

Workshop Manual

HP 65-130 | MF400Xtra Tractors

Models: 425X, 435X, 440X, 445X, 455X, 460X, 470X, 480X



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



MASSEY FERGUSON

Machine models applied

Massey Ferguson Tractors models

MF 425X, 435X, 440X, 445X, 455X, 460X, 470X, 480X.

Models and variations

- Plataform ou Cab.
- With and without hydraulic lift system 3 points.



Fig. 1



Fig. 2

This publication has been written in accordance with the ISO 3600 International Standard, which regulates technical literatures about agricultural and forest machines and equipment.

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Workshop Manual - MF 400 Xtra

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01

01

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Introduction

01

A. Presentation

The purpose of this Workshop Manual is to help Dealers in the efficient maintenance of Massey Ferguson 400 Xtra Series 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.

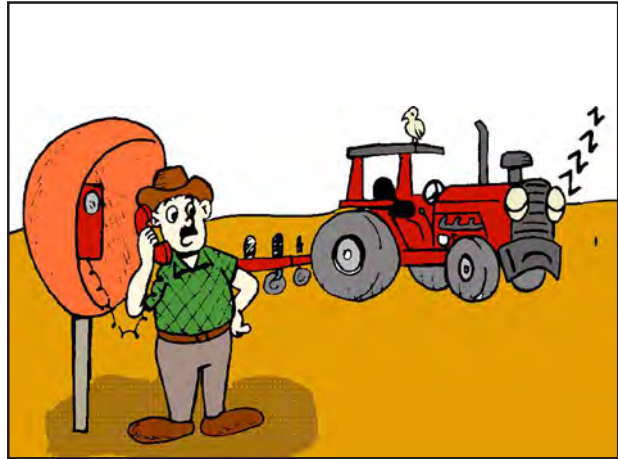


Fig. 1

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: International Engine 4-3.9 / 4-4.1, 1000 Series, etc.
- 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...).
- Each page of the subsections has a sequence number beginning with 01.



Fig. 1

01

Introduction

01

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.

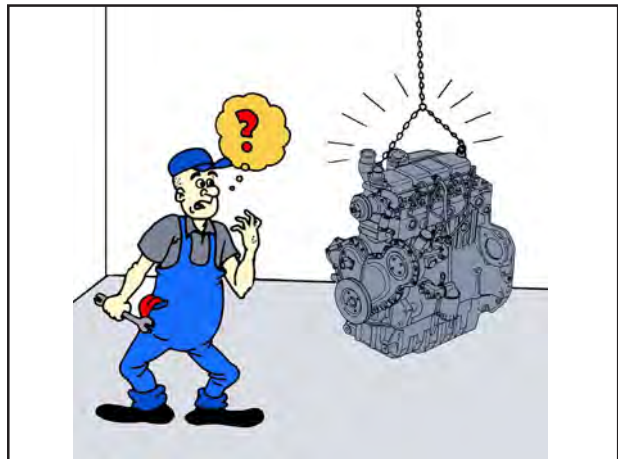


Fig. 1

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

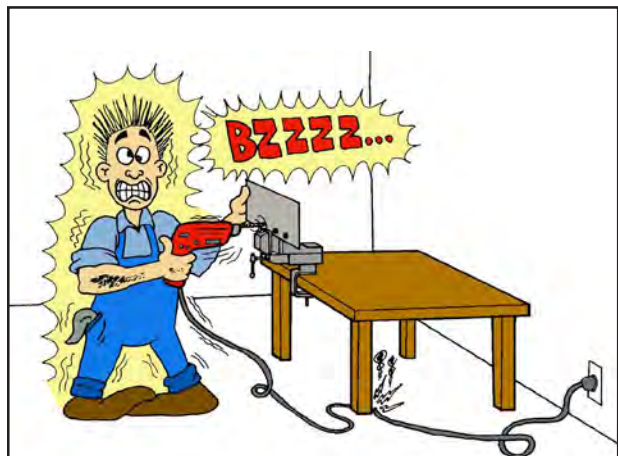


Fig. 2

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

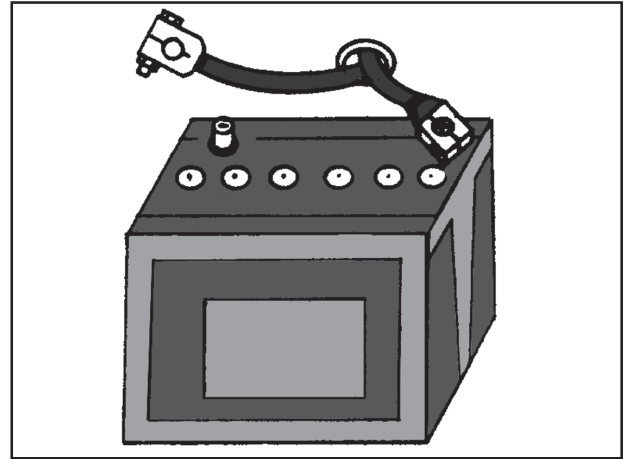


Fig. 3

- 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.

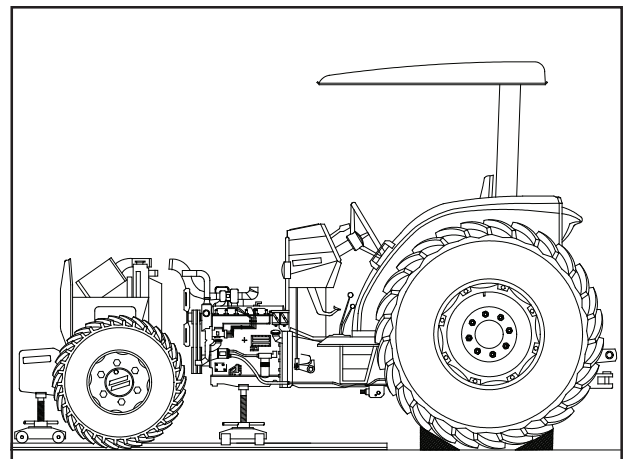


Fig. 5

- 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.

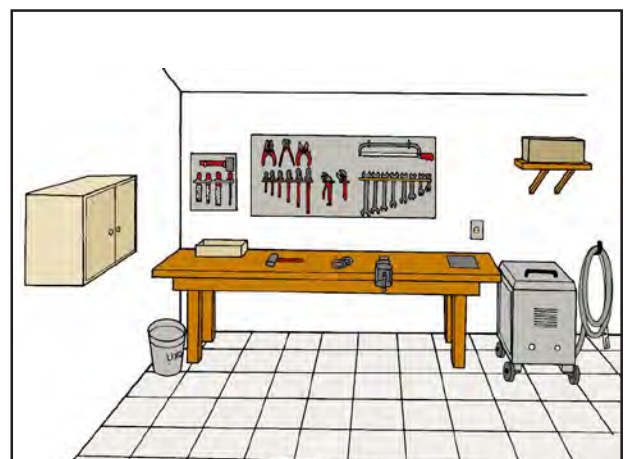


Fig. 6

Introduction

01

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

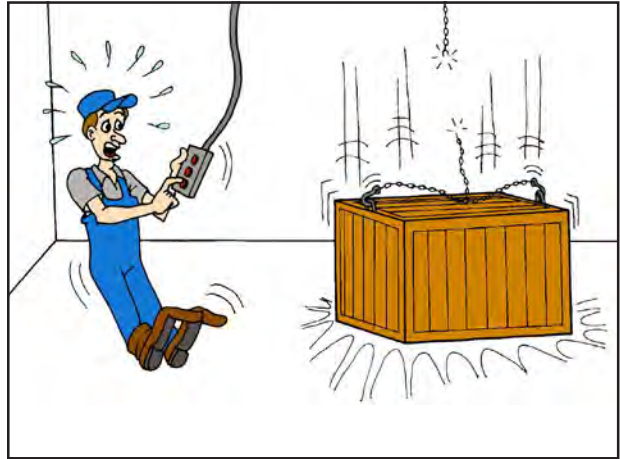


Fig. 7

- 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.



Fig. 8

- Don't work with long hair or with loose clothes. If they get caught in moving machinery, they can cause serious accidents.

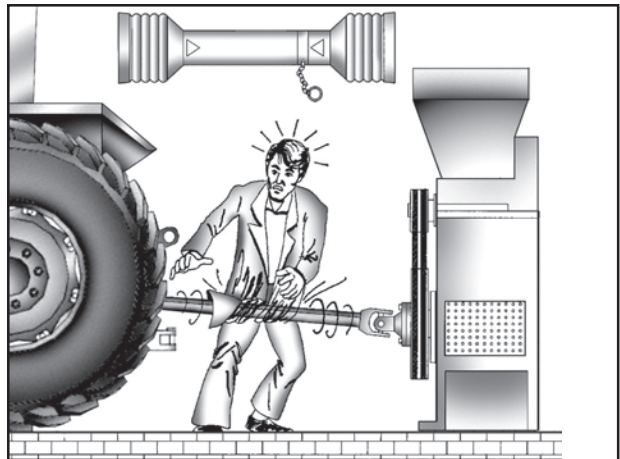


Fig. 9

- 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.

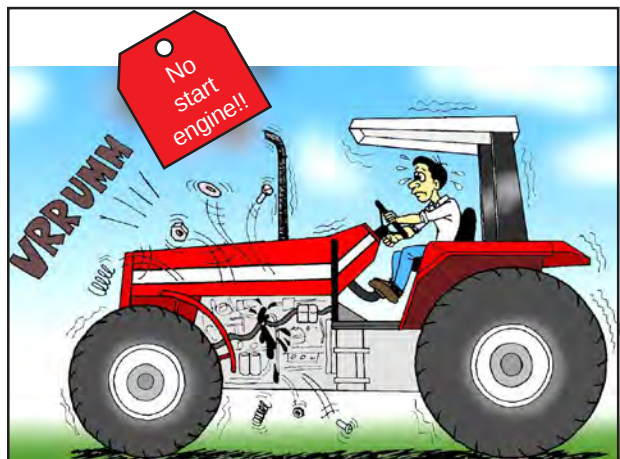


Fig. 10

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.

