Challenger®

MT945C / MT955C / MT965C / MT975C
Articulated Tractor

SERVICE MANUAL
79033097 E Rev.
Volume 1

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Volume 1

Volume 2

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Challenger®

MT945C / MT955C / MT965C / MT975C Articulated Tractor

SERVICE MANUAL

79033097 E Rev.

01 - Introduction

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Contents

INTRODUCTION

SERVICE MANUAL

This service manual has been prepared with the latest service information available at publication. Read and understand service manual carefully before doing any service on machine.

Right-hand and left-hand, as used in manual, are determined by facing direction machine travels when in use.

Photos, illustrations and data used were current at time of printing, due to possible production changes machine may vary slightly. Manufacturer reserves right to redesign and change machine as necessary without notification.

WARNING: Some pictures in manual show shields removed to allow a clearer view. Never operate machine with any shields removed.

Divisions and Page Numbers

Service manual is separated into divisions. Refer to Master Table of Contents.

Each division has an identifying part number with an alpha revision level indicator. Each division also has a Table of Contents, Safety section and Index.

Each page is identified with division part number and revision level. Pages are in numeric order within each division.

UNITS OF MEASUREMENT

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

REPLACEMENT PARTS

To receive prompt efficient service, always remember to have correct part number and description along with model and serial number of machine.

IMPORTANT SAFETY INFORMATION

FIG. 1: Most personal injuries occurring during product operation, maintenance or repair are caused by failure to observe basic safety rules and precautions. In most cases, an injury can be avoided by recognizing hazardous situations before an injury occurs.

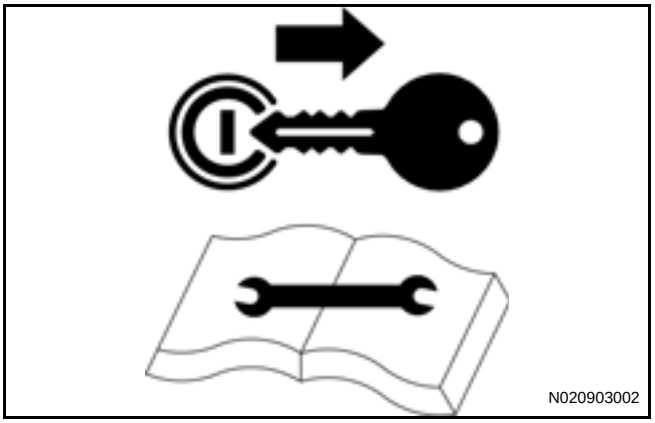


FIG. 1

Be alert to potential hazards and have necessary training, skills and tools to perform these functions properly.

Improper operation, lubrication, maintenance or repair of product can be hazardous and could result in injury or death.

Do not operate or perform any lubrication, maintenance or repair on machine, until reading and understanding operation, lubrication, maintenance and repair information.

Safety precautions and warnings are provided in manual and on machine. If hazard warnings are not heeded, bodily injury or death could occur to operator or bystanders.

Not every possible circumstance involving a potential hazard can be anticipated. Warnings in service manual and on machine are, therefore, not all inclusive. If a tool, procedure, work method or operating technique not specifically recommended by AGCO is used, ensure it is safe for operators and others.

Make sure machine will not be damaged or be made unsafe by operation, lubrication, maintenance or repair procedures chosen. Information, specifications and illustrations in publication are based on information available at time of publication.

Specifications, torques, pressures, measurements, adjustments, illustrations and other items can change at any time. Changes can affect service given to machine. Obtain complete and most current information before beginning any job. Dealers have most current information available.

WARNING: When replacement parts are required for this product, AGCO recommends using AGCO replacement parts or parts with equivalent specifications including, but not limited to, physical dimensions, type, strength and material. Failure to heed this warning can lead to premature failures, product damage, personal injury or death.

Safety Alert Symbol

FIG. 2: This is the safety alert symbol. It means ATTENTION! BECOME ALERT! SAFETY IS INVOLVED!

Look for it, both in this manual and on safety decals on machine. It directs attention to information involving operator safety and safety of others.

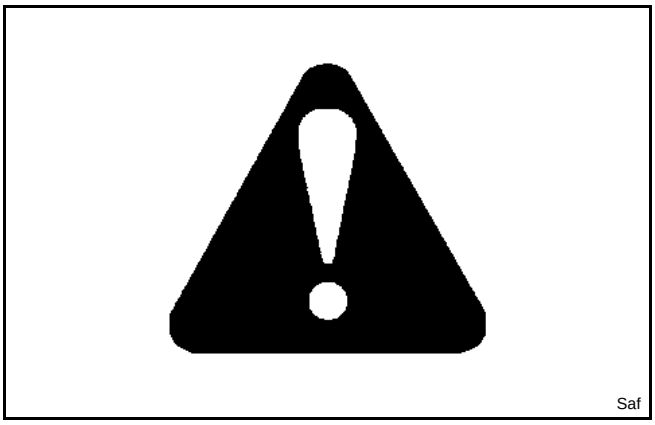


FIG. 2

Signal Words

FIG. 3: Words DANGER, WARNING or CAUTION are used with safety alert symbol. Learn to recognize safety alerts and follow recommended precautions and safe practices.

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

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

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

FIG. 3

Informational Messages

FIG. 4: Do not operate or perform any lubrication, maintenance or repair on machine until reading and understanding operation, lubrication, maintenance and repair information.

Read and understand this manual, operator's manual and attachment manuals before operation.

Learn how to operate machine and use controls properly.

Do not allow anyone to operate machine without instruction and training.

For operator's safety and safety of others, follow all safety precautions and instructions found in manuals and on decals affixed to machine and attachments.

Personal injury and death may result if precautions are not followed.

Words IMPORTANT and NOTE are not related to personal safety, but are used to give additional information and tips for operating or servicing equipment.

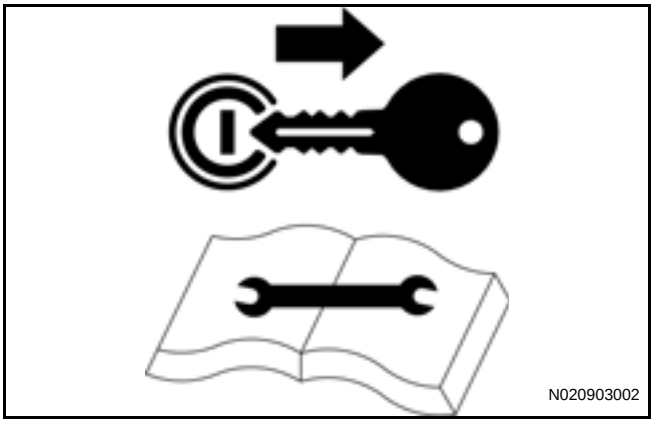


FIG. 4

IMPORTANT: Used to identify special instructions or procedures which, if not strictly observed, could result in damage to or destruction of machine, process or its surroundings.

NOTE: Used to indicate points of particular interest for more efficient and convenient repair or operation.

Right-hand and left-hand, as used in this manual, are determined by facing direction machine travels when in use.

General Hazard Information

FIG. 5: When engine is running and steering wheel is turned, machine will turn with transmission control lever in PARK (P) position.

IMPORTANT: Ensure all personnel are a safe distance from machine before turning steering wheel.

Do not start engine until area is free of personnel to avoid personal injury due to unexpected machine movement.

Unless instructed otherwise, perform maintenance under the following conditions:

- Machine is parked on level ground.
- Implements are lowered to ground.
- Transmission control lever is in PARK position.
- Engine is stopped.
- Engine start switch is turned off and switch key is removed.
- Machine has cooled down.
- Steering cylinder lock is in place.

WARNING: Do not start engine until area is free of personnel to avoid personal injury due to unexpected machine movement.

Know width of equipment to maintain proper clearance when operating machine near fences or boundary obstacles.

Wear a hard hat, protective glasses and other protective equipment, as required.

If wearing clothing that is too loose or not using correct safety equipment for job, injury can occur. Never wear clothing that will catch on objects. Extra safety equipment that can be required includes hard hat, safety shoes, ear protection, eye or face protection, heavy gloves and reflective clothing.

Make sure all protective guards and covers are secured in place.

Keep machine free of foreign material. Remove debris, oil, tools and other items from deck, walkways and steps.

Secure lunch boxes, tools and other loose items not a part of machine.

Know appropriate work site hand signals and personnel authorized to give hand signals. Accept hand signals from one person only.

FIG. 5

Hydraulic oil or diesel fuel leaking under pressure can penetrate skin and cause infection or other injury.

To prevent personal injury relieve all pressure before disconnecting fluid lines. Before applying pressure, make sure all connections are tight and components are in good condition. Do not use hand to check for suspected leaks under pressure. Use a piece of cardboard or wood for this purpose. If injured by leaking fluid, see a doctor immediately.

Never put maintenance fluids into glass containers, drain into a suitable container.

Discard any drained fluids and filter elements according to local regulations.

Use all cleaning solutions with care.

Report all necessary repairs.

Some components of machine are very heavy. Use suitable lifting equipment or additional help as instructed in Service Manual.

Do not allow unauthorized personnel on machine.

Do not smoke when servicing an air conditioner or when refrigerant gas may be present. Inhaling fumes released from a flame contacting air conditioner refrigerant can cause bodily harm or death.

Inhaling gas from air conditioner refrigerant through a lit cigarette can cause bodily harm or death.

FIG. 6: Be prepared for emergencies. Always carry one or more suitable fire extinguishers - ABC rating, dry chemical.

Keep a first aid kit handy for treatment of minor cuts and scratches.

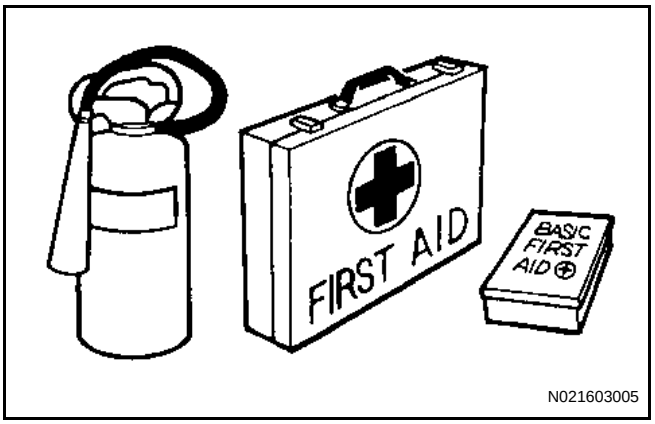


FIG. 6

Protective Clothing

FIG. 7: Wear hard hat, protective glasses and other protective equipment as required.

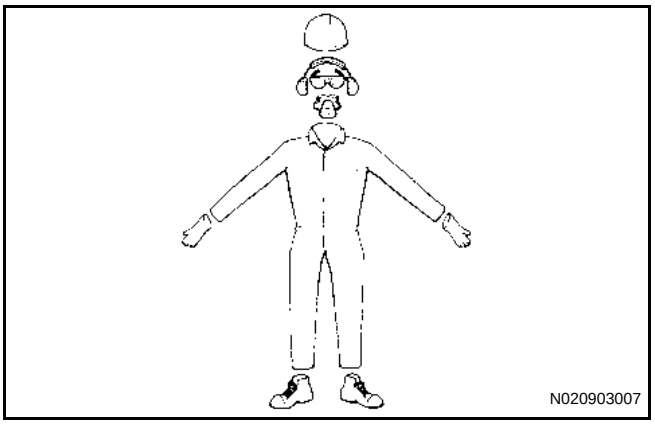


FIG. 7

Mounting and Dismounting

FIG. 8: Mount and dismount machine only where there are steps and/or handholds. Face machine whenever mounting or dismounting.

FIG. 8

Maintain three-point contact with steps and handrails. Three-point contact is two feet and one hand or one foot and two hands.

Never mount or dismount a moving machine and never jump off machine except in an emergency.

Do not get on or off machine while moving.

Do not carry tools or supplies when mounting or dismounting machine. Use a hand line to pull equipment onto platform.

Do not use any controls as handholds when entering or exiting operator compartment.

Crushing/Cutting Prevention

Stay clear of center articulation joint area of machine when engine is running. Connect articulation joint stop whenever servicing this area.

Support equipment properly when performing work under equipment. Do not depend on hydraulic cylinders to hold equipment.

WARNING: An implement can fall if a control lever is moved or if a hydraulic line breaks.

Never jump start machine by short circuiting across starter solenoid terminals. Always start machine from operator's seat.

Never attempt adjustments while machine is moving or engine is running.

When there are attachment control linkages, clearance in linkage area changes with movement of attachment.

Stay clear of all rotating and moving parts. Keep objects away from moving fan blades. Fan blades will throw and cut objects.

Wear gloves to handle wire cable and do not use kinked or frayed wire cable.

Retainer pins can fly when struck, ensure there are no personnel in area before striking. Wear protective glasses to protect eyes. When striking objects, chips or other debris may fly off. Ensure there will be no injury prior to striking any object.

Exhaust Dangers

FIG. 9: Diesel engine exhaust contains products of combustion, potentially harmful to health. Always run engine in a well-ventilated area. Never operate engine in a closed building unless exhaust is vented outside.

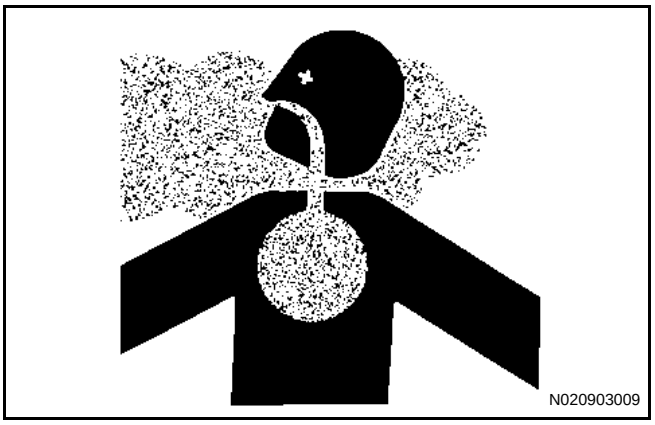


FIG. 9

Before Operation

Clear all personnel from machine and surrounding area. Make sure all obstacles are cleared from machine's path. Operator must be familiar with hazards (wires, ditches, fences, etc).

Be sure all windows are clean. Secure doors and windows in open or closed position.

Adjust rearview mirrors for best visibility close to machine. Make sure horn, backup alarm (if equipped) and all other warning devices are working properly.

Fasten seat belt securely, low around hips.

Parking

Park on a level surface. When parking on a grade, chock machine tires.

Move transmission control lever to PARK and lower all implements to ground. Move implement controls to HOLD position.

Before stopping engine, move throttle control lever to LOW IDLE position. Allow turbocharger to cool by running engine at low idle speed for five minutes.

Stop engine, turn engine start switch to OFF and remove engine start switch key.

Turn battery disconnect switch to OFF position.

Operation

Only operate machine from operator's seat. Seat belt must be fastened during machine operation. Only operate controls while engine is running.

Check for proper operation of all controls and protective devices while operating machine slowly in an open area.

Make sure area is free of personnel before moving machine.

Report any damage noted during operation of machine and make necessary repairs.

Hold attachments approximately 40 cm (15 inches) above ground level while driving machine. Do not drive machine near an overhang, edge of a cliff or excavation.

If machine begins to sideslip on a grade, immediately dispose of load and turn machine downhill.

Avoid any ground condition that could cause machine to tip.

A rollover can occur when working on hills, banks or slopes or when crossing ditches, ridges or other unexpected obstacles.

When possible, operate machine up and down slopes. Always avoid driving across slopes.

Keep machine under control and do not overload beyond capacity.

Make sure towing devices are adequate for application. Connect trailing equipment only to drawbar or hitch.

Never straddle or allow any personnel to straddle a wire cable.

When maneuvering to connect equipment, ensure no personnel are between machine and trailing equipment. Block up hitch of trailing equipment to align equipment with drawbar.

Know maximum dimensions of machine.

When operating on icy roads, reduce travel speed. If stability is noticeably reduced, reduce speed.

Select a gear that controls machine speed when descending a hill.

Downshift if braking is required to control machine speed. Never coast down a hill with transmission in NEUTRAL.

Do not allow passengers anywhere on machine except in approved passenger seat.

Operator Station

Any modifications to inside of cab should not project into operator space. Addition of a radio, fire extinguisher and other equipment must be installed so defined operator space is maintained.

Any item brought into cab should not project into defined operator space. A lunch box or other loose items must be secured. Objects must not pose an impact hazard in rough terrain or a rollover.

Engine Starting

FIG. 10: Only start engine from operator's seat. Never short across starter terminals or batteries.

Move all hydraulic controls to HOLD position and transmission control lever to PARK before starting engine.

WARNING: Machine will turn if steering wheel is moved and engine is starting or running.

Do not start engine until area is free of personnel. This aids in avoiding personal injury due to unexpected machine movement.

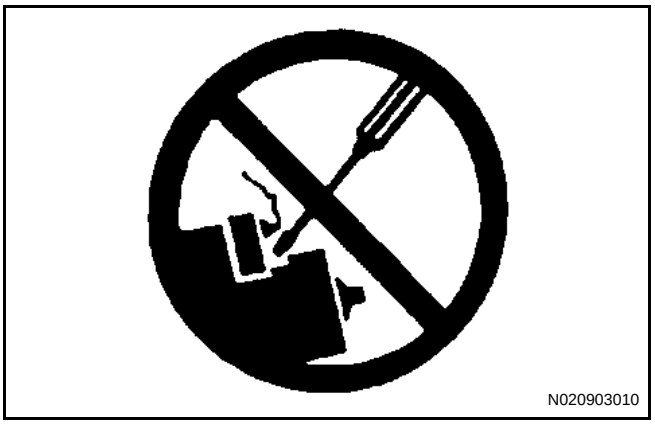


FIG. 10

Seat Belts

FIG. 11: Only operate machine from operator's seat with seat belt fastened. Only operate controls while engine is running.

Any rider in instructor's seat must fasten seat belt. Never allow anyone on any part of machine or its attachments except in operator's and instructor's seat when engine is running.

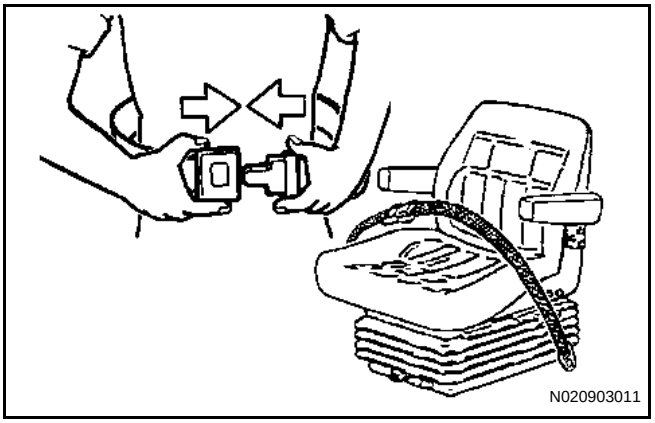


FIG. 11

Shield Removal

FIG. 12: Some photos in this manual may have been taken with shields removed for clarity.

WARNING: To provide a better view, certain photographs and illustrations in manual may show an assembly with shields removed. Do not operate machine unless all shields are in good condition and are in place. Replace shields immediately upon completion of inspection, repairs, cleaning or adjustments and before operating begins or resumes.

FIG. 12

Fluid Precautions

FIG. 13: Drain all fluids into suitable container and never put maintenance fluid into glass containers.

Discard drained fluids and fluid-saturated materials according to local regulations. Use all cleaning solution with care.

FIG. 13

FIG. 14: Do not smoke when serving an air conditioner. Inhaling gas from air conditioner refrigerant through a lit cigarette can cause bodily harm or death.

Keep machine free of foreign material (fuel, oil, some coolants, oily rags and debris).

Do not weld on lines or tanks containing flammable fluids.

Use caution when refueling machine and do not smoke. Always stop engine before refueling. Fill fuel tank outdoors.

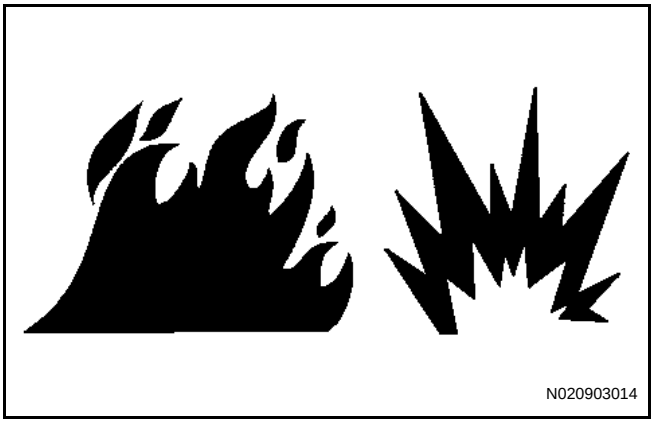


FIG. 14

Battery Disconnect

FIG. 15: Always shut off engine, shift transmission to park, remove ignition key and set battery disconnect switch to OFF before permitting inspection, cleaning, lubrication, adjustment or repair of any part of machine or attachments.

FIG. 15

Rollover Protective Structure (ROPS)

Do not make any modifications to ROPS as this affects protection. Do not alter structure by welding, cutting, adding weight or drilling holes into structure.

Any alteration, not specifically authorized by AGCO, invalidates AGCO certification for ROPS. Protection offered by ROPS is impaired if ROPS has structural damage. Damage to structure can be caused by a roll over or by falling objects.

Do not mount items (fire extinguishers, first aid kits, work lights, etc) by welding brackets to or drilling holes into ROPS. See dealer for mounting guidelines.

Burn Hazards

FIG. 16: Do not touch any part of an operating engine. Other components such as transmission, axles and oil reservoir may be hot. Allow engine to cool before any maintenance is performed. Relieve all pressure in air, oil, lubrication, fuel system or cooling system before any line, fittings or related items are disconnected.

FIG. 16

Coolant Precautions

FIG. 17: When engine is at operating temperature, engine coolant is hot and under pressure. Radiator and all lines to heaters or engine contain hot coolant.

Any contact with hot coolant or steam can cause severe burns. Allow cooling system components to cool before cooling system is drained.

Check coolant level only after engine has been stopped.

Cooling system conditioner contains alkali that can cause personal injury.

Do not allow alkali to contact skin, eyes or mouth. Do not remove radiator cap if engine is hot. Only remove cap when it is cool enough to touch with bare hands. Loosen cap slowly to first notch to relieve pressure, then remove cap.

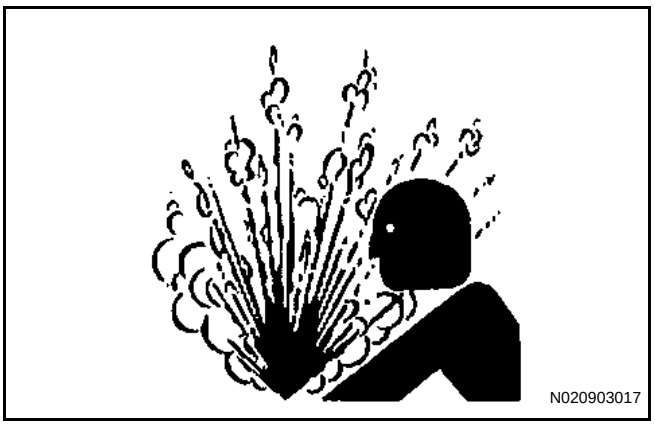


FIG. 17

Escaping Fluid Dangers

FIG. 18: Escaping fluid under high pressure can be almost invisible but can penetrate skin causing serious injury and possible death. A pinhole leak can cause severe injury.

Consult a doctor immediately if an injury from escaping fluids is sustained. Fluid injected into skin must be surgically removed within a few hours or gangrene may result.

Hot oil and hot components can cause personal injury.

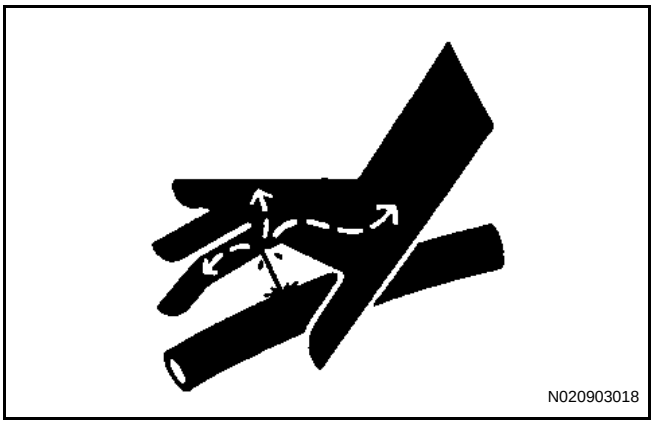


FIG. 18

FIG. 19: Use a piece of cardboard or wood to search for possible leaks, never use hands.

IMPORTANT: Ensure fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids. Dispose of all fluids according to local regulations and mandates.

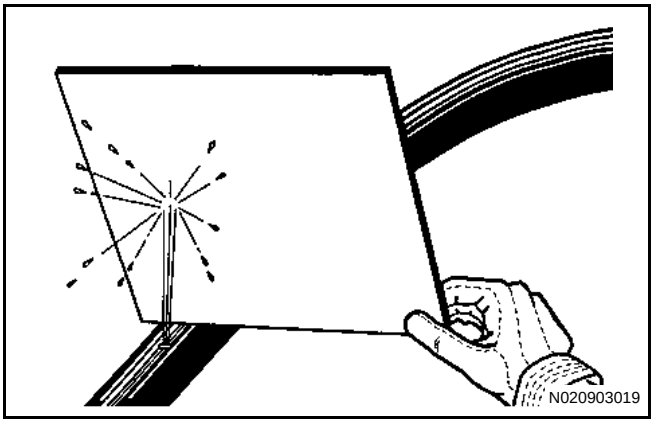


FIG. 19

Do not bend or strike any high-pressure line. Do not install bent or damaged lines.

Check lines, tubes and hoses carefully. Repair loose or damaged lines. Tighten all connections to recommended torque.

Replace parts if any of the following conditions are present:

End fittings are damaged or leaking.

Outer coverings are chafed or cut.

Wires are exposed.

Outer covering is ballooning.

Flexible parts of hoses are kinked.

Outer covers have embedded armoring.

End fittings are displaced.

Batteries

FIG. 20: Electrolyte is an acid and can cause personal injury. Do not allow electrolyte to contact skin or eyes. Always wear protective glasses when servicing batteries. Wash hands after touching batteries and connectors.

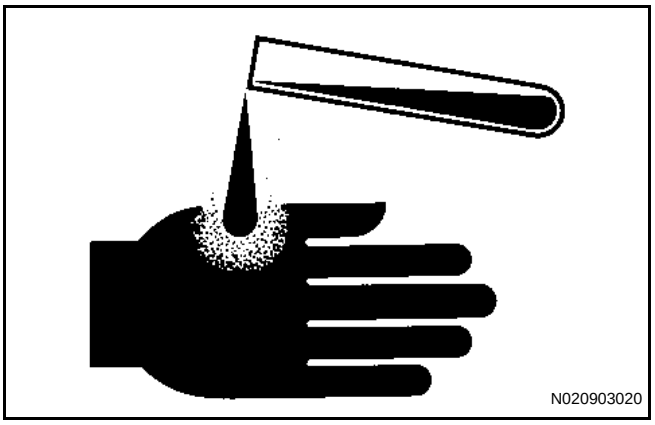


FIG. 20

FIG. 21: Battery gases can explode. Keep any open flames or sparks away from top of battery. Do not smoke in battery charging areas.

Never check battery charge by placing a metal object across terminal posts. Do not lay tools or other conductive materials on battery. Use a voltmeter or a hydrometer.

Improper jumper cable connections can cause an explosion resulting injury.

Be careful when connecting booster cables to batteries. Electrical component damage or battery explosion can result if booster cables are not installed correctly.

Do not charge a frozen battery as it may explode. Warm battery to 16 degrees C (60 degrees F).

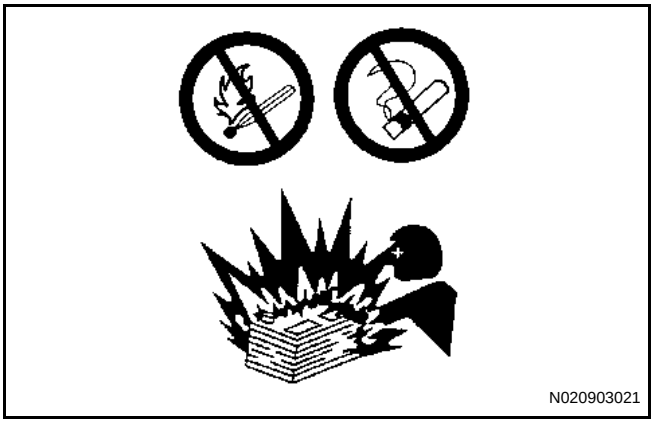


FIG. 21

Lights, Reflector and Signs

FIG. 22: Ensure all machine lights, reflectors and slow moving vehicle (SMV) are installed, in good condition and wiped clean.

Consult local law enforcement agency for local regulations regarding movement of equipment on public roads.

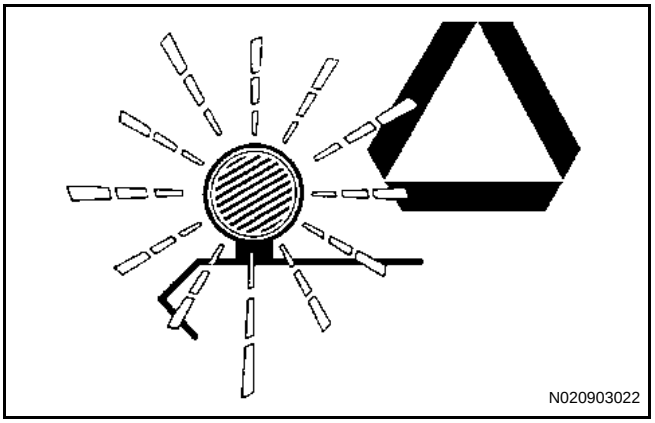


FIG. 22

Fire and Explosion Prevention

FIG. 23: All fuels, most lubricants and some coolant mixtures are flammable.

Flammable fluids leaking or spilled onto hot surfaces or electrical components can cause fire.

Fire may cause personal injury and property damage.

Remove all flammable materials such as fuel, oil and debris from machine.

Store fuels and lubricants in properly marked containers away from unauthorized persons. Store oily rags and any flammable materials in protective containers.

Do not smoke in areas used for storing flammable materials.

Do not operate machine near any flame.

Exhaust shields protect hot exhaust components from oil or fuel spray in case of a break in a line, hose or seal. Exhaust shields must be installed correctly.

Do not weld or flame cut on lines or tanks containing flammable fluids. Clean any such lines or tanks thoroughly with non-flammable solvent prior to welding or flame cutting.

Check all electrical wires daily. Repair any loose or frayed wires before operating machine. Clean and tighten all electrical connections.

Dust generated from repairing non-metallic hoods or fenders can be flammable and/or explosive. Repair such components in a well-ventilated area away from open flames or sparks.

Inspect all lines and hoses for wear or deterioration.

Hoses must be properly routed. Lines and hoses must have adequate support and secure clamps. Tighten all connections to recommended torque.

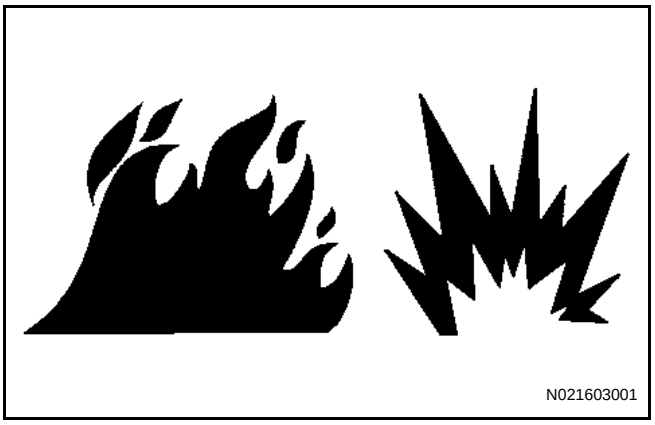


FIG. 23

FIG. 24: Use caution and do not smoke while refueling a machine. Do not refuel a machine near open flames or sparks and always stop engine before refueling. Always refuel outdoors.

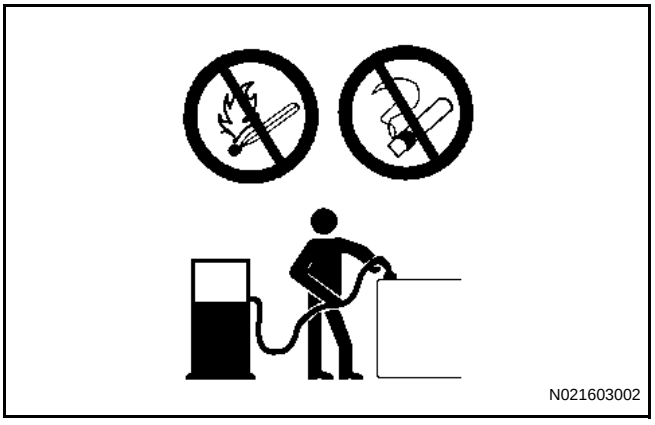


FIG. 24

Fire Extinguisher

FIG. 25: Ensure a fire extinguisher is available. Be familiar with operation of fire extinguisher. Inspect and service extinguisher regularly and obey instructions on instruction plate.

A mounting bracket can be installed on right front frame rail. Bracket is designed to hold a 4.5 kg (10 lb) extinguisher.

Ensure all clamps, guards and shields are installed correctly to prevent vibration, rubbing against other parts and excessive heat.

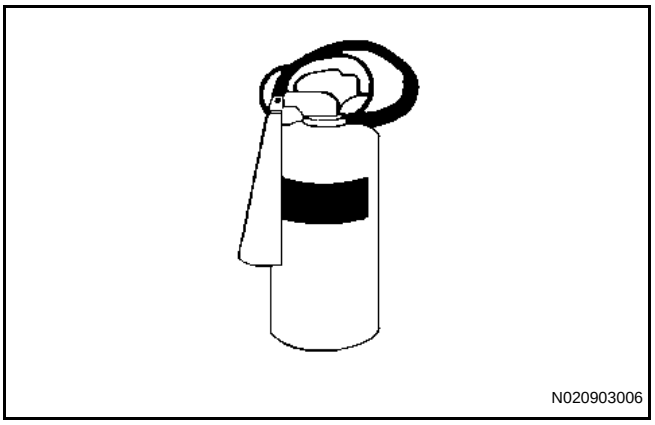


FIG. 25

Auto-Guide Precautions

Auto-Guide can be momentarily disabled if satellite signal is lost. It is imperative operator be alert to position and conditions in field at all times.

Auto-Guide System is designed to aid operator with machine steering. Operator attention is required at all times.

Asbestos Information

AGCO equipment and replacement parts shipped from AGCO are asbestos-free. AGCO recommends use of only genuine AGCO replacement parts.

Electrical Storm Injury Prevention

When lightning is striking in vicinity of machine, do not mount or dismount machine.

If in operator's station during an electrical storm, remain there. If on ground during an electrical storm, stay away from machine.

MACHINE IDENTIFICATION

Product Identification Information

Plate Locations

Product identification number (PIN) will be used to identify a machine designed for an operator to ride.

Components such as engines, transmissions and major attachments that are not designed for an operator to ride, are identified by serial numbers.

For quick reference, record identification numbers in spaces provided next to illustration.

FIG. 26: Machine PIN. Plate is located on left side of frame rail.

Machine PIN: _____

FIG. 26

FIG. 27: Engine Serial Number. Plate is located on right side of engine.

Engine Serial Number: _____

FIG. 27

FIG. 28: Transmission Serial Number. Plate is located on right rear side of transmission.

Transmission Serial Number: _____

FIG. 28

FIG. 29: Cab Serial Number. Plate (1) is located on the front left-hand corner of the cab.

Cab Serial Number: _____

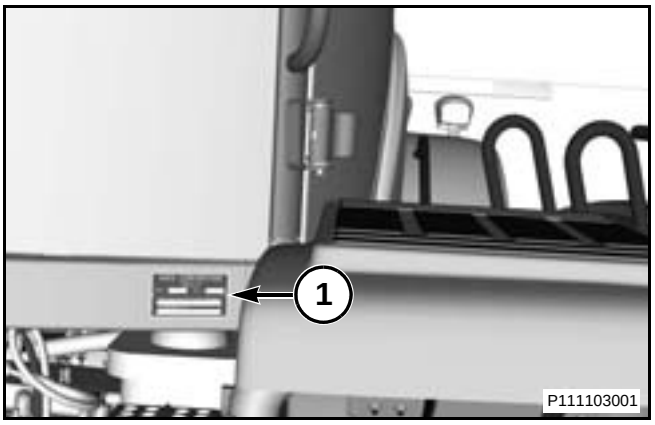


FIG. 29

FIG. 30: Operators Seat Serial Number. Tag (1) is located on rear of operator's seat.

Seat Serial Number: _____

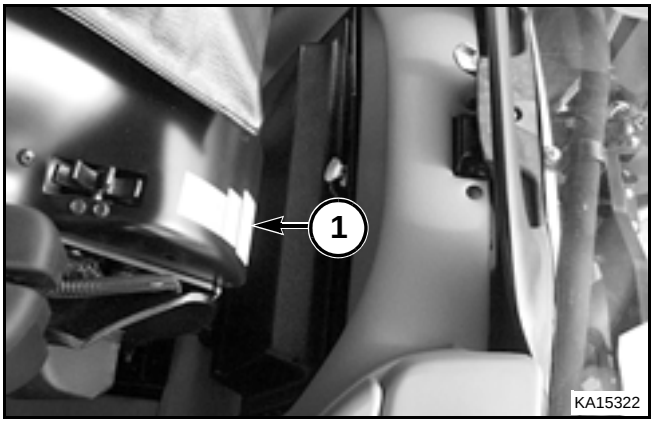


FIG. 30

FIG. 31: Serial Number for front and rear axles. Serial number (1) is located at top center of axle.

Front and rear axle Serial Number: _____

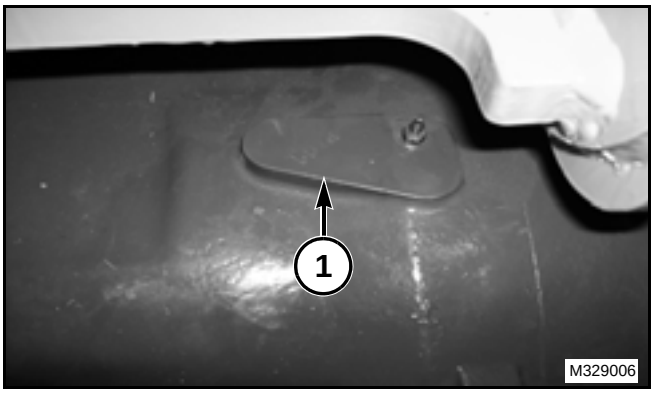


FIG. 31

TORQUE SPECIFICATIONS

WARNING: Mismatched or incorrect fasteners can result in damage, malfunction or personal injury. Avoid mixing metric and inch dimensioned fasteners.

Exceptions to torques are listed in Service Manual, if necessary.

Prior to installation of any hardware, ensure components are in near new condition. Bolts and threads must not be worn or damaged. Threads must not have burrs or nicks and hardware must be free of rust and corrosion. Clean hardware with a noncorrosive cleaner.

Do not lubricate fastener threads except with rust preventative. Rust preventative should be applied by supplier of component for purposes of shipping and storage. Other applications for lubricating components may be specified in Service Manual.

Constant Torque Hose Clamps

Due to extreme temperature changes, hose will heat set. Heat setting can cause hose clamps to loosen. Loose hose clamps can result in leaks. Constant torque of hose clamp helps prevent leaks.

FIG. 32: Constant torque hose clamp is installed correctly under the following conditions:

- Screw tip (1) extends 6.35 mm (0.25 inch) (A) beyond housing.
- Belleville washers are collapsed nearly flat after screw (2) is tightened to a torque of 11 Nm (8.1 lbf ft).

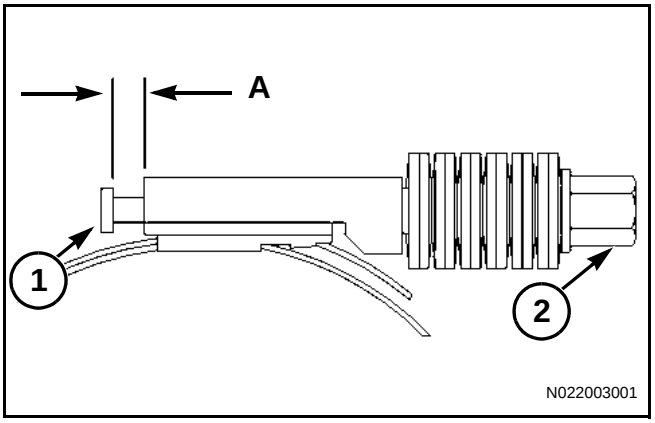


FIG. 32

FASTENERS INFORMATION

Metric Fasteners

Assembly Torque for Metric Fasteners

Standard			High		Low	
Thread Size	Torque Pound Feet lbf ft	Torque Newton Meters Nm	Torque Pound Feet lbf ft	Torque Newton Meters Nm	Torque Pound Feet lbf ft	Torque Newton Meters Nm
M6 x 1	8 to 10	9 to 15	9 to 11	10 to 16	3.5 to 4.5	5 to 7
M8 x 1.25	19 to 23	21 to 35	20 to 24	23 to 37	10 to 12	12 to 18
M10 x 1.5	37 to 45	45 to 65	40 to 48	48 to 72	20 to 24	23 to 37
M12 x 1.75	67 to 83	80 to 120	72 to 88	85 to 125	31 to 39	40 to 60
M14 x 2	108 to 132	130 to 190	120 to 140	145 to 205	55 to 65	65 to 95
M16 x 2	160 to 190	200 to 280	180 to 220	230 to 310	80 to 100	105 to 145
M20 x 2.5	305 to 375	400 to 520	350 to 430	460 to 600	165 to 205	210 to 290
M24 x 3	530 to 650	700 to 900	600 to 730	800 to 1000	285 to 345	375 to 475
M30 x 3.5	1060 to 13000	1400 to 1800	1200 to 1460	1600 to 2000	565 to 685	750 to 950
M36 x 4	1800 to 2200	2400 to 3000	2055 to 2515	2750 to 3450	990 to 1210	1300 to 1700

Standard Taperlock Studs		
Thread Size	Torque Pound Feet lbf ft	Torque Newton Meters Nm
M6	6	8
M8	13	17
M10	26	35
M12	48	65
M16	80	110
M20	125	170
M24	300	400
M30	550	750
M36	880	1200

Inch Fasteners

Assembly Torque for Inch Fasteners

Standard			High		Low	
Thread Size	Torque Pound Feet lbf ft	Torque Newton Meters Nm	Torque Pound Feet lbf ft	Torque Newton Meters Nm	Torque Pound Feet lbf ft	Torque Newton Meters Nm
1/4 - 20	8 to 10	9 to 15	9 to 11	10 to 16	3.5 to 4.5	5 to 7
5/16 - 18	16 to 20	19 to 31	18 to 22	21 to 35	9 to 11	10 to 16
3/8 - 16	31 to 39	38 to 56	36 to 44	40 to 60	16 to 20	19 to 31
7/16 - 14	45 to 55	55 to 85	54 to 66	65 to 95	27 to 33	32 to 48
1/2 - 13	67 to 83	85 to 125	81 to 99	100 to 140	40 to 50	48 to 72
9/16 - 12	110 to 130	130 to 190	117 to 143	145 to 205	55 to 65	70 to 100
5/8 - 11	145 to 175	175 to 255	160 to 190	200 to 280	75 to 95	95 to 135
3/4 - 10	245 to 305	320 to 420	290 to 350	370 to 490	135 to 165	160 to 240
7/8 - 9	410 to 510	540 to 700	470 to 570	610 to 790	215 to 265	285 to 365
1 - 8	590 to 730	800 to 1000	700 to 850	900 to 2200	335 to 405	435 to 565
1 1/8 - 7	860 to 1060	1150 to 1450	965 to 1175	1300 to 1600	465 to 565	610 to 790
1 1/4 - 7	1190 to 1450	1600 to 2000	1395 to 1705	1850 to 2350	880 to 1070	875 to 1125
1 3/8 - 6	1600 to 1960	2100 to 2700	1790 to 2190	2400 to 3000	1185 to 1445	850 to 1150
1 1/2 - 5	2050 to 2510	2750 to 3450	2385 to 2915	3200 to 40000	1515 to 1845	1500 to 1900

Standard Taperlock Studs		
Thread Size	Torque Pound Feet lbf ft	Torque Newton Meters Nm
1/4	6	8
5/16	13	17
3/8	26	35
7/16	33	45
1/2	48	65
5/8	80	110
3/4	125	170
7/8	190	260
1	300	400
1 1/8	390	525
1 1/4	550	750
1 3/8	700	950
1 1/2	880	1200

TIGHTENING STRAIGHT THREAD FITTINGS

Straight thread hydraulic fittings require precise tightening. Overtightening ruins sealing surfaces and require replacement of damaged parts.

Proper initial tightening depends on mating parts to be connected. Proceed as follows:

An adapter fitting (37 degree flare) connected to a double flare tube assembly, fitting must be tightened finger tight and wrenched 1/2 turn (for single flare, 1/4 turn).

An adapter fitting (37 degree flare) connected to a hose, fitting must be tightened finger tight and wrenched 1/4 turn.

An o-ring adapter fitting connected to a solid port, fitting must be tightened so backup washer contacts face of boss after fitting has been properly positioned.

To retighten after initial tightening, as in service work, both tube and hose connnections should be tightened finger tight and wrenched 1/4 turn. O-ring fittings should be tightened as for initial assembly.

JIC SWIVEL NUTS (37 degree seat). Following values are maximum recommended torque values for JIC (37 seat) swivel nuts either swaged or brazed type. Swivel nuts normally withstand torque for a minimum of 15 repeated assemblies.

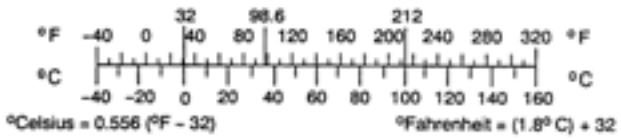
Torque required to seal swivel female fittings or hose couplings to a male connector depends on many variables such as medium, pressure, surface finish, etc. Following values are intended only as a guide for maximum values fittings may be subjