MASSEY FERGUSON

MF 2700E

Series Tractors
Models: 2705E / 2706E

SERVICE MANUAL

FROM MASSEY FERGUSON

Workshop Service Manual

MASSEY FERGUSON

2705E
2706E

North America
4205 River Green Parkway, Duluth GA 30096 USA

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NA
English

MASSEY FERGUSON

CALIFORNIA
Proposition 65 Warning

WARNING: Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, or other reproductive harm.

WARNING: Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm. Wash hands after handling.

1. General

1.1 Introduction

1.1.1 The service manual

Read the table of contents and basic layout. Become familiar with all parts of this service manual. This service manual gives the technician very important information.

Machine movement when in normal use determines right-hand and left-hand.

This manual covers general safety practices for this machine.

The photos, illustrations, and data used in this manual were current at the time of printing. Inline production changes can make machines vary from the information in the service manual. The manufacturer reserves the right to redesign and change the machine as necessary without notification.

WARNING:
In some of the illustrations and photos used in this manual, shields or guards may have been removed for clarity. Never operate the machine with any shields or guards removed. If the removal of shields or guards is necessary to make a repair, they must be replaced before operation.

1.1.2 Replacement parts

To receive prompt efficient service, remember to have the following information:

Correct part description and part number
Model number of the machine
Serial number of the machine

1.1.3 Units of measurement

Measurements are given in metric units followed by the equivalent in US units. Hardware sizes are given in millimeters for metric hardware and inches for US hardware.

1.1.4 Serial number plate

The serial number plate (1) is located below the operator seat.

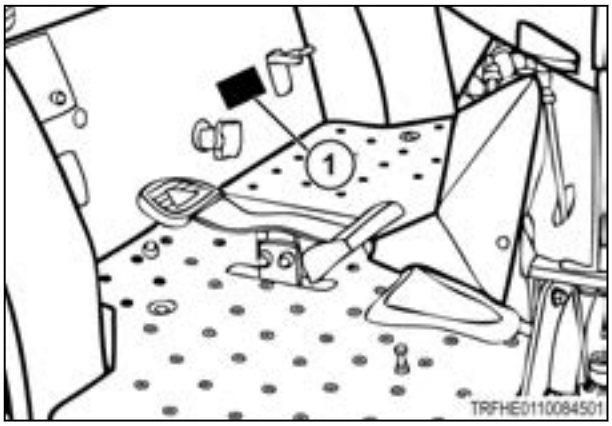


Fig. 1

The serial number plate contains the model number and serial number.

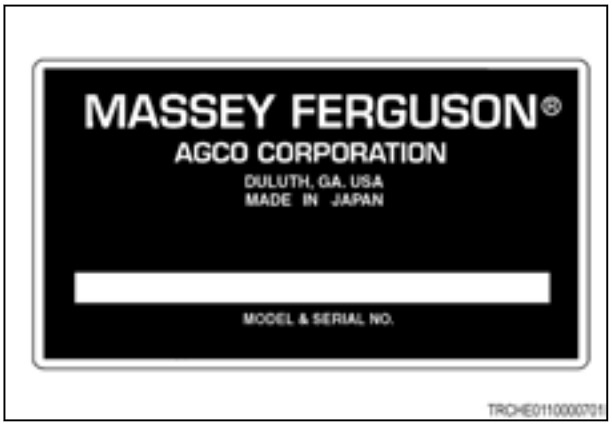


Fig. 2

1.1.5 Engine identification

The engine identification plate (1) is located on the left-hand side of the engine.

Fig. 3

The engine identification plate contains the engine model number (1), the engine serial number (2), and the month(s)/year(s) (3) the engine was assembled.

Engine model number:	
Engine serial number:	
Assembled month(s)/ year(s):	

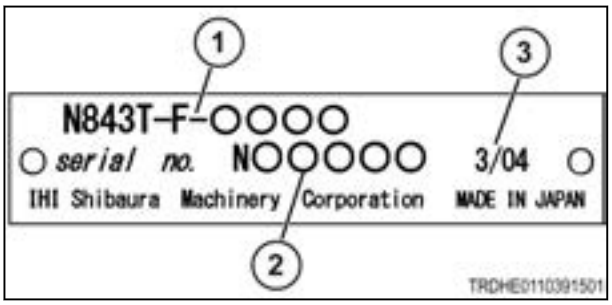


Fig. 4

1.1.6 Chassis number

The chassis number (1) is stamped in right-hand side of the front frame.

Chassis number:	

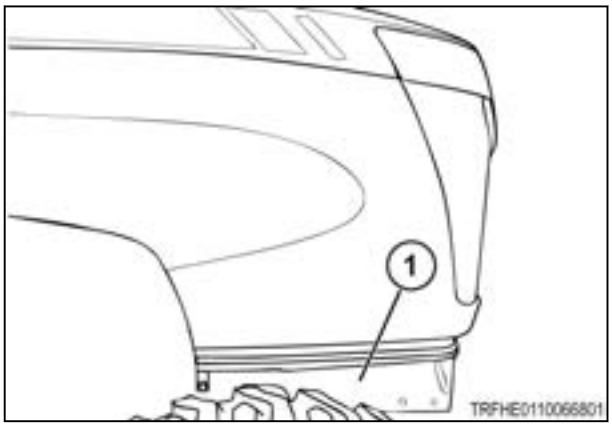


Fig. 5

1.2 Specifications

1.2.1 Engine specifications

	2705E mechanical	2705E hydrostatic	2706E mechanical	2706E hydrostatic
Type	Water-cooled, in-line overhead valve, turbocharged diesel			
Model	N4LDI-T		N4LDI-TA	
Make	IHI SHIBAURA Machinery Corporation			
Number of cylinders	4			
Combustion system	In-direct injection system			
Compression ratio	18.0			
Injection	Inline injection pump			
Bore	84 mm (3.31 in)			
Stroke	100 mm (3.94 in)			
Displacement	2216 cm^3 (135.23 in^3)			
Rated speed	2600 rpm			
Low idle speed	975 to 1025 rpm			
High idle speed	2705 to 2755 rpm			
Maximum torque at rpm	160 Nm (118 lbf ft) @ 1600 rpm	192 Nm 141.6 lbf ft) @ 1600 rpm	160 Nm (118 lbf ft) @ 1600 rpm	192 Nm 141.6 lbf ft) @ 1600 rpm
Engine horse power (estimated gross)	36.4 kW (48.8 hp) @ 2600 rpm		42.7 kW (57.3 hp) @ 2600 rpm	
PTO horse power (estimated)	30.9 kW (41.4 hp) @ 578 rpm	29.1 kW (39.0 hp) @ 578 rpm	36.3 kW (48.7 hp) @ 578 rpm	34.2 kW (45.9 hp) @ 578 rpm
Engine cooling	Water cooling			
Fan	430 mm (16.93 in)/ 8 blades			
Air cleaner	Dual stage, dry element			
Air intake	Engine cover grille			
Cold starting aid	Glow plug			
Firing order	1-3-4-2			
Valve clearance (cold) - intake and exhaust	0.2 mm (0.008 in)			

1.2.2 Electrical specifications

	2705E mechanical	2705E hydrostatic	2706E mechanical	2706E hydrostatic
System voltage	12 volt			
Grounding	Negative			
Battery cold cranking amperage @ 18° C (64° F)	680 cca			
Battery JIS type	115D31R			
Battery holder	Length: 305 mm (12 in) Width: 172 mm (6.8 in) Height: 200 mm (7.9 in)			
Alternator rating	90 ampere			
Starter rating	12 volt / 2.0 kW (2.7 hp)			

1.2.3 Power take-off specifications

	2705E mechanical	2705E hydrostatic	2706E mechanical	2706E hydrostatic
Type	Engine driven			
Control	PTO selector switch			
Clutch	PTO over-running clutch			
PTO shaft type	35 mm (1.38 in) diameter, 6 spline			
Output	Clockwise rotation			

1.2.4 Mechanical transmission specifications

	2705E mechanical	2706E mechanical
Primary transmission	Gear type	
Range transmission	2-speed range	
Gear speeds	8 gears (forward, reverse)	
Clutch	Single stage dry type	

1.2.5 Hydrostatic transmission specifications

	2705E hydrostatic	2706E hydrostatic
Primary transmission	HST, gear	
Range transmission	3-speed range	
Gear speeds		
Clutch	None	