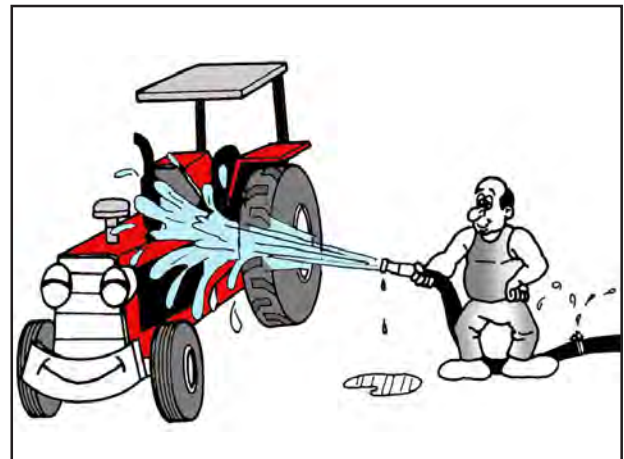


Fig. 11

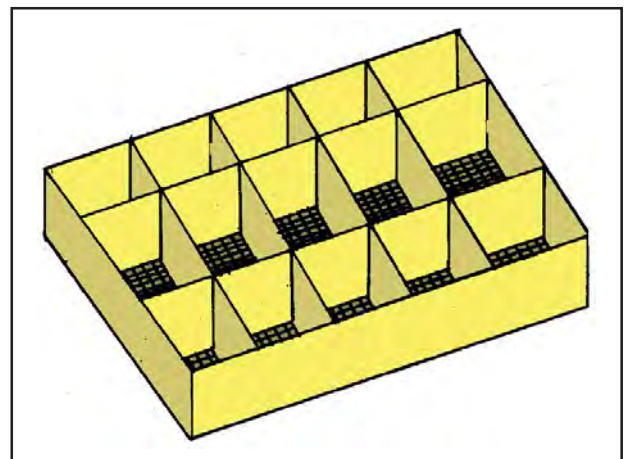


Fig. 12

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.

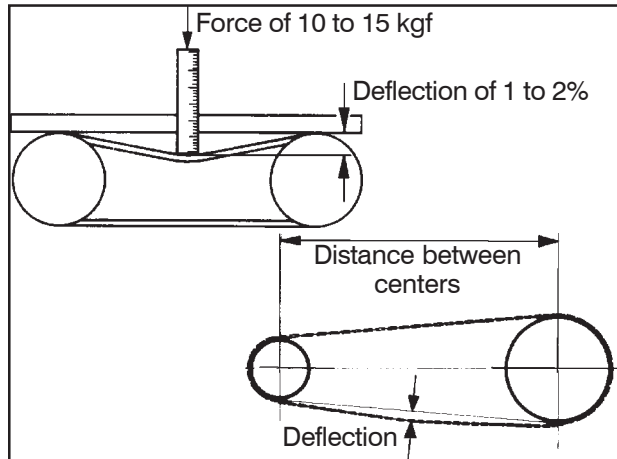


Fig. 13

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.

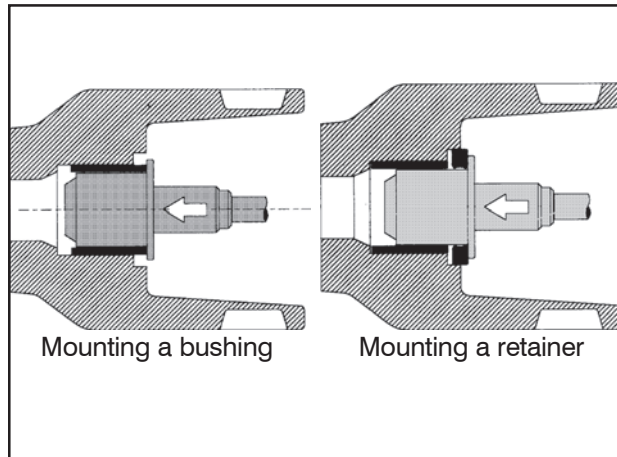


Fig. 14

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.

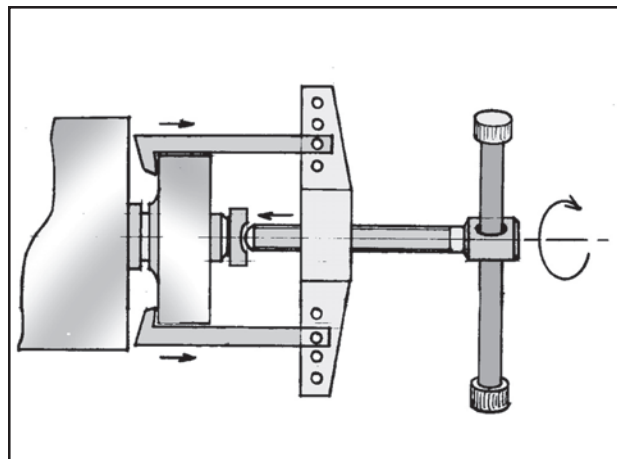


Fig. 15

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...

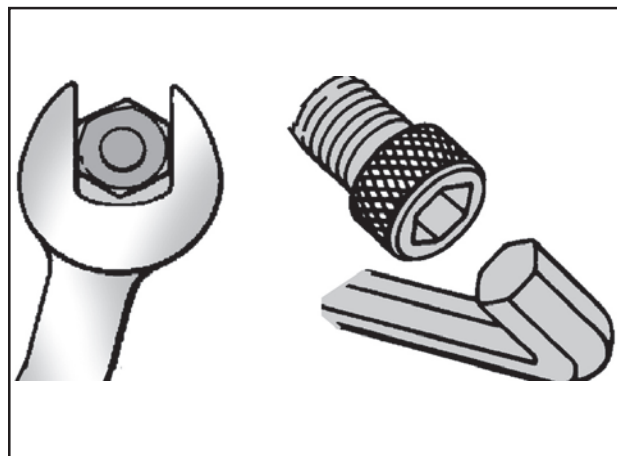


Fig. 16

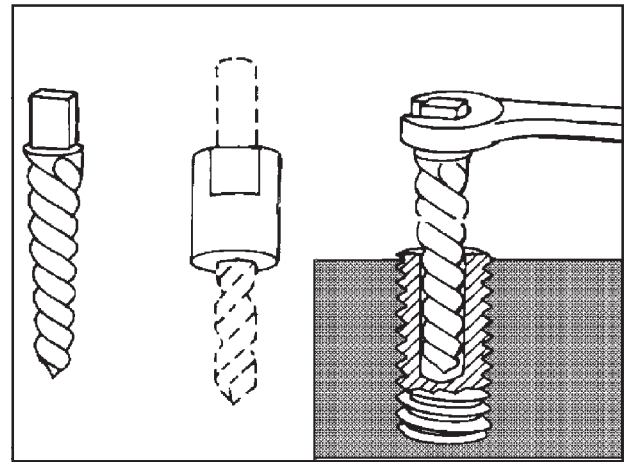
Removing a stud that has broken in place:

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

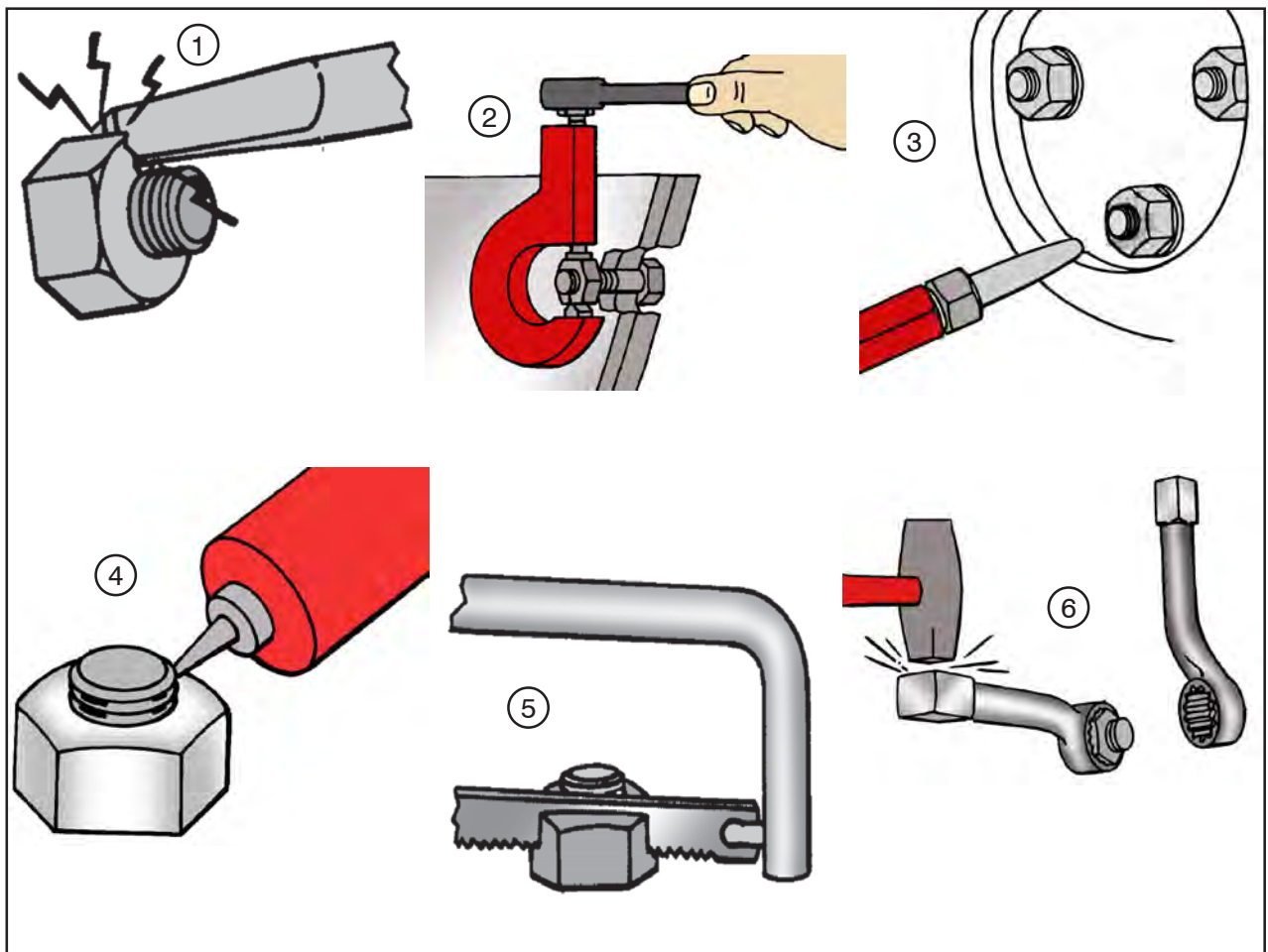
Then remove the stud by turning the bolt extractor counter-clockwise (in the case of a bolt with right hand thread).

