

# Workshop Manual

HP  
140-180

# MF7100

Tractors

Models: 7140-7150-7170-7180



INNOVATION - COMMITMENT - PROXIMITY - VISION - RELIABILITY - LEADERSHIP - SUPPORT - TECHNOLOGY



MASSEY FERGUSON

## Tractor models applied

Massey Ferguson tractor models

MF 7140, 7150, 7170, and 7180

## Models and variations

- Footstep or Cab version
- With or without 3-point linkage



Fig. 1



Fig. 2



Fig. 3



Fig. 4

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### A. Presentation

The purpose of this Workshop Manual is to help Dealers in the efficient maintenance of Massey Ferguson Series Advanced Tractors.

Good after sale support is becoming increasingly important. Besides selling a good product, it is essential to provide good service, because that is the only way that to reach the greater goal: customer satisfaction.

With this in mind, the structure of the maintenance offered by the Dealer is of fundamental importance, and it should be performed only by trained personnel who are perfectly familiar with the different components of the tractor.

For this reason, in addition to undertaking regular refresher courses at one of AGCO's Training Units, you should always consult this Manual before performing the service, whenever there is any doubt. Beside keeping it in usable condition, the Service Department should be aware of the updates that are introduced from time to time in the tractors and thus in the Manual.

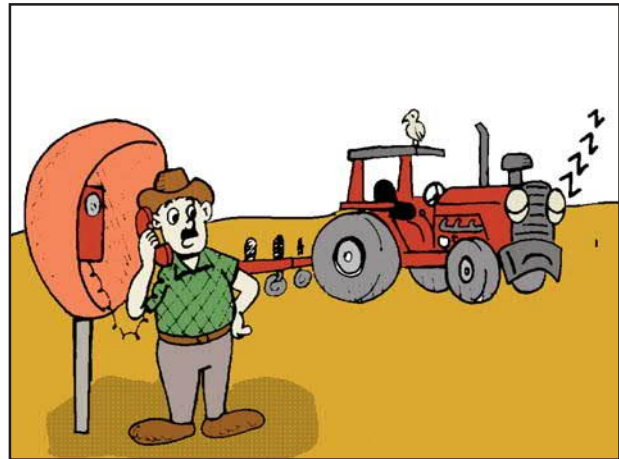


Fig. 1

## B. How to use this manual

- This manual is divided into Modules (01, 02, 03, 04, 05), and each of them describes a specific sector of the tractor.

*Examples: Engine, front axle, hydraulic systems, etc.*

- Each module is divided into subsections (A, C, C, D...), which describe a specific type of system when there are different options.

*Examples - Engines: Single disc clutch / double disc clutch*

- Each Section is divided into Subsections (01, 02, 03, 04...), and each one described a part or subdivision.

*Examples - Engines: Head, block, crankshaft, etc.*

- Each subsection is divided into chapters (A, B, C, D...).

*Examples: Disassembly, inspection of components, specification, adjustments, etc.*

- Each page of the subsections has a sequence number beginning with 01.



**Fig. 1**

## C. Safety

Your safety and the safety of others should be your first concern when doing maintenance work. For this to work, you need to do three things: be aware of what you are doing, use the tools correctly, and use the right protective equipment, both personal and collective.

Awareness depends on each person, which means that every person needs to be aware of what they are doing and what risks they are taking in their work. When you learn about a safety rule, don't think of it as "don't do this, don't do that". First you should think about what might happen if you break that rule. Don't believe that old idea the "you have to learn by making mistakes", because the results of a mistake might be impossible to fix. Remember: After an accident, the first thing you think is that you would do anything to go back and not make that mistake. Walking 20 meters to get the "right tool" might be tiresome, but it's never going to be as much trouble as an accident that causes injury or damage.

As far as the rules go, it's impossible to write them all down. There are too many possible risks. What we have here are some basic rules as an example.

- Always use the tools and gear that are right for the job, especially when you are working with heavy assemblies and parts. Make sure that the hydraulic jack, the block and tackle, the chain are in perfect condition, and strong enough for the load.

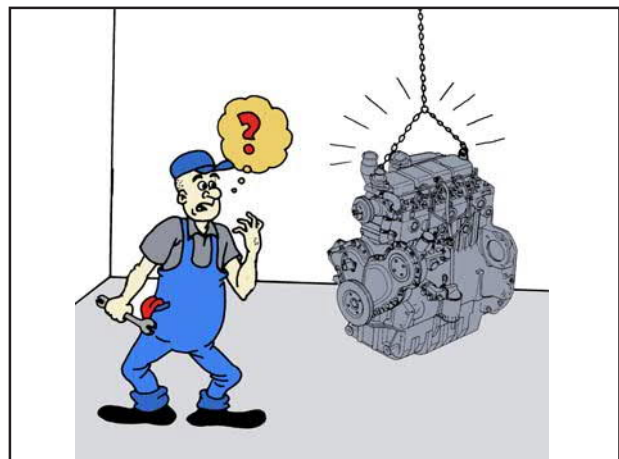


Fig. 1

- Every time you use a power tool, check that it is grounded and that there are no exposed wires.

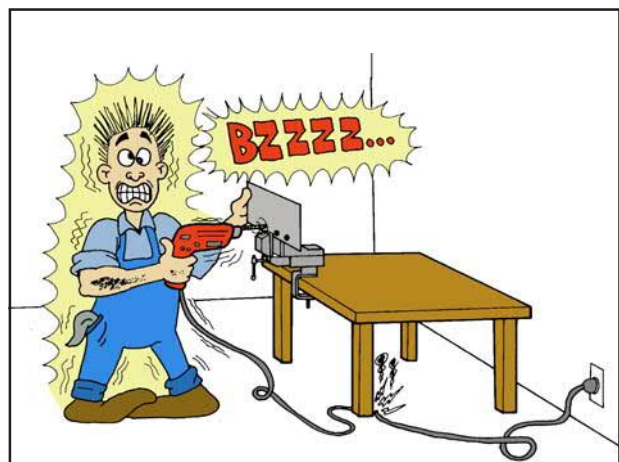


Fig. 2

- Always disconnect the negative cable from the battery, so that no one can accidentally turn on the starter motor.

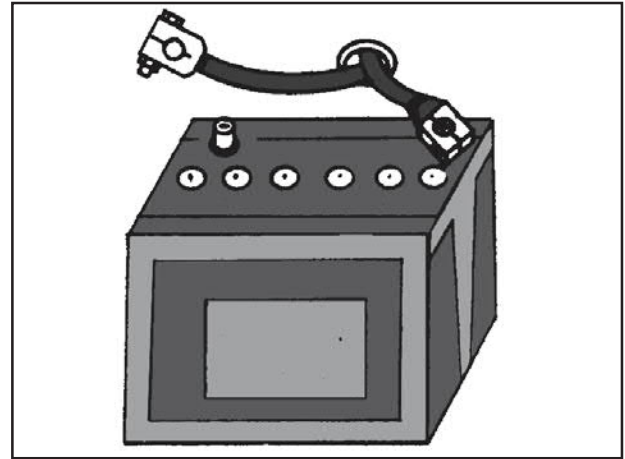


Fig. 3

- When welding, as well as disconnecting the battery, you should use the proper protection: safety mask or goggles, gloves and apron. If you don't use eye protection, for example, you can do permanent damage to your eyes very quickly!



