farthest behind the tractor as possible (**Fig. 29**).

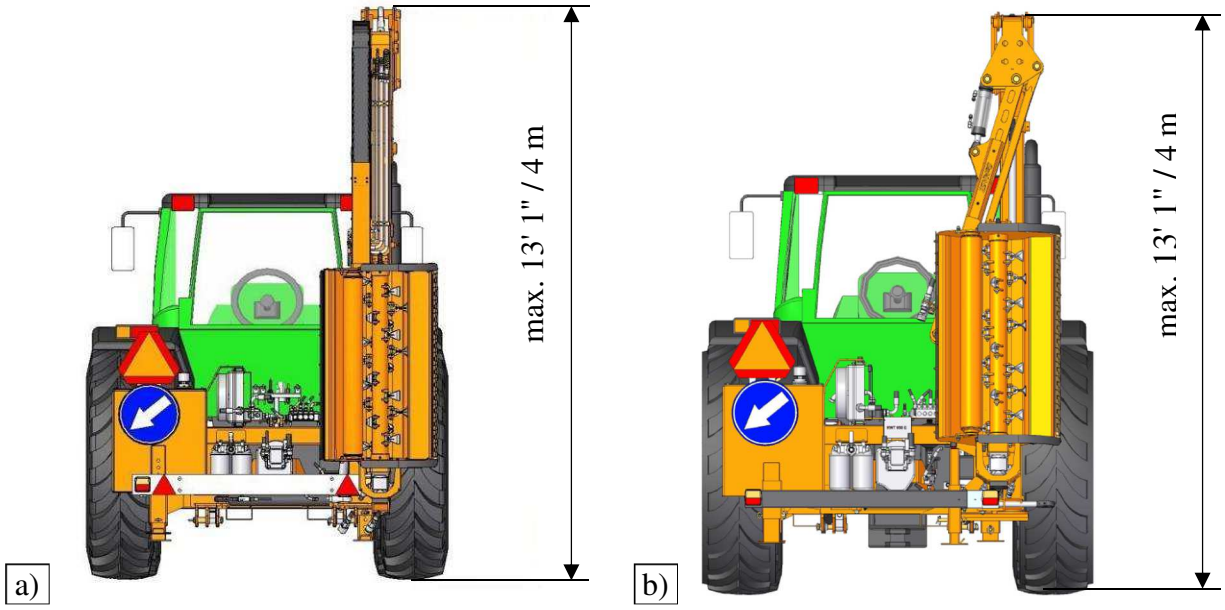


Fig. 29. Arm in transport position– a) KWT 550, b) KWT 651.
Placing warning plate and lights on the machine

The arm is connected to tractors on rear 3-point linkage. Machine driving on public road must be in transport position (**Fig. 29**) and hold proper marking. Transport position is when flail head is set nearest possible to tractor's axis (width is minimal). Inner extension arm (cylinder **S**) is protected against hydraulics failure – with special rupture valve (**Fig. 30**) – (**A**) and additionally with oil flow regulator (**Fig. 30**) – (**B**). For transport time cylinder rod should additionally be protected with channel lock. Moreover the tractor must be equipped with warning triangle, as well as yellow flashing light mounted on the cabin's roof (at street side). Warning plate with white and red stripes equipped with a light on right side should also be mounted.

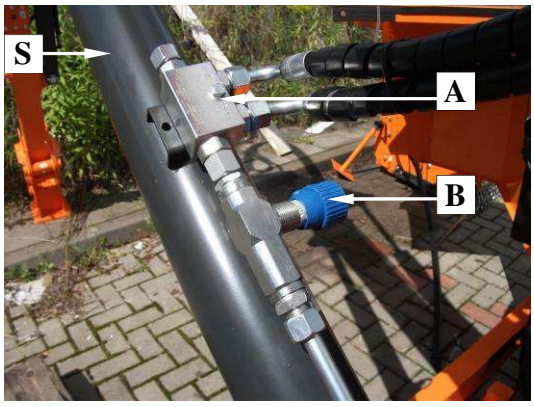


Fig. 30. Actuator hydraulic lock and choke valve
in extension arms KWT 550/650, CAMEL 900, Koliber 400/450

NOTE:

For transportation of outrigger close valve (**Z**) (**Fig. 31**) – applies to: KWT 550 E, KWT 650 E, KWT 651E.

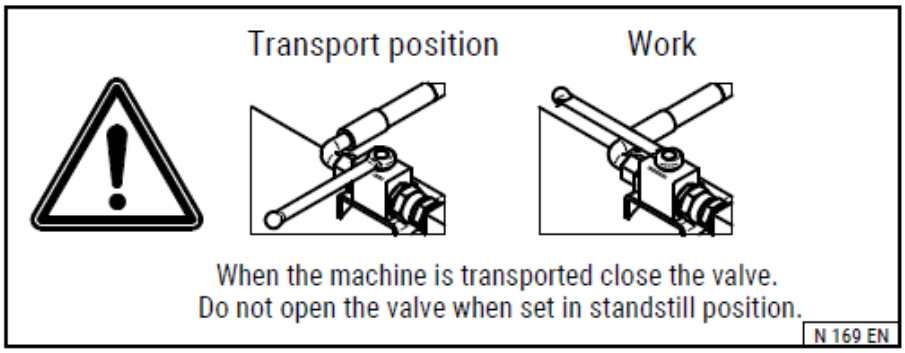


Fig. 31. Safety valve for transportation of outriggers KWT 550E/650E/651E

NOTE:

For transport purposes protect outrigger from getting rotated by means of a pin (**Fig. 32**).

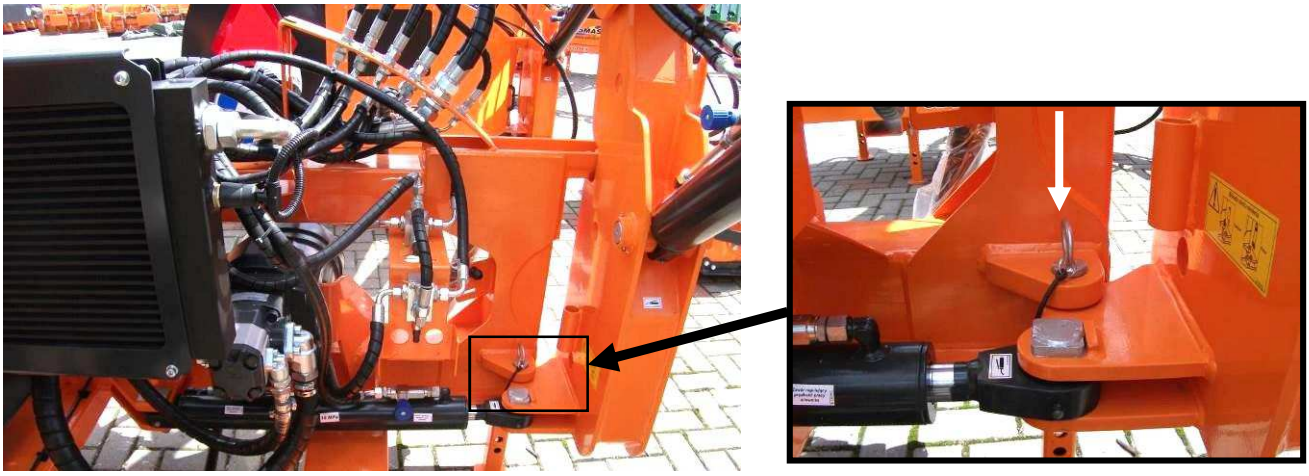


Fig. 32. Protecting outrigger from getting rotated

WARNING!

Do not drive machine on public roads, if its transport height is more than 4 m (transport height should be lowered with tractor's links when transported).

IMPORTANT:

Pay attention to efficiency and tightness of the hydraulic system of the tractor during the machine transport.

IMPORTANT:

Telescope in telescopic cylinders should be protected against any incidental extension.

5.3. Preparing extension arm with mowing head for work

WARNING!

Moving the machine to and from working position from the transport position should only take place on an even and stable ground. Before moving make sure whether there are no unauthorized personnel exposed to any hazardous moving parts.

NOTE:

During storage of the machines in company SaMASZ the cylinders are protected by special grease in order to secure them against weather which may cause their premature wear. Before starting the operation excess grease should be removed from the cylinders.

Each time before operating, the following shall be examined

- condition of cutterbar guards,
- condition of cutting knives and holders (all knives must be of the same type, have the same weight, if need be, knife should be replaced with new one in pairs with the same SaMASZ manufacture weight),
- condition of bolt connections and pins,
- condition of hydraulic hoses,
- oil level in the tank,
- tightness in hydraulics,
- rotation ease of flail rotor,
- warning signs for needs of driving on public road (warning triangle at the tractor's rear, warning plates painted in skew white and red stripes and yellow flashing light),
- open oil shut-off valve,
- engage front PTO drive, inserting multiplier with pumps into the drive,
- set the machine in working position respectively for each location mowed,
- set the cutterbar freely until adapting bar touches the ground,
- start the cutterbar until flail shaft reaches its nominal rotary speed,
- when starting use horn to warn anyone around, engage proper tractor gear and start mowing,
- in case of telescopic extension arm dismount telescope's locking.

5.4. Operation

5.4.1. General information on mowing

- In an urban setting, to ensure that the mower works without breaking, it is recommended that a pilot, who will mark all obstacles, should walk in front of the mower.
- While crossing roads, on pedestrian crossings or other permanent obstacles the mower must always be raised using the actuator.
- In real life the user should use so called "common sense". In regards with this during intense usage the cost of necessary service checks should be taken into account - see Warranty conditions.
- After driving onto single bushes with diameters up to about 2 cm. the tractor should be momentarily stopped until the mower can shred the bush completely and then slowly, in spurts, move forward so that the cutting unit does not get clogged.

WARNING!

During operation with arm extended over 13' 1" / 4m from tractor's axis it is forbidden to lift head higher than 1' 8" / 0.5 m above the ground.

5.4.2. Operating positions

Fig. 33. Mowing of shoulder slopes and land drainage ditches with KWT

Fig. 34. Mowing of shoulder slopes KOLIBER 400

Fig. 35. Mowing of shoulder counter slopes and land drainage ditches with KWT

Fig. 36. Mowing behind protection barriers with KWT

Fig. 37. Mowing behind protection barriers with CAMEL 900

Fig. 38. Working position for KWT 651

CAUTION!

When maneuvering the operating head pay attention so as not to hit it against a tractor or the extension arm (**Fig. 39**).

Fig. 39. Risk of head collision with tractor or extension arm

5.4.3. Operating control panel

Tilting with the machine's arms is performed with use of hydraulic cylinders controlled from control panel located in the tractor's cabin. On the panel there is the machine diagram placed with numbering of each cylinder (**Fig. 40**) and corresponding control levers.

WARNING!

Minimum bending radius of cords of control panel is 20 cm. The cords set with lower radius will break.

I. Control panel with mechanical control

Controlling the machine is performed with use of lever in control panel **Fig. 41**, marked with corresponding pictograms:

a) Lever **A** – adjusting the cutterbar vertically/horizontally with "floating" position – cylinder **4** ;

b) Lever **B** – adjusting the machine in working/transport position (rotation of arms) – cylinder **14**;

c) Joystick **C** – controls the arms – cylinder **1** and **2**;

d) Lever **D** – starting/stopping hydraulic engine **23** driving the cutterbar; Lever **D** features function of sudden rear direction change locking. Lock in position as on **Fig. 42a** allows right rears to be switched on only. Lock in position as on **Fig. 42b** is used for turning opposite rears on.

