

VALTRA

Workshop Manual

BM85

BM100

BM110

BM120

BM125i

SECTION 110-01

Introduction

Application on the Models: **Medium Duty**

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Hello dear friend!

Thank you very much for reading.

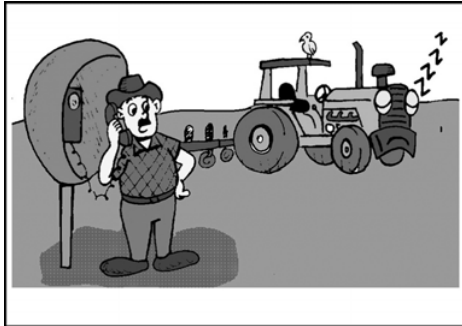
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INTRODUCTION

Presentation



The purpose of this Service Manual is to assist the Dealers when performing an efficient maintenance of the BM Series tractors.

A good product support assumes increasing importance. Besides selling a good product, good service is indispensable, because only then you can achieve the ultimate goal which is the Customer satisfaction.

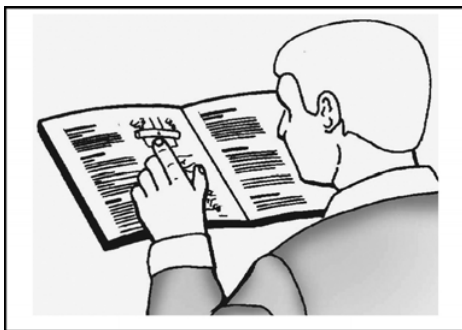
In this context, the maintenance structure provided by the Dealer is of fundamental importance and therefore should only be performed by trained personnel, thoroughly familiar with the different components of the tractor.

Therefore, in addition to taking periodic refresher courses in the AGCO Brazil Training Units, REFER TO this guide before performing the service whenever you have any questions.

For this, the Manual should always be available at the workshop.

In addition to always keeping it in working condition, the Services Department should be alert for updates that will be introduced in the tractors and therefore in the Manual.

How to Read the Services Manual



This manual was divided in systems (1, 2, 3, 4, 5, etc.), each describing a specific system of the tractor. Examples: Information, Engine, Electric, Transmission, Rear Axle and Brake, Front Axle and Steering, Chassis, Tires and Wheels, etc.

Each system is divided in groups (10, 20, 30, 40, 50, etc.), each describing a specific group. Examples: Engine, Transmission, Hydraulic System, Chassis, Tires and Wheels, etc.

Each group is divided in sections (01, 02, 03, 04, 05, etc.), each describing a specific section. Examples: in the case of Engines: Introduction, the engine itself, Cooling System, Lubrication System, Fuel System, etc. Other examples: Transmission: Gearbox, Clutch, Power Take Off, etc.

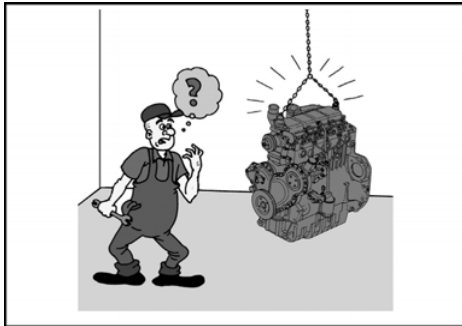
Each section page has a sequential number, starting with 01.

Security

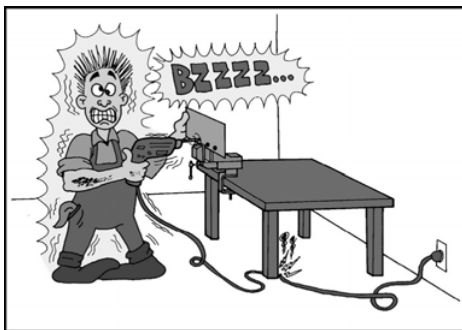
Your safety and that of others, must be the first concern when performing maintenance work. For this to become effective, three things are necessary: awareness, proper use of tools and adoption of protective equipment, individually and collectively, PPE and PSAO respectively.

With regard to awareness, it depends on individuals, that is to say, each one must obtain it, based on the risks to which they are subject at work. Upon learning about any security rule, this cannot be interpreted as "Do not do this, do not do that ...". First TRY to think about what might happen in case of not observing a certain rule. Do not be attached to the outdated idea that "we must make mistakes to learn," because the consequences may be irreparable. REMEMBER: after an accident, the first thought that arises is that one would have done anything - if they still had the time - to prevent that damage. Walking twenty meters to seek "that appropriate tool" can be tiresome, but not as disastrous as an accident with personal and/or material injury.

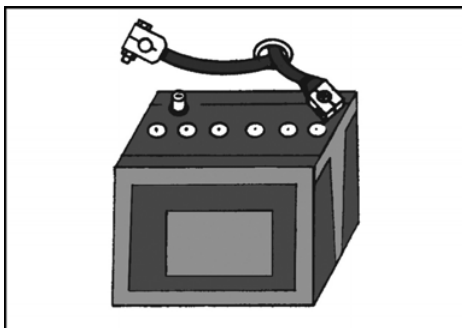
With regard to the rules themselves, it is impossible to gather all. There are countless situations of risk. Thus, we list some basic rules for illustrative purpose.



- Always USE the appropriate tools and devices at work, especially when dealing with whole sets and/or heavy parts. MAKE SURE that the hydraulic jack, the hoist, the chain are in perfect condition, and with the corresponding load capacity.