Fig. 4

- When splitting a tractor, you must use the right cranes and tackle. This will make the work safer, but also better quality and more profitable. Always use wooden wedges to chock the wheels which will not be removed in the job.

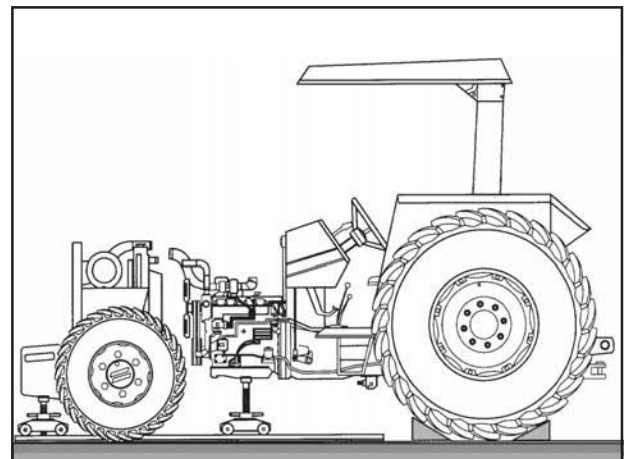


Fig. 5

- Don't let the floor of the workshop get soaked with oil: it will cause accidents, and it lowers the tone of the shop. Remember: well organized workshop reflects the quality of the people that work there.

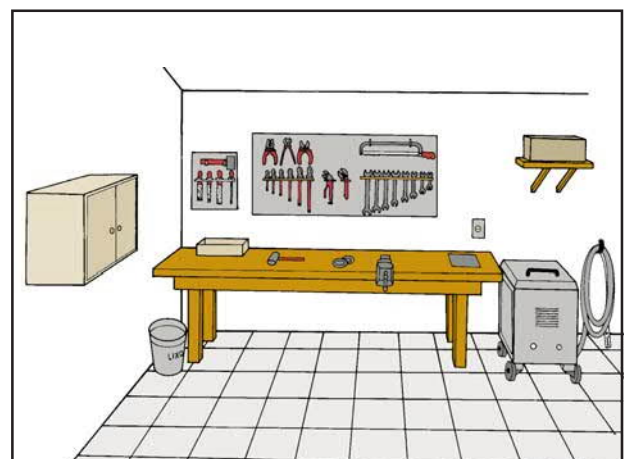


Fig. 6

## Introduction

01

- Never stand under hanging loads. Even though the equipment is perfectly safe, there is no reason to tempt fate!

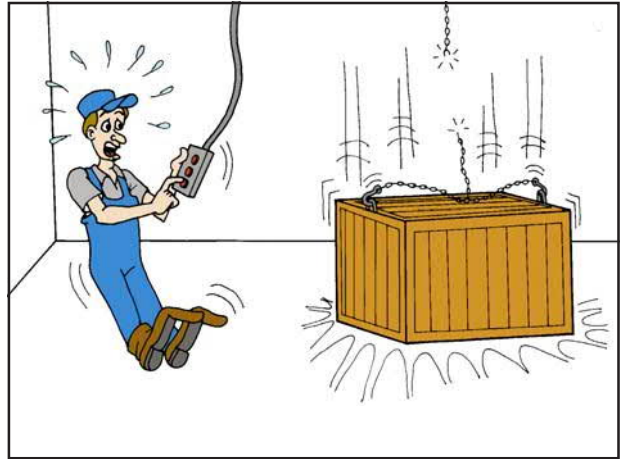


Fig. 7

- Don't leave the engine running in a closed place without ventilation. It only takes a few minutes for the exhaust fumes to start to poison you.
- Don't smoke in the workshop. There is always the risk of fire with all the flammable products.
- Don't work with long hair or with loose clothes. If they get caught in moving machinery, they can cause serious accidents.

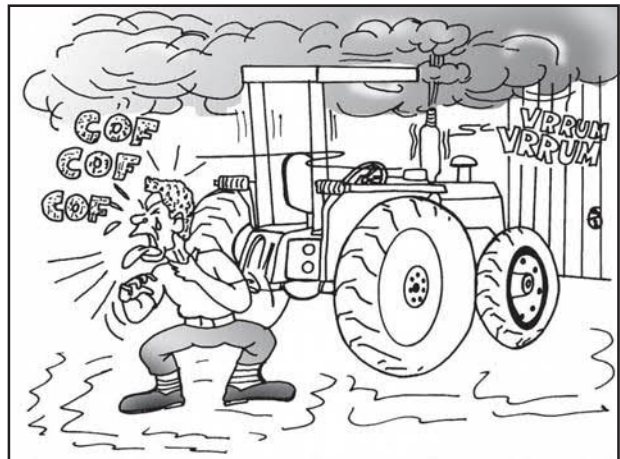


Fig. 8

- Before starting the engine of any tractor, check that no one is working on it, and that no tools have been left on it. .

Use a warning notice on the instrument panel to make sure no one turns on the engine if it has parts removed.

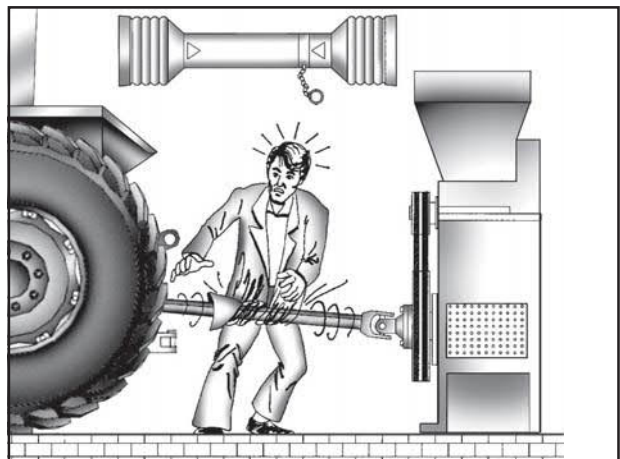


Fig. 9

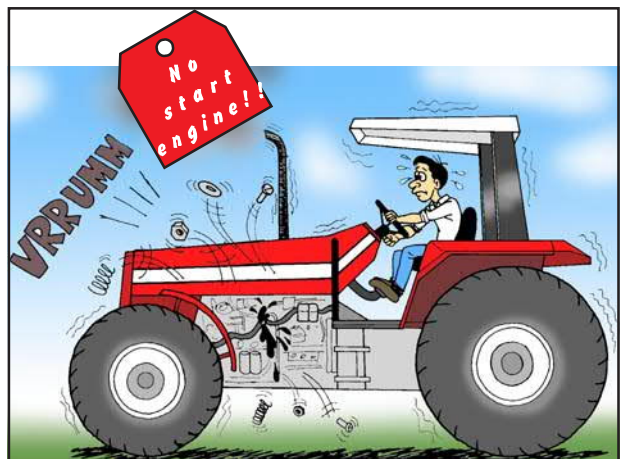


Fig. 10

## D. Proper workshop techniques

Most of the repair and service procedures described in this manual are written with the assumption that the assembly you are working on has been completely disassembled and removed from the machine.