Non-shaded pointers ⇩ (lever down) – turning right rears on,

Shaded pointers ⇧ (lever up) – position for turning opposite rears on in order to clean the shaft from wound up material.

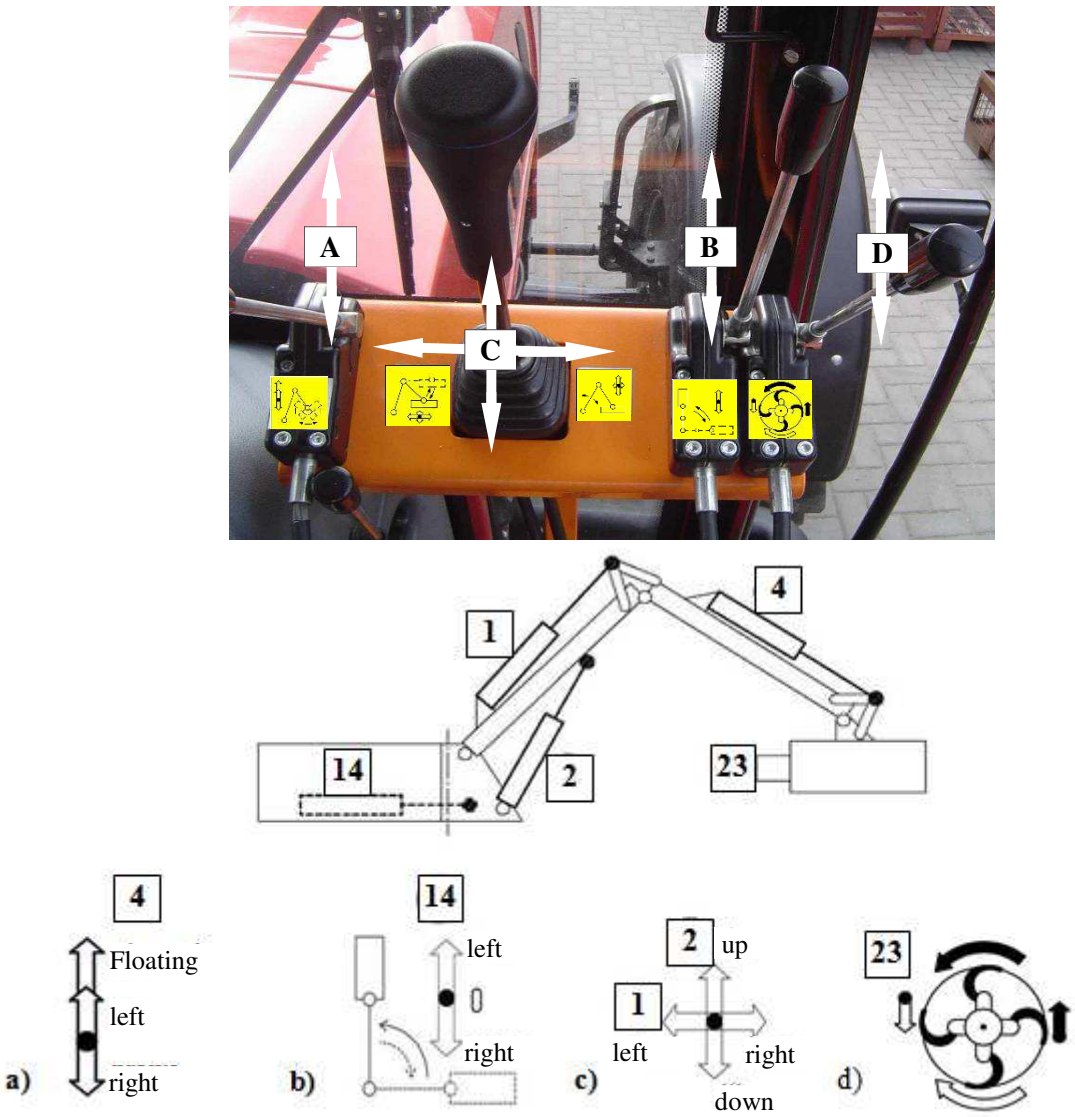


Fig. 40. Control pictograms

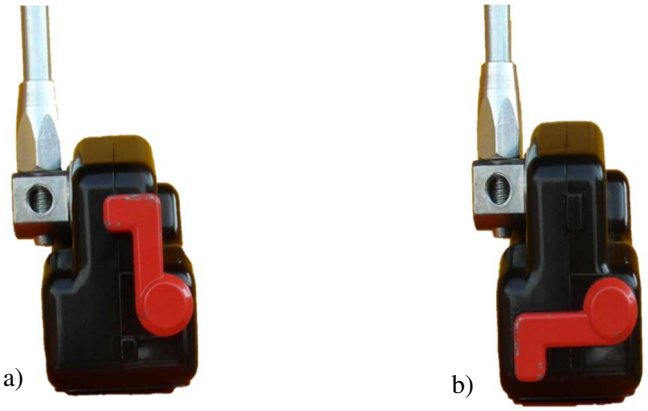


Fig. 41. Lock of direction change a) right rears (work), b) left rears

WARNING!

Sudden changing direction of rears may lead to damaging hydraulics. Left rears can be turned on as soon as hydraulic engine's rears are completely stopped.

II. Panel with electrical control (semi-proportional)

Electrical controlling set for extension arms KWT 550 E, KWT 650 E, KWT 651E, Koliber 400EP/450EP and CAMEL 900 E comprises the following elements as provided in **Fig. 42**:

A. Control joystick,

B. Control panel,

C. Joystick – control panel connection pin,

D. Executive module – control panel connection pin,

E. Feeding pin for socket 12 V,

F. Executive module.

WARNING!

Once PTO shaft is turned off remember to switch control off!

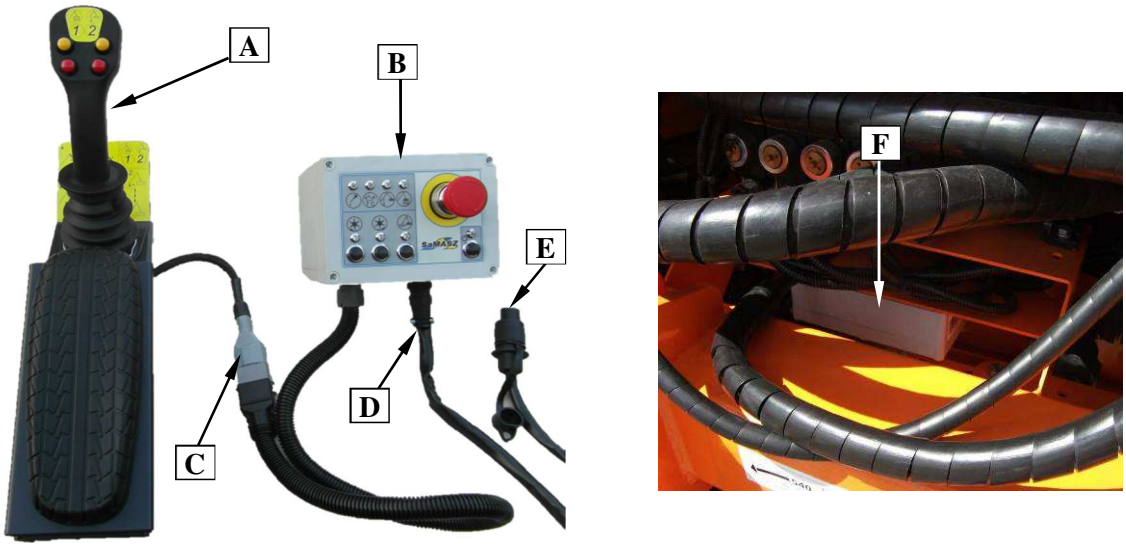


Fig. 42. Proportional control system parts

Control panel and its functions:

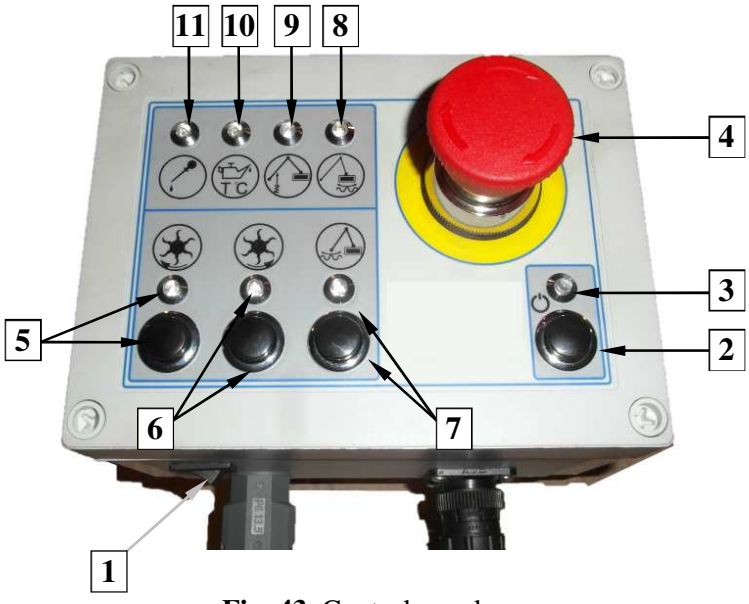


Fig. 43. Control panel

1. Power switch. Once the feeding is switched off, all diodes one by one light up and go out, and diode (**3**) starts to blink.
2. Control switch off. To turn control off, hold button (**2**) for around 2 seconds. Turning control on is signaled by a diode (**3**), which turns to steady light.
3. Diode signals turning both power and control on.
4. Safety breakaway device.
5. Button for switching to mowing head's right-hand gears and diode signaling turning the head on. To turn the head on, press and hold button (3) for around 2 seconds. In order to turn the head off push button (**5**) or (**6**) until the diode goes out.
6. Button for switching to mowing head's left-hand gears and diode signaling turning the head on. Left-hand gears are turned on, whenever wire or flexible, thick branches get wound up onto the flail shaft.
7. Turning left-hand gears on:
   a) If right-hand turns are engaged, turn them off, release the button and wait for 3 seconds (in this period the buttons are inactive) and then push button (**6**). In order to turn left-hand gears off hold button (**6**) or (**5**) again until the diode above the button goes out.

NOTE: Once the head rears are off buttons (5) and (6) become inactive for 3 seconds.

8. Button for turning arm's floating function and diode for signaling the floating function. To turn arm's floating function press button (**7**). To turn the function off just hold the button (**7**) again.
9. Diode for signaling turning the mowing head's floating function on. Turning the head's floating function on/off is performed by means of button (**3**) found on joystick (**Fig. 44**).
10. Diode signaling if the first arm's unloading function is on. Turning the unloading function on/off is performed by means of joystick's button (**4**).
11. Diode for signaling, if admissible oil temperature is exceeded.

    Caution! If oil temperature is exceeded, turn the working head off. If oil temperature does not get lower within 10 minutes, control would be turned off. Control will be turned on again when oil temperature gets lower. Diode for signaling low oil level.
12. Diode for signaling low oil level.