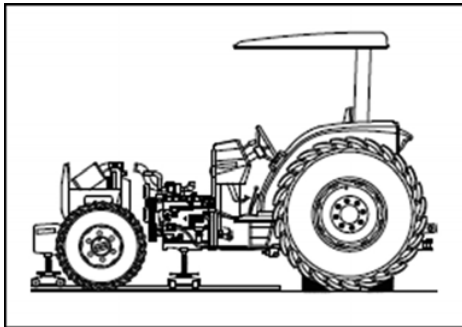
- Whenever using an electrical appliance, MAKE SURE that it is grounded and that there is no bare wire.



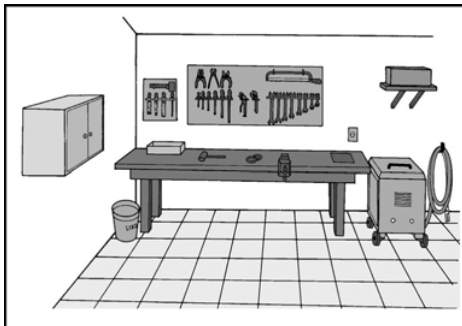
- Always TURN OFF the battery negative cable, preventing someone from triggering the accidental or inadvertent starter actuation.



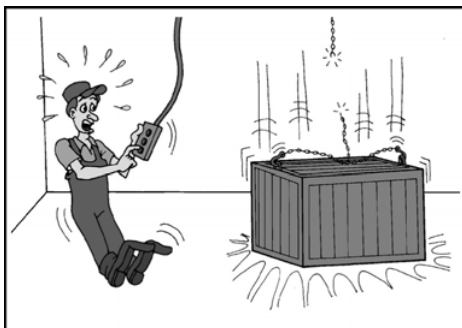
- To perform welds, besides disconnecting the battery, USE the necessary protections: mask or goggles, gloves and apron. The lack of eye protection, for example, affects the eyesight in a short time, often irreversibly.



- When opening the tractor, it is essential to use the appropriate trails and carts. This provides, besides safety, a profitable and quality service. Always USE wooden blocks in wedge to shim the wheels that will not be displaced for the opening.



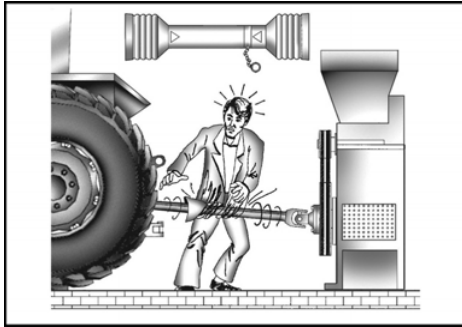
- Do not allow the workshop floor to be soaked in oil; this may cause slip and falls, besides compromising the workshop appearance. REMEMBER: organization mirrors the quality of the professional who works there.



- Never stand under suspended loads. No matter how safe the equipment is, you may not want to risk.



- Do not run the engine indoors and in a non-ventilated room. Toxic gases can suffocate you in a few minutes.
- Do not smoke in the workplace, there is always the risk of fire due to the wide variety of flammable products.



- Do not wear long or down hair, as well as loose clothing. When in contact with moving parts, these can cause serious accidents.



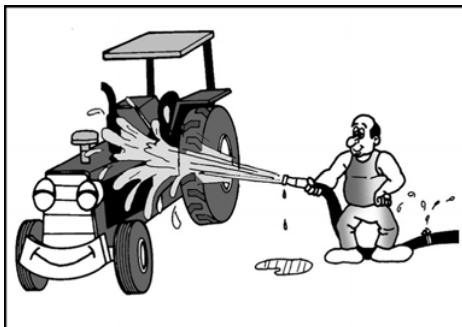
- Before starting the engine of any tractor, MAKE SURE that there is no one working on it. CHECK also if there are no tools or other utensils under the tractor.
- USE a warning card attached on the panel to prevent anyone from starting the engine with parts removed.

Proper Services Strategies in Workshops

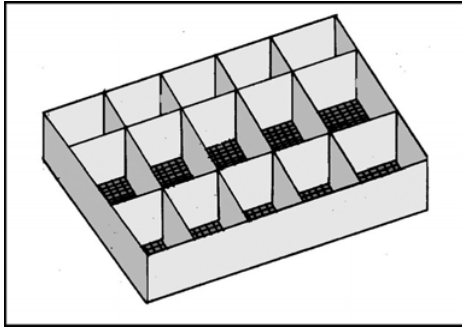
Most of the procedures recommended for repairs and services in different parts of this Manual are described considering that the assembly to be repaired is completely dismantled and removed from the machine.

Many services, in particular of certain parts, may be performed without completely removing the assembly from the machine. The mechanic will determine the need for removing it or not, taking into account the degree and extent of services needed and the degree of difficulty of access.

The following are important points to be remembered and put into practice:



- **IDENTIFY the breakdown and CLEAN the machine before taking it apart.**
If it is possible to make a complete diagnosis to determine the extent of the repair to be done, TAKE all necessary precautions to safely avoid any foreign material entering into the hydraulic systems, fuel supply or air.



- **SEPARATE the parts.**

PAY ATTENTION during disassembling, observing the special parts that cannot shift position. SEPARATE the various bolts and nuts in "trays" with dividers and bottom screen to allow the flow of oil and washing water.