1.2.6 Power take-off specifications

	2705E mechanical	2705E hydrostatic	2706E mechanical	2706E hydrostatic
Type	Engine driven			
Control	PTO selector switch			
Clutch	PTO over-running clutch			
PTO shaft type	35 mm (1.38 in) diameter, 6 spline			
Output	Clockwise rotation			

1.2.7 Hydraulic specifications

	2705E mechanical	2705E hydrostatic	2706E mechanical	2706E hydrostatic
Main hydraulic system				
Pump	Transmission mounted			
Maximum output	47.8 l/min (12.6 gal/min (US))			
Pressure	16.18 mPa (2346.8 psi)			
Steering system				
Type	Hydrostatic			
Pump	Transmission mounted			
Maximum output	26.5 l/min (7 gal/min (US)) @ 2600 rpm			
Pressure	Relief valve setting 11.77 mPa (1706.8 psi)			
Rear linkage				
Type	Three-point hitch			
Size	Category I and II			
Control	Operated by single position control lever			
Relief valve setting	15.7 mPa (2275.7 psi)			
Lift Capacity				
Measured at ball ends	1200 kg (2645 lb)			
Measured at 610 mm (24 in)	1100 kg (2425 lb)			

1.2.8 Fuel specifications

	2705E mechanical	2705E hydrostatic	2706E mechanical	2706E hydrostatic
Type	Ultra low Sulfur fuel only			
Above 4 °C (39 °F)	No. 2-D			
Below 4 °C (39 °F)	No. 1-D			

1.2.9 Operating slope angle

	2705E mechanical	2705E hydrostatic	2706E mechanical	2706E hydrostatic
Up/down	20 degrees			
Side to side	20 degrees			

1.2.10 Capacities

	2705E mechanical	2705E hydrostatic	2706E mechanical	2706E hydrostatic
Fuel tank	53.0 L (14 gal (US))			
Engine crankcase with filter	5.8 L (1.53 gal (US))			
Cooling system	6.3 L (1.66 gal (US))			
Reserve tank	1.0 L (0.26 gal (US))			
Hydraulic system	38.0 L (10.04 gal (US))			
Front drive axle	8.5 L (2.21 gal (US))			

1.2.11 Lubrication specifications

	2705E mechanical	2705E hydrostatic	2706E mechanical	2706E hydrostatic
Lubrication fitting	Massey Ferguson M-1105 or equivalent lithium base grease No. 2			
Engine oil	Massey Ferguson Multiguard® or equivalent in the correct SAE viscosity. Oil must meet or exceed requirements API service classification CJ-4 class			
Recommended Viscosity:				
Between -10 and 40 °C (5 to 104 °F)	SAE10W-30			
Between -20 to 40 °C (-4 to 104 °F)	SAE0W-30 / SAE5W-30			
0 °C (32 °F) and above	SAE15W-40 / SAE20W-40			
Engine coolant	50/50 mixture ethylene glycol and water			
Freezing protection (original factory fill)	-34 °C (-29 °F)			
Transmission and differential housing (including hydraulic system)	AGCO Permatran 821XL			
Front axle	AGCO Permatran 821XL			

1.2.12 Tire inflation pressures

Tire type	Tire location	Tire size	Pressure
Ag	Front	9.5-16-6	207 kPa (30 psi)
	Rear	13.6-28-6	152 kPa (22 psi)
Ag	Front	9.5-16-6	207 kPa (30 psi)

Tire type	Tire location	Tire size	Pressure
	Rear	16.9-24-6	124 kPa (18 psi)
Turf	Front	27x10.50-15-4	207 kPa (30 psi)
	Rear	44x18.00-20-4	138 kPa (20 psi)
R4	Front	10-16.5NHS-6	310 kPa (45 psi)
	Rear	17.5L-24-6	138 kPa (20 psi)

1.2.13 Maximum load capacity

	2705E mechanical	2705E hydrostatic	2706E mechanical	2706E hydrostatic
Front axle capacity	1000 kg (2205 lb)			
Rear axle capacity	1000 kg (2205 lb)			
Total capacity	2000 kg (4409 lb)			

1.3 General dimensions

1.3.1 Dimensions

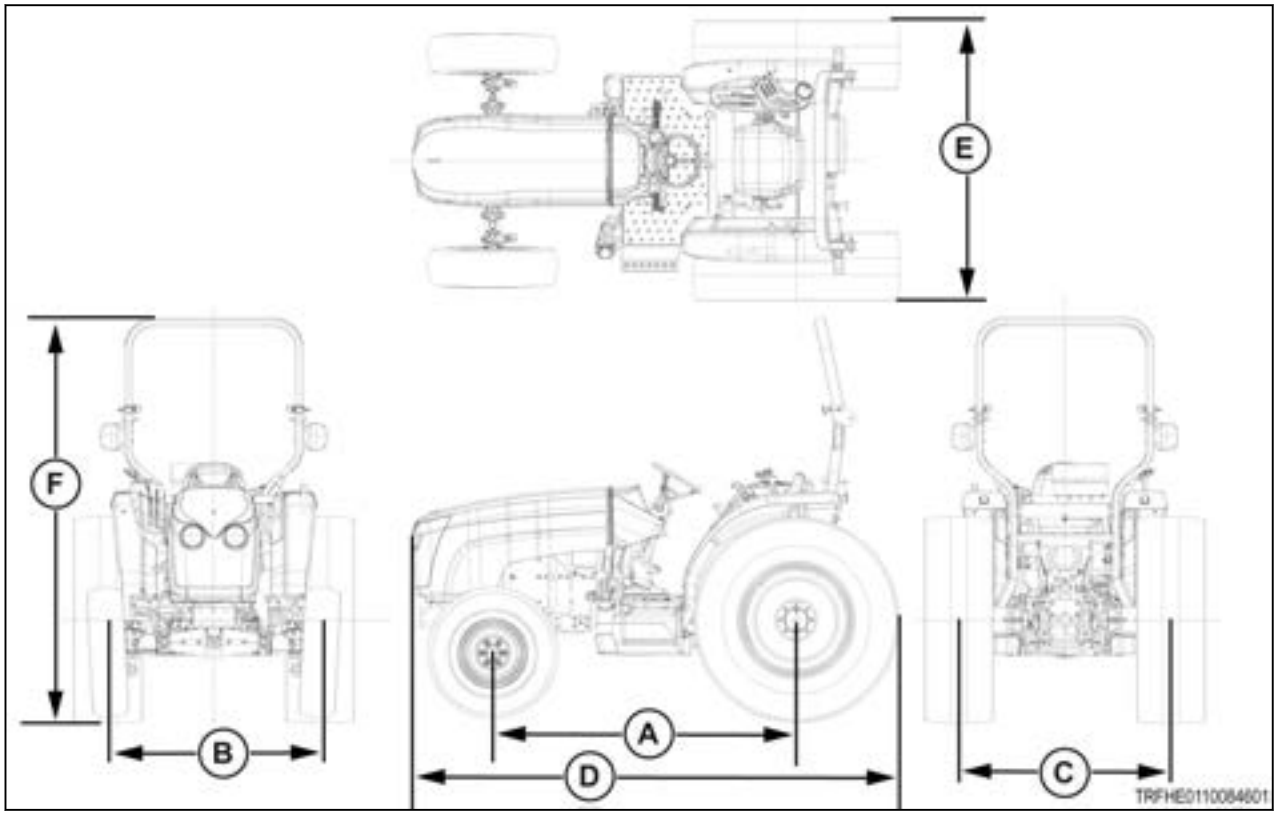


Fig. 6

		2705E	2706E
Tire		**R1-2**	
Front		**9.5-16**	
Rear		**16.9-24**	
A	Wheelbase	1980 mm (77.95 in)	
B	Front wheel tread	1340 mm (52.76 in)	
C	Rear wheel tread	1440 mm (56.69 in)	
D	Length	3370 mm (132.68 in)	
E	Width	1890 mm (74.41 in)	
F	Height	2645 mm (104.13 in)	
Turning radius (with brake)		2.5 m (98.42 in)	
Turning radius (without brake)		2.9 m (114.17 in)	
Ground clearance		380 mm (14.96 in)	
Weight			
Mechanical transmission		1740 kg (lb)	
Hydrostatic transmission		1760 kg (lb)	