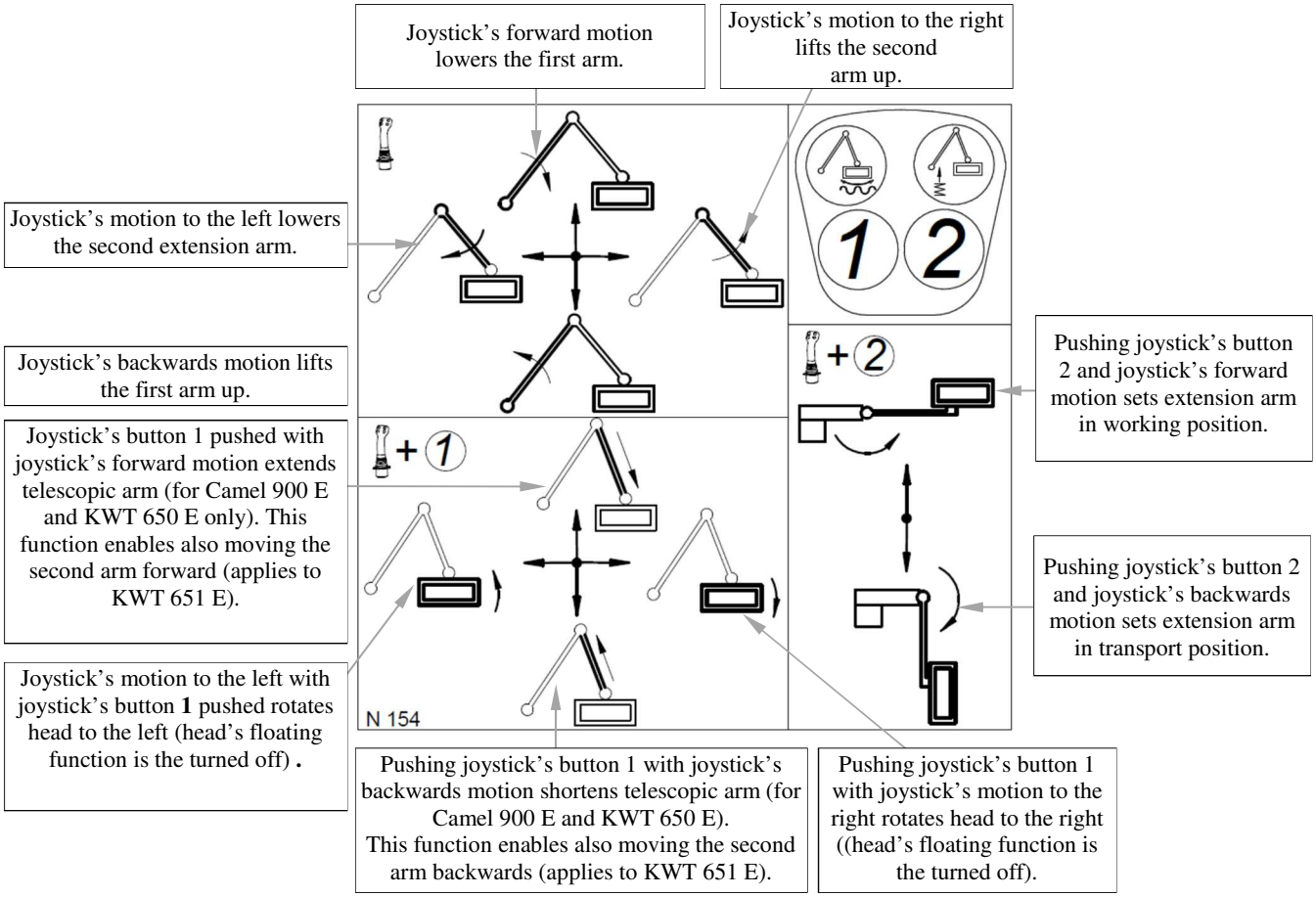
Joystick and its functions

Fig. 44. Control joystick overview and description of its functions (KWT 550E/650E/651E, CAMEL 900 E, Koliber EP)

1. Button 1 and pictogram ① to symbolize the button.
2. Button 2 and pictogram ② to symbolize the button.

3. Button for turning on the head's floating function. Pushing the button turns on the head's floating function, which is signaled with lighting up of diode (**8**) on control panel (**Fig. 45**). Pushing button **3** on joystick again turns off the head's floating function. The floating function gets turned off also when the head's rotation is being controlled.
4. Button for turning on the head's unloading function. Pushing the button turns on the first arm's unloading function, which is signaled by lighting up of diode (**9**) (**Fig. 43**). Pushing button **4** on joystick again turns off the head's unloading function.

Description of label on manner of controlling arm



Control panel with proportional control

Proportional control of extension arm is possible using the same control panel as for electrical control (**Fig. 43**) and joystick (**Fig. 45**). Controlling is presented in **Fig. 48**.

Fig. 45. Proportional control joystick

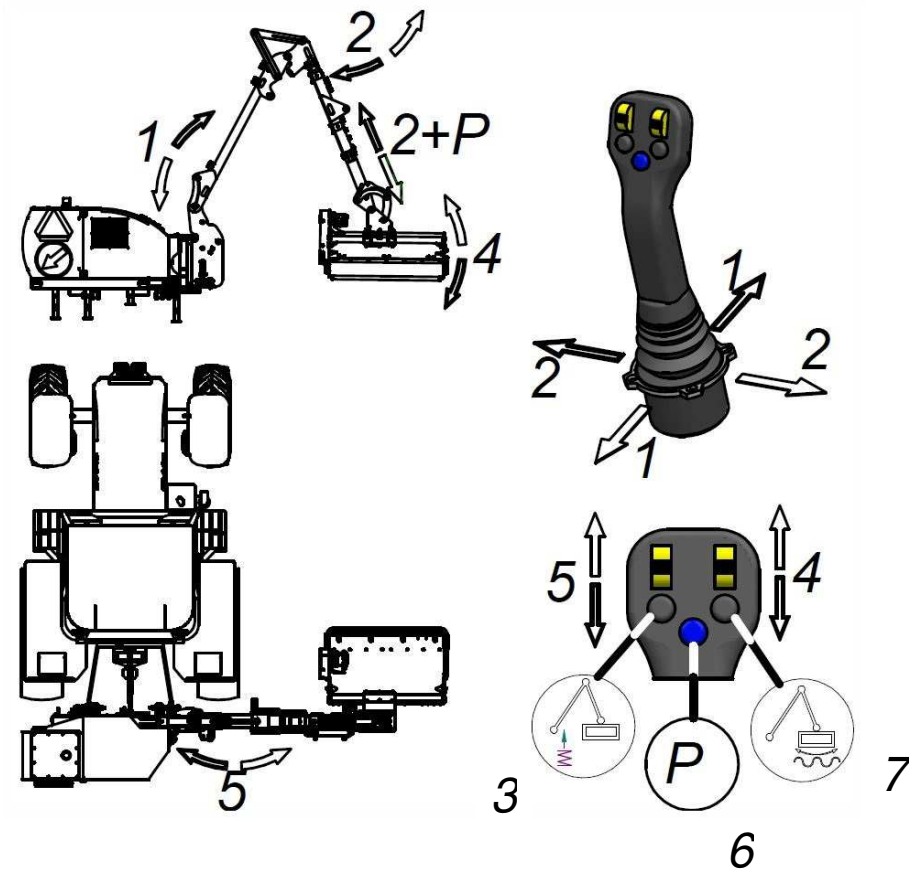


Fig. 46. Proportional control description

Proportional control description:

1. Moving joystick in directions as marked in **Fig. 46** as (**1**), enables control of the main arm.
2. Moving joystick in directions (**2**), enables control of the other arm.
3. Unloading function switch on button. Pushing the button will turn on the first arm's unloading function, which is signalled by lighting up of diode (**9**) (**Fig. 43**). Pushing the button again (**3**) (**Fig. 46**) switches the unloading function off.
4. Head rotation control lever. Moving the slide up/down changes position of the mowing head.
5. Arm turntable control lever. Moving the slide up unfolds extension arm to its working position. Moving the slide down folds the machine to its transport position.
6. Function button (**P**). Pushing this button and moving the joystick right/left extends/retracts the arm respectively.
7. Button for turning head's floating function on. This function is signaled by lighting up of diode (**8**) on control panel (**Fig. 43**). Pushing button (**7**) on joystick again turns off the head's floating function. The function is turned off as soon as the head's rotation is being controlled.

6. MOUNTING AND ADJUSTMENTS

6.1. Mounting and dismounting flail head

- Mounting flail head on extension arm is performed with use of multi-purpose linkage with mounting catch (**2**) (**Fig. 47**).
- Prepare flail head (**1**), which first should be dismounted – using support foot (**4**) set the head parallel to the ground.
- Place the machine on level ground.
- Lift extension arm and drive tractor away.
- Drive the tractor and position extension arm so it is possible to attach a head.
- Turn the tractor's engine off and take ignition key out.
- Screw bolts in mounting catch (**2**) and connect quick fasteners (**3**). For Lama 120 P head, connect 2 cables for rotation control of the moving part of ejector directly to push-in fittings of tractor's hydraulics.

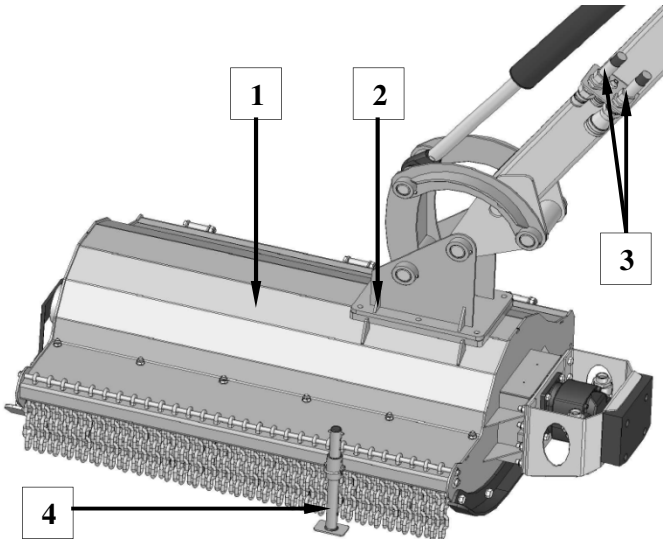


Fig. 47. Mounting flail head with use of multi-purpose linkage

In order to dismount flail head take analogical steps, that is place machine on even ground and disconnect tractor's engine. Then unscrew bolts in mounting catch (**2**) and disconnect quick fasteners (**3**) (**Fig. 47**).

NOTE:

The arm is equipped with set of twist-on push-in fittings designed for quick mounting and dismounting of the cutterbar or working adapters.

6.2. Mounting flail heads

Coupling Lama 121/ 141 mowing heads is significantly facilitated owing to application of mountings. Mountings such as: basic mounting (**Fig. 19**, item 1), rotary mounting (item 2), hydraulic turntable (item 3) are normally bolted to extension arm with 6 bolts.

Hydraulic turntable can be attached to mowing heads.

For Lama 121 / 141 heads it is possible to manually shift the head to the side in relation to the arm. In order to perform this, first:

- untighten 6 screws M14 (**1**) (**Fig. 48**),
- move the head as desired,
- tighten screws M14 (**1**).