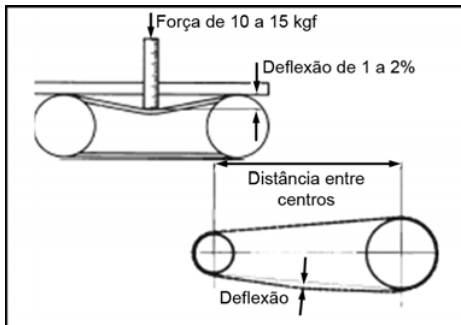
- **INSPECT the parts during disassembly, cleaning them well..**
- **ATTACH labels on the parts and PROTECT the precision and polished surfaces.**

Use of Original Valtra Replacement Parts

The use of not recommended spare parts can be a source of major problems. Do not believe that all parts that look alike are equal. Some parts have special properties, known only by the manufacturer. They are the result of special requirements established by intense research and engineering tests and from field experience.

AGCO keeps a constant parts improvement program. Many of these improvements cannot be detected by visual comparison. It is therefore critical to use only genuine spare parts.

Rule for tensioning belts and chains in general



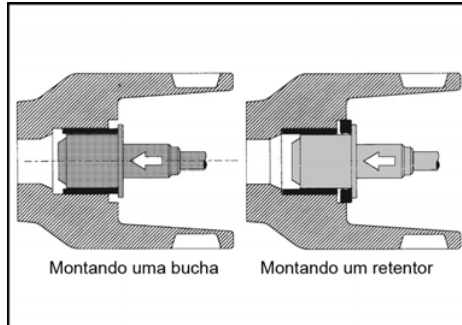
To check the belt tension, always FOLLOW the rule below:

Apply a load of 10-15 kg in the center of the largest distance between the supports.

The deflection found in belts or chains must be 1-2% of this distance.

In the case of chains, APPLY a sufficient force to bring the entire deflection to either side: deflection also must be 1-2% of the distance between centers.

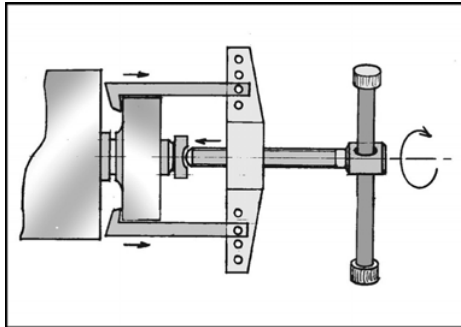
Bushings, Retainer Rings and Bearings Mounting with Interference



Always USE the special tool for this purpose. Where necessary, APPLY stress, by a press.

Improvisation results in these cases, besides loss of time, in damaged parts, which inevitably will present problems in the operation.

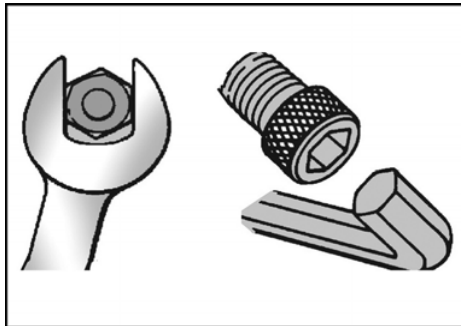
In the case of bushings, after assembly CHECK the inside diameter (or outside if any) and ADJUST if necessary, based on clearance technical specifications for each case.



- **USE the appropriate pullers to pull pulleys, hubs and gears.**

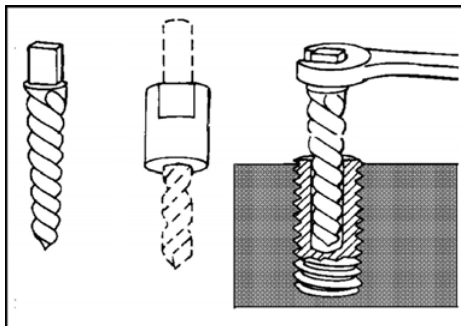
The use of sledge hammers and levers, in addition to the risk of damaging the parts, can require much more time in the operation.

NOTE: Always USE a protector for the shaft end.



- **Always USE the appropriate tool for each case.**

Saving a few steps to find the right key can result in more lost time, after damaging a hexagonal, a slot, etc.