1.3.2 Major components

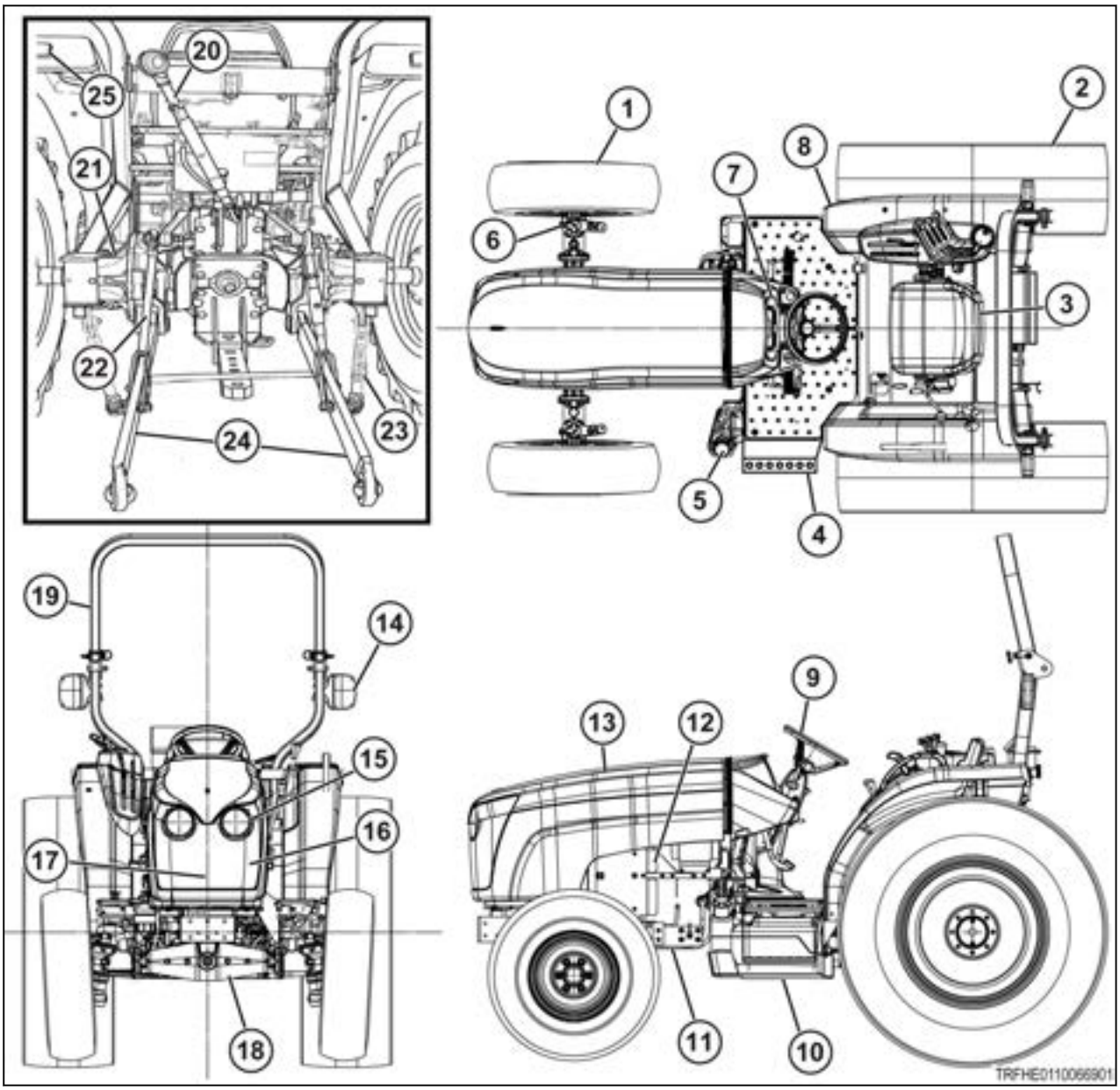


Fig. 7

(1) Front wheel
(2) Rear wheel
(3) Operator's seat
(4) Foot step
(5) Fuel tank filler
(6) Steering cylinder
(7) Instrument panel
(8) Fender
(9) Steering wheel
(10) Transmission
(11) Front wheel drive shaft
(12) Engine
(13) Engine cover
(14) Turn/hazard lamp
(15) Head lamp
(16) Front grill
(17) Battery
(18) Front axle
(19) Roll over protective structure (ROPS)
(20) Lift arm
(21) Rear axle
(22) Lift rod
(23) Stabilizer
(24) Lower links
(25) Reflector

1.4 Lubrication / fill points

1.4.1 Lubrication and maintenance chart

Daily	50 hours	150 hours	300 hours	Other	
X					Check the filter bowl for deposits of sediment or water. Clean as necessary.
X					Inspect and repair all the controls and switches.
X					Inspect and tighten all the fasteners and hardware.
X					Inspect and repair the hoses, belts and wiring.
X					Check and fill the transmission oil level.
X					Check and clean debris from the air cleaner.
X					Check and fill the radiator coolant level.
X					Check and adjust belt tension.
X					Check and fill the fuel tank level.
X					Inspect and clean the fuel filter sediment bowl.
X					Check and repair the lamps and flashers.
X					Check and adjust the clutch pedal free play.
X					Check and adjust the brake adjustment and balance.
X					Check, adjust, or replace the tire condition and pressure.
X					Check and adjust the wheel bolt torque.
X					Check and adjust the steering free play.
X					Check and fill engine oil level.
					Lubricate lubrication fittings.
	X			Then every 200 hours	Change and replace engine oil and filter.
	X			Then every 400 hours	Change and replace mechanical transmission oil and filter.
	X			Then every 200 hours	Change and replace hydrostatic transmission oil and filter.
		X			Check and fill front axle oil level.
				600 hours	Change and replace front axle oil.

Daily	50 hours	150 hours	300 hours	Other	
				2 years	Drain, flush, and replace radiator coolant.
				Yearly	Inspect, clean and replace air cleaner elements.
				400 hours	Replace the fuel filter and bleed the fuel system.
	X				Check, clean, and tighten the battery cables.
	X				Check the battery charge indicator.
			X		Check and adjust the front wheel alignment.
			X		Check and adjust the front axle end-float.
		X		Yearly	Inspect and replace the clutch housing plug.

1.4.2 Lubrication fill and drain locations - mechanical

- Lubrication fittings
- Fill location
- Drain location
- Level location
- Coolant fill location
- Coolant drain location

Ref	Description	Type
1	Crankcase	Engine oil
2	Radiator	Coolant
3	Radiator overflow reservoir	Coolant
4	Fuel tank	Diesel fuel
5	Rear housing	Hydraulic oil
6	Front axle	Hydraulic oil
7	Four-wheel drive axle pivots	Grease
8	Tie rod ends	Grease
9	Clutch shaft	Grease
10	Brake pivots	Grease

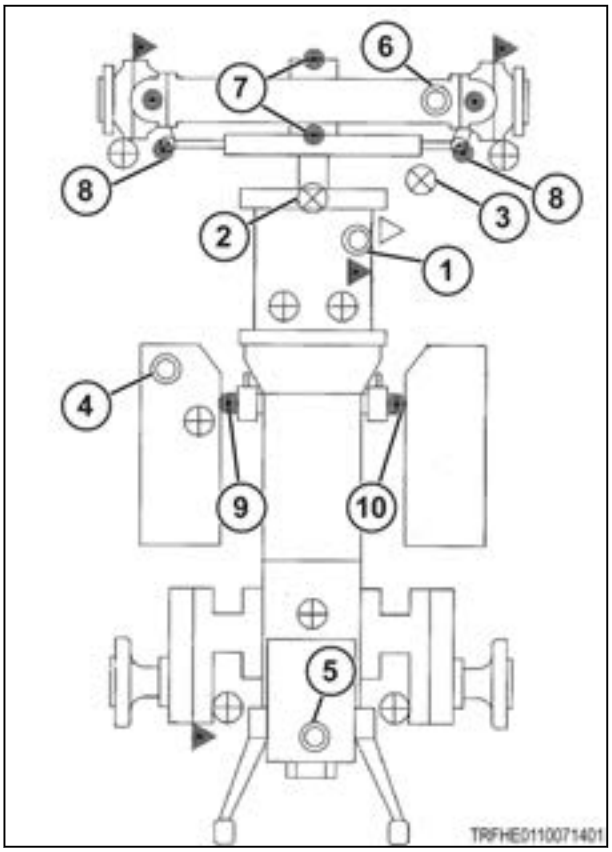


Fig. 8

1.4.3 Lubrication fill and drain locations - hydrostatic

- ● Lubrication fittings
- ◎ Fill location
- ⊕ Drain location
- ▲ Level location
- ⊗ Coolant fill location
- △ Coolant drain location

Ref	Description	Type
1	Crankcase	Engine oil
2	Radiator	Coolant
3	Radiator overflow reservoir	Coolant
4	Fuel tank	Diesel fuel
5	Rear housing	Hydraulic oil
6	Front axle	Hydraulic oil
7	Four-wheel drive axle pivots	Grease
8	Tie rod ends	Grease
9	Hydrostatic pedal	Grease
10	Brake pivots	Grease

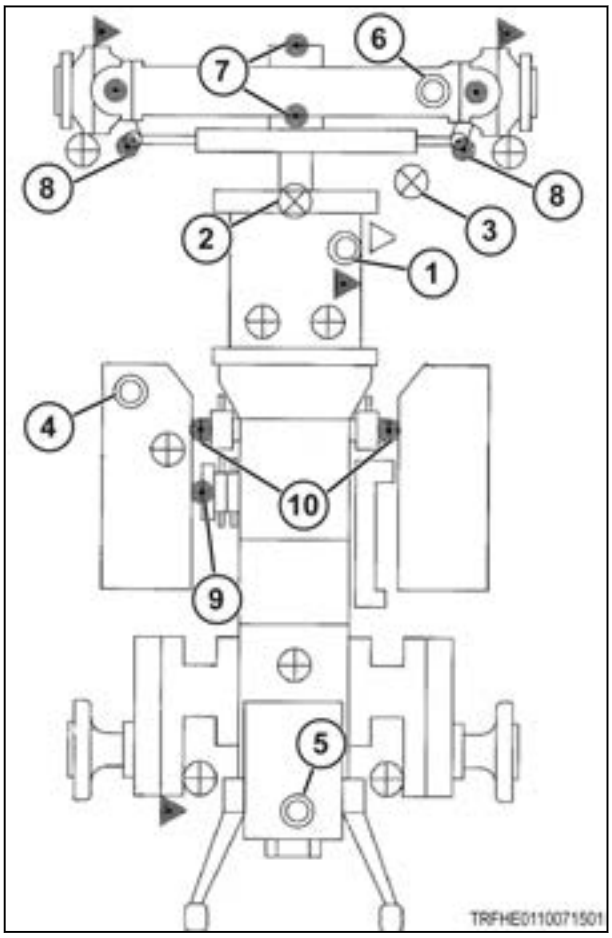


Fig. 9

1.5 General precautions for disassembly and installation

1.5.1 Precautions for disassembling and installing

Before operation

Always be safety conscious in selecting clothes to wear and correct tools to use.

Before disassembly, make sure to become familiar with the assembled condition to assist in assembly.

Keep parts, and tools in the correct order during operations.

When assembling disassembled parts, discard used gasket, O-rings, or oil seals and install new ones.

When lifting, tip only the front, or rear part of the tractor, make sure to wedge the grounded wheels.

When the tractor is jacked up, make sure to support the full tractor with a stand. Do not raise the tractor with only a jack, this is a dangerous and not stable procedure.

1.5.2 Precautions when installing according to standard parts

Bearings

Use an installer when installing a bearing in a housing by the outer race. The installer is specially used to push on only the outer race and vice versa.

The installer must is used to install the bearing on the shaft in a parallel position.

When installing a bearing which looks the same on both sides, install the face with the identification number visible. Install all bearings in the transmission housing with their identification number pointing outward.

Push a bearing fully until seated, when installed in a shaft or a hole with an inner seat.

Bearings must turn smoothly.

Oil seals

A oil seal installer must not deform the oil seals.

During installation, be careful not to damage the lips. Make sure to push the bearing in parallel to the shaft or hole.

Installed oil seals must have no turnover of the lips and no dislocation of the springs.

When installing a multiple lip, fill the grooves between the lips with grease.

Use a lithium-based grease.

There must not be any oil, or water leaks around the new seals.

O-rings

Coat O-rings with grease before installing.

Installed O-rings must not have any tension or twist.

Installed O-rings must keep correct tightness.

Retainer rings

Retainer ring installers must not permanently deform the retainer rings (1).

Install the retainer rings correctly in the groove.

Be careful not to overload the retainer ring to the point that the retainer ring is permanently damaged.

Install a retainer ring as shown in the figure, with its round edge turned toward the retained part. Pressing the retainer ring out will round the edge.

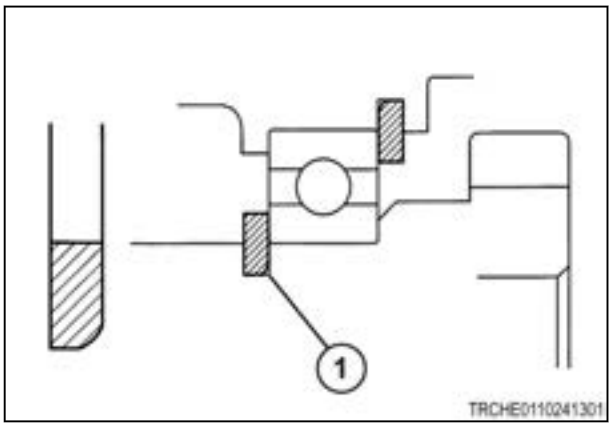


Fig. 10

Spring (roll) pin

Spring pins must install tightly.

Install the retainer rings with the seams pointing in the direction of the applied load.

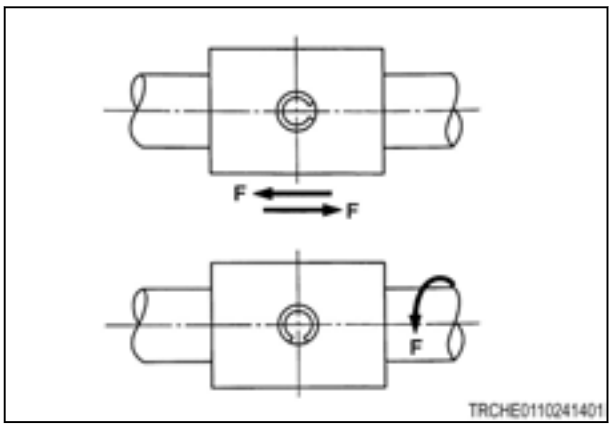


Fig. 11

Cotter pins

Correctly bend the cotter pins at the ends as shown in the figure when installing.

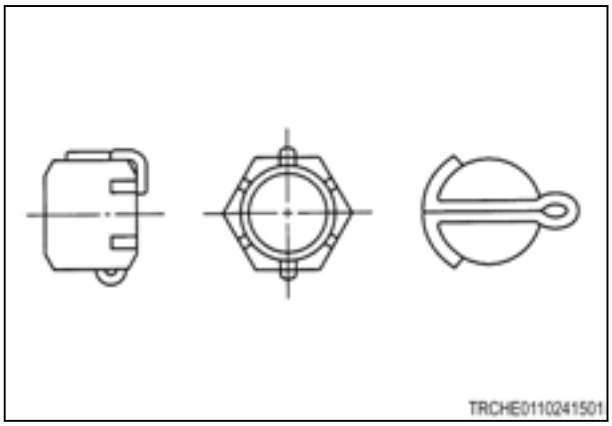


Fig. 12

Bolts and Nuts

Special bolts are installed at some locations, so make sure not to interchange the special bolts with the other bolts.

Use a torque wrench to tighten the bolts and nuts to their specified torque .

When locking the bolts or nuts with wire, take note in the winding direction to hold the bolt tight.

When locking the bolts or nuts with a extension lock washer, bend the extension against the hexadecimal. This will give secure locking.

When locking bolts and nuts with an adhesive apply the adhesive on the thread and tighten correctly.

Apply a sealant to components which have any risk of oil leaks, such as stud bolts and treaded holes.

Tighten each lock nut tight.

See the tightening torque table in introduction section when tightening the bolts and nuts.

Grease fittings

After installation, fill each grease fitting with grease.

When installing 45° or 90° grease fittings, make sure to turn the fitting. Turn the fitting in a direction that will let easy access for a grease gun.