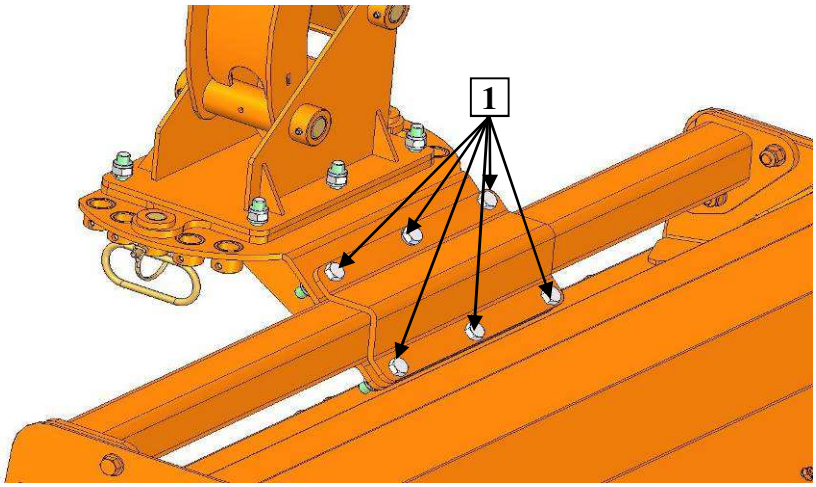


Fig. 48. Lateral shift in relation to arm

Rotary mountings (**item 2**, **Fig. 20**), hydraulic turntable (**item 3**, **Fig. 19**) can be rotated vertically. In case of the first type, the rotation is performed manually, and the hydraulic turntable rotation is powered by the tractor's hydraulics. In order to turn head in rotary mounting (**item 2**, **Fig. 19**) perform the following:

- lift the head over an even ground and set it horizontally,
- remove safety cotter (**1**) (**Fig. 49**),
- remove locking pin (**2**),
- rotate the head as desired,
- secure the head with the pin and the cotter.

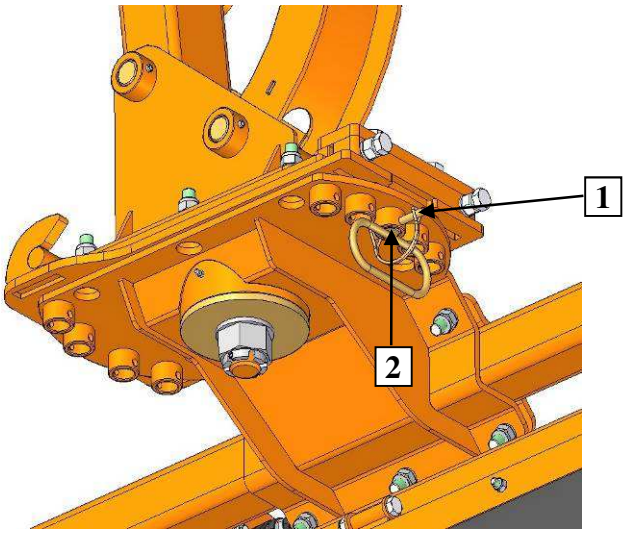


Fig. 49. Rotary mounting

Hydraulic turntable is controlled with a special hydraulic motor (**Fig. 50**), which is powered directly from the tractor's hydraulics. For this purpose:

- connect two hydraulic push-in fittings to the tractor's hydraulics,
- moving an appropriate control lever for distributor in the tractor, rotate the mowing head and set it in the desired position,
- if the head rotation is performed too fast, throttle the oil flow with throttle valves (**3**) located just behind hydraulic push-in fittings.

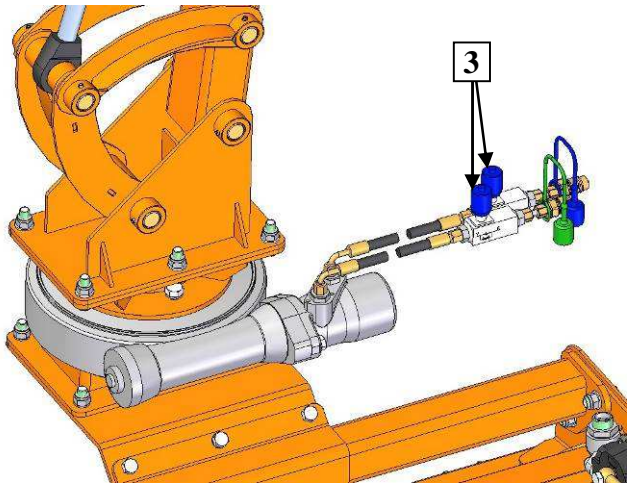


Fig. 50. Hydraulic turntable

For heads Lama 120/140 and Lama 121/141 head suspension can be fitted. If fitting for Lama 121/141 is used, it is necessary to use suspension mounting. Head suspension facilitates the operator's work as he doesn't need to constantly control the extension arm because of the suspension which enables the mowing head to follow ground vertically within 260 mm, and also enables driving speed increase while mowing. The suspension has 2 springs providing the head relief which enables the head to tackle ground unevenness more smoothly. Head relief is adjustable according to the ground configuration and the operator's preferences. For transport, suspension is fitted with locking pin which locks the mechanism against uncontrolled motions.

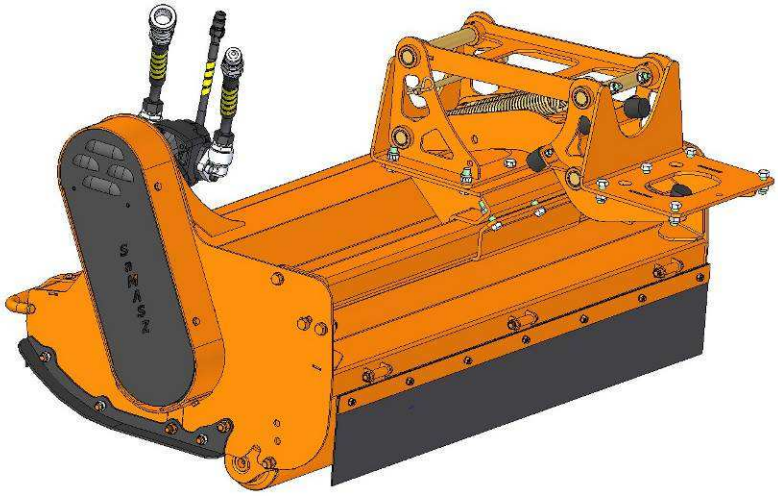


Fig. 51. Linkage with mounting for Lama 121 / 141 mowing head

6.3. Adjusting flail head mowing height

Mowing height adjustment using the mowing head is possible by changing position of ground-following shaft (**Fig. 52**). Therefore undo screws fastening the ground-following shaft and re-tighten them on the desired level.

Additionally, in mowing heads KW it is possible to move the ground-following shaft backwards by loosening screws **I, II** or **III** and **1** (**Fig. 52**), and then re-tightening them in holes **IV, V** or **VI** and **2** (**Fig. 52**).

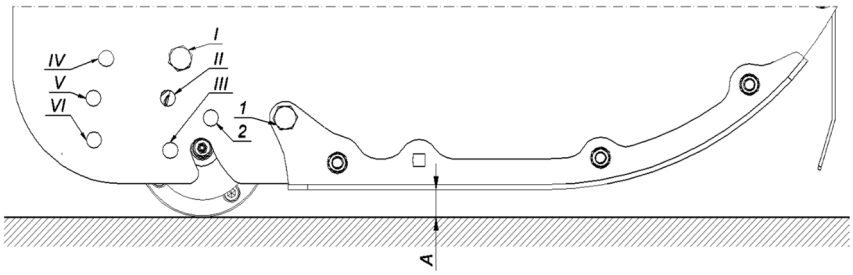


Fig. 52. Ground-following shaft position adjustment

Tab. 8. Possible mowing heights

Setting	Flail head mowing height A [mm]			
	KW 110 / 125 / 140	KW 111 / 126 / 141	LAMA 120 / 140	LAMA 101(P) / 121(HD) / 141
I + 1	31	26	45	32
II + 1	47	52	65	53
III + 1	64	76	85	73
IV + 1	76	–	–	–
IV + 2	–	27	–	–
V + 2	–	52	–	–
VI + 2	36	73	–	–

6.4. Replacing knives in mowing adapter

WARNING!

Before any work always check condition of flail knives and their mounts. Do not use damaged or worn elements due to the risk of throwing objects. Damaged or worn elements are dangerous.

If necessary a blade should be replaced as shown in **Fig. 53**. All blades must be of the same type and have the same weight. Blades should be purchased from the manufacturer of the machine - "SaMASZ".

If rotor of cutterbar is equipped with standard knives, make sure whether these are mounted in right direction.

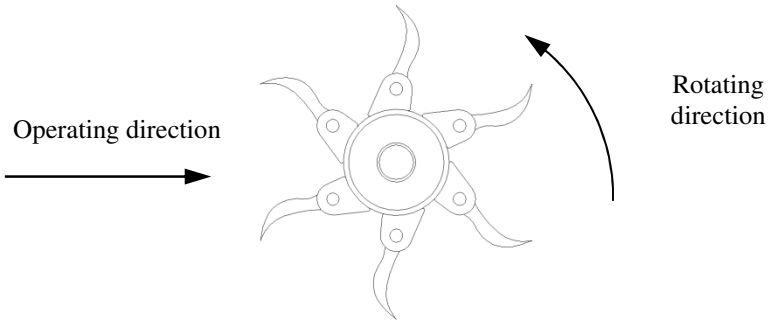


Fig. 53. Knife mounting manner

IMPORTANT:

Flail knives must be replaced in pairs.

Worn-out bolts securing the flail blades should be unconditionally replaced. It is forbidden to use bolts with a lower strength class than 10.9.

Prior to entering hands or any other tools to casing of the cutterbar follow the below advice:

- wait until the rotor is stopped,
- lower the machine's cutterbar onto the ground,
- disconnect the tractor's engine, take ignition key off, lock valves at oil tank,
- wear protective gloves and clothing as required by safety precautions.

6.5. Operating hydraulics

Condition of hoses and hydraulic fittings should be examined periodically and in case of finding damages replaced with new ones. Irrespective of the above hydraulic hoses should be replaced with new ones every 5 years taking their storing period into consideration. In winter idle period it is recommended to store the machine in dry, well vented room, paying attention the hydraulic hoses are not deflected.

CAUTION!

Oil used in hydraulic circuits is toxic. Prior to performing any servicing, oil replacement, the operator should wear protective clothing.

Strictly follow the binding provisions on hazardous waste. Used oils should be drained to special containers and then taken to a nearby oil treatment plant.

6.5.1. Oil tank with equipment

Tightness of tank's (**1**) welded joints should be examined as well as hoses connections. These activities should be performed at least once a month (**Fig. 54**).

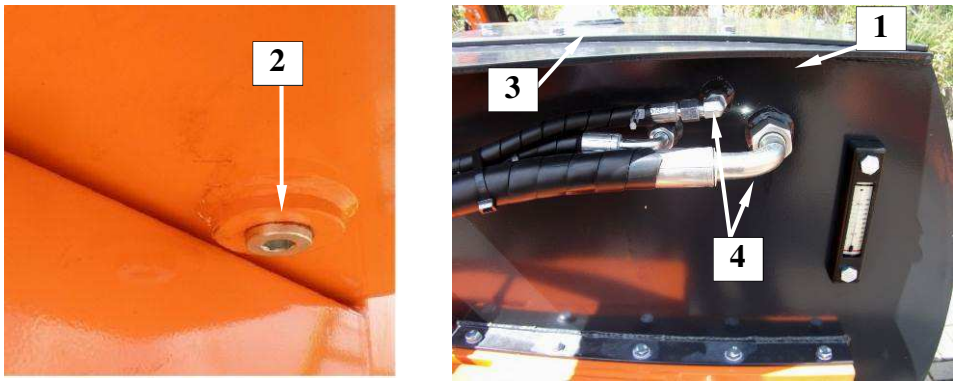


Fig. 54. Oil tank

Potential leaks shall be welded after the oil is drained. Drain plug (**2**) is located underneath the tank (**1**). Damaged paintwork should be repainted and oil loss supplemented with HYDRAULIC PREMIUM 46 HV oil group oil with similar properties. The tank holds approx. 150 l of oil – Koliber 400/450, 220 l of oil – Camel 900 and KWT 550/650/651. Refilling oil should be performed through upper air vent filter (**3**). In order to perform this "can" should be dismounted from the tank, and only special sieve shall remain inside, which collects impurities contained in oil. Oil level is indicated by indicator plug, which should be unscrewed when oil is filled into the tank. Upon obtaining proper oil level all plugs and filter should be tightened. Above the indicator plug there are hydraulic hoses nozzles – tank fills (**4**).