- **To remove a stud that broke inside the hole:**

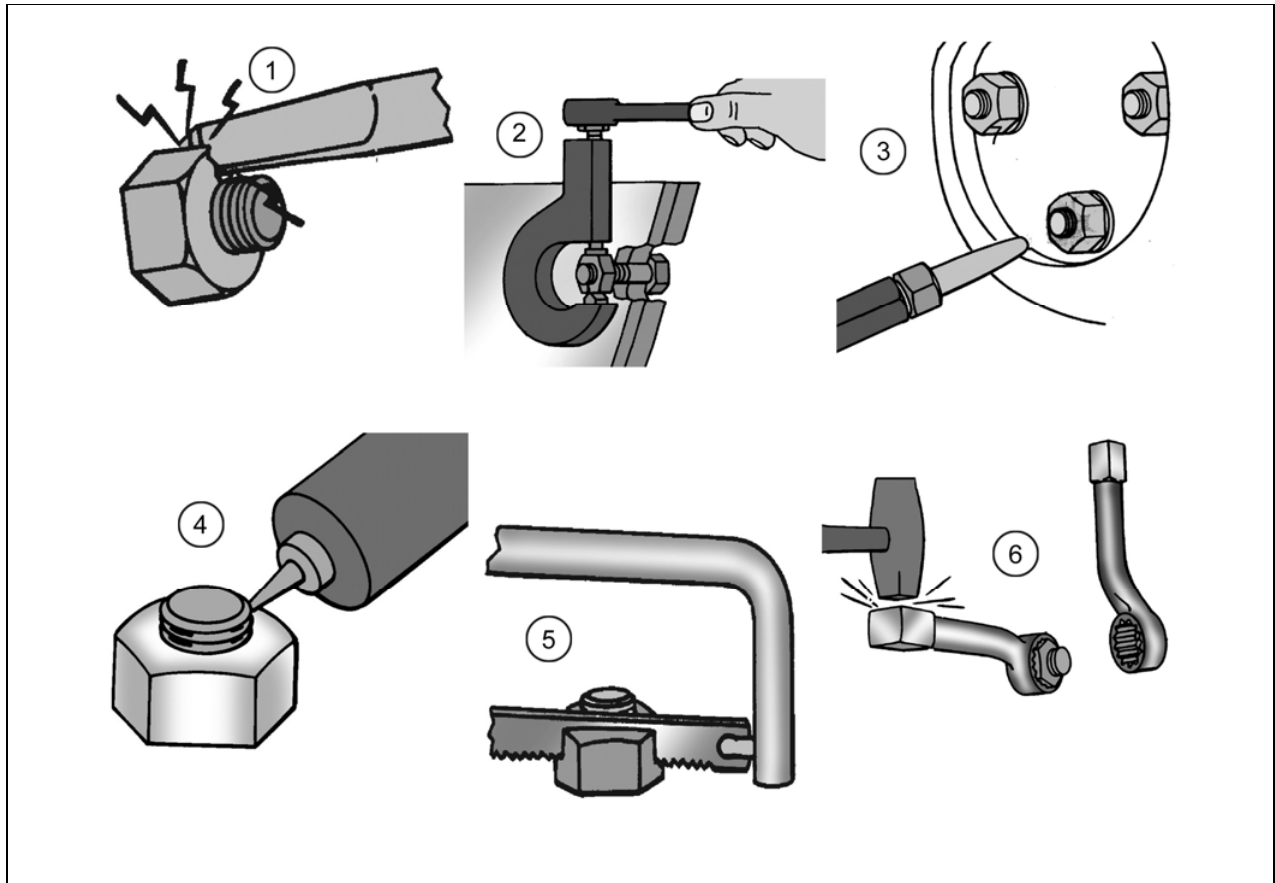
MAKE a hole having a diameter approximately half the diameter of the broken stud and USE a puller such as in the figure, with a thread opposite to the stud thread.

Then REMOVE the stud, turning the puller counterclockwise (if right-hand thread).

NOTE: when mounting studs or screws into non-passing holes, MAKE SURE that there is no oil or other impurities in the hole. The oil forms a hydraulic shim which can crack the housing.

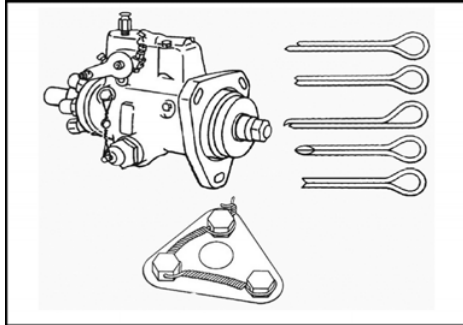
- **To remove a stuck nut:**

There are several ways, depending on the situation. In any case, they must not damage the surrounding parts.



Item	Description
1	Using a chisel
2	With a "splitter"
3	Heating
4	Penetrating oil
5	Cut with a saw
6	Impact wrench