Other precautions

Make sure not to damage any finished surfaces or parts.

Always refrain from forcing installation.

Install each lever knob coated with an adhesive.

Coat each contact surface with an adhesive and tighten equally with bolts. Install adhesive coated surfaces within 30 minutes after application of the adhesive.

The contact surface must be flawless and free from unwanted material. Remove all grease before application of the adhesive.

Precautions for applying adhesives:

- The surface or the thread where an adhesive is applied, must be fully free of chips.
- The surface of the thread where an adhesive is applied must be fully free of oil.

1.6 Tightening torque chart

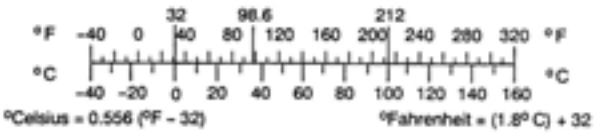
Main components	Parts to be tightened	Tightening torque		Size	Quantity
		Nm	lbf ft		
Cylinder head	Cylinder head	83.4 to 88.3	61.5 to 65.1	M11 X 1.5	18
	Cylinder head cover	9.8 to 19.6	7.2 to 14.5	M8 X 1.25	3
	rocker shaft	13.7 to 23.5	10.1 to 17.3	M8 X 1.25	4
	Injection nozzle	13.7 to 23.5	10.1 to 17.3	M8 X 1.25	4
	Fuel pipe	9.81 to 14.7	7.2 to 10.8	M8 X 1.25	4
	Glow plug	14.7 to 19.6	10.8 to 14.5	M10 X 1.25	4
	Glow plug connector	0.98 to 1.47	0.7 to 1.1	M4 X 0.7	4
	Hanger	13.7 to 23.5	10.1 to 17.3	M8 X 1.25	4
Cylinder block	Bearing cap	137.3 to 156.9	101.3 to 115.7	M14 X 1.5	10
	Front plate	13.7 to 23.5	10.1 to 17.3	M8	4
	Thrust plate	5.85 to 9.85	4.3 to 7.3	M6 X 1.0	2
	Rear plate	74.5 to 90.1	55.0 to 66.5	M12 X 1.5	8
	Oil pan	13.7 to 23.5	10.1 to 17.3	M8 X 1.25	24
	Strainer clamp	13.7 to 23.5	10.1 to 17.3	M8 X 1.25	1
	Injection pump cover	5.85 to 9.85	4.3 to 7.3	M6 X 1.0	4
Crankshaft	Connecting rod cap	34.3 to 44.1	25.3 to 32.5	M9 X 1.0	8
	Flywheel	127.3 to 146.9	93.9 to 108.3	M14 X 1.5	8
	Crankshaft pulley	166.7 to 203.9	123.0 to 150.4	M16 X 1.5	1
	Gear case	13.7 to 23.5	10.1 to 17.3	M8 X 1.25	16
	Plug	7.9 to 17.7	5.8 to 13.0	M8	1
	Oil pump	5.8 to 9.8	4.3 to 7.2	M6 X 1.0	3
	Relief valve	14.7 to 24.5	10.8 to 18.1	M8 X 1.5	1
	Adaptation unit	19.6 to 29.4	14.5 to 21.7	M16 X 1.5	1
Injection pump	Injection pump	13.7 to 23.5	10.1 to 17.3	M8 X 1.25	6
	Connector	19.6 to 24.5	14.5 to 18.1	M12 X 1.5	1
	Injection pipe	14.7 to 24.5	10.8 to 18.07	M12 X 1.5	8
	Delivery valve holder	39.2 to 44.1	28.9 to 32.5	M18 X 1.5	4
	Governor weight bracket	5.85 to 9.85	4.3 to 7.3	M6 X1.0	3
Others	Water pump	13.7 to 23.5	10.1 to 17.3	M8 X 1.25	4
	Thermostat housing	13.7 to 23.5	10.1 to 17.3	M8 X 1.25	2

Main components	Parts to be tightened	Tightening torque		Size	Quantity
		Nm	lbf ft		
	Water outlet pipe	13.7 to 23.5	10.1 to 17.3	M8 X 1.25	2
	Intake manifold	13.7 to 23.5	10.1 to 17.3	M8 X 1.25	8
	Exhaust manifold	13.7 to 23.5	10.1 to 17.3	M8 X 1.25	8
	Cooling fan	5.85 to 9.85	4.3 to 7.3	M6 X 1.0	4
	Starter motor	74.5 to 90.1	55.0 to 66.5	M12 X 1.25	2
	Generator fulcrum	34.3 to 46.1	25.3 to 34.0	M10 X 1.25	1
	Generator adjusting plate	13.7 to 23.5	10.1 to 17.3	M8 X 1.25	1
	Solenoid	5.85 to 9.85	4.3 to 7.3	M6 X 1.0	2
Standard bolts and nuts torques		5.89 to 9.87	4.3 to 7.3	M6 X 1.0	
		13.7 to 23.5	10.1 to 17.3	M8 X 1.25	
		34.3 to 46.1	25.3 to 34.0	M10 X 1.25	
		74.6 to 91.2	55.0 to 67.3	M12 X 1.25	

1.7 Conversion table

	MULTIPLY:	BY:		To Get: MULTIPLY	BY:		To Get:
LINEAR	inches	x 25.4	=	millimeters (mm)	x 0.03937	=	inches
	feet	x 0.3048	=	meters (m)	x 3.281	=	feet
	yards	x 0.9144	=	meters (m)	x 1.0936	=	yards
	miles	x 1.6093	=	kilometers (km)	x 0.6214	=	miles
	inches	x 2.54	=	centimeters (cm)	x 0.3937	=	inches
	microinches	x 0.0254	=	micrometers (um)	x 39.37	=	microinches
AREA	inches²	x 645.16	=	millimeters² (mm²)	x 0.00155	=	inches²
	inches²	x 6.4516	=	centimeters² (cm²)	x 0.155	=	inches²
	feet²	x 0.0929	=	meters² (m²)	x 10.764	=	feet²
	yards²	x 0.8361	=	meters² (m²)	x 1.196	=	yards²
	acres	x 0.4047	=	hectometers² (hm²)	x 2.471	=	acres
			=	hectares (ha)			
VOLUME	inches³	x 16387	=	millimeters³ (mm³)	x 0.000061	=	inches³
	inches³	x 16.387	=	centimeters³ (cm³)	x 0.06102	=	inches³
	inches³	x 0.01639	=	liters	x 61.024	=	inches³
	quarts	x 0.94635	=	liters	x 1.0567	=	quarts
	gallons	x 3.7854	=	liters	x 0.2642	=	gallons
	feet³	x 28.317	=	liters	x 0.03531	=	feet³
	feet³	x 0.02832	=	meters³ (m³)	x 35.315	=	feet³
	fluid oz.	x 29.57	=	milliliters (ml)	x 0.03381	=	fluid oz.
	yards³	x 0.7646	=	meters³ (m³)	x 1.3080	=	yards³
	teaspoons	x 4.929	=	milliliters (ml)	x 0.2029	=	teaspoons
	cups	x 0.2366	=	liters	x 4.227	=	cups
	bushel	x 35.239	=	liters	x 0.02838	=	bushels
	bushel	x 0.03524	=	meters³ (m³)	x 28.378	=	bushels
MASS	ounces (av)	x 28.35	=	grams (g)	x 0.03527	=	ounces (av)
	pounds (av)	x 0.4536	=	kilograms (kg)	x 2.2046	=	pounds (av)
	tons (2000 lbs)	x 907.18	=	kilograms (kg)	x 0.001102	=	tons (2000 lbs)
	tons (2000 lbs)	x .90718	=	metric tons(t)	x 1.1023	=	tons(2000 lbs)
	tons (long) (2240 lbs)	x 1016.05	=	kilograms (kg)	x .000984	=	tons (long) (2240 lbs)
FORCE	ounces - f (av)	x 0.278	=	newtons (N)	x 3.597	=	ounces - f (av)
	pounds - f (av)	x 4.488	=	newtons (N)	x 0.2248	=	pounds - f (av)
	kilograms - f	x 9.807	=	newtons (N)	x 0.10197	=	kilograms - f
PRESSURE OR STRESS	pounds/sq.in.	x 6.895	=	kilopascals (kPa)	x 0.145	=	pounds/sq. in.
	pounds/sq.in.	x 0.0689	=	bar	x 14.503	=	pounds/sq. in.
POWER	horsepower	x 0.746	=	kilowatts (kW)	x 1.34	=	horsepower
	ft-lbf/min.	x 0.0226	=	watts (W)	x 44.25	=	ft - lbf/min.
TORQUE	pound - inches	x 0.11298	=	newton-meters (N.m)	x 8.851	=	pound-inches
	pound - feet	x 1.3558	=	newton-meters (N.m)	x 0.7376	=	pound-feet
VELOCITY	miles/hour	x 1.6093	=	kilometers/hour (km/h)	x 0.6214	=	miles/hour
	feet/sec.	x 0.3048	=	meters/sec. (m/s)	x 3.281	=	feet/sec.
	kilometers/hr.	x 0.27778	=	meters/sec. (m/s)	x 3.600	=	kilometers/hr.
	miles/hours	x 0.4470	=	meters/sec. (m/s)	x 2.237	=	miles/hour

TEMPERATURE



°Celsius = 0.556 (°F – 32)

°Fahrenheit = (1.8° C) + 32

MetConv.doc

CMCHE021003580

Fig. 13

1.8 Safety introduction

1.8.1 Safety alert symbol

The safety alert symbol means Attention! Become Alert! Your Safety Is Involved!

Look for the safety alert symbol both in this manual and on safety signs on this machine. The safety alert symbol will direct your attention to information that involves your safety and the safety of others.

Fig. 14

1.8.2 Safety messages

The words DANGER, WARNING or CAUTION are used with the safety alert symbol. Learn to recognize these safety alerts and follow the recommended precautions and safety practices.

DANGER:
Indicates an imminently hazardous situation that, if not avoided, will result in DEATH OR VERY SERIOUS INJURY.

WARNING:
Indicates a potentially hazardous situation that, if not avoided, could result in DEATH OR SERIOUS INJURY.

CAUTION:
Indicates a potentially hazardous situation that, if not avoided, may result in MINOR INJURY.

Fig. 15

1.8.3 Informational messages

The words important and note are not related to personal safety, but are used to give additional information and tips for operating or servicing this equipment.

IMPORTANT: *Identifies special instructions or procedures which, if not strictly observed, could result in damage to or destruction of the machine, process, or its surroundings*

NOTE: *Identifies points of particular interest for more efficient and convenient repair or operation.*

1.8.4 Safety signs

WARNING:
Do not remove or obscure safety signs. Replace any safety signs that are not readable or are missing. Replacement signs are available from your dealer in the event of loss or damage. The actual location of the safety signs is illustrated at the end of this section.

Keep signs clean by wiping off regularly. Use a mild soap and water solution if necessary.

If parts have been replaced or a used machine has been purchased, make sure all safety signs are present and in the correct location and can be read. Illustrations of safety sign locations are located at the rear of this section.

Replace any safety signs that can not be read, are damaged, or are missing. Clean the machine surface thoroughly with a mild soap and water solution before replacing signs. Replacement safety signs are available from your dealer.

1.9 Operation

1.9.1 Prepare for operation

Read and understand all operating instructions and precautions in this manual before operating or servicing the machine.

Make sure you know and understand the positions and operations of all controls. Make certain all controls are in neutral and the park brake is applied before starting the machine.

Make certain all people are well away from your area of work before starting and operating the machine. Check and learn all controls in an area clear of people and obstacles before starting your work. Be aware of the machine size and have enough space available to allow for operation. Never operate the machine at high speeds in crowded places.

Emphasize the importance of using correct procedures when working around and operating the machine. Do not let children or unqualified persons operate the machine. Keep others, especially children, away from your area of work. Do not permit others to ride on the machine.

Make sure the machine is in the proper operating condition as stated in the Operator Manual. Make sure the machine has the correct equipment required by local regulations.

1.9.2 Roll over protective structure

The roll over protective structure (ROPS) is effective in reducing injuries during overturns. Overturning a tractor without ROPS or with the ROPS folded down can result in serious injury or death. Operate with ROPS folded down only when conditions make this necessary. Return ROPS to upright, locked position as soon as conditions permit.

Do not weld, drill, or alter the ROPS.

If the tractor has been rolled over or the ROPS frame has been damaged in any manner, the ROPS must be replaced. Do not attempt to repair a damaged ROPS. If damage does occur, consult your dealer and replace all damaged parts.

Before using the tractor make sure the ROPS frame is not damaged and it is securely fastened to the tractor .

Do not attach chains, ropes, or cables to the ROPS for pulling purposes - damage to the ROPS and/or overturn of the tractor may result. Always pull from the tractor drawbar.

Observe all recommendations and instructions regarding the installation of covers or roofs which are used as sunshields only, and do not afford the operator protection from falling objects.

1.9.3 General information

When parking, park the machine on a solid level surface and lower any implements to the ground. Put all controls in neutral and apply the park brake. Stop the engine and take the key with you.

WARNING:
Do not leave the machine unattended with any implement or attachment in the raised position. Lower the implement or attachment fully before leaving the machine. A sudden loss of hydraulic pressure can cause the implement or attachment to drop without warning.

Make sure the machine is in the proper operating condition according to the Operator Manual.

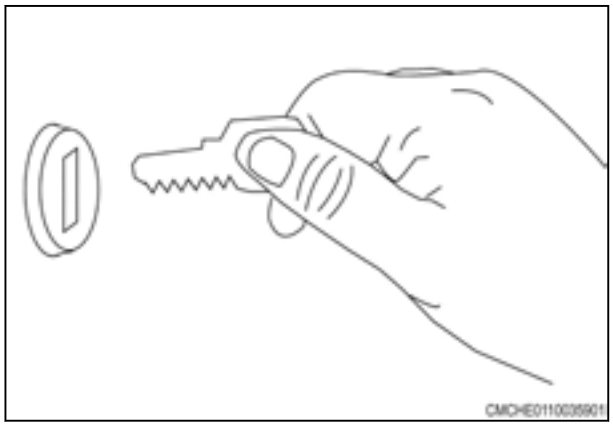


Fig. 16

Do not dismount from moving machinery.

Stay off slopes too steep for operation.

Be aware of the size of the machine and have enough space available to allow for operation.

Do not operate near the edge of banks. Setback distance from the bank must equal or exceed, the overall height of the bank.

Whenever possible, travel directly up or down slopes, keeping the heavy end of the tractor on the uphill side. If necessary to cross a steep slope, avoid turning uphill. Slow down and make a wide turn.

Do not operate on steep slopes as overturn may result.

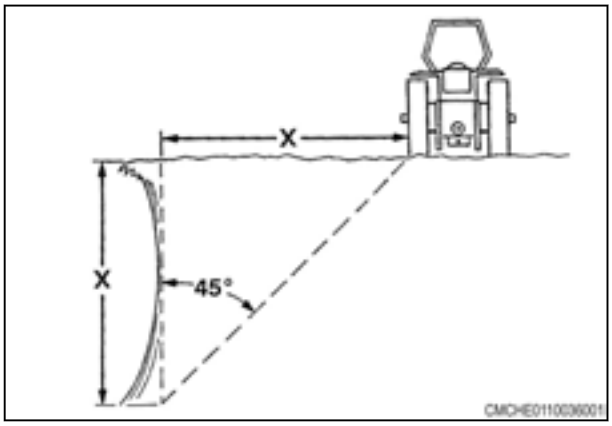


Fig. 17

On models with independent brake pedals, keep the brake pedals latched together at all times unless independent braking is required. Never use independent braking during transport.

Always drive at a proper speed relative to local conditions and ensure your speed is low enough for an emergency stop.

Reduce speed prior to turns to avoid the risk of overturning.

Keep speed to a minimum.

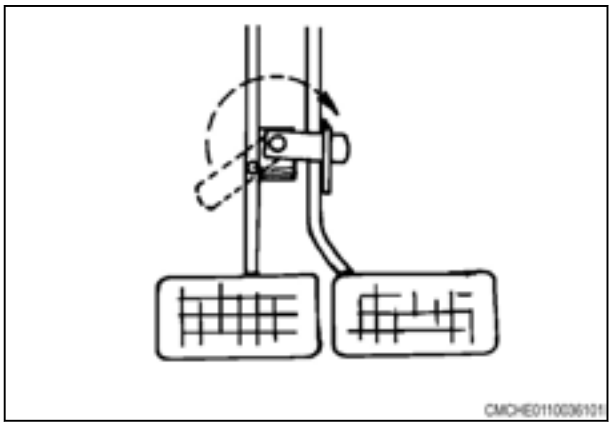


Fig. 18

Always keep the tractor in gear to provide engine braking when going downhill. Do not coast.

Avoid sudden or heavy brake applications when operating in wet, muddy, or icy ground conditions, or on loose surfaces, such as sand or gravel.

Sudden or heavy braking during turns increases the tendency to over steer. This effect is more pronounced with trailed equipment.

Keep a firm grip on the steering wheel at all times, with the thumbs clear of the spokes when driving the tractor.

Remain seated in operator's seat.

Fig. 19

In the event of an overturn, hold the steering wheel firmly and keep your seat belt fastened. Do not attempt to leave the seat until the tractor has come to rest.

Watch for holes, rocks, or other hidden hazards. Always inspect area prior to operation.

Be observant of the operating area and terrain.

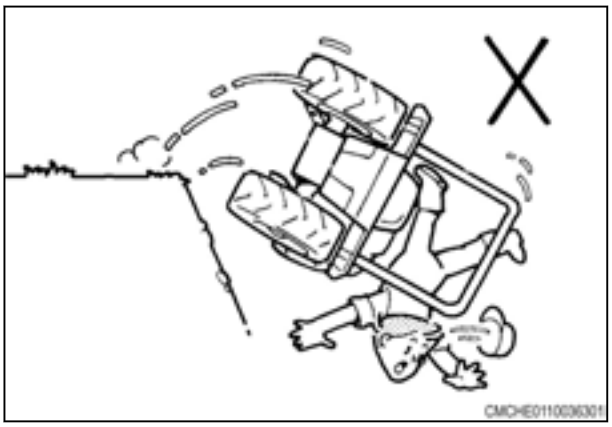


Fig. 20

Avoid contact with electrical power lines. Contact with electrical power lines can cause electrical shock, resulting in very serious injury or death.

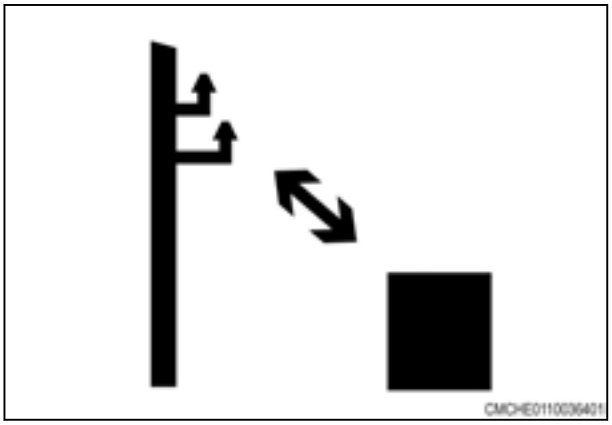


Fig. 21

Never allow anyone on any part of the tractor or attachments except in the operator's seat when the engine is running.

Do not get on or off the tractor or attachments while the tractor is moving.

Do not carry passengers.

Fig. 22

Always shut off the engine, shift the transmission to neutral, set park brake and remove the start key before leaving the operator's seat or before permitting anyone to inspect, clean, lubricate, adjust or repair any part of the tractor or attachments. Never leave the tractor unattended while the engine is operating.

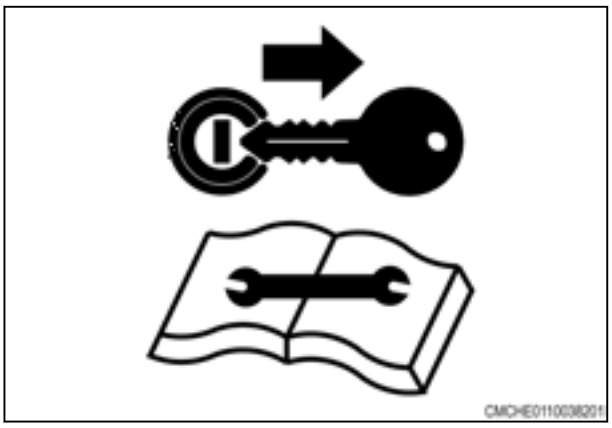


Fig. 23

Pull only from the approved drawbar.

Towing or attaching to other locations may cause the tractor to overturn.

Use a safety transport chain with towed implements. A safety transport chain connecting the tractor to the implement will help control pull-type equipment should it accidentally separate from the drawbar.

Always attach the safety transport chain to the tractor drawbar support.

Provide only enough slack in the safety transport chain to permit turning. See your dealer for a chain with strength rating equal to or greater than the gross weight of the towed machine.

For towed equipment without brakes, Do not tow equipment at speeds over 32 km/h (20 mph). Do not tow equipment that, when fully loaded, weighs more 1.5 times the weight of the towing unit.

For towed equipment with brakes, Do not tow equipment at speeds over 40 km/h (25 mph). Do not tow equipment that, when fully loaded, weighs more than 4.5 times the weight of the towing unit.

Stopping distance increases with speed and weight of towed loads, and on hills and slopes. Towed loads with or without brakes, that are too heavy for the tractor or are towed too fast, can cause loss of control. Consider the total weight of the equipment and load.

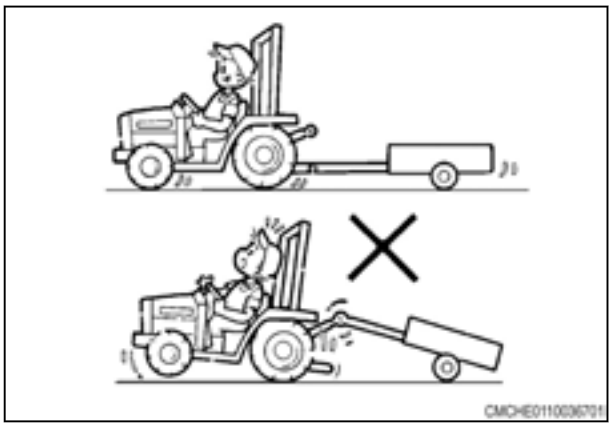


Fig. 24

When using a loader attachment, to avoid serious injury or death due to falling loads resulting from inadvertent raising or roll-back of the loader, do not connect loader hydraulics to any tractor auxiliary valve that has detents which cannot be locked out or removed, except for the float function in the loader lower circuit. If the tractor is equipped with such a valve, a dedicated, properly configured loader valve must be installed.

Make sure the proper attachment is on the loader so the load is restrained and cannot roll down the loader arms onto the operator.

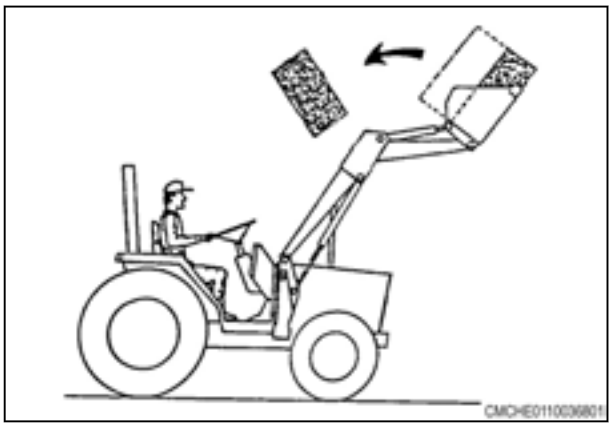


Fig. 25

1.9.4 Personal protective equipment

Wear all personal protective equipment (PPE) and protective clothing issued to you or called for by job conditions and country/local regulations. PPE includes, but is not limited to, equipment to protect eyes, lungs, ears, head, hands and feet when operating, servicing, or repairing equipment.

Always keep hands, feet, hair, and clothing away from moving parts. Do not wear loose clothing, jewelry, watches, or other items that could entangle in moving parts. Tie up long hair that can also entangle in moving parts.