**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.

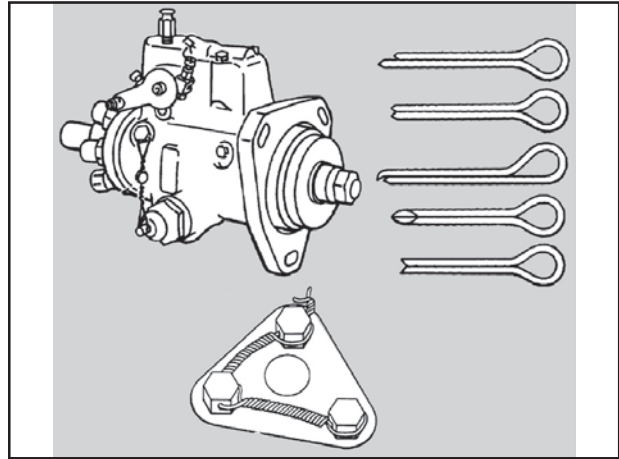


Fig. 19

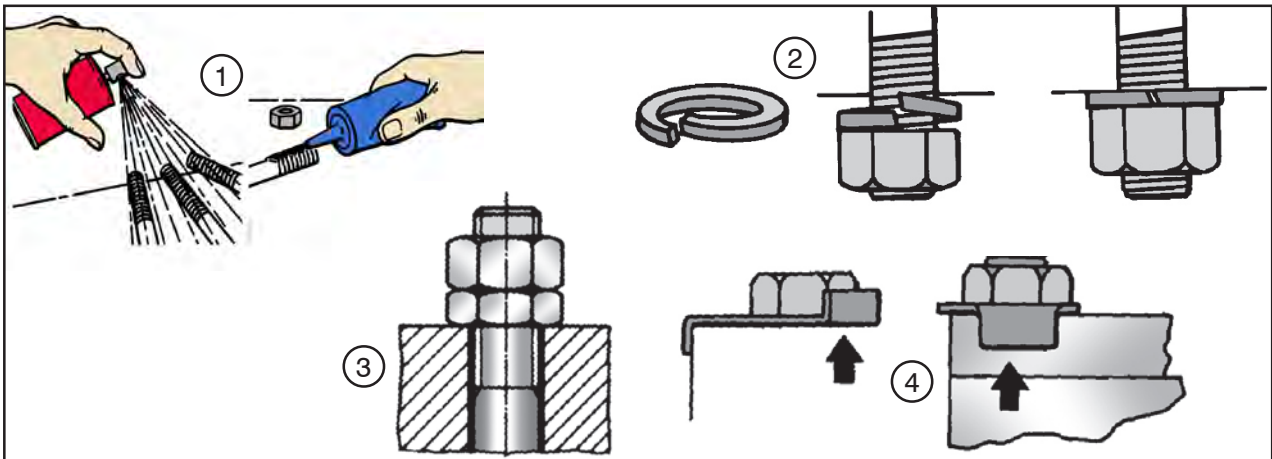


Fig. 20

- 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.

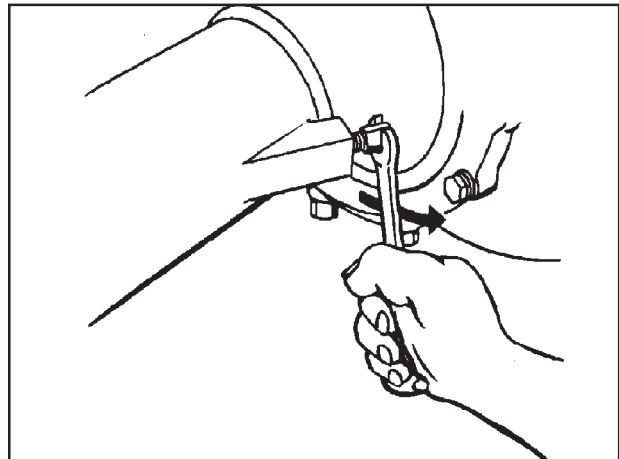


Fig. 21

Use open wrenches the right way.

Working with the wrench reversed puts more stress on it.

Don't improvise.

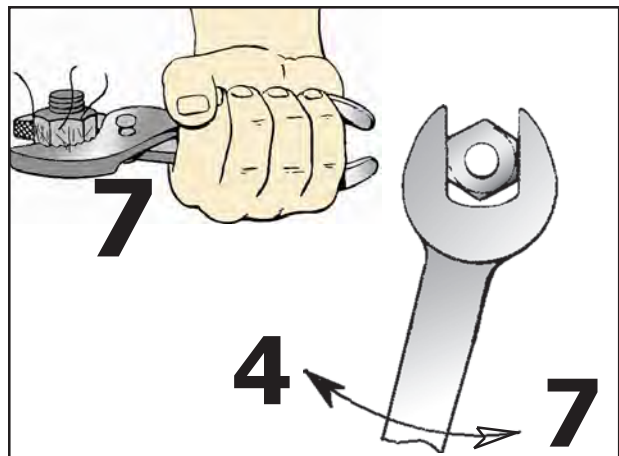


Fig. 22A

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

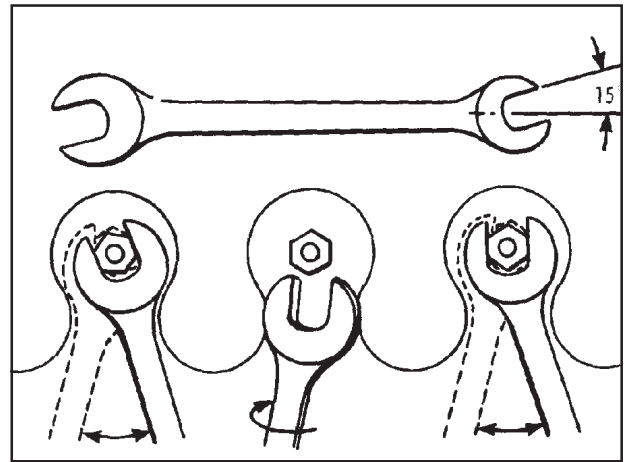


Fig. 22B

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.

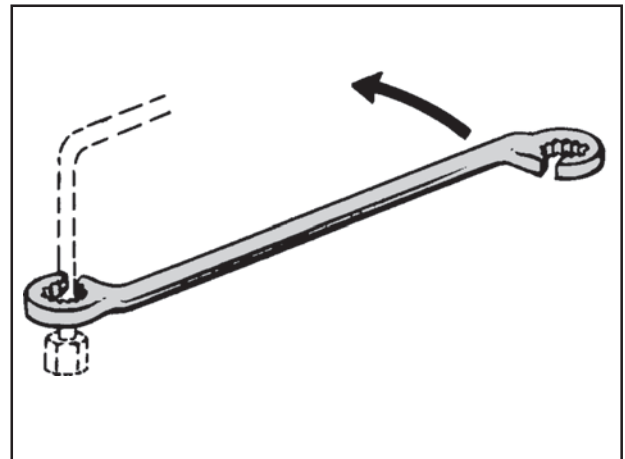


Fig. 23

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.

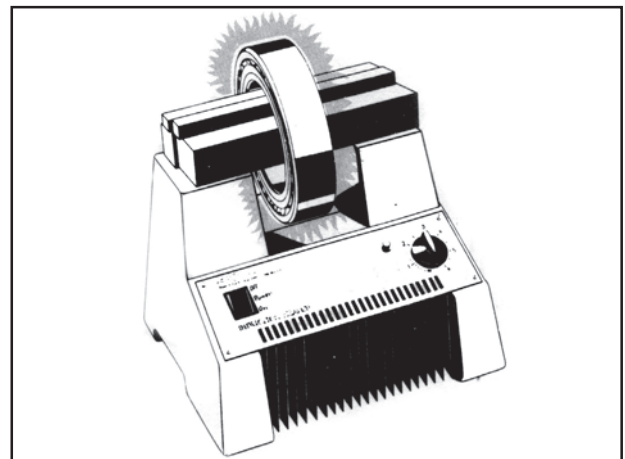


Fig. 24

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



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.

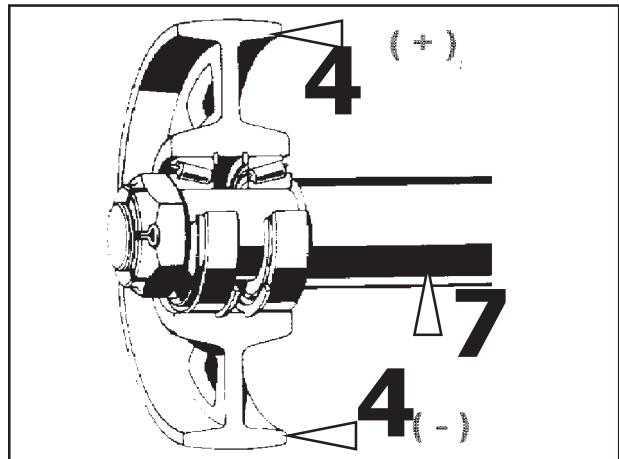


Fig. 26

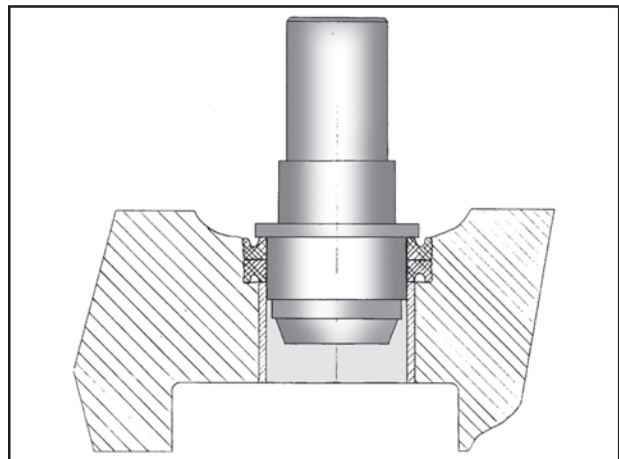


Fig. 27

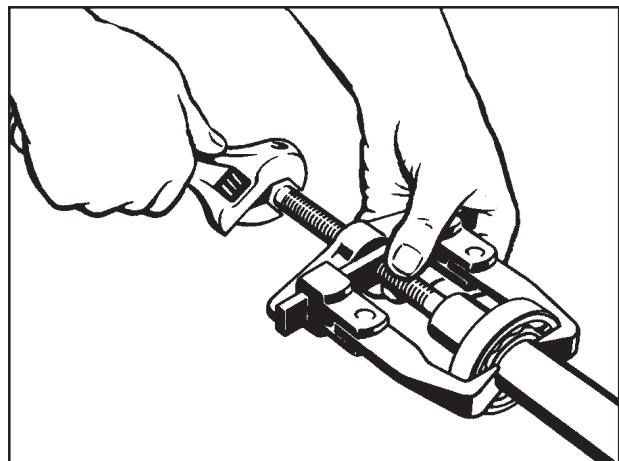


Fig. 28

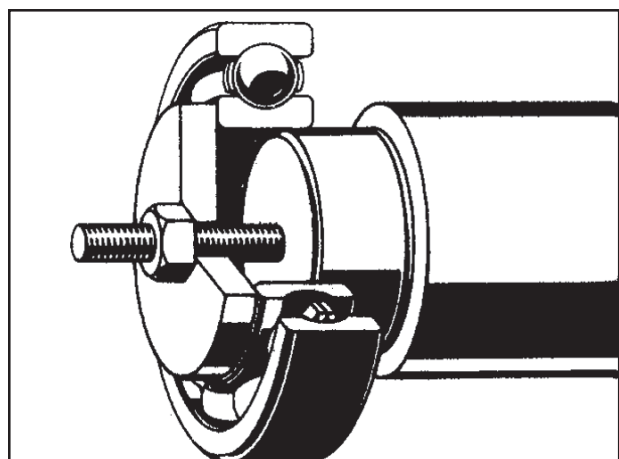


Fig. 29

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.