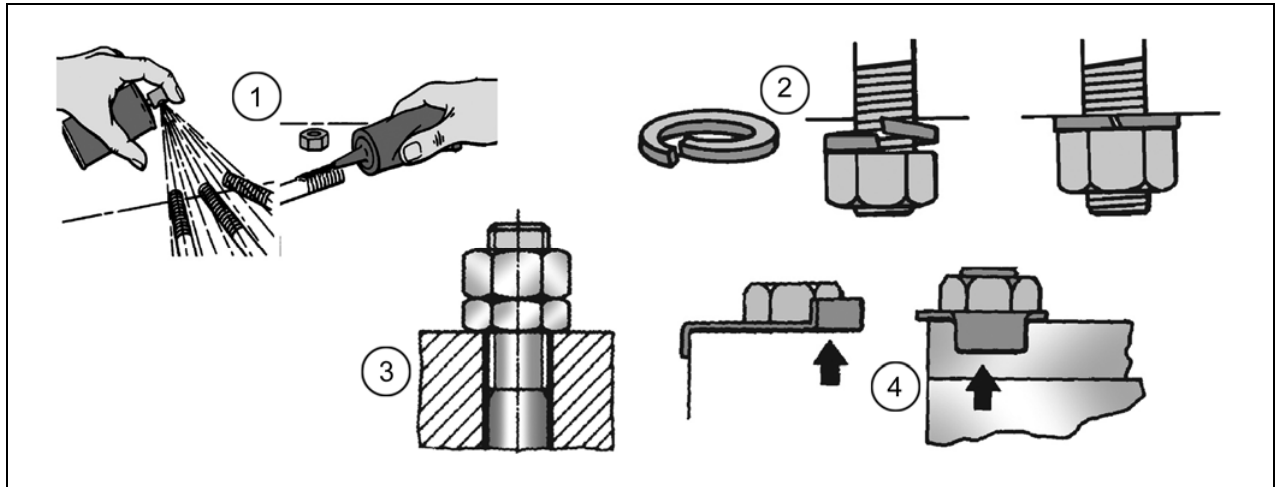
Correct locking of nuts and bolts



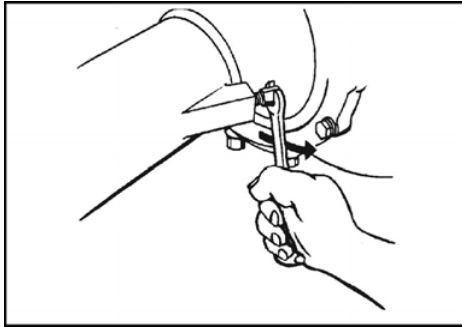
Counter pins, cotter pins and other means whenever removed must be replaced.

- **How to prevent screws or bolts to loosen with the normal vibration required by the work:**

There are several ways, common sense and practice should dictate the best way for each case.

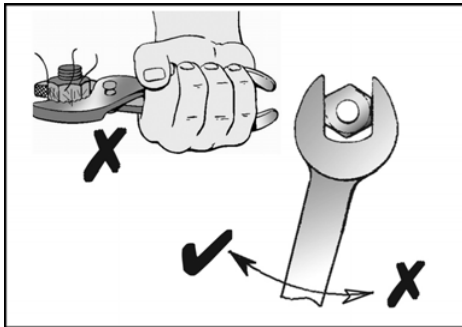


Item	Description
1	Locking decal
2	Spring washer
3	Lock nut
4	Locking plates



- **Always EXERCISE force on the wrenches in order to pull the lever.**

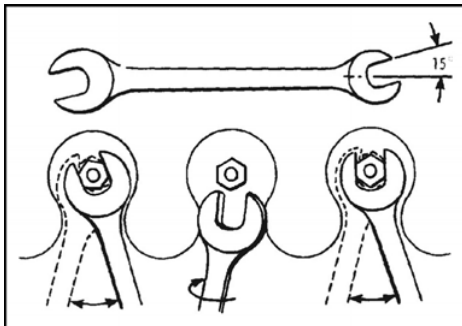
AVOID pushing, because in cases where the wrench slips, you may suffer hand injuries.



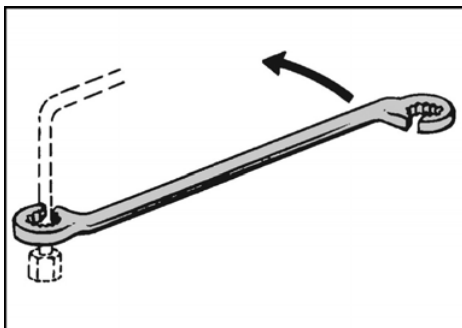
- **USE the open wrenches properly.**

Working with the wrench reversed, there is a greater effort in their structure.

Do not improvise using another type of tool.

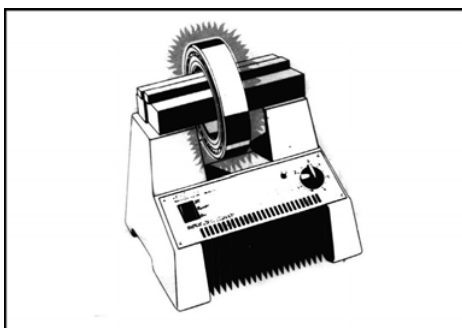


Only if you remove screws that are difficult to access, USE an open wrench in the two positions (angles) alternately, until releasing the bolt or nut.



- **For releasing the connection nuts from the injector pipes:**

USE a special wrench or a flare nut wrench. But for this, MAKE an opening (cut) on the way to the tube, allowing this wrench only for this purpose.

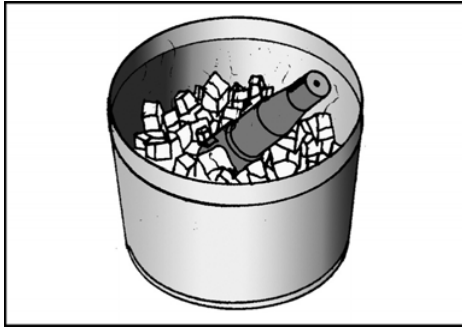


- **Assembling pieces with interference:**

Always TRY to warm the external parts (bearings, hubs) and/or to cool the internal parts (axles, seats and valve guides, etc.).

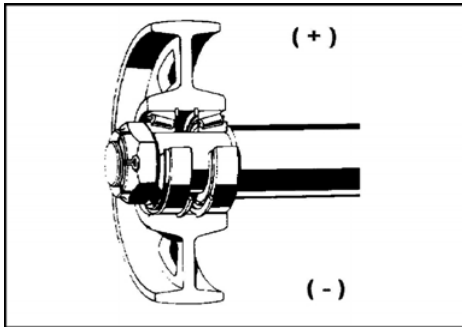
This procedure, besides facilitating the assembly, avoids damaging the parts, since when cold they contract and when heated they expand (swell).

Heating should never be done under the action of direct fire on the parts, as this makes them fragile.