Many services, especially of some components, can be performed without removing the assembly from the machine. The mechanic must decide whether it is necessary or not, bearing in mind the level and amount of work to be done and the difficulty of Access.

-{}-The following important point should be remembered and put into practice.

### Identify the problem and clean the machine before disassembling it (Fig. 11)

If possible, do a complete diagnosis to determine how much work needs to be done and take all the precautions necessary to prevent any dirt from getting into the hydraulic, fuel and air systems.

### Don't mix parts (Fig. 12)

When you take an assembly apart, pay attention to special parts whose position cannot be changed. Separate the different nuts and bolts in divided trays with a screen bottom that permits oil and water to drain away.

### Inspect parts during disassembly and wash them well.

### Label parts and protect precision or polished surfaces.

### Use Original Massey Ferguson Service Parts

Using non-genuine service parts can cause big problems.

Don't believe that parts are the same just because they look the same. Some parts have special properties, known only to the manufacturer. They are the result of special requirements established by intensive studies, engineering tests and field experience.

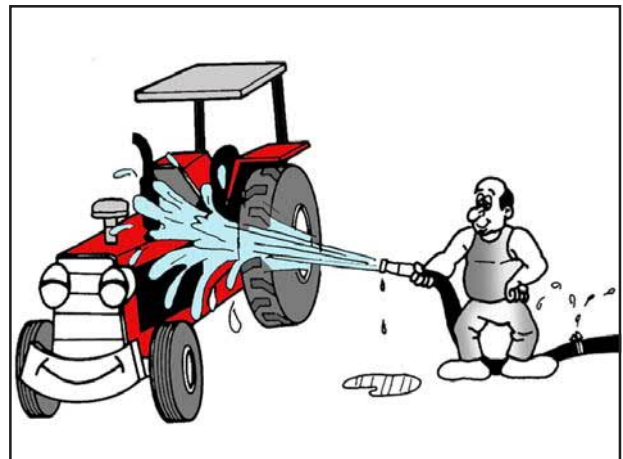


Fig. 11

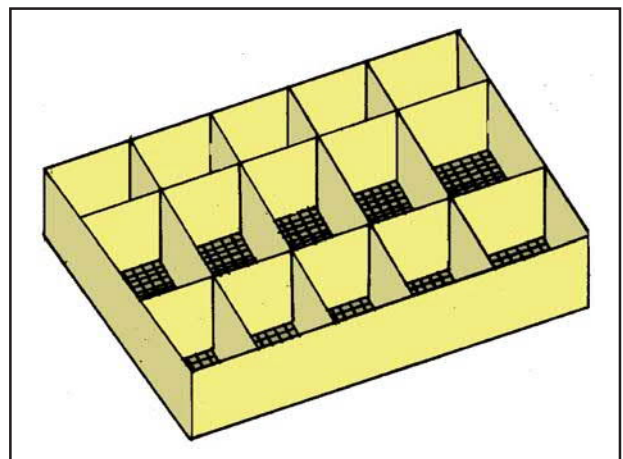


Fig. 12

AGCO has a program for continuous improvements of parts. Many of these improvements cannot be seen with the naked eye.

That is why it is extremely important to use only genuine service parts.

## Introduction

01

### Rule for tensioning belts and chains

Use the following rule to check belt tension:

Apply a load of **10 to 15 kg** at the center of the largest unsupported distance.

Deflection in the belt or chain should be 1 to 2% of this distance.

In the case of chains, apply sufficient force to bring all of the deflection to one side: should be 1 to 2% of the distance between the centers.

### Interference fitting of bushings, retainers and bearings:

Always use a special tool for this job. When necessary, use a press to apply force. Whenever necessary, apply the recommended force by means of a suitable press. Improvisation in this case leads to wasted time and damaged parts, which will cause operating problems. With bushings, check the internal diameter (or external diameter, if that is the case) and make an adjustment if you need to, based on the specifications in this manual for each situation.

### Use correct punches to remove pulleys, hubs and gears.

Using hammers and levers may damage the parts, and will probably take longer than using the right tools!

NOTE: use a protector for the end of the axle.

### Use the right tool for each job.

Using the wrong tool just to save a few steps can end up wasting a lot more time after you damage a hex nut, a screw slot...

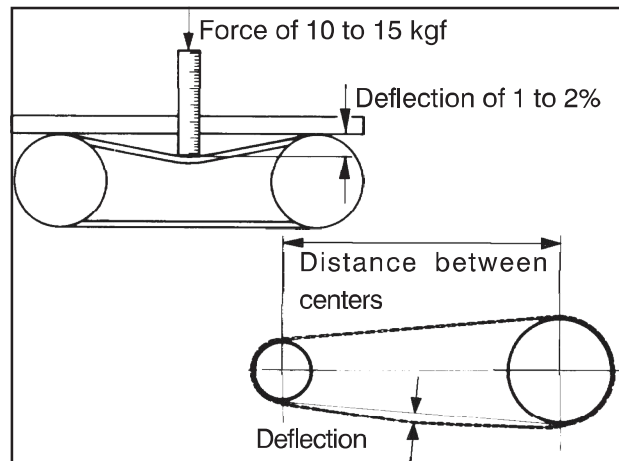


Fig. 13

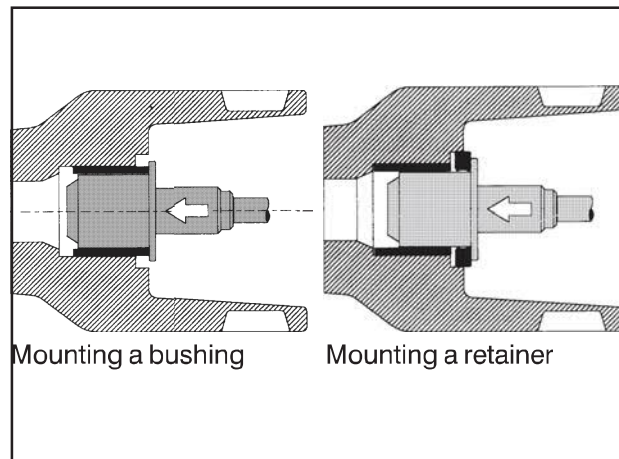


Fig. 14

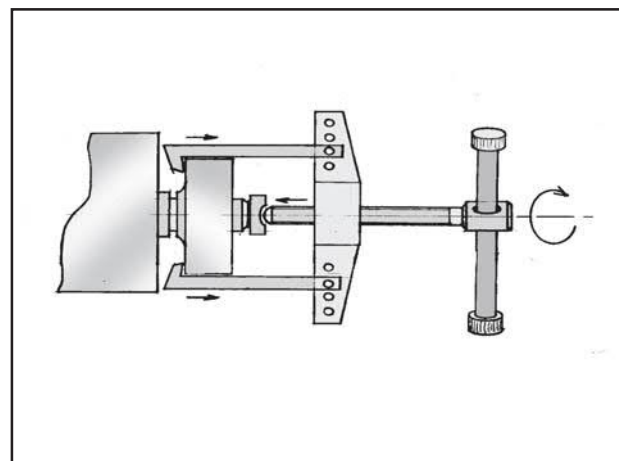


Fig. 15



Fig. 16

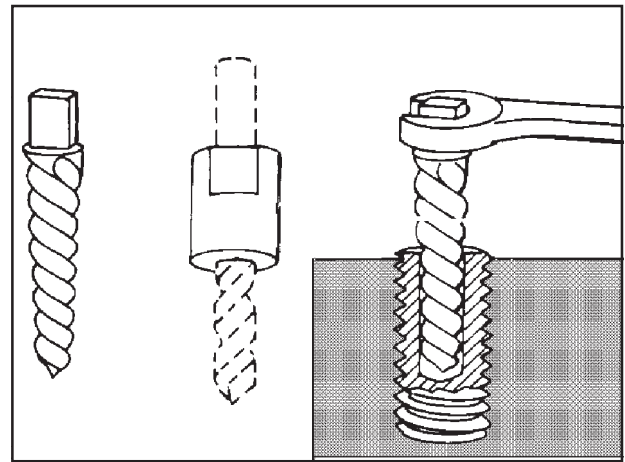
**Removing a stud that has broken in place:**