The oil must conform with purity class: 15÷18 in conformity with ISO 4406, 9 in conformity with standard NAS 1638. If the oil does not conform with the provided purity class then replace it. If the oil purity is doubtful then it should undergo a purity test in corresponding testing authority.

6.5.2. Oil shut-off valve

Tightness of joint connections at valve (**5**) should be controlled at least once a day. Leaks should be removed by tightening nuts and /or band clips (**6**) (**Fig. 55**).

Open position – lifting set along feeding hydraulic hoses (**ON**).

Close position – lifting set perpendicular to feeding hydraulic hoses (**OFF**).

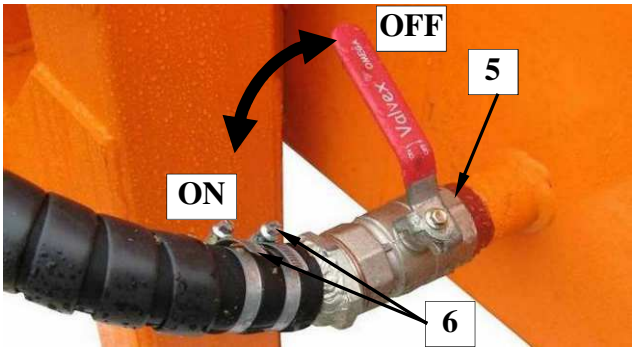


Fig. 55. Shut-off valve placed on tank

6.5.3. Multiplier with pump set

Tightness of connections and oil level in multiplier should be examined as well as tightness of connection of hoses to pumps (**7**) (**Fig. 56**). This activity should be performed at least once a week.

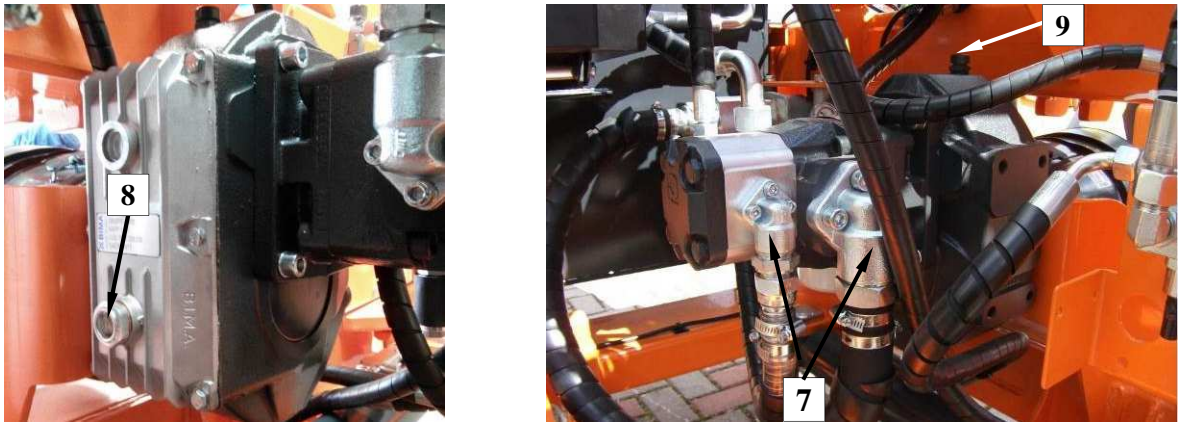


Fig. 56. Mounted multiplier with pump set

Leaks in casing of multiplier should be removed by tightening casing bolts and sealing with silicone. If oil level is low, take out air vent (**9**) and refill oil up to about 1L (half the inspection window (**8**). Then air vent should be tightened anew.

Drippings at connecting hoses to pumps should be removed by tightening bolts, possibly sealing should be replaced.

6.5.4. Suction filter CCA 302 CD1

Suction filter is equipped with two inserts CS 100 (**10**), contamination of which is determined with use of indicator located in upper part of casing MPS 300 (**11**) (**Fig. 57**).

At commission these inserts (**10**) should be replaced after 100 h, next replacement after 500 h of operation, if indicators do not show any contamination.

If indicators show contamination, these inserts should be replaced regardless of the operation time. Contamination level should be controlled daily. No indicators control and no replacement of inserts may lead to damaging hydraulics parts, what **is not covered by warranty**. During control of indicators attention should be paid to condition of hoses and potential leaks. If such occur, seats and clip bands should be tightened. Applied inserts and indicators must be purchased at manufacturer's or at recommended stores. Use of non-genuine sub-assemblies may lead to damage, which **is not covered by warranty**.

CAUTION!

If filter indicator shows full contamination – the filter will be disabled – causing the system to work without a filter – what may lead to pumps and hydraulic drive failure.

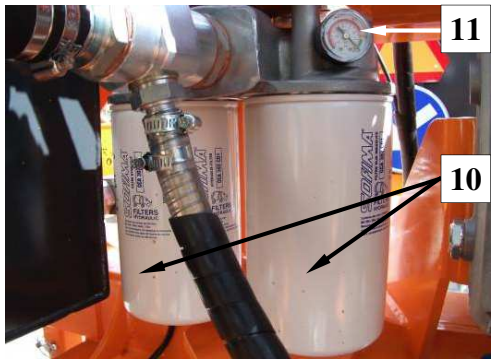


Fig. 57. Suction filter in hydraulics

6.5.5. Control distributors

In arm two distributors are applied:

1) single-section (**12**) designed for starting hydraulic engine driving the cutterbar,
2) four-section (**13**) or five-section designed for operating hydraulic cylinders controlling the machine.

WARNING!

Sweep valves of distributors are factory set (**Fig. 58**). Adjusting them is forbidden, as it may lead to damaging hydraulics, what **is not covered by warranty**.

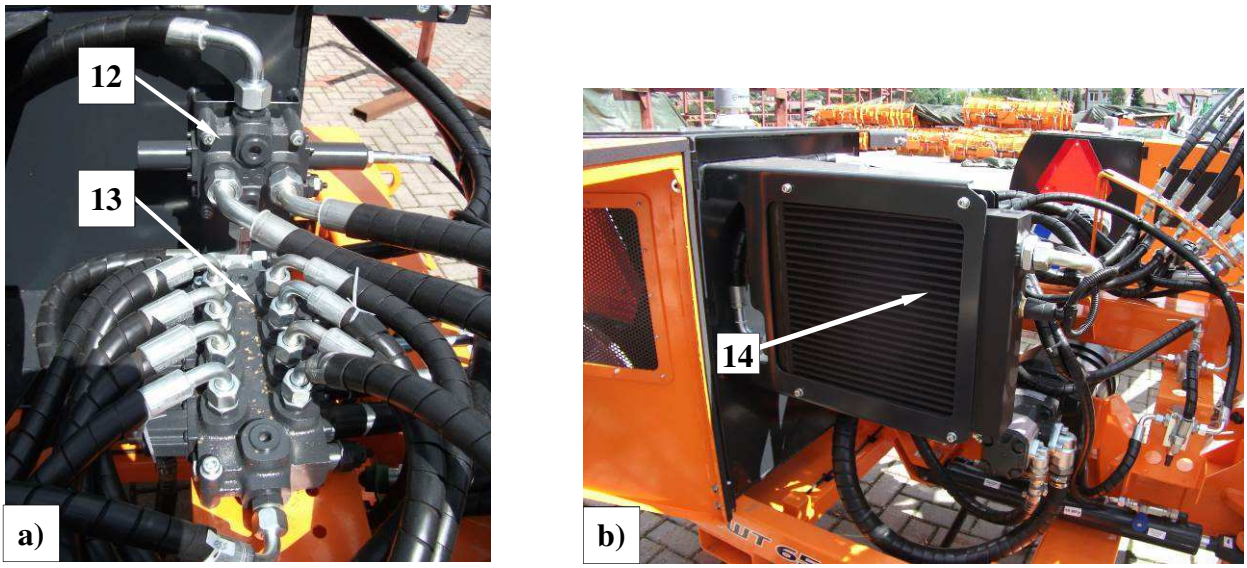


Fig. 58. Hydraulics control assembly

Control assembly I (Fig. 58a):

Single-section distributor (**12**) is responsible for starting the cutterbar. The drive is started from the tractor's cabin using the control system. Sweep valve of distributor is set on 180 bar. On tank fill there is oil cooler (**14**). Cooler radiator is started when oil temperature exceeds 65ºC.

Control assembly II (Fig. 58b):

Four-section (**13**) or five-section distributor is responsible for tilt of the machine's arms, extension rotation to proper mowing/transport position as well as settings of the cutterbar (control is specified in chapter 5.5.1. Control panel operation). Sweep valve of distributor is set on 180 bar.

6.5.6. Initial regulations

Four hydraulic cylinders (**1**), (**2**) are equipped with throttle valves (**15**) (**Fig. 59 and Fig. 60**), designed for regulation of oil flow. Their task is to adjust settings for any machine's operator. Reducing oil flow improves operation of cylinders (eliminates jerks), but at the same time slows down their operation. Setting is performed by turning the valve rotary handle:

Turning right − reduces capacity, improves operation, slows down the cylinder's operation.

Turning left − improves capacity, causes jerks, accelerates the cylinder's operation.

Fig. 59. Adjustment of cylinders

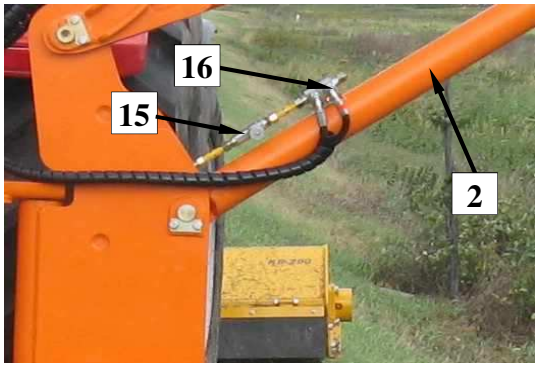


Fig. 60. Cylinder protection

6.5.7. Safety valves

Cylinder (**2**) is connected to twin locking valve (**16**) (**Fig. 60**). Its main task is to keep the cylinder's position, in case of hydraulics failure. This valve is factory set and is not covered by warranty.

Rotation cylinder (**17**) is connected to sweep valve (**18**) (**Fig. 61**), which protects working arms from overloading. Increasing pressure in cylinder shall cause oil flow and arm deflection. Valve adjustment is performed with bolt (**19**) located on the valve. Do not make any self-adjustments of the valve.

Keep in mind that hydraulic hoses (**20**) of cylinder (**17**) must be suitable to hold high pressure (min 300 bar).

It should be borne in mind, that too big a deflection of the boom, changes the mower's position to improper. Then the tractor should be stopped immediately and lever (**B**) switched in up position (extension arm turned left) (**B** - **Fig. 40**). Improper mower's position causes impairment of mowing quality.