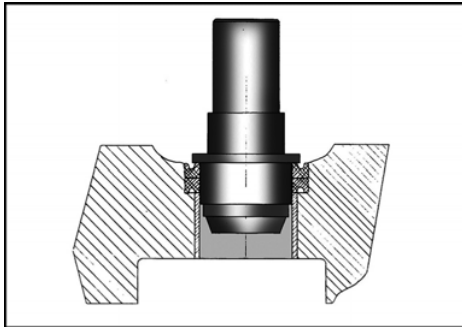
USE oil heated to 80-90 degrees Celsius and electrical induction heating.

The cooling of the parts can be done in a freezer or by placing them in a container with dry or wet ice.



- **When performing welding:**

Always disconnect the battery, and REMEMBER the following: ATTACH the negative terminal (-) of the welder to the same part you are welding (+). This is to avoid having a high current flowing through parts like bearings and damaging them.



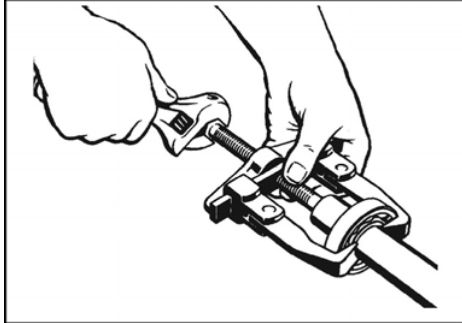
- **When assembling retainers, always USE a special tool for this purpose to ensure the correct mounting position and prevent damages to the retaining ring.**

Otherwise, there is danger of leakage after the first hours of work.

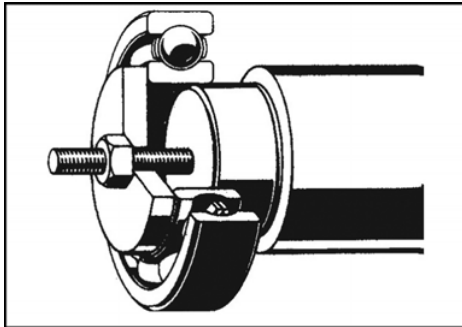
Moreover, the retainer housing must be free of impurities. LUBRICATE the retainer ring lip with all-purpose industrial grease E-P2.

TAKE care during assembly when the retainer ring is traversed by a splined shaft, a keyway, etc. At the slightest sign of a cut on the lip, there are leaks later.

Removing and Installing Bearings



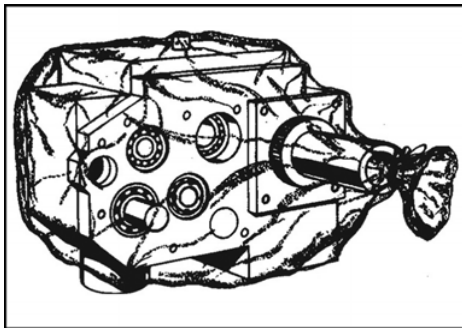
To remove bearings, USE special or proper pullers. It is important that the puller be supported in the track which is mounted with interference (internal or external), preventing the balls or rollers from being damaged.



When assembling:

- Do not hit directly with the hammer on the bearing when assembling. USE a special or suitable cup- or disk-shaped tool.
- When installing bearings on shafts, PRESS the inner track and when installing bearings in holes, PUSH the outer track.

Protection of Disassembled Sets



If the machine is to remain disassembled for some time, ORGANIZE the parts and PROTECT them against dust and moisture.

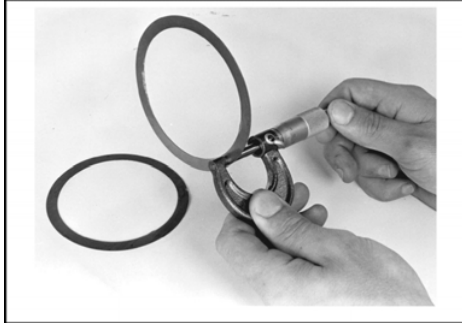
KEEP the new parts in their containers until the time they are used.

When assembling, MAKE SURE that the parts are perfectly clean, with no obstructed hole or gallery.

The injection pump and nozzles connections, pipes and terminals must be covered to prevent the entry of impurities.

The same treatment should be provided to the turbocharger, intake and exhaust manifolds, etc.

Precision and Safety Checks



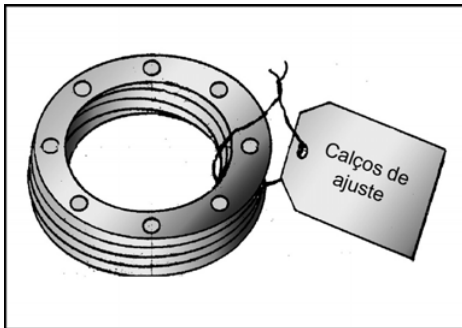
When assembling, **COMPLETE** every step.

FINISH the assembly of one part or component before proceeding to the next.

Make all of the adjustments as recommended.

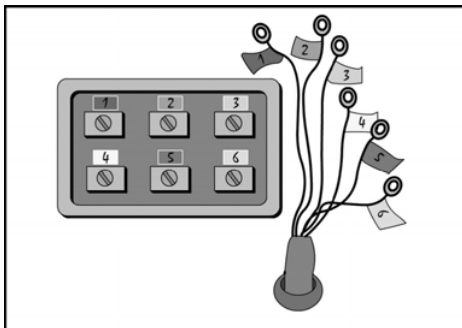
CHECK as many times as necessary to make sure that everything is exactly right.

Adjustment Shims



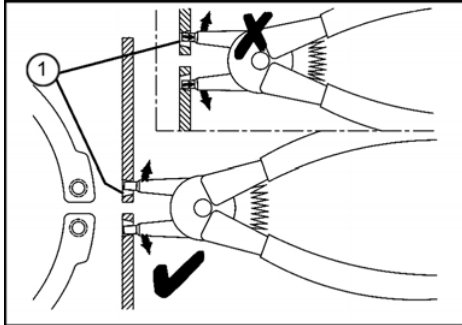
When removing bearing adjustment shims, **KEEP** them together, identify their location, store them clean and flat.

Electrical Wires



Whenever you remove or disconnect a group of wires or cables, **IDENTIFY** them as to the correct position of each one with a tape label, to avoid incorrect reassembly.

Removal of Snap Rings



Always USE appropriate nose pliers to remove and install snap rings or elastic rings.

But TAKE NOTE: the engagement holes (1) for the nose pliers are normally conical, with the purpose of facilitating the nose pliers mounting, when removing and assembling the rings.

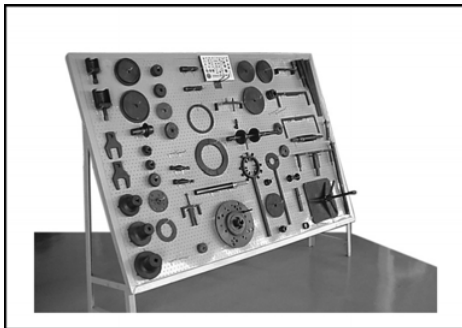
But for that, the rings should be assembled with the smaller diameter of the conical holes facing the pliers side.

It will be difficult to handle a reversed ring, because the ends of the pliers tend to be pushed outwards the ring. SEE the detail in the picture.

Besides making the operation difficult, with potential damages to the ring, this can be violently thrown away, causing serious injuries.

Always USE goggles.

Valtra Special Tools



They should be stored in their frames, properly identified with their numbers.

NOTE: All the precision tools should be submitted to a gauging procedure.

Without that, the precision measurements, as the crankshaft wearing, will not be reliable and they may lead to serious errors.

Trouble Diagnosis Procedure

This is a task that usually requires some experience. Even so, you should follow a methodical procedure, which will prove its value in many occasions.

This procedure consists of following an order defined in the troubleshooting, following the principle "beginning, middle and end".

Basically, we can define the steps as follows:

- a) DETERMINE what the problem is by analyzing the symptoms.
- b) LIST all possible causes.
- c) KEEP a record of what you have checked.

d) DO the tests in a logical order, to find the actual cause of the problem.

NOTE: It is very important to talk with the machine operator to get the most detailed description you can of the symptoms.

e) WORK OUT the time and the parts needed to do the job.

f) DO the repairs.

g) After the repair and before the delivery, MAKE a final check and if necessary, a practice test, simulating the operating conditions.

h) If necessary, INSTRUCT the Operator so that the problem can be avoided.

General Table for Recommended Bolts and Nuts Torques

Instructions to Use the Tables

USE these tables only when the torque is not specified.

When to use the tables 1A and 2A for LOW torque:

- When there is a potential for damages to the components joined by bolts.
- When there are thick and/or compressible gaskets between the components.
- When non-flat surfaces of junction or non-parallel surfaces are found;

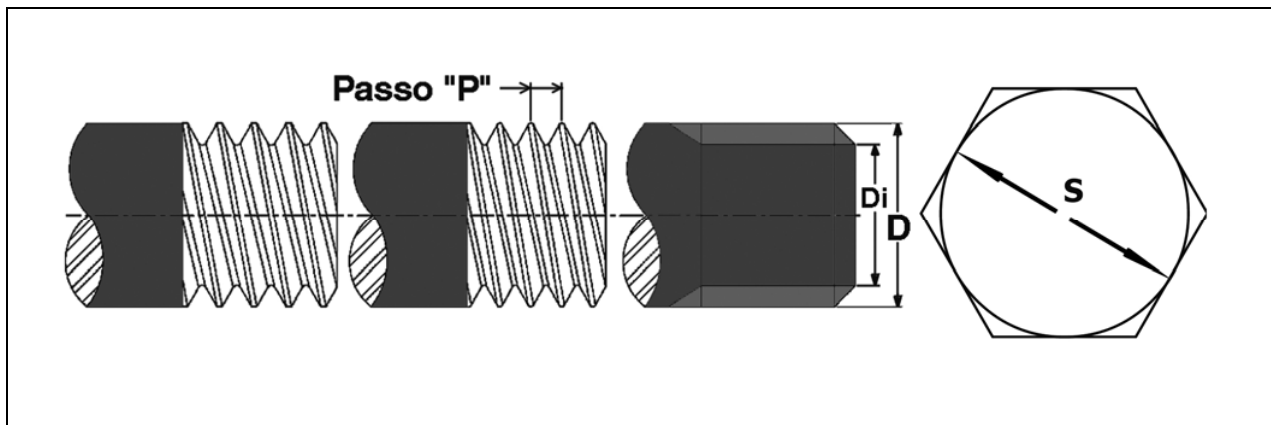
The picture below shows that the correct tightening is essential, because it determines the tension submitted to the bolts (or studs) and consequently, the compression of the joined components.

Non-flat surfaces, without milling, for the bolt head (or nut).

When to use the tables 1B and 2B for NORMAL torque:

- When there are no potential to damages to the components.
- When it is necessary a tightening that ensures a higher bolt or nut mounting.
- When the thread is not lubricated before the assembly.

The gauge of the nuts and bolts, in millimeters (ISO) or in inches, is the "D" diameter according to the drawing below and not the "s" width of the head.





Suggest:

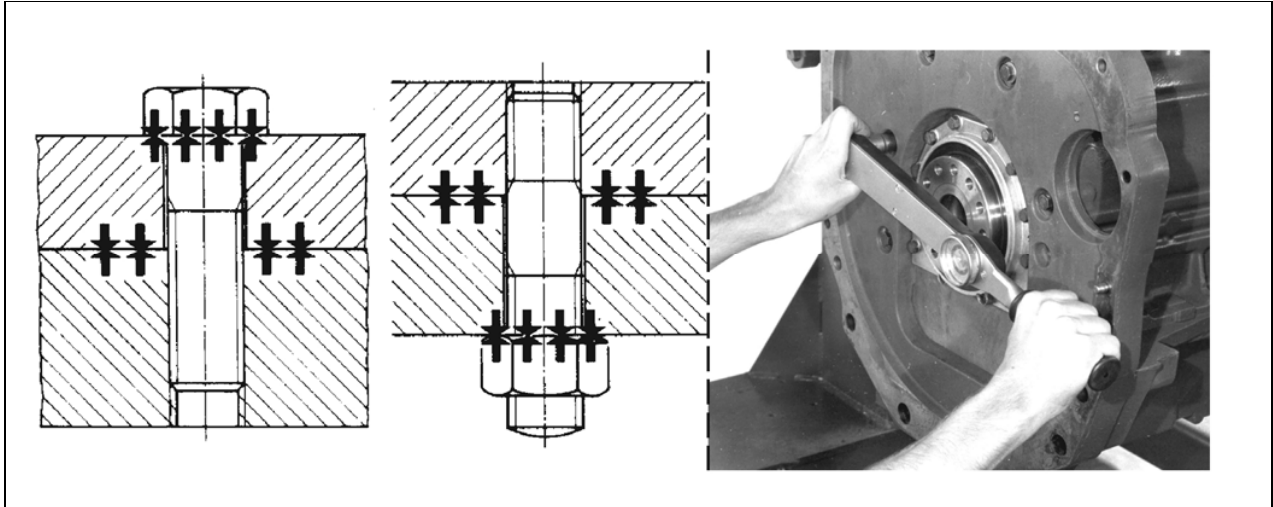
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The picture below shows that the correct tightening is essential, because it determines the tension submitted to the bolts (or studs) and consequently, the compression of the joined components.



E1A – General Table for Bolts and Nuts Torques, in Nm

ISO Metric Thread, LOW torque									
Class	ISO 4,6 = SAE 1			Class ISO 8.8 = SAE 5			Class ISO 10.9 = SAE 8		
Gauge	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.
M3	0.5	0.6	0.4	1.2	1.4	1.0	1.7	1.9	1.5
M4	1.15	1.3	1.0	2.9	3.3	2.5	4.0	4.6	3.4
M5	2.1	2.4	1.8	5.6	6.4	4.8	8.0	9.2	6.8
M6	3.6	4.0	3.2	9.5	11.0	8.0	14.0	16.0	12.0
M8	8.8	10.0	7.6	24.0	28.0	20.0	33.0	37.0	29.0
M10	17.5	20.0	15.0	48.0	56.0	40.0	67.0	77.0	57.0
M12	30.0	34.0	26.0	84.0	96.0	72.0	115.0	130.0	100.0
M16	78.0	88.0	68.0	185.0	210.0	160.0	280.0	320.0	240.0
M20	150.0	170.0	130.0	395.0	450.0	340.0	560.0	640.0	480.0
M24	260.0	290.0	230.0	670.0	770.0	570.0	920.0	1040.0	800.0
M30	500.0	570.0	430.0	1300.0	1400.0	1100.0	1950.0	2200.0	1700.0
M36	800.0	1000.0	760.0	2300.0	2600.0	2000.0	3350.0	3800.0	2900.0

E1B – General Table for Bolts and Nuts Torques, in Nm

ISO Metric Thread, Normal Torque									
Class	ISO 4,6 = SAE 1			Class ISO 8.8 = SAE 5			Class ISO 10.9 = SAE 8		
Gauge	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.
M3	0.6	0.7	0.5	1.5	1.7	1.3	2.1	2.4	1.8
M4	1.4	1.6	1.2	3.6	4.1	3.1	5.0	5.7	4.3
M5	2.6	3.0	2.2	7.0	8.0	6.0	10.0	11.5	8.5
M6	4.5	5.0	4.0	12.0	14.0	10.0	17.0	20.0	14.0
M8	11.0	12.5	9.5	30.0	35.0	25.0	41.0	46.0	36.0
M10	22.0	25.0	19.0	60.0	70.0	50.0	84.0	96.0	72.0
M12	38.0	43.0	33.0	105.0	120.0	90.0	140.0	160,	120,
M16	97.0	110.0	84.0	230.0	260.0	200.0	350.0	400.0	300.0
M20	185.0	210.0	160.0	490.0	560.0	420.0	700.0	800.0	600.0
M24	320.0	360.0	280.0	840.0	960.0	720.0	1150.0	1300.0	1000.0
M30	630.0	720.0	540.0	1600.0	1800.0	1400.0	2450.0	2800.0	2100.0
M36	1100.0	1250.0	950.0	2900.0	3300.0	2500.0	4200.0	4800.0	3600.0

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