Drill a hole about half the diameter of the broken stud and use a bolt extractor with the opposite thread to the stud.

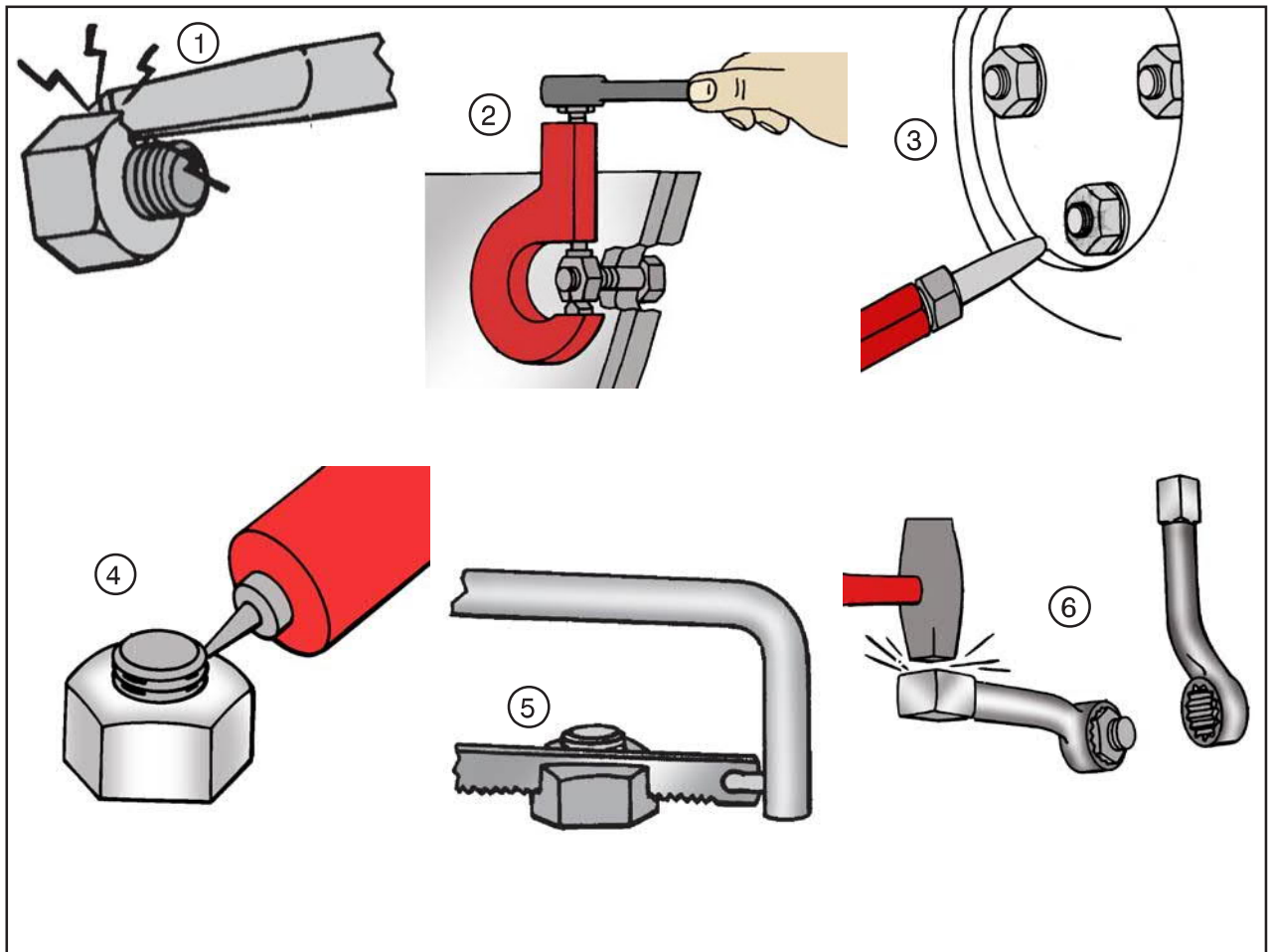
Then remove the stud by turning the bolt extractor counter-clockwise (in the case of a bolt with right hand thread).

**NOTE:**

When you are putting a bolt in a dead end hole, make sure there is no oil or other impurity in the hole. Oil forms a hydraulic block which may damage the housing.

**Fig. 17****Removing stuck nuts:**

There are several ways, depending on the case. But, the surrounding parts cannot be damaged either way.

**Fig. 18**

- 1 - Using a chisel
- 2 - With a splitter
- 3 - Heating;

- 4 - Penetrating oil
- 5 - Cut with saw
- 6 - Impact wrench

# Introduction

01

## Correct locking of nuts and bolts

With a cotter pin or some other means, check what condition it is in. It is usually best to replace them after disassembly.

## How to prevent nuts or bolts from shaking loose under normal working conditions

There are also a number of ways. Experience and common sense will tell you the best procedure for each situation.