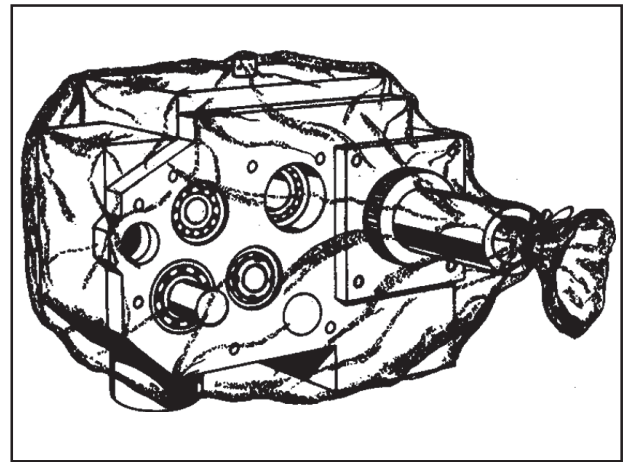


Fig. 30

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.

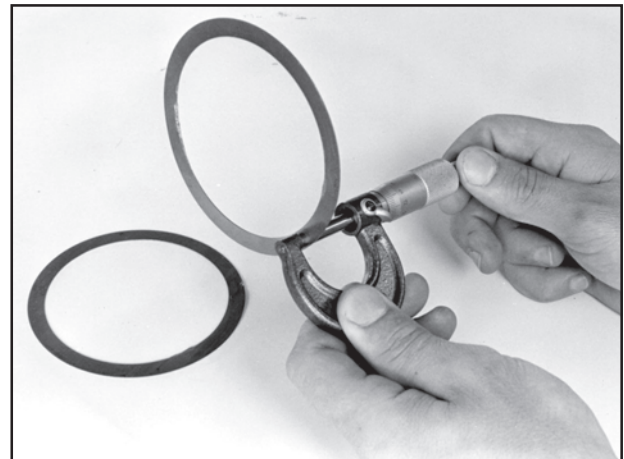


Fig. 31

Adjustment shims

When removing bearing adjustment shims, keep them together, and identify their location. Store them clean and flat.

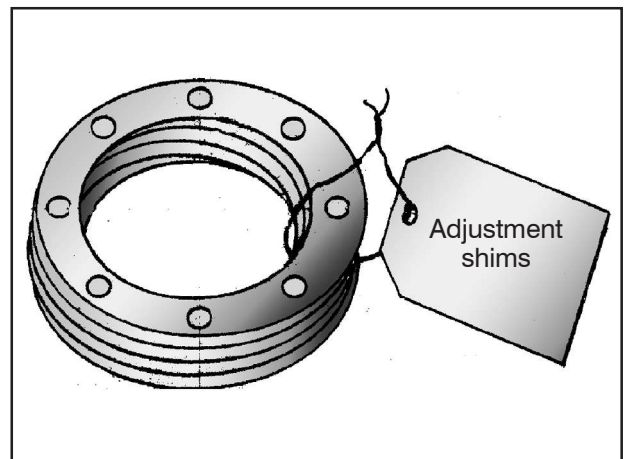


Fig. 32

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.

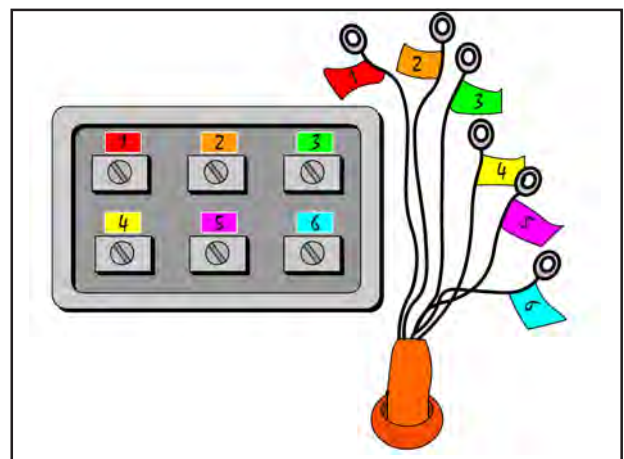


Fig. 33

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.

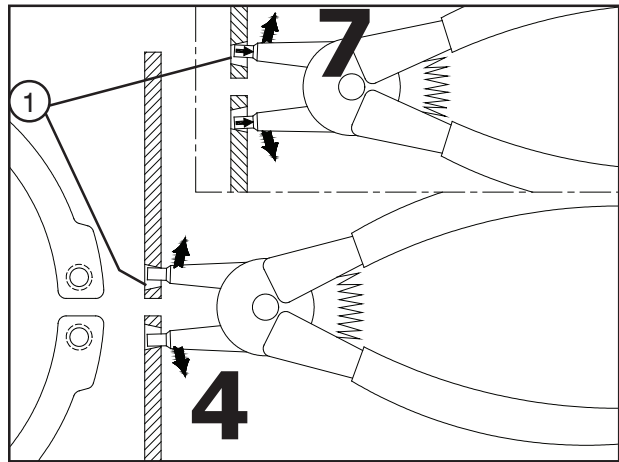


Fig. 34

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.

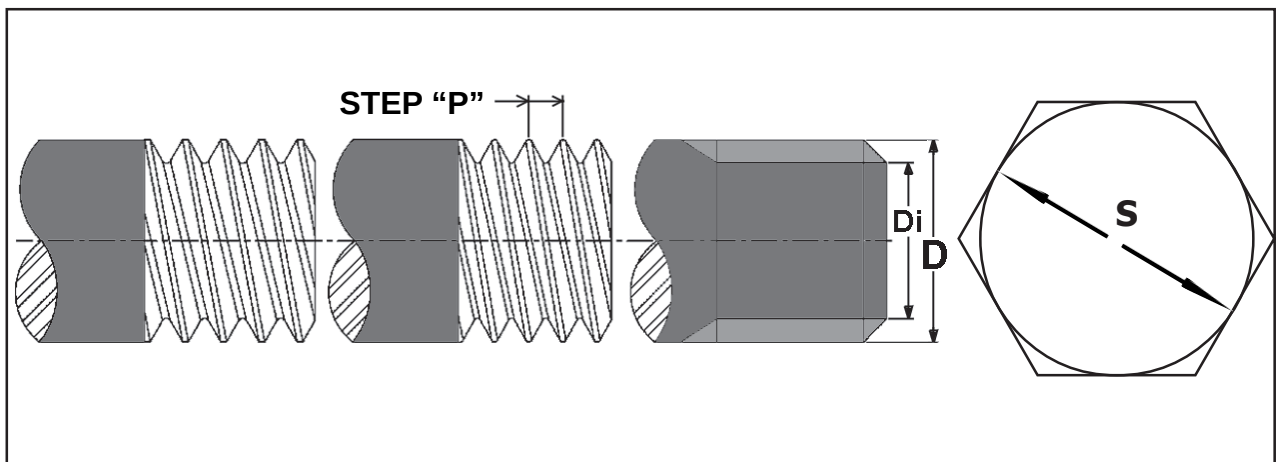


Fig. 1

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.

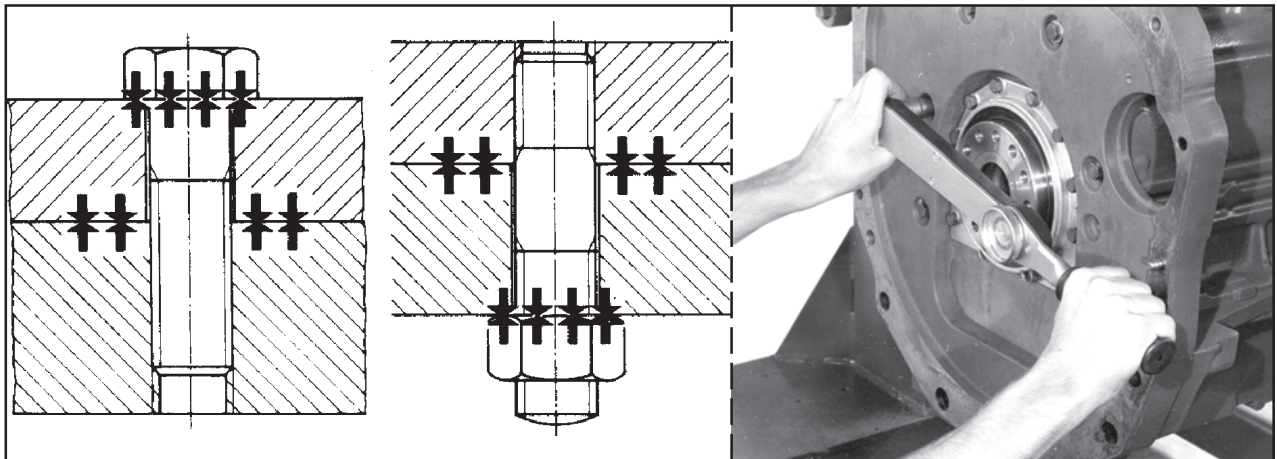


Fig. 2

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	0,4	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	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		
Gauge	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	15.0	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		
Gauge	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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F. Technical units

1. Conversion table

1 - Distance

You have:	You should	To get:
- 1 meter	Multiply by 39.37	inches (in. or “)
- 1 meter.	Multiply by 1.094	yards (y)
- 1 centimeter.	Multiply by 0.3937	inches (in. or “)
- 1 millimeter.	Multiply by 0.03937	inches (in. or “)
- 1 kilometer.	Multiply by 0.622	miles
- 1 foot.	Multiply by 30.48	centimeters (cm)
- 1 foot.	Multiply by 0.3048	meters (m)
- 1 foot.	Multiply by 12.0	inches (in. or “)
- 1 inch.	Multiply by 25.4	millimeters (mm)
- 1 inch.	Multiply by 0.0833	feet (‘)
- 1yard.	Multiply by 0.914	meters (m)
- 1 mile (statute)	Multiply by 1,609.0	meters (m)
- 1 mile (nautical)	Multiply by 1,853.0	meters (m)
- 1 knot.	Multiply by 21.938	meters (m)
- 1 fathom.	Multiply by 1.828	meters (m)
- 1 league (braz.)	Multiply by 6,600.0	meters (m)