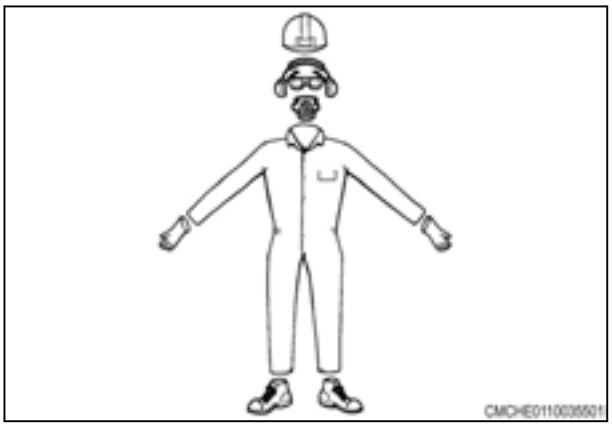


Fig. 26

1.9.5 Seat instruction

Securely fasten the seat belt before operating the machine. Always remain seated and have the seat belt fastened while operating the machine when the roll over protective structure (ROPS) is in the upright position. Replace the seat belts when they become worn or broken.

Never wear a seat belt loosely or with slack in the belt system. Never wear the seat belt in a twisted condition or pinched between the seat structural members.

Do not wear the seat belt when the ROPS is folded down.

Do not adjust the steering column or seat while driving.

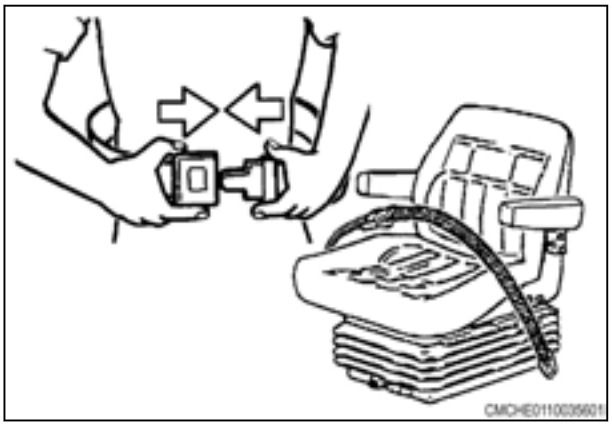


Fig. 27

1.9.6 Shield and guards

All shields and guards must be in the correct operating position and in good condition.

Do not open, remove, or reach around shields while the engine is operating. Entanglement in rotating belts and components can cause serious injury or death. Stay clear of rotating components.

Fig. 28

Do not operate the machine with the drive shaft shields open or removed. Entanglement in rotating drive shafts can cause serious injury or death. Stay clear of rotating components.

Make sure rotating guards turn freely.

Fig. 29

1.9.7 Power take-off safety

Keep all shields in place.

The rear power take-off (PTO) master shield (1) must be correctly installed at all times. The PTO shaft cover(s) must be installed when the PTO driveline is not in use.

Do not use PTO adapters. PTO shaft adapters, reducers and/or extensions extend the implement drive shaft coupler and universal joint beyond the protection of the PTO master shield.

Reduce PTO speed slowly. When stopping any PTO driven machine, idle the engine to reduce the PTO speeds before disengaging.

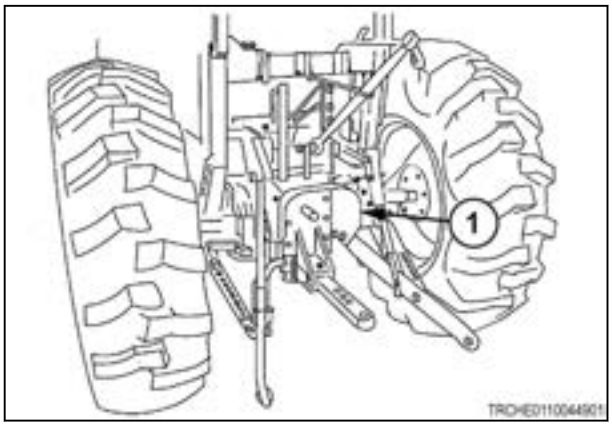


Fig. 30

The implement drive shaft coupler (1) must securely lock to, and be retained by the annular groove on the tractor PTO shaft.

Always disengage the PTO, park the tractor, shut off the engine and remove the key before:

- Connecting or disconnecting the implement drive shaft.
- Adjusting the PTO driveline or PTO driven machine.
- Cleaning, unplugging, or servicing the PTO driven machine.

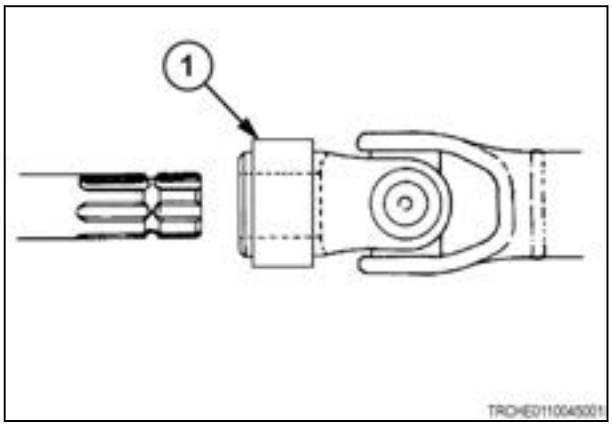


Fig. 31

1.9.8 Exhaust warning

Never operate the engine in a closed building unless the exhaust is vented outside.

Do not tamper with or modify the exhaust system with unapproved extensions.

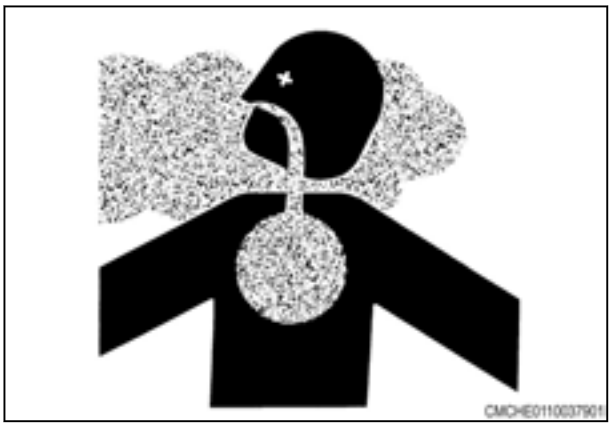


Fig. 32

1.9.9 Agricultural chemicals

Agricultural chemicals can be very hazardous. Improper use of fertilizer, fungicides, herbicides, insecticides and pesticides can injure people, plants, animals, soil and other people's property.

Always read and follow all manufacturers' instructions before opening any chemical container.

Even if you think you know the instructions, read and follow instructions each time you use a chemical.

Use the same precautions when adjusting, servicing, cleaning or storing the machine as used when installing chemicals into the hoppers or tanks.

Inform anyone who comes in contact with chemicals of the potential hazards involved and the safety precautions required.

Stand upwind and away from smoke from a chemical fire.

Store or dispose of all unused chemicals only in a manner as specified by the chemical manufacturer.

1.9.10 Travel on public roads

Make sure you understand the speed, brakes, steering, stability, and load characteristics of this machine before you travel on public roads.

Use good judgment when traveling on public roads. Maintain complete control of the machine at all times. Never coast down hills.

The maximum speed of farm equipment is governed by local regulations. Adjust travel speed to maintain control at all times.

Familiarize yourself with and obey all road regulations that apply to your machine. Consult your local law enforcement agency for local regulations regarding movement of farm equipment on public roads. Use head lamps, flashing warning lamps, tail lamps and turn signals, day and night, unless prohibited by local law.

Make sure all the flashers are operating prior to driving on the road. Make sure reflectors are correctly installed, in good condition, and wiped clean. Make sure the Slow Moving Vehicle (SMV)

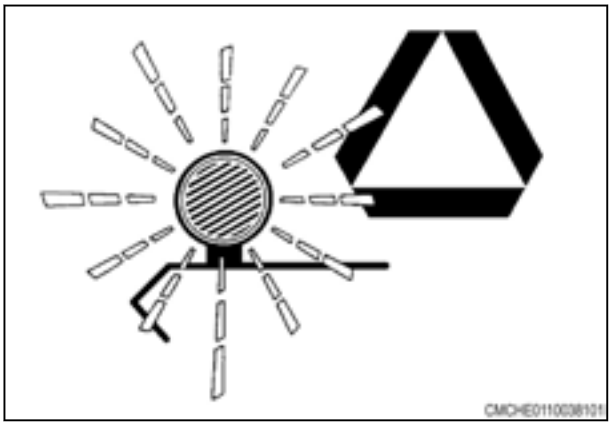


Fig. 33