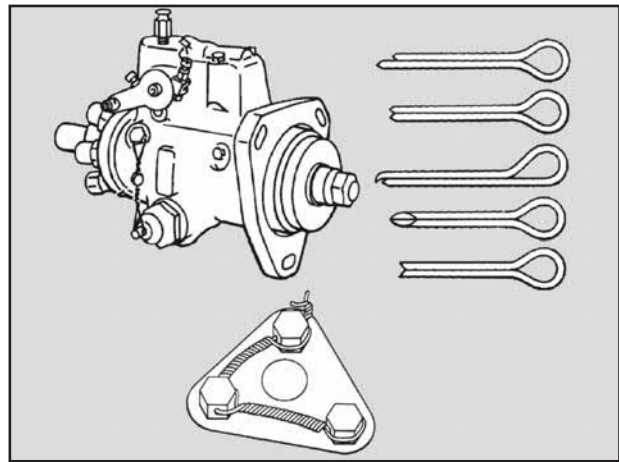


Fig. 19

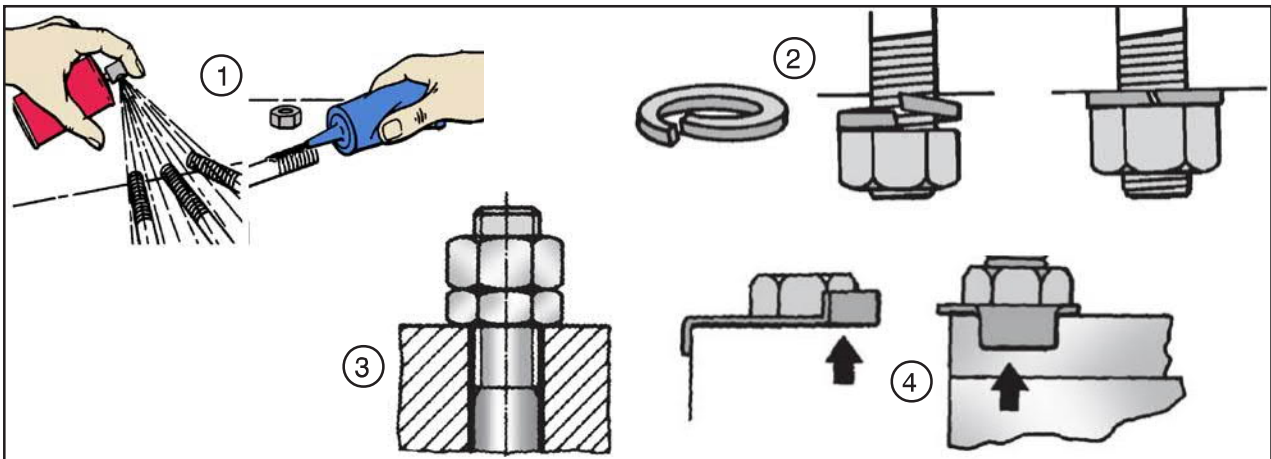


Fig. 20

- 1 - Lock sealant
- 2 - Lock washer
- 3 - Counter-nut
- 4 - Locking plates

## Whenever you use force on a wrench, always pull it towards you.

If you push on the wrench and it slips, you are likely to hurt your hands.

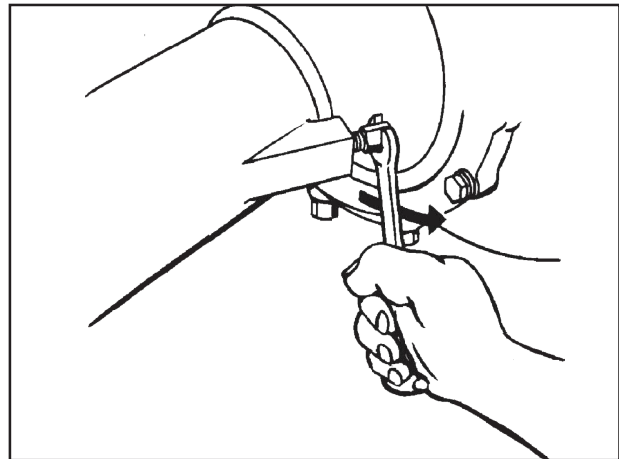


Fig. 21

## Use open wrenches the right way.

Working with the wrench reversed puts more stress on it.

Don't improvise.

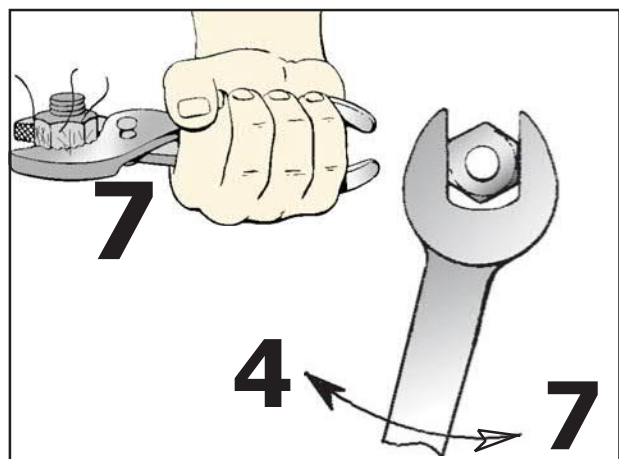


Fig. 22A

Use an open wrench in both grades only to remove hard-to-access bolts, alternately, until the bolt or nut is released.

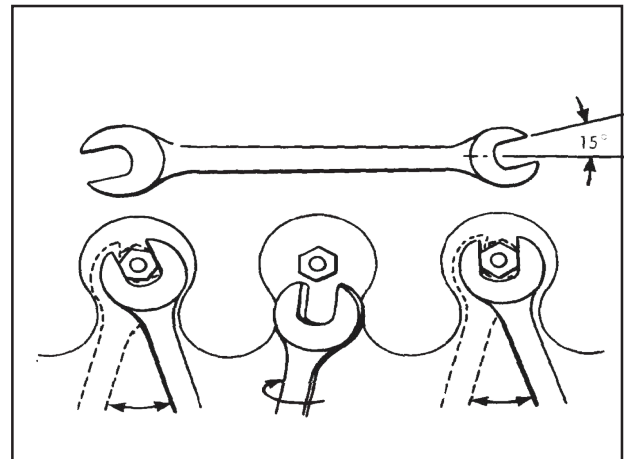


Fig. 22B

### Removing nuts from injection tubes

A box wrench is best, but first you need to cut an opening in the wrench for the tube to pass through. Use this wrench only for this purpose.

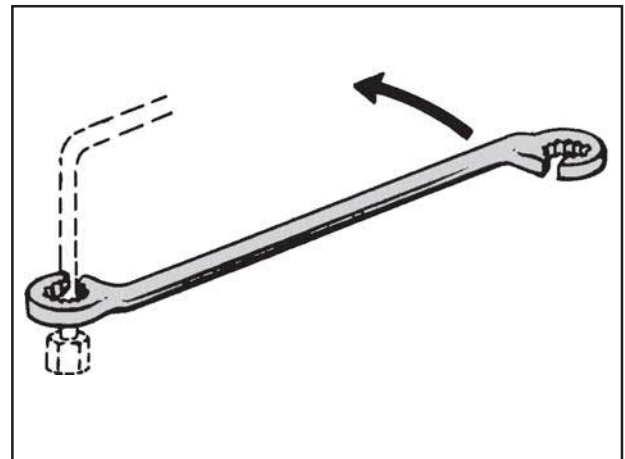


Fig. 23

### Mounting parts with interference

Always heat the external part (bearings, hubs, etc) and/or cool the internal part (axles, valve guides and seats, etc).

Heating makes a part expand, and cooling makes it shrink, so using this method you make the fitting easier and reduce damage to the parts.

The heating should never be done with a direct flame, because this would weaken the part and make it brittle. You should heat the part in hot oil (80 to 90°C / 176 to 194°F) or by electrical induction.

Cooling can be done in a freezer, or in a bucket of ice or dry ice.