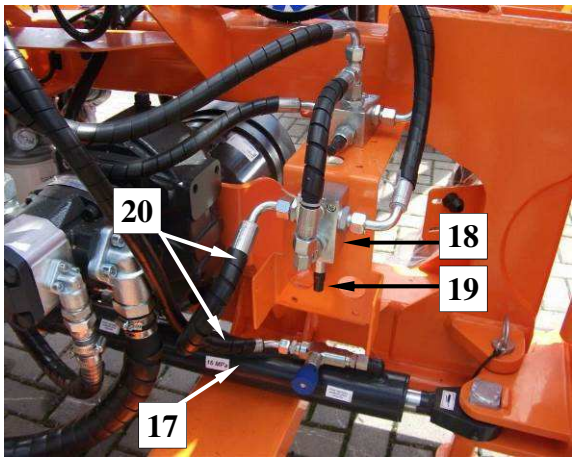


Fig. 61. Sweep valve (18) for underrun protection

6.5.8. Hydraulic engine

Hydraulic engine drive's (**21**) hydraulic hoses connection should be controlled at least once a month. In case of leaking tighten the hoses (**Fig. 62**).

Hydraulic motor (**21**) connected to flail shaft by means of a coupling.

CAUTION!

Hydraulic engine can operate in one direction only (to the left from engine bar side). Do not connect the engine in the other direction – it shall lead to its damage!

Operation without guard around the hydraulic engine is forbidden – it may lead to damaging the engine!

Fig. 62. Hydraulic engine driving shaft with cutterbar's knives

6.6. Manual control of electrical and electrical-proportional distributor

In case of electrical and electrical-proportional control failure it is possible to adjust the hydraulic distributor manually. This allows for mechanical machine folding and emergency service drive. Please learn the below description of procedure for two types of distributors:

a) Electrical E control

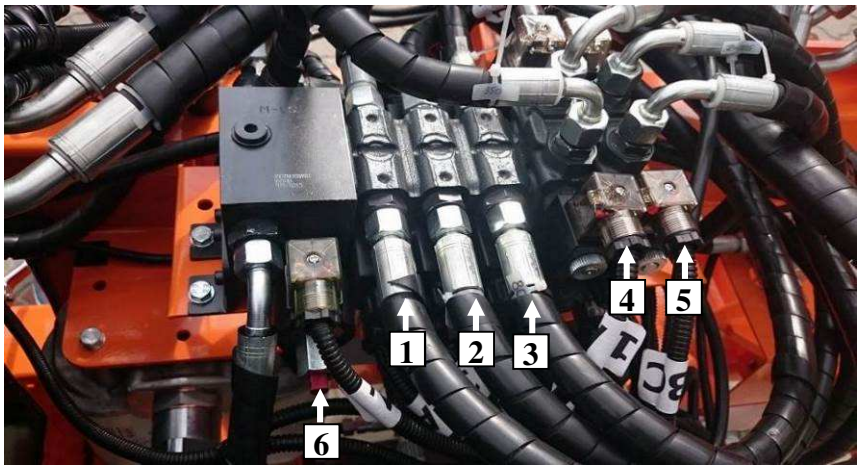


Fig. 63. Hydraulic distributor E – description of distributor functions:
1- turntable, 2- arm extension, 3- 2nd extension arm, 4- main extension arm,
5- cutting part, 6- start distributor

To overload hydraulic distributor with electrical control:

- push the button (**6**) and turn it left,
- next adjust hydraulic actuators by pushing buttons (**1**), (**2**), (**3**) on coils under hydraulic hoses,
- to change sections (**4**) and (**5**) firstly apply 12V voltage on the coils and then adjust in the same manner as in the case of other.

b) EP control – electrical-proportional

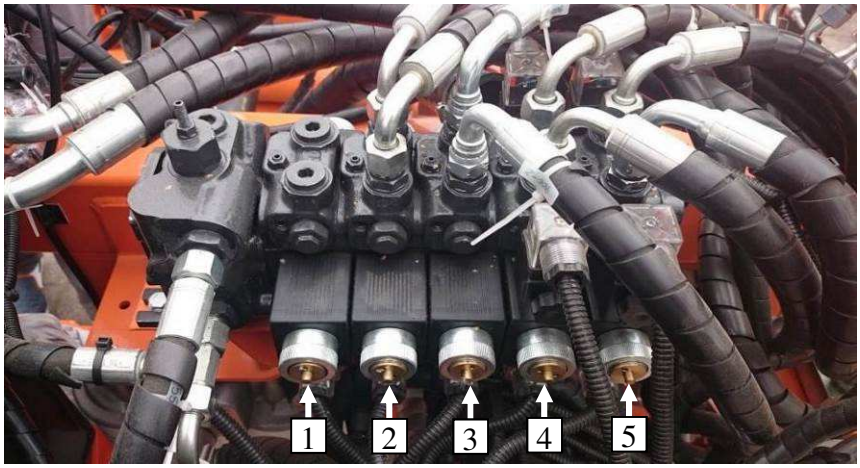


Fig. 64. Hydraulic distributor EP – description of distributor functions
Camel 900 EP, KWT 650 EP, KWT 651 EP: 1 - turntable, 2- arm extension,
3- 2nd extension arm, 4- main extension arm, 5- cutting part;
KWT 550 EP: 1- turntable, 3- 2nd extension arm,
4- main extension arm, 5- cutting part

To adjust hydraulic distributor with electrical-proportional control:

- adjust hydraulic actuators by pushing buttons (**1**), (**2**), (**3**) on coils,
- to change sections (**4**) and (**5**) firstly apply 12V voltage on the coils and then adjust in the same manner as in the case of other.

6.7. Manual adjustment of column oil level and temperature indicator

In the case of column oil level and temperature indicator failure, manual adjustment of sensors is possible. This allows for restarting of the machine and service drive.

Causes of damage to column oil level and temperature indicator:

- mechanical damage,
- damage of temperature and oil level sensors,
- oil overheating,
- oil level dropped below the admissible level.

For manual adjustment of the indicator please loosen the plug (**Fig. 65**). Then using an electrical cable connect (bridge) adequate ends (**Fig. 66**) - for temperature sensor failure, end 3 and T, and for oil level sensor failure, end 1 and 2.

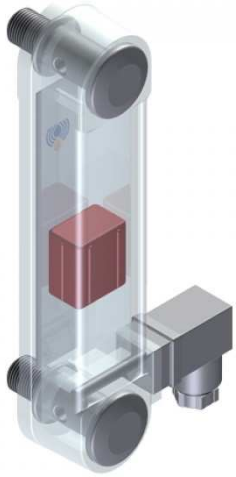


Fig. 65. Column oil level and temperature indicator

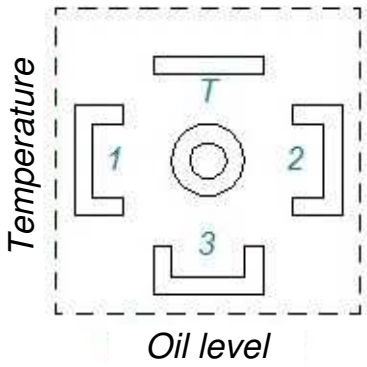


Fig. 66. Connection diagram

WARNING!

Follow the above procedure only in an emergency, and therefore do not apply it for normal extension arm operation.

6.8. Operating service

6.8.1. Removing clogging and jams

When operating the mower pay attention to variable conditions on field, which may influence the mower clogging, such as: terrain unevenness, height and density of grass as well as other objects in the grass. In order to avoid clogging, mowing speed should be adjusted to the mentioned conditions.

In order to remove the machine clogging, lower the cutting set onto the ground, disconnect the

drive, take ignition key off and pay particular attention, remove excess material using sharp tool. After clearing the machine check if nothing has been damaged. When eliminating any clogging on the machine, use also safety means for operator, so protective gloves and tight wear, due to the risk of injury, abrasion or damage of skin.

6.8.2. Daily maintenance

Upon daily completion of operation the following should be performed:

- remove grass and mud from the machine, etc., (pay particular attention to cutterbar, flail shaft, adapting shaft and engine guard),
- examine condition and number of flail knives. If need be, replace following the manual (in pairs),
- perform check-up of vivid external parts and assemblies as well as their connections: tighten loosened connections and replace worn or damaged parts,
- lubricate all pins and cylinder joints,
- visually examine technical condition of hydraulics: oil filter contamination indicator, fitting elements for leaks. If these are major, check oil level in the tank and remove defects following provisions give in the manual (tighten fitting elements, replace copper washers, tighten band clips,
- examine technical condition of connections between the machine and the tractor.

6.8.3. After-season maintenance

At the end of the season the machine should be cleaned, washed and dried. Carefully grease unpainted surfaces and 3-point linkage pins.

After that the following work should be carried out:

- examine the paintwork condition. If need be, clean and paint any damaged points,
- examine technical condition of hydraulics taking actions as in case of daily servicing. Moreover condition of hydraulic hoses should be examined thoroughly. If need be, replace with new ones meeting technical requirements of the manufacturer,
- examine technical condition of moving parts of the machine. If clearance is found on pins, these should be replaced along with slide bushings and well protected,
- examine condition of bearings in fail and adapting shaft (whether there is no run out). If necessary, replace bearings and gaskets (it is recommended that these activities are performed by the SaMASZ company specialized personnel).
- cooperating elements (pins, joints, cylinder rods, etc.) should be protected for corrosion by covering them with thin film of solid grease.

6.8.4. Storing

Detached machine should be stored in standstill position, so it is supported onto supporting legs and the cutterbar (**Fig. 67**). It is recommended to store the set on paved ground, preferably in roofed places, inaccessible to unauthorized personnel or animals.

After storing for winter period prior to the machine operation, its technical condition should be examined and special attention should be paid to the hydraulics and the drive. Paintwork should be complemented, hydraulic hoses checked and lubricated.

Fig. 67. Correct machine storage position: a) KWT, Camel, b) KOLIBER

CAUTION!

When performing repair and maintenance works the machine should be lowered onto the ground or supported (cutterbar) onto supports ensuring its full stability, with the tractor's engine disconnected and ignition key off.

CAUTION!

Storing the machine otherwise as given, may result in machine instability and thus its damage.

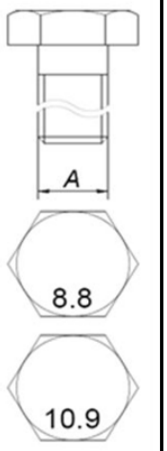
6.8.5. Restarting the machine after storing period

After the storing period perform the following:

- Make sure that all nuts and screws are tightened with correct torque (**Tab. 9**).
- Make sure that all guards are installed in place.
- Lubricate the whole machine.
- Examine condition of flail knives, and if necessary, replace them with new ones.

Tab. 9. Torque values for bolts

A	6.8		8.8		10.9		12.9	
	Maximum torque							
	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm
M4	1.5	2.2	2	3.0	3	4.4	4	5.1
M5	3.5	4.5	4.5	5.9	6.5	8.7	7.5	10
M6	5.5	7.6	7.5	10	11	15	13	18
M8	13	18	18	25	26	36	33	43
M10	27	37	37	49	55	72	63	84
M12	47	64	63	85	97	125	111	145
M14	74	100	103	135	151	200	177	235
M16	118	160	159	210	232	310	273	365
M18	162	220	225	300	321	430	376	500
M20	229	310	321	425	457	610	535	710
M22	314	425	435	580	620	820	726	960
M24	395	535	553	730	789	1050	926	1220



In the absence of specific torque values, the following chart can be used as a guide to the maximum safe torque for a particular size and grade of fastener. There is no torque difference for fine or coarse threads. Torque values are based on clean, dry threads. Reduce value by 10% if threads are oiled before assembly.