2 - Mass

You have:	You should	To get:
- 1 kilogram	Multiply by 35.27	ounces (oz)
- 1 kilogram.	Multiply by 1000	grams (g)
- 1 kilogram.	Multiply by 2.205	pounds (lb)
- 1 ton.	Multiply by 1000	kilograms (kg)
- 1 pound force	Multiply by 0.453	kilograms (kg)
- 1 ounce.	Multiply by 28.35	grams (g)
- 1 arroba (braz. = 15 kg.)	Multiply by 14.7	kilograms (kg)

3 - Force

You have:	You should	To get:
- 1 kgf	Multiply by 9.81	newtons (N)
- 1 kgf	Multiply by 2.205	pounds force (lbf)
- 1 pound force	Multiply by 0.453	kilograms force (kgf)
- 1 newton.	Multiply by 0.102	kilograms force (kgf)
- 1 pound force	Multiply by 4.448	newtons (N)

4 - Speed

You have:	You should	To get:
- 1 km/h	Multiply by 0.6214	miles per hour (mph)
- 1 km/h	Multiply by 0.2778	meters per second (m/s)
- 1 mph	Multiply by 1.6093	kilometers per hour (km/h)

5 - Volume

You have:	You should	To get:
- 1 cubic meter	Multiply by 1000	liters (l)
- 1 cubic meter.	Multiply by 35.31	cubic feet (feet ³)
- 1 liter	Multiply by 1000	cubic centimeters (cm ³)
- 1 liter	Multiply by 0.001	cubic meters (m ³)
- 1 liter	Multiply by 0.264	US gallons (gal)
- 1 liter	Multiply by 2.12	pints (pt)
- 1 1 cubic inch.	Multiply by 16.387	cubic centimeters (cm ³)
- 1 1 cubic foot.	Multiply by 0.02832	cubic meters (m ³)
- 1 1 cubic foot.	Multiply by 28.32	liters (l)
- 1 US gallon	Multiply by 3.785	liters (l)
- 1 UK gallon	Multiply by 4.546	liters (l)
- 1 pint.	Multiply by 0.47	liters (l)
- 1 quart (UK)	Multiply by 1.137	liters (l)
- 1 quart (US)	Multiply by 0.946	liters (l)
- 1 bushel.	Multiply by 35.24	liters (l)
- 1 ounce.	Multiply by 30.0	milliliters (ml)

6 - Area

You have:	You should	To get:
- 1 square inch	Multiply by 6.452	square centimeters (cm ²)
- 1 square meter.	Multiply by 10000	square centimeters (cm ²)
- 1 square meter.	Multiply by 10.76	square feet (foot ²)
- 1 square foot.	Multiply by 144.0	square inches (inch ²)
- 1 square foot.	Multiply by 929.03	square centimeters (cm ²)
- square yards (jd ²).	Multiply by 0.836	square meters (m ²)
- 1 square meter.	Multiply by 1.196	square yards (y. ²)
- 0.40 ha	Multiply by 4,047.0	square meters (m ²)
- 1 hectare	Multiply by 4,046.86	square meters (m ²)
- 1 alqueire	Multiply by 2.4	hectares (ha)

7 - Pressure

You have:	You should	To get:
- 1 kgf/cm ²	Multiply by 0.981	bar
- 1 bar	Multiply by 1.019	kilograms per square centimeter (kgf/cm ²) = 1 atmosphere (atm)
- 1 atm	Multiply by 1.0132	bar
- 1 kgf/cm ²	Multiply by 101,325.0	pascal (Pa)
- 1 kgf/cm ²	Multiply by 14.22	pounds per square inch (lbf/pol ² =PSI)
- 1 bar	Multiply by 14.50	pounds per square inch (lbf/pol ² =PSI)
- 1 MPa	Multiply by 145.038	pounds per square inch (lbf/pol ² =PSI)
- 1 PSI	Multiply by 0.00689	megapascal (Mpa) = 10 ⁶
- 1 bar	Multiply by 394.13	inch H ₂ O
- 1 inch Hg	Multiply by 344.678	mm H ₂ O

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8 - Flow rate

You have:

- 1 l/min
- 1 gpm

You should

- Multiply by 0.264
- Multiply by 3.788

To get:

- gallons per minute (gpm)
- liters per minute (l/min)

9 - Torque

You have:

- 1 N.m
- 1 N.m
- 1 N.m
- 1 lb.in
- 1 lb.foot
- 1 kgf.m
- 1 kgf.m
- 1 kgf.m
- 1 N.m
- 1 kgf.cm
- 1 N.m
- 1 N.m
- 1 lb.in

You should

- Multiply by 8.851
- Multiply by 0.738
- Multiply by 10.0
- Multiply by 0.113
- Multiply by 1.356
- Multiply by 7.239
- Multiply by 86.8
- Multiply by 9.81
- Multiply by 10.0
- Multiply by 0.10
- Multiply by 0.102
- Multiply by 8.851
- Multiply by 0.113

To get:

- pounds-force x inch (lbf.pol)
- pounds-force x foot (lbf.foot)
- kilograms-force x centimeter (kgf.cm)
- newtons x meter (N.m)
- newtons x meter (N.m)
- pounds-force x foot (lbf.foot)
- pounds-force x inch (lbf.pol)
- newtons x meter (N.m)
- kilo. force x centimeter (kgf.cm)
- newtons x meter (N.m)
- kilogram-meter (kgf.m)
- pound force (lbf.in)
- newtons x meter (N.m)

10 - Power

You have:

- 1 hp
- 1 hp
- 1 hp
- 1 hp
- 1 kW
- 1 kW
- 1 kW

You should

- Multiply by 735.7
- Multiply by 0.9863
- Multiply by 1.014
- Multiply by 746
- Multiply by 1.36
- Multiply by 1.341
- Multiply by 1000

To get:

- watts (W)
- horse power (hp)
- cv (or PS)
- watts (W)
- cv (or PS)
- horse power (hp)
- watts (W)

11 - Temperature

You have:

- °C

Use the formula:

$(^{\circ}\text{C} \times 1,8) + 32$

Examples: 50 °C = 122 °F -10 °C = 14 °F

To get:

°F (Fahrenheit)

- °F

$5/9 \times (^{\circ}\text{F} - 32)$

°C (Celsius)

Examples: 60 °F = 15.5 °C 49 °F = 9.44 °C

Note the coincidence: -40 °F = - 40 °C

2. Equivalence between units - Imperial and SI systems

Quantities	Units		
	IMPERIAL SYSTEM	INTERNATIONAL SYSTEM - SI	PRACTICAL OR DERIVED UNITS
Distance	foot	m	mm, cm, km
Area	foot ³	m ²	mm ² , cm ² , km ² , ha, alqueire...
Volume	foot ³	m ³	mm ³ , cm ³ , l, gallon
Mass	lb	kg	g
Specific mass	lb/foot ³	kg/m ³	g/cm ³ , g/l, kg/l
Specific volume	foot ³ /lb	m ³ /kg	cm ³ /g, l/kg
Power	lbf	newton - N	kgf, dyne
Speed	foot/s	m/s	km/h, m/min
Speed	grad/s	rad/s	rpm, rps
Torque	lbf.foot	N.m	m.kgf, cm.kgf
Ideal pressure	lbf/foot ²	N/m ² (or Pa	kgf/m ² , kgf/cm ² , kgf/mm ²
Flow rate	foot ³ /s	m ³ /s	m ³ /h, l/h, l/min, l/s
Time	s	s	min, h
Energy	lbf.foot	J	kgf.m
Power	Btu	W	hp, cv

3. Prefixes of technical units

- ✓ To form multiples or sub-multiples of a base unit, simply add the desired prefix/symbol in front of it.
To multiply the unit volt by 1000: *kilo + volt = kilovolt* and *k + V = kV*.
To divide the unit volt by 1000: *milli + volt = millivolt* and *m + V = mV*.
- ✓ These prefixes can also be used with non-SI units:
millibar, kilocalorie, megaton, hectoliter, etc
- ✓ For historical reasons, the name of the basic unit of mass has a prefix: kilogram. For this reason, multiples and submultiples of this unit are formed using the gram.

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Name of prefixes

Name	Symbol	Multiplication factor
yotta	Y	$10^{24} = 1\,000\,000\,000\,000\,000\,000\,000\,000$
zetta	Z	$10^{21} = 1\,000\,000\,000\,000\,000\,000\,000\,000$
exa	E	$10^{18} = 1\,000\,000\,000\,000\,000\,000\,000$
peta	P	$10^{15} = 1\,000\,000\,000\,000\,000\,000$
tera	T	$10^{12} = 1\,000\,000\,000\,000\,000$
giga	G	$10^9 = 1\,000\,000\,000$
mega	M	$10^6 = 1\,000\,000$
kilo	k	$10^3 = 1\,000$
hecto	h	$10^2 = 100$
deca	.	10
deci	d	$10^{-1} = 0.1$
centi	c	$10^{-2} = 0.01$
mili	m	$10^{-3} = 0.001$
micro	μ	$10^{-6} = 0.000\,001$
nano	n	$10^{-9} = 0.000\,000\,001$
pico	P	$10^{-12} = 0.000\,000\,000\,001$
femto	f	$10^{-15} = 0.000\,000\,000\,000\,001$
atto	to	$10^{-18} = 0.000\,000\,000\,000\,000\,001$
zepto	Z	$10^{-21} = 0.000\,000\,000\,000\,000\,000\,001$
yocto	y	$10^{-24} = 0.000\,000\,000\,000\,000\,000\,000\,001$

upper case
symbols



Multiples



lower case
symbols



Sub-multiples

G. Products for locking and sealing

Loctite 241/242: Threadlocking liquid with medium strength against disassembly for nuts and bolts.

Threadlocking liquid with medium strength against disassembly for nuts and bolts. Simplifies assembly, eliminates mechanical locking systems, prevents loosening through vibration, prevents corrosion and rusting, prevents leakage, eliminates retightening and permits disassembly with standard tools.

Loctite 277: High strength threadlocker for nuts, bolts and studs.

Simplifies assembly, eliminates mechanical locking systems, prevents loosening through vibration, prevents corrosion and rusting, prevents leakage, eliminates retightening.

Allows disassembly with standard tools.

Loctite 290: Loctite 290 Locks and seals bolts after assembly

Penetrates by capillary action, filling all empty spaces. Eliminates mechanical locking systems, prevents loosening through vibration, prevents corrosion and rusting, prevents leakage, eliminates retightening and seals micropores.

Allows disassembly with standard tools.

Loctite 567: Seals threads with Teflon®.

For any threaded assembly. Prevents clogging, does not contaminate the system, instantly seals NPT connections to 17 bar (250 psi). Simplifies positioning of parts and equipment such as connections.

Loctite 601: Fastens bearings, bushings and other cylindrical parts

Allows assembly by sliding parts into place and prevents corrosion between parts. Eliminates necessity for polished finish of parts; disassembly with standard tools.

Loctite 660: Fastens bearings and bushings with large clearance, woodruff key, etc.

Fills larger gaps, not requiring plane surfaces. Fastens and seals parts.

Allows disassembly with standard tools.



Liquid gaskets

If there is no risk of oil contamination, you can use **Loctite 515, 598, 599** or **Three Bond**.

However, when bonding housings containing oil, we recommend you apply degreaser Loctite 7070 in the entire surface and only after apply a continuous thread of **Loctite 509** along the entire surface.

Failure to comply with these recommendations will contaminate the oil and clog the filters.

Examples: hydraulic cover, mounted on central housing, upper covers of all gearboxes and union of gearbox housing with central housing (rear axle).

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Method of application for LOCTITE products

- a) Remove all traces of old glue, dirt, grease, and oxidation.
For that, use wire brushes or sandpaper or chemical remover.
- b) Use a dry cloth on the points where adhesives are applied.
- c) Degrease the components with proper solvent such as LOCTITE 706.
- d) Allow time for the solvent to evaporate completely.
- e) Apply the recommended product by using a clean brush.

In order to apply adhesive as a thread use the opening of the package.



NOTES:

- ✓ *After applying the product, assemble as soon as possible.*
- ✓ *Do not use product in excess. To avoid:*
 - *Locking adjacent components.*
 - *Difficulty in curing, which usually only occurs with lack of oxygen.*
 - *Oil contamination inside mechanical assemblies and/or obstruction of hydraulic or lubrication circuits.*
- ✓ *The bolts should be tightened and the parts should be joined as soon as possible. After curing (drying) the adhesive, do not tighten again or the sealing lock or film may be broken.*

Grease application

When using grease in components that are in contact with transmission oil, use special grease, which can be diluted in oil, thus preventing filters and circuits from being clogged.

H. Paint specific for tractor paintwork

Components	Color specification (Massey Ferguson)
- Monobloc (powertrain = front axle, engine, transmission, center housing, rear axle) - Hydraulic control valve support - Stabilizer support - Front weight support - Front weight, engine shield - Rear weights (wheel weights) - Lift system (arms, stabilizers, leveling arms, etc.) - Hydraulic control valve, drawbar - Front fender support - Chassis and driveline shield - Exhaust tube support (L6000 & L7000)	Fendt gray (Fendt Gray-MF 50) EM A 034
- ROPS of L200, L400, L500, and L5000 - Air filter, pre-filter, and filter support - Levers in general, steering column - Sills (no footstep), front grille - Deflectors (shield) - Instrument panel frame - Mirror rods, hydraulic quadrant - Toolbox, seat frame - Ladders, tank support - Cab frame, battery case - Steering column cover plate (metal) - Console of L600 and L5000 - Steering frame and pedals in general - Cooling and intake system tubes	Shine black (Shine Black) EM A 007
- Upper and side hood - Mini hood (no footstep) - Rear fenders - Seat deck no foot step - Platforms - Nose	Red (Red - MF 50) EM A 003
- All platforms, cabs, and footstep - Seat upholster, wheel rims - Consoles and cover plates (platform and cab) - Cab mats - Canopy frame (platform and footstep) - ROPS of L600, L6000, and L7000	Smoke gray (Smoke Gray) EM A 022
- Black plastic parts in general (no paint) - Front fenders - Fender extensions (rear and front) - Fuel tank	Opaque black (Opaque Black) EM A 006
- Fender edges of platform L6000 and L7000 - Plastic parts in general painted in black	Textured opaque black (Textured Black) EM A 018
- Muffler and exhaust system tubes - Muffler shield - Turbine deflector - Ejectors (venturi)	High temp black (High Temp. Black) EM A 015

Introduction

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I. AGCO Environmental Policy

AGCO do Brasil Comércio e Indústria LTDA, at its plant in Canoas city, Rio Grande do Sul state, is committed to the development, production and sales of products aimed at meeting the mechanization needs of agribusiness, both in the Brazilian and foreign markets, always adopting the most appropriate alternatives for the preservation of the Environment.

Main Guidelines

- 1 - Comply with applicable regulations and standards, seeking to stay up-to-date with the latest regulatory trends.
- 2 - Continually improve environmental performance. Adopt pollution prevention practices aimed at making rational use of natural resources and reducing noise levels and solid, liquid and gaseous wastes.
- 3 - Be proactive in the internal and external community by keeping a channel of communication open for information related to environmental concerns and actions.
- 4 - Promote a sense of environmental responsibility by providing further training to employees and raising the awareness of suppliers and service providers.

How will we achieve these goals?

Working together with the environment will ensure that the company survives in the future. With this philosophy in mind, AGCO planned and implemented its environmental policy by putting into practice an Environmental Management system and a program for Cleaner Production.

What is ISO 14000?

It is a set of environmental management standards defined by the International Standards Organization (ISO). The ISO 14000 series consists of 6 sets of standards, each one dealing with a specific environmental issue.

ISO 14001 Standard applies to AGCO, because it deals with environmental management systems.

Environmental Management System - EMS

An EMS is a set of procedures used to manage a company in order to obtain the best relationship with the environment.

The implementation of this system aims at fully analyzing all of the company's activities, products and services in terms of their influence on the environment, and at taking on an ongoing commitment to environmental quality.



Fig. 1

Environmental issues

Greenhouse effect

It is the rise in temperature that the Earth experiences caused by the build-up of gases such as carbon dioxide (CO₂) and methane (CH₄) in the atmosphere. Carbon dioxide is produced in industrial processes, in the burning of fossil fuels and in fires.

“Global warming can melt the polar ice caps and cause flooding”.



Fig. 2

Reduction in the ozone layer.

The ozone (O₃) acts as a filter in the upper atmosphere, shielding us from the sun's harmful rays. Some gases can destroy the ozone, causing a hole in the ozone layer. These gases include chloroflourocarbons (CFCs), which are used in refrigeration.

"As a result, it is estimated that 100,000 new cases of skin cancer are reported every year".

The population explosion

It is estimated that by the year 2020, the earth's population will have an addition of 8 billion people if compared with today's population. The majority of these people will live under unsafe conditions, without a water supply system, education or medical assistance.

"Population growth, together with adverse conditions, is creating an unsustainable situation for the planet."

Sustainable development

This is a new type of development, which aims at balancing social and economic needs with the needs for environment protection and natural resources conservation so as to ensure the sustainability of human life on earth.

It is believed that sustainable development is the only way of dealing with poverty, waste, environmental degradation and social problems.

Recommendations to customers and users of MF tractors

With regard to the environmental issues discussed above, here are some suggestions to help increase your awareness, as such issues affects the use and maintenance of the machine throughout its life.

- 1 - Adopt proper agricultural practices in order to minimize the impact on the environment.
- 2 - Get the best performance from your tractor by adjusting implements correctly, using adequate implements and operating under proper conditions (gear, rpm, speed...) according to this operator's manual.

- 3 - Take full advantage of your machine for as long as possible. You can achieve this through proper preventative maintenance, as described in this operator's manual.
- 4 - Carry out *an integrated pest management*, which consists of procedures and crop monitoring, with the aim of using pesticides only when needed and at the correct amount.
- 5 - Do not waste fertilizers, seeds, pesticides, etc. Use all products in the correct amount.
- 6 - Avoid broadcast burning at all costs, and adopt appropriate cultivation techniques, such as straw planting or no-tillage.
- 7 - Check what the law establishes for parts and fluids changed in your tractor.

See some examples:

- * Metals
There are many advantages in recycling metals. Each metric ton of steel recycled represents a saving of 1,140 kg of iron ore, 454 kg of charcoal, and 18 kg of lime.
- * Oils and fluids:
During use, these fluids accumulate impurities and suffer oxidation. Therefore, they must be changed.
Never throw oil or fluids directly into the environment. Take them to the gas station where you bought them. Oils can be re-refined or, as a last resort, incinerated in industrial dumps regulated by legislation.
- * Batteries
Batteries can have a disastrous effect on the environment if dumped anywhere.
Send them to a recycling station, or return them to the supplier, who is responsible for disposing them properly.

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- * Tires

Energy generation and retreading were the first ways of recycling tires. With improvements in technology, new options arose, such as mixing with asphalt.

Retreading is now widely practiced, and lengthens the life of tires by 40%, but the majority of used tires still end up in garbage dumps, by the roadside, or even in the back yards, where they become breeding places for insects that spread diseases.
- * Plastics

Plastics are made from oil, and when recycled they consume only 10% of the energy required to make the same amount from raw materials. Like glass, plastic is also not biodegradable. Therefore, because of this and its increasing usage, recycling becomes essential.
- * Glass

Waste glass has a number of uses, including the production of asphalt, foam, fiberglass, costume jewelry and reflective paints.
- * Cardboard

Fifty (50) kilos of used paper transformed in new paper prevents a tree from being cut.

J. Compulsory recycling of batteries



ATTENTION:

Return your used battery to the Dealership when replacing it. In compliance with CONAMA resolution 257/99 from 30/06/99.

CONAMA resolution

CONAMA - The Brazilian Council for Environment - through resolution 257 from June 30th 1999, establishes standards and responsibilities regarding used battery management and disposal. This resolution determines that all establishments that distribute or resell these products must be aware of such resolution and must receive enough information and advertisements capable of guiding end users on their responsibility of returning used batteries to the manufacturer through the establishments that sell them and/or render technical service assistance.



DEAR CUSTOMER

All customers/end users are obliged to return their used battery to a point of sale. Do not throw batteries away.

Points of sale are obliged to accept your used battery. Store it in a proper place and return it to the manufacturer for recycling.

Risk of exposure to lead and acid solution.

The acid and lead in batteries can contaminate the soil, the subsoil, and the water if released into the environment.

The consumption of contaminated water may cause arterial hypertension, anemia, sadness, weakness, leg pain and drowsiness.

Acid solution in contact with the eyes can cause chemical conjunctivitis, and with the skin it can cause contact dermatitis.

In case of accidental contact with the skin or eyes, wash the spot immediately with running water and call a physician for medical assistance.

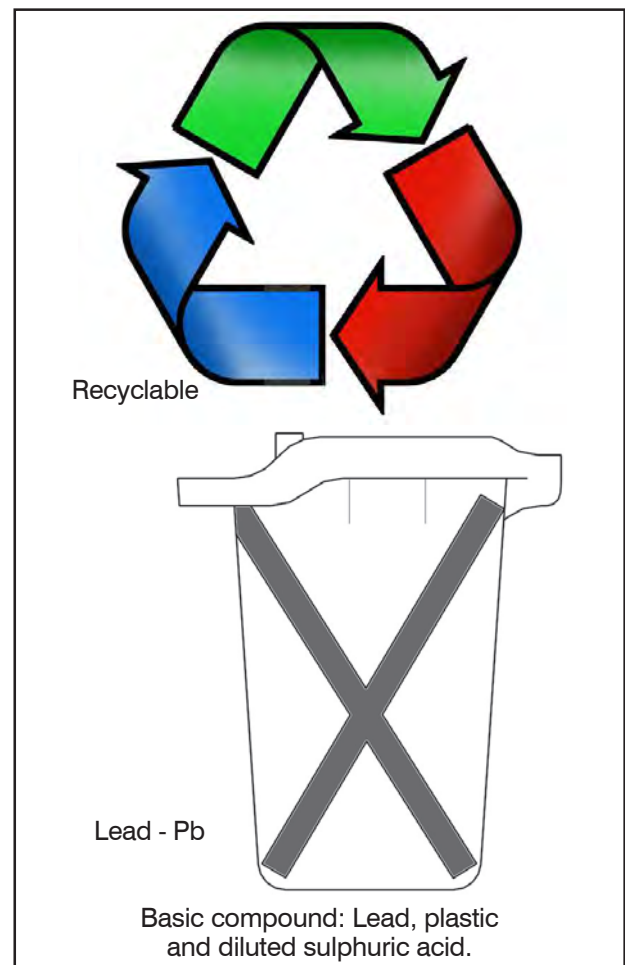


Fig. 1

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Technical specifications

	MF 425	MF 435	MF 440	MF 445	MF 455	MF 460	MF 470	MF 480
1. Engine								
Mark	MWM DSA / Tier II	MWM / Perkins	MWM / Perkins	MWM	Perkins	SISU	SISU	SISU 4 2 0
Model	A4-3.9	A4-4.1 / 1104C-44	A4-4.1	A4-4.1	1104C-44T	420DS / Tier II	420DS / Tier II	420 DSA / Tier II
Engine (LP) code	8C72 and 8C73	8C74 / RE 37827 8C75 8C77	8C84 / RE 37830 8C85	8C84 8C85	RG 37829	-	-	-
Ar intake	Natural	Natural	Natural	Natural	Turbo	Turbo	Turbo	Turbo
Number of cylinders	4	4	4	4	4	4	4	4
Injection order	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2
Compression ratio	16,0:1	16:1 / 19.3:1	16:1 / 19.3:1	16:1	18,23:1	16,5:1	16,5:1	16,5:1
Piston stroke - mm	127,00	127,00	127,00	127,00	127,00	120,00	120,00	120,00
Cylinder bore - mm	98,40	101,0 / 105	101,0 / 105	101,0	105	108,00	108,0	108,0
Capacity - cm³	4.100	4.100 / 4.400	4.100 / 4.400	4.100	4.400	4.400	4.400	4.400
Maximum power (hp) @ rpm (NBR5484)	65,0@2200	75,0@2200 / 72@2200	85@2200 / 80@2200	85@2200	97@2200	110@2200	120@2200	130@2200
Maximum torque (N.m) @ rpm (NBR5484)	235,5@1400	279@1400 / 292@1400	289@1400 / 328@1400	289@1400	402@1400	420@1400	480@1400	500@1400
Lubrication system								
Filtering	All have integral flow filters							
Type	Pressure-fed, with gear pump (relief valve built-in).							
Heat exchanger	No	No	No	No	No	Yes	Yes	Yes
Air system								
Filter - type	Dry filter with 2 elements (primary and secondary). Equipped with a cyclonizer and restriction indicator with warning light on the panel. In tractors which are not equipped with a dust ejector, there is a valve to discharge the accumulated dust, located on the filter front end.							
Pre-filter (optional)	O4 type with cyclonizer, and can be equipped with an automatic dust ejector.							
Fuel Supply System								
Pre-filter / separation - number of elements	There is 1 pre-filter or 2 sedimenters, which separate larger residues and decant water contained in the fuel.							
Filter system - number of elements	1	1	1	1	1	1	1	
Injection pump (or transfer):	Diaphragm type, activated by means of a lever and a cam in the camshaft. The pump has a knob or lever used to bleed the fuel system. The tractor with 1104 engine has an electric supply pump incorporated to the fuel filter head.							
Injection pump - Marck	Delphi	Delphi / Bosch	Delphi / Bosch	Delphi	Delphi	Delphi	Delphi	Delphi
Injection pump - type	DP100	DP100 / EPVE	DP100 / EPVE	DP100	DP210	DP100	DP100	DP100

	MF 425	MF 435	MF 440	MF 445	MF 455	MF 460	MF 470	MF 480
Cooling system								
Water pump	Centrifuge, belt driven.							
Thermostatic valve (wax capsule type) - Qty.	1	1	1	1	1	1	1	1
Temperature range:	77 a 95 °C	80 a 98 °C	80 - 98 °C	80 - 98 °C	80 - 94 °C	79 - 83 °C	79 - 83 °C	79 - 83 °C
Radiator cap	7,0 PSI	7,0 PSI	7,0 PSI	7,0 PSI	7,0 PSI	10,5 PSI	10,5 PSI	10,5 PSI

2. Electrical system - powers and ratings

Battery(ies).....	1 x 100 A/h	1 x 100 A/h	1 x 100 A/h	1 x 100 A/h	1 x 100 A/h	1 x 100 A/h	1 x 100 A/h	1 x 100 A/h
Alternator (Footstep):	All: 12 V / 55 A							
Alternator (With cab):	12 V / 120 A/h							
Starter motor - kW	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0
Glow plug (start aid for cold weather) - optional	-	-	-	-	-	9 A	9 A	9 A
Neutral Starter Switch	Standard on all models, prevents starting when the right lever (High and Low selection) is not in Neutral.							

3. Clutches

Clutch collar	The clutch release bearing is designed to be a constant running bearing. That is, with no free play. Only the correct pedal height is required:							
Pedal height in relation to the footstep or floor	150 to 160 mm	150 to 160 mm	150 to 160 mm	150 to 160 mm	150 to 160 mm	170 to 190 mm	170 to 190 mm	170 to 190 mm

MF code	Clutch - features	Application						
039210T1 - Split clutch with spring 13" (cerametallic or organic disc)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
044695T1 - Split with spring 13" (cerametallic disc)	Yes	Yes	Yes	No	Yes	No	No	No
044701T1 - Single clutch 13" (cerametallic or organic disc)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3586769M92 - Dual clutch 13" (cerametallic or organic disc)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

4. Engine flywheel

Código MF	Aplicação							
022319P1	Yes	Yes	Yes	Yes	Yes	No	No	No
6201313M1	Yes	Yes	No	No	Yes	No	No	No
6220419M1	No	No	No	No	No	Yes	Yes	Yes

Technical specifications

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	MF 425	MF 435	MF 440	MF 445	MF 455	MF 460	MF 470	MF 480
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5. Gearbox - types vs. application

8 x 2 speeds	Yes	Yes	Yes	Yes	Yes	No	No	No
8 x 8 speeds	Optional	Optional	Optional	Optional	Optional	No	No	No
12 x 4 speeds Constant Mesh	No	No	No	No	No	Yes	Yes	Yes
12 x 4 speeds - synchro	Optional	Optional	Optional	Optional	Optional	Yes	Yes	Yes
Reduction gearbox	Optional	Optional	Optional	Optional	Optional	No	No	No

6. Rear axle

Ring gear / pinion ratio:	3,889:1	3,889:1	3,889:1	3,889:1	3,889:1	3,889:1	3,889:1	3,889:1
Differential lock	With coupling sleeves, right hand axle shaft splines. The sliding sleeves are driven by a fork, which, in turn, is mechanically controlled through a pedal.							
Reduction of final drives	3,143:1	3,143:1	3,143:1	4,8:1	4,8:1	4,8:1	4,8:1	6,0:1

7. Brakes

Type.....	Comprised of oil immersed discs with mechanical drive and independent action in the rear wheels.											
Drive	Hydraulic											
Number of active discs on each side	4	4	4	4	4	4	4	5				
Active discs - types.....	Organic				Steel with syntherized bronze							
Fixed discs - type....	All: Polished steel											
Parking brake	Multi-disc oil immersed type, assembled over the output shaft for the four-wheel drive.											

8. Front axles

2WD axle	
..... Type	Three section axle with track adjustable by means of a telescopic rod that allows the displacement in relation to the support trough.
Toe-in	All: 0 to 6.35 mm
Maximum vertical swing	All: 11°
Camber	All: 3° 30'
Caster	All: 0°

4WD axle - CARRARO

Ca 20.14 (Side)	Sim	Sim	Sim	Não	Não	Não	Não	Não
Ca 2018 (Central)	Não	Não	Não	Sim	Sim	Não	Não	Não
Ca 20.21 (Central)	Não	Não	Não	Não	Não	Sim	Sim	Sim
Wheel toe-in	All: 0°							
Maximum steering angle	All: 50°							
Final drive	All: 6.0:1							
Ring gear/pinion ratio	Ca 20.14 = 2.153:1 Ca 20.18 and 20.21 = 3.74:1							

	MF 425	MF 435	MF 440	MF 445	MF 455	MF 460	MF 470	MF 480
9. Lift hydraulics								
Type	FERGUSON Category I I							
Operating controls	Position - Depth - Transport - Response and Constant Pumping (The “Constant Pumping” is used when the combined flow is actuated, optional resource for the auxiliary control valve, which consists of transferring the hydraulic lift pump flow to the auxiliary control valve, increasing its flow rate).							
Hydraulic cylinder(s)	All have an inner cylinder with the option for outer auxiliary cylinders. Lift capacities marked with * below indicate use of auxiliary outer cylinders							
Maximum lift capacity in kgf on the ball joints	2100/2500*	2500/3200*	2500/3200*	3200	3200	3800	3800	3800
Hydraulic pump	Piston-type, ISYP model							
Output (Liters/min.) /	17 or 27**							
* NOTE: Capacity obtained with HD type lift arms or with outer auxiliary cylinders. ** NOTE: Only when equipped with dual speed PTO or IPTO (540 and 1000 rev/min), flow rate is 27 liters/min.								
Adjustment pressure for the relief valve - kgf/cm². All: 210								

10. Auxiliary Hydraulic System

Number of lines and options	1, 2 or 3 / double action, female terminals - quick-release coupling Options: with spring return, Kickout or valve for hydraulic motor with variable flow*.							
Flow rate:								
Independent type	Sim	Sim	Sim	Sim	Sim	Sim	Sim	Sim
Output = lpm	42	42	42	42	42	42	42	42
Independent type with combined flow active CF (operating system)								
active CF (operating system)	59 l/mim (for tractors with PTO of 540 rpm) and 69 l/mim (for tractors with PTO of 540 and 1000 rpm). The combined flow, when active, transfers the hydraulic lift pump flow (17 or 27 l/min) to the auxiliary control valve, increasing flow rate. When activating the combined flow, the lift system is inoperative. *Tractors with PTO 540 rpm: + 17 lpm **Tractors with PTO 540/1000 rpm: + 27 lpm							
Maximum pressure - (Kgf/cm²)	150	150	150	150	150	150	150	150
Valve with variable flow (set in 0 to 60% of the full flow rate	Não	Não	Não	Não	Não	Opcional	Opcional	Opcional

11. Steering system

Adjustment pressure for the system (relief valve) All: 145 to 150 lpm

12. Power take-off

Types.....	Live (PTO - Standard) Independent (IPTO - Optional)	
540 / 1000 rev/min	Optional, both for Live and Independent	
Engine speed for rated speed at PTO	This speed depends on the tractor and PTO configuration. The following options are available: 1700 - 1790 - 1800 - 1900 and 2000 rev/min. This information can be found in the speed decal on the right-hand side of the operator station.	
Shaft rotation direction	All: Clockwise - seen from the back.	
Shaft diameter / number of splines	All: PTO type 540 rev/min = 35/6 - PTO type 1000 rev/min = 35/21	
Adjustment pressure for the system - IPTO:		
Tractors, maintaining valve mounted by the IPTO pump inside the housing	17 bar	
Tractors with maintaining valve mounted on the outside - PMV or Manifold	22 to 24 bar	

Technical specifications

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	MF 425	MF 435	MF 440	MF 445	MF 455	MF 460	MF 470	MF 480
13. Filling capacity - in liters								
Fuel tank	100	100	100	100	100	115 e 85	115 e 85	115 e 85
Engine sump	7,1 / 8,1	8,1 / 9,1	8,1 / 9,1	8,1 / 9,1	5,5 / 7,5	13	13	13
Cooling system	14,5	14,5	14,5	14,5	18	24	24	24
Transmission and hydraulics	It varies from 42 to 47 liters, depending on tractor configuration. Always take into consideration the correct levels by using the dipstick. In addition, when coupling an implement with auxiliary hydraulic control valves, add oil to the transmission as necessary, so as the recommended level be kept at all times.							
Rear epicyclic hubs (each)	2,0	2,0	2,0	3,0	3,0	3,0	3,0	10
Front axle (4WD):								
Differential	Carraro	Ca 20.14 = 5,0 / Ca 20.18 e 20.121 = 4,5						
Reducers	Carraro	Ca 20.14 = 0,7 / Ca 20.18 e 20.121 = 1,0						
Brakes	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3

14. Approved lubricants and additives

Fuel tank	Diesel Oil - with maximum sulphur content = 0.5%
Engine sump	SAE 15W 40 API CF-4 Multigrade.
Cooling system	Running water with ethylene glycol based antifreeze and anticorrosion additive.
Transmission and hydraulics	SAE 10W-30 API GL -4/SF - GL-4 MF CMS M1143.
Front and rear final drive	SAE 90 API GL 5 MIL-L-2105 B
4WD front differential	SAE 90 API GL 5 MIL-L-2105 B

15. Cab and air conditioning

Condenser.....	Located in front of the water cooler
Compressor.....	Belt driven, from fan pulley
Refrigerant	R-134A / 1.7 kg (3.74 lb).
Air filtering	Paper element located on the left side of cab roof.

	MF 425	MF 435	MF 440	MF 445	MF 455	MF 460	MF 470	MF 480
16. Tratores dimensions								
NOTE: for complete specifications concerning dimensions, see the operator's manual.								
Footstep tractors, standard, 4WD								
Rear wheels and tires used	18.4-30R1	18.4-30R1	18.4-30R1	18.4-34R1	18.4-34R1	23.1-30R1	23.1-30R1	23.1-30R1
Ballasted weight - kg	4517	4567	4829	5410	5446	6720	6740	7040
Overall length - mm	4125	4170	4170	4270	4270	4270	4580	4730
Maximum height - mm	2580	2600	2600	2600	2650	2600	2600	2650
Distance between axles - mm	2370	2370	2280	2380	2380	2450	2740	2740
Average clearance - mm	380	380	380	380	380	400	410	410
Tracks (minimum/maximum) - mm								
- Front.....	1317/1826	1317/1826	1317/1826	1645/2040	1654/2164	1645/2040	1645/2040	1645/2040
- Rear	1445/2167	1445/2167	1445/2167	1560/2165	1420/2330	1560/2165	1560/2165	1560/2165
Turning radius - mm								
- With brakes	3750	3750	3750	3750	3750	3750	3750	3750
- No brakes	4220	4220	4220	4220	4220	4220	4220	4710

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- 02A01** **Splitting the tractor between engine and front axle**
- 02B01** **Splitting the tractor between engine and gearbox**
- 02C01** **Splitting the tractor between gearbox and rear axle (center housing)**
- 02D01** **Sheet metal and awning**
- 02E01** **Splitting tractors with cab**

02

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Splitting the tractor between engine and front axle

A. Introduction

It is usually necessary to split the tractor between the front axle and engine to service the engine internal assemblies or components such as the timing case.

02



IMPORTANT:

- *All procedures involving tractor splitting should be performed according to the appropriate safety precautions.*
- *Before splitting the tractor, make sure all connections have been properly disconnected between the moving part (front end of tractor) and the fixed part (rear end of tractor).*

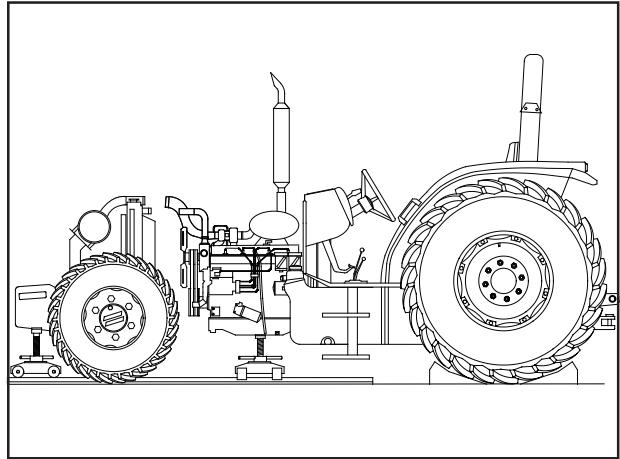


Fig. 1

B. Opening

1. Preliminary operations

- Support the front axle beam (2WD or 4WD) with wooden wedges (1) on both sides to ensure the side balance of the front assembly that will be moved.
- Apply the parking brake and/or wedge the rear wheels with wooden shims.



Fig. 1

2. Electrical system

- Tractors up to 100 hp

- Disconnect the positive cable from the battery (2).
- Disconnect the electrical connections (2a) from the battery (2) negative cable.
- Remove the primary fuse box (3) and the relays (4).
- Loosen the tab bolts (4a) from the cables.



Fig. 2

- Tractors of more than 100 hp

- Disconnect the horn (5) Fig. 4.

3. Steering system

- Disconnect the steering cylinder hoses (6) (2WD and 4WD) Fig. 4 and 5.



NOTE:

Cap the hose (6) ends to prevent dirt from getting inside.

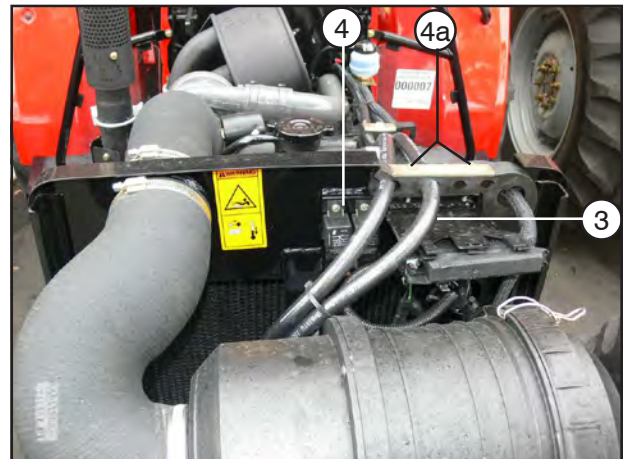


Fig. 3

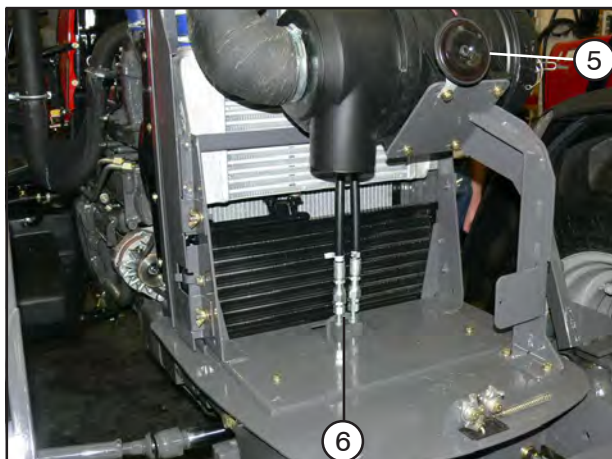


Fig. 4

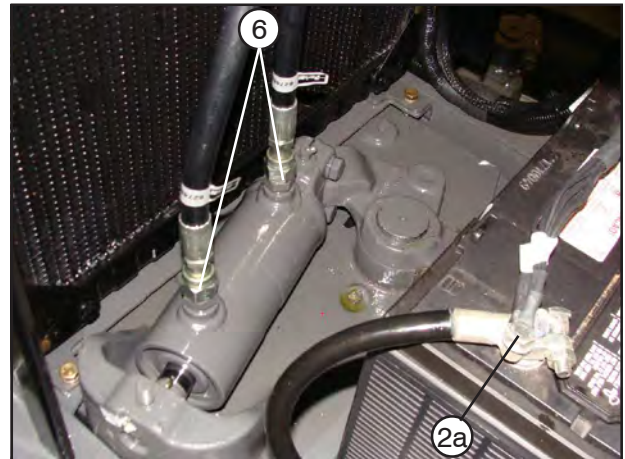


Fig. 5

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