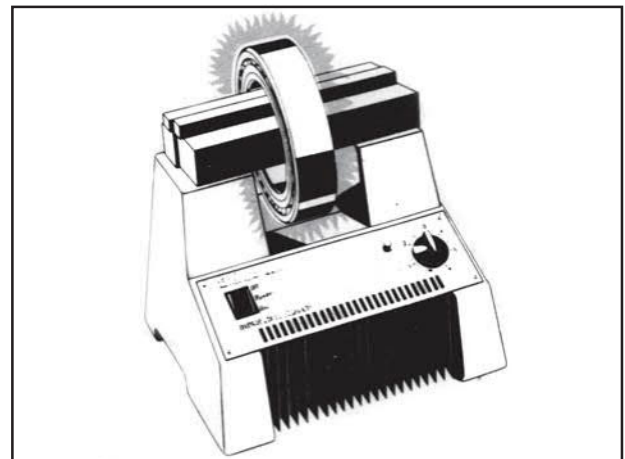


Fig. 24



Fig. 25

## Introduction

01

### Welding

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

### When you are mounting retainers, always use the right tool for the job.

This will make sure the part is mounted in the correct position and undamaged. Otherwise, it may start to leak after just a few hours of operation. In addition, make sure that the seat of the retainer is clean. Lubricate the lip of the retainer. Take special care when the retainer passes over a splined axle, a keyway, etc. The slightest cut on the lip will cause leaks.

### Removal and fitting of bearings

To remove bearings, use proper extractors.

It's important that the extractor be supported on the race that is fit with interference, thus avoiding damage to balls and rollers.

When assembling:

- Never hit a bearing directly with a hammer. Use a suitable tool with a cup shape, or similar.
- When mounting a bearing on an axle, press on the inner race; when mounting a bearing in a hole, press on the outer race.

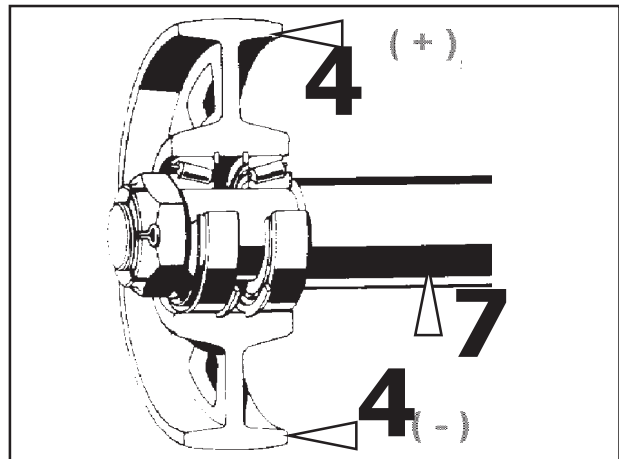


Fig. 26

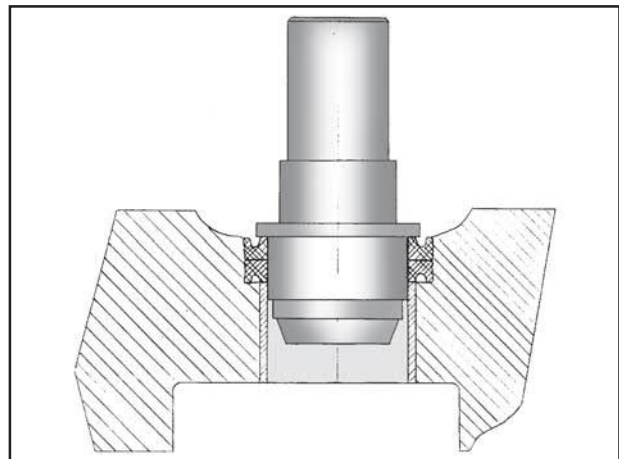


Fig. 27

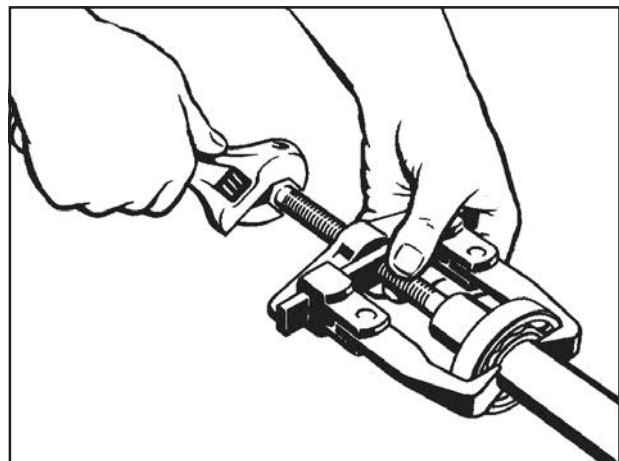


Fig. 28

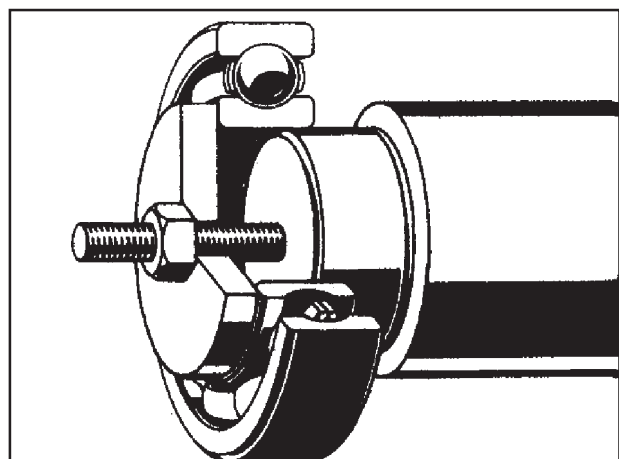


Fig. 29

### Protection of dismantled assemblies

If the tractor is going to stay disassembled for a long time, organize the parts and protect them from dust and humidity.

Keep new parts in their packaging until they are to be used.

When putting the parts together, make sure that each one is perfectly clean, with no plugged holes or galleries.

The connectors, tubes and terminals of the fuel injection pump and nozzles should be covered to prevent any impurities from getting in.

You should do the same with the turbocharger, intake and exhaust manifolds, etc.

### Precision and certainty in adjustments

When putting the tractor back together, complete every step for one part before moving on to the next part. complete every step for one part before moving on to the next part.

Make all of the adjustments that are 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, and identify their location. Store them clean and flat.