6.8.6. Dismounting machine from tractor

WARNING!

When detaching, make sure there is no person in between the machine and the tractor.

When dismounting machine from tractor perform the following:

- turn off unloading function and do not turn it on again,
- open pressure reduction valve for 10 seconds and then close it (**Fig. 68**),
- lower flail head onto paved and even ground,
- put forth and protect support legs,
- dismount linkage frame (undo bolts and remove pins),
- take linkage pins out,
- lower the machine by means of 3-point linkage,
- unscrew control panel with handles and links (Bowden's links and hydraulic hoses feeding pump should not be deflected),
- manner of mounting PTO shaft is provided in **Fig. 69**,
- then drive tractor away.

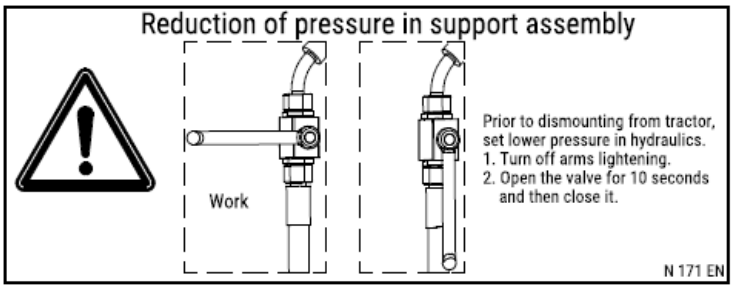


Fig. 68. Pressure reduction valve in unloading system

Fig. 69. WPT linkage after machine is detached from tractor

7. LUBRICATION

For lubrication joints of the machine use greases STP. Lubricate bearings of gear operation with ŁT43. Do not use any plant or animal based grease. Prior to applying the grease clean out grease fittings as well as lubrication points prior to grease application.

The following should be lubricated:

- rolling bearings of cutterbar rotor,
- joint pins.

After 2 h of operation:

- make sure whether nuts, pipe fittings and clips are well tightened.

Every 4 h of operation:

- apply grease into permanent grease fittings.

Every 8 h of operation:

- lubricate all eyes of hydraulic cylinders,
- examine pressure oil filter sucking (if the indicator is in red apply a new insert),
- examine proper operation of Bowden lines (if any line cuts occur, lubricate).

After 100 h of operation:

- check oil level in multiplier (if the level is too low refill with SAE 90 type oil or similar).

After 600 h of operation:

- replace oil in multiplier (SAE 90).

8. DEFECTS AND THEIR REPAIR

In case of a malfunction, immediately stop the machine on a stable grounds, turn off the motor and wait until the mowing head is fully stopped. Before disconnecting any of the hydraulic hoses, check whether there is no pressure in the hydraulics and remember to cut-off the oil feed from the tan to the machine's hydraulics. Hot or pressurized oil leak may cause serious bodily injuries. For the sake of the operator's safety, the machine must be stopped on even ground. All hydraulic cylinders and moving elements must be completely locked.

Malfunction	Cause	Recommendations
The machine is not mowing properly or leaves strips of uncut grass	Worn or blunt flail knives	Sharpen the knives or replace
	Wrong selection of type of flail knife to work conditions	Mount correct flail knives
	Too low cutterbar rpm	Adjust to adequate rpm on tractor output 540 or 1000 rpm depending on option
	Inoperative tractor PTO, no rpm output	Check PTO shaft and repair in service station
	Improperly matched work conditions to machine and driving speed	
	Pump becomes inoperative or leak on 1-section divider	Check pump operation with use of flow meter and pressure gauge. If oil feed and pressure is correct, check the divider, if necessary replace damaged elements
	Damaged disk key on flail shaft-engine coupling. (Heads with a direct power transmission from engine on flail shaft)	Replace key
	Inoperative hydraulic motor	Replace motor
	Locked cutting chamber	Remove material deposits
Problem with arm control with hydraulic cylinders, they work slowly, automatically or become inoperative	Inoperative hydraulic cylinder, oil leaks between the chambers	Replace sealing on the cylinder or replace the cylinder
	Defective cylinder control distributor, oil leaks	Replace damaged elements
	Hydraulic pump becomes inoperative	
	Damaged Joystick or controller for E or EP control	
	Damaged wiring system	Repair the system
	Control cable not adjusted	Make adjustments
	No voltage on tractor	Perform tractor repairs
	Loose ground cable.	Attach ground cable to machine frame correctly
	Damaged control system	Replace damaged parts
	Closed throttle check valves	Check and adjust valves
Mower after a short period becomes disconnected / stops operating	Temperature of oil is too high, damaged column oil level indicator	Replace damaged elements. Check fan for function
	Damaged Rotex clutch	Replace clutch
	Damaged hydraulic motor	Replace motor

Malfunction	Cause	Recommendations
Oil level and high temperature LED lights up on the controller	Oil temperature too high	Turn off the drive without disconnecting the control, oil must cool down
		Damaged thermostat on cooler
	Oil level too low	Refill oil
	Damaged column oil level sensor	Replace sensor
Control will not start	Damaged wiring system	Repair the system
	No power supply on tractor	Perform tractor repairs
Fan inoperative	Defective thermostat	Replace thermostat
	Burnt fuse on wire harness	Replace fuse
	No power supply	Check voltage, systems and plug
Excessive vibration during operation	Damaged or no knives	Check condition and replace knives as described in instruction manual
	Opposite knives have different weight	Make sure there is no difference in knife weight. Balance flail knife.
	Mechanically damaged flail shaft	Repair or replace the shaft
	Damaged bearings of flail shaft	Replace bearings
	Loosen bolts fastening the bearing housing on the shaft or not properly secured.	Tighten bolts fastening the shaft or check condition of flail shaft in a service point.
Loud machine operation	No oil in the system	Refill oil in accordance with instruction manual
	Main oil valve closed	Open main valve
	Damaged hydraulic pump	Replace hydraulic pump
	Damaged / worn bearings on working unit	Replace bearings
Damaged control lever	Damaged or improperly adjusted control cables,	Replace or adjust and route cables without deflections
Repeatedly damaged control cables	Kinked or deflected cables in tractor cabin	Adjust and route cables without deflections
No rotation of flail shaft, even if hydraulic motor is in motion	Sheared key on flail shaft or motor	Replace key
	Damaged belt gear or belt	Repair belt gear or replace damaged belt
Oil leak from intensifier	Damaged sealing	Replace sealing
	Too much oil in intensifier	Adjust oil level in intensifier

9. REPAIR AND WITHDRAWAL FROM USE

9.1. Repair

REMEMBER:
Before repair works make sure the machine is disconnected from the tractor.

Before repairing or assessing whether the machine is still serviceable, it should be carefully cleaned of dirt, mud and plant remains.

After checking nuts and bolts, proper slack in joints and gears we can assess if the machine is still serviceable. Worn out bolts, pegs, pins, discs, holders, knives etc. should be replaced.

Once the machine is repaired perform the following:

- make sure that all elements are installed properly,
- install the removed guards,
- check whether screws and nuts are tightened,
- check proper slack in joints and in gears,
- once all the guards are installed, perform a warm-up start to make sure the repaired machine operates properly.

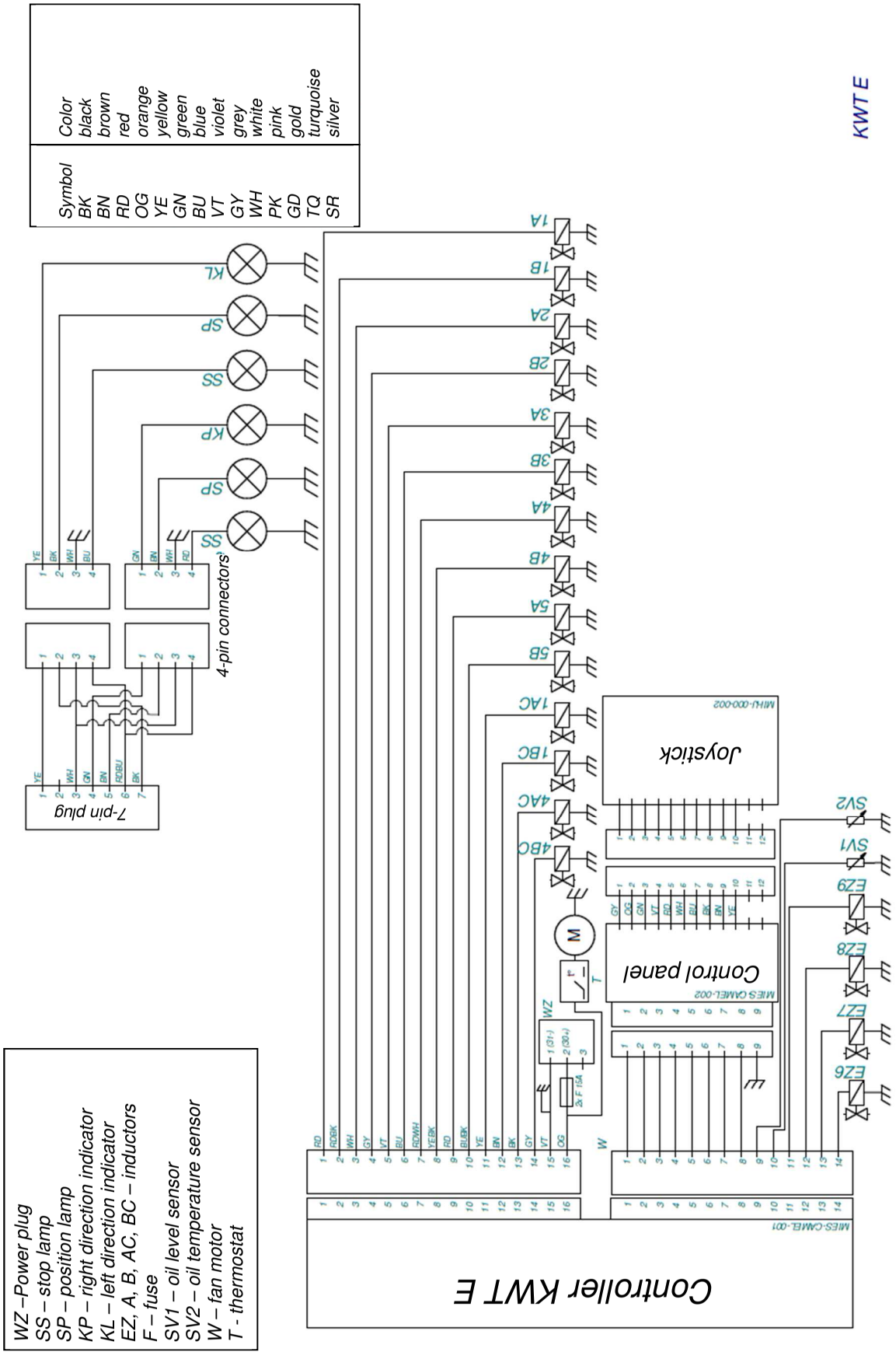
9.2. Disassembly and withdrawal from use

If the machine cannot be repaired anymore, it should be withdrawn from use. Therefore oil from the frame gearbox should be drained and thoroughly clean any excess oil with cleaning agent, take parts made of plastic off. They should be used further on or delivered to a proper waste treatment company. Upon completing the required activities the machine should be sold to breaker's yard.

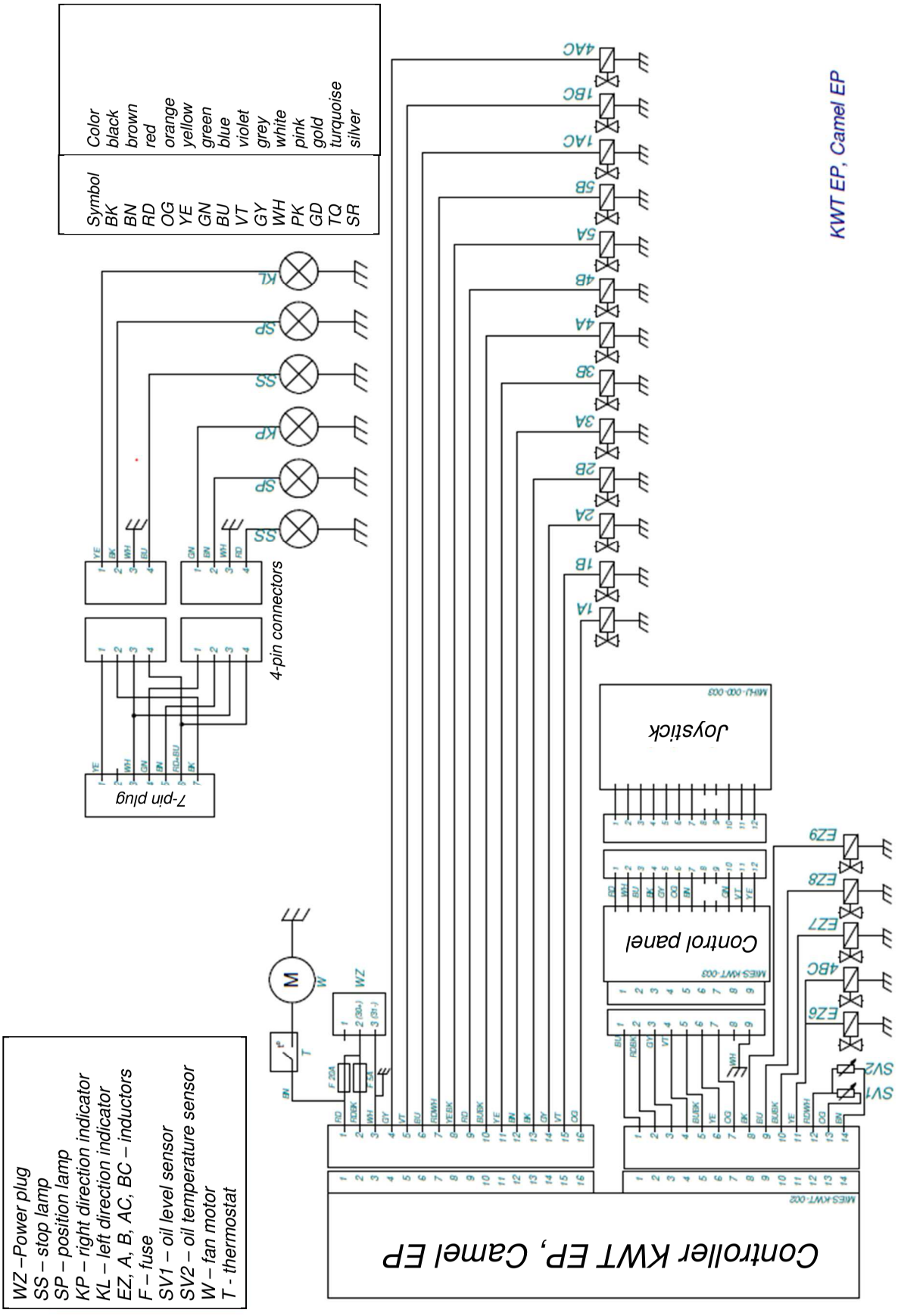
IMPORTANT:
When dismounting the machine pay particular attention to and additional dangers, as crushing, cutting, wounding, concussion and abrasion. Use proper tools and personal protective equipment: protective gloves, clothing and footwear, eye wear, etc. Pay attention so that the machine works efficiently, and thus it is required to secure the machine with supports.

10. ELECTRIC DIAGRAMS

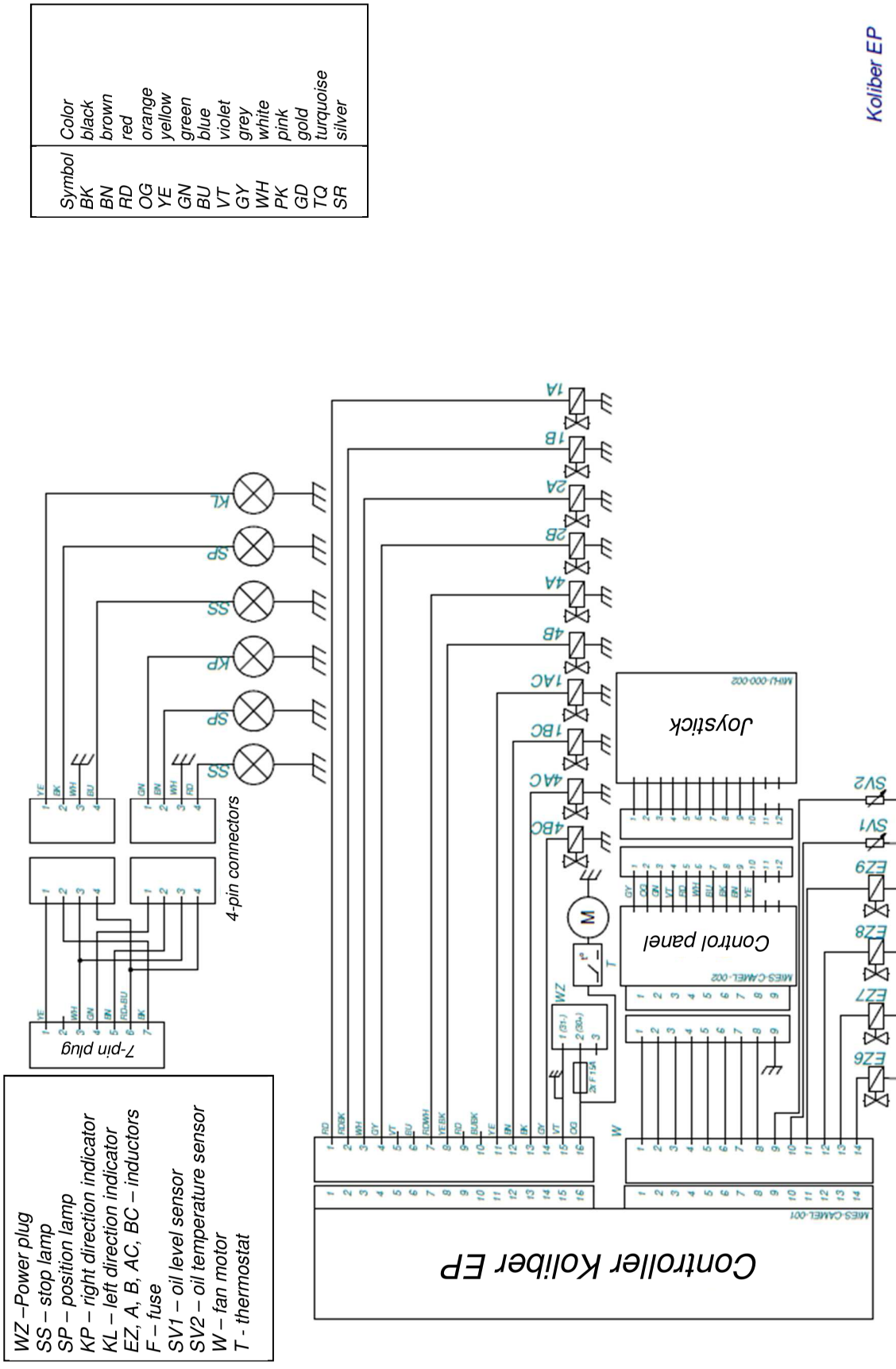
10.1. Electric diagram KWT E



10.2. Electric diagram KWT EP, Camel EP



10.3. Electric diagram Koliber EP



11. WARRANTY CARD

REAR EXTENSION ARM / MOWING HEAD

	Serial number Manufacture date Warrantor's stamp Controller's signature
	Date of sale Seller's stamp Seller's signature

This product has been checked and deemed fully serviceable and cleared for use.

NOTE:
Warranty card – if not filled in, corrected or illegible – **is not valid.**

12. WARRANTY TERMS

12.1. Warranty claim procedure

1. The manufacturer warrants good quality and defect-free operation of the machine under this warranty if the machine is operated in accordance with the operator's manual. It only concerns operation in good conditions, so when there is no obstacles, such as:
   a) stones,
   b) sewage, pipeline, gas chambers and any other municipal obstacles,
   c) edges perpendicular to operating direction,
   d) ditches and perpendicular channels,
   e) concrete poles, etc.

REMEMBER:

As the abovementioned obstacles are hard to avoid machine's operator should learn item 5.4.1. Basic data on mowing herein.

2. Faults or damages to the machine found within 12-month period from the date of purchase shall be removed free of charge at the purchaser's or the manufacturer's.
3. Faults or damages should be submitted personally, in writing or by telephone. Repairs shall be carried out within 14 days. Any repairs under the warranty should be carried out by authorized SaMASZ service facilities.
4. Warranty claims regarding the product replacement or repayment are considered within 14 days by the manufacturer.

5. The following conditions are not covered by warranty:
   a) **wear and tear of parts such as: mowing discs, slides, intersecting axis gears and parts within, bushings and sliding bushes, joints, knife holders, cutting knives, V-belts, conditioner's tines and rollers, roller conditioner's rubbers, bearings, rubber - metal fenders, safety curtains, conveyor's belts, connective elements, etc. These repairs may be carried out only at the purchaser cost.**
   b) **use of the machine for any purpose other than described in the operator's manual,**
   c) **working on stony fields and consequences,**
   d) **running into any obstacle,**
   e) **too fast lowering of the machine onto the ground,**
   f) **random events or other occurrences, for which the Manufacturer cannot be held responsible**
   g) **damaged linkage.**
6. The Purchaser bears the costs of technical evaluation – if the Manufacturer finds that a claimed product is free of defects and this is confirmed by technical report.
7. The Manufacturer has the right to cancel the warranty in the following cases:
   a) **hampering with the machine, modifications to its mechanical design or intentional damages.**
   b) **vast damage caused by random events or others, for which the Manufacturer does not bear any responsibility,**
   c) **lack of required records in the warranty card or filling in the warranty card independently,**
   d) **use of the machine for any purpose other than described in the operator's manual.**
8. The Manufacturer can break the service agreement with immediate effect when the user does not pay the invoice according to that agreement in a timely manner and the delay in payment is longer than 30 days from maturity date. Breaking the service agreement by the Contractor due to causes dependent on the user shall lead to termination of the warranty given for the particular machine.
9. The Manufacturer shall not bear any compensation responsibility for the loss caused by the machine breakdown during its operation.

NOTE:
Please ask your dealer to complete and return the warranty card with date and place of purchase, and dealer's stamp and signature. Otherwise you may lose your warranty rights.

NOTE:
The Manufacturer reserves the right to introduce design changes.

NOTE:
The SaMASZ company is constantly working on the development of all of its machine types and models. Therefore, any modifications of our machinery due to their form, equipment and technology are likely. No claims can arise from data, drawings and descriptions included herein as well as the spare parts list.
SaMASZ is not responsible for printing errors.

12.2. Warranty repairs record

Repair scope and spare parts replaced:

Date, stamp and signature of repair shop.

Date, stamp and signature of repair shop.

Date, stamp and signature of repair shop.