### Electrical cables

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

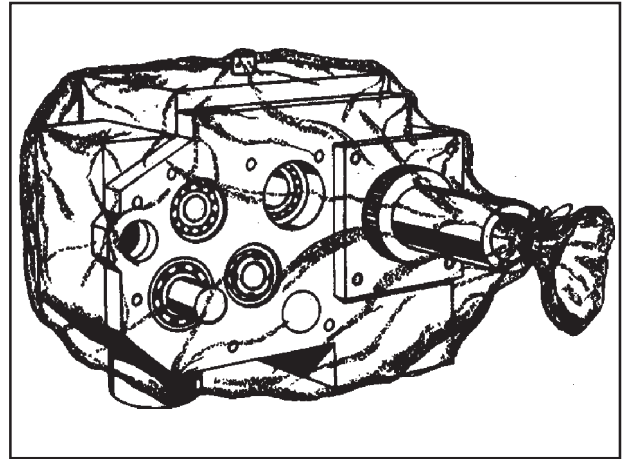


Fig. 30

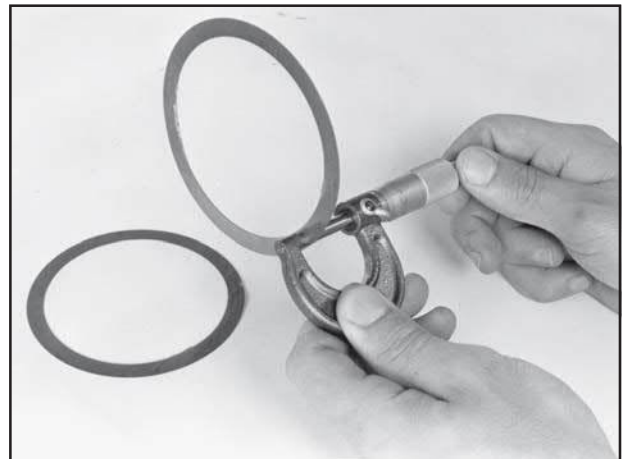


Fig. 31

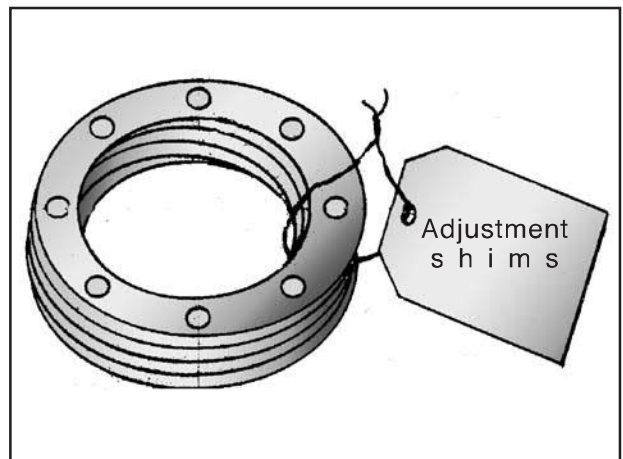


Fig. 32

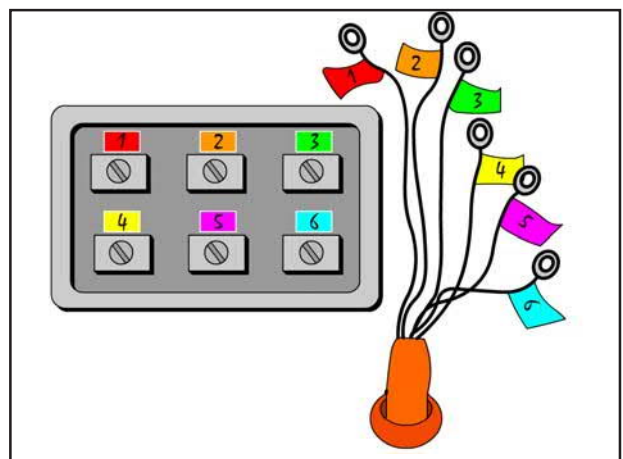


Fig. 33

## Introduction

01

### Removal of lock rings

In order to remove and refit lock rings or split rings, always use the correct pliers - Fig. 34.

Attention needed: the engagement holes (1) for pliers are usually tapered in order to secure the pliers more easily when removing or fitting rings.

But for that to occur, the rings should be fit so as the small diameter of the tapered holes be towards the pliers.

It will be hard to handle a ring when it is up side down, since the tips of the pliers tend to be forced out of the ring. See picture.

Besides making the operation more difficult, with potential damage to the ring, there is serious risk of the ring being abruptly thrown out, causing serious injuries.

Always wear goggles.

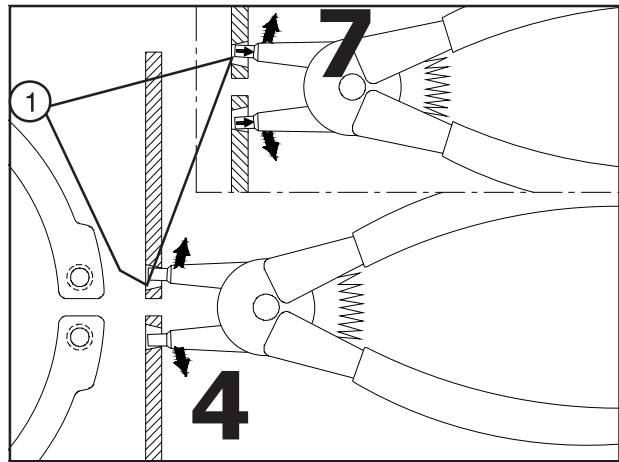


Fig. 34

### Massey Ferguson special tools

These should be stored in their boards, properly identified and numbered.



**NOTE:**

*Otherwise, precision measurements like crankshaft wear will be unreliable, and can lead to serious mistakes!*

### Troubleshooting

This usually takes some experience. Even so, you should follow a logical procedure, which will prove its value on many occasions.

This basically consists of following a defined order of problem solving with a "beginning, middle and end".

Basically, we can define the steps as follows:

- Determine what the problem is, by analyzing the symptoms.
- List the possible causes.
- Keep a record of what you have checked.
- Do the tests in a logical order to find the true cause of the problem.

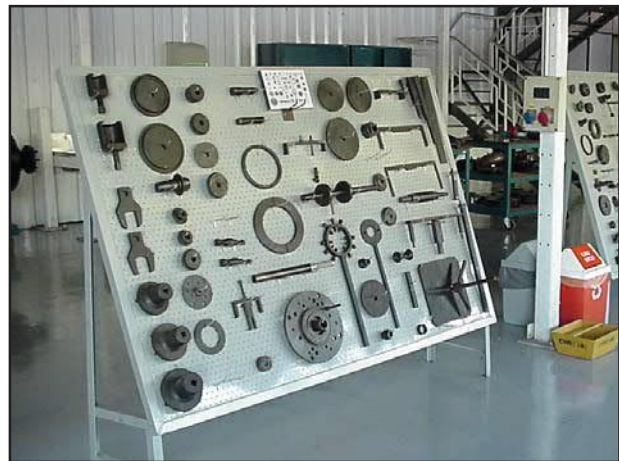


Fig. 35



**NOTE:**

*It is very important to talk with the operator of the tractor to get the most detailed description you can of the symptoms.*

- Work out the time and the parts needed for the job.
- Do the required repairs.
- After repairs and before delivery, perform a final check and if required a practical test by simulating operating conditions.
- If necessary, instruct the operator so as the problem presented be avoided in the future.

## E. General table of recommended torques for bolts

### Guide for use of the tables

- ✓ Only use these tables when the torque is not specified.
- ✓ Use tables 1A and 2A for LOW torque:
  - When there is risk of damage to the parts held by the bolt.
  - When there are thick or compressible joints between the components.
  - When the surfaces to be joined are not plane or not parallel.
- ✓ With non-plane, non-milled surfaces against the head of the bolt or nut.
- ✓ Use tables 1B and 2B for NORMAL Torque:
  - When there is no risk of damage to the parts held by the bolt.
  - When it's necessary a higher tightening torque to ensure the bolt or nut is properly secured.
  - When the thread is not lubricated before assembly.
- ✓ The gauge of nuts and bolts, in mm (ISO) or in inches, is the diameter (D) in the drawing below, and not the width (s) of the head.

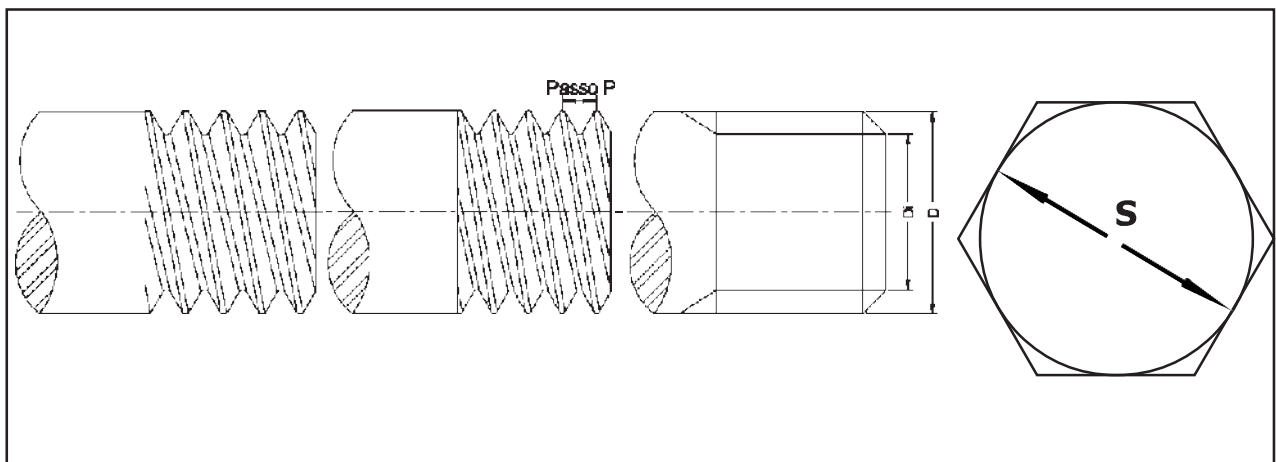


Fig. 1

The illustration below shows why correct tightening is essential, as it determines the tension in the bolt (or stud), and thus the compression in the components.

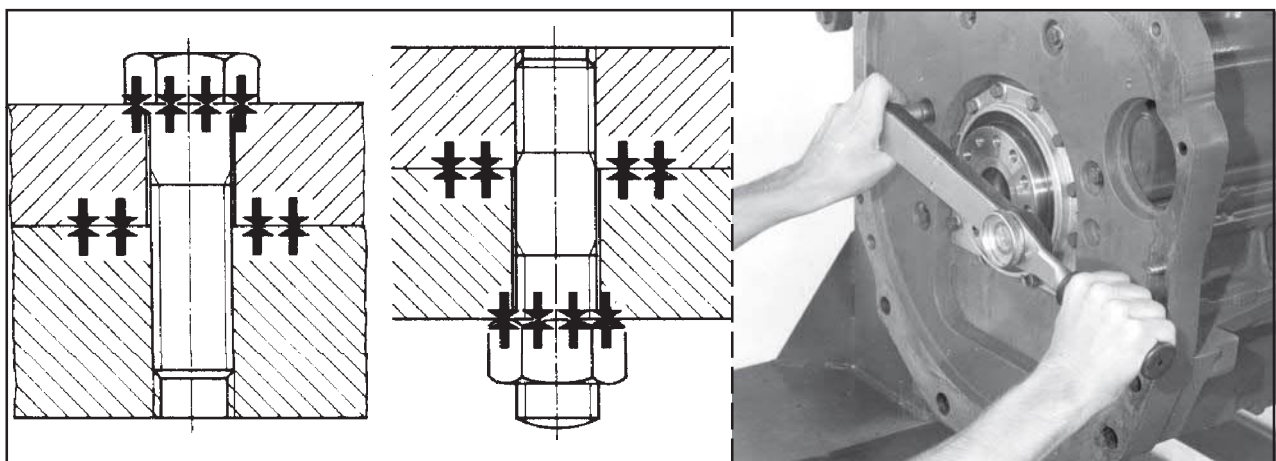


Fig. 2



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# Introduction

01

## E1A - General table of recommended torques for bolts and nuts, in N.m

Metric ISO thread, LOW torque									
Grade ISO	4.6 = SAE 1			Grade ISO 8.8 = SAE 5			Grade ISO 10.9 = SAE 8		
Gauge	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.
M3	0,5	0,6	0,44	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
M 6	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	38,00	2900,0

## E1B - General table of recommended torques for bolts and nuts, in N.m

Metric ISO thread, NORMAL torque									
Grade	ISO 4.6 = SAE 1			Grade ISO 8.8 = SAE 5			Grade 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	160,0	120,0
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

**E2A - General table of recommended torques for bolts and nuts, in N.m**

Inches thread, LOW torque									
Grade	ISO 4.6 = SAE 1			Grade ISO 8.8 = SAE 5			Grade ISO 10.9 = SAE 8		
	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.
1/4"	5,6	6,4	4,8	10,4	12,0	8,8	15,5	18,0	13,0
5/16"	11,3	13,0	9,6	21,0	24,0	18,0	29,5	34,0	25,0
3/8"	21,0	24,0	18,0	36,5	42,0	31,0	52,0	60,0	44,0
7/16"	33,0	38,0	28,0	60,0	69,0	51,0	84,0	96,0	72,0
1/2"	50,0	57,0	43,0	92,0	104,0	80,0	125,0	140,0	110,0
5/8"	100,0	110,0	90,0	185,0	210,0	160,0	260,0	300,0	220,0
3/4"	175,0	200,0	150,0	325,0	370,0	280,0	460,0	530,0	390,0
7/8"	290,0	330,0	250,0	530,0	610,0	450,0	745,0	850,0	640,0
1"	435,0	500,0	370,0	785,0	900,0	670,0	1120,0	1280,0	960,0
1 1/8"	450,0	510,0	390,0	970,0	1100,0	840,0	1560,0	1760,0	1360,0
1 1/4"	630,0	720,0	540,0	1400,0	1600,0	1200,0	2240,0	2560,0	1920,0
1 1/2"	1130,0	1300,0	960,0	2400,0	2700,0	2100,0	3800,0	4320,0	3280,0

**E2B - General table of recommended torques for bolts and nuts, in N.m**

Inches thread, NORMAL torque									
Grade	ISO 4.6 = SAE 1			Grade ISO 8.8 = SAE 5			Grade ISO 10.9 = SAE 8		
	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.
1/4"	7	8	6	13	15	11	19	22	16
5/16"	14	16	12	26	30	22	37	43	31
3/8"	26	30	22	46	53	39	65	75	55
7/16"	41	47	35	75	86	64	105	120	90
1/2"	63	72	54	115	130	100	160	180	140
5/8"	125	140	110	230	260	200	325	370	280
3/4"	220	250	190	405	460	350	575	660	490
7/8"	360	410	310	660	760	560	930	1060	800
1"	540	620	460	980	1120	840	1400	1600	1200
1 1/8"	560	640	480	1220	1390	1050	1950	2200	1700
1 1/4"	790	900	680	1750	2000	1500	2800	3200	2400
1 1/2"	1400	1600	1200	3000	3400	2600	4750	5400	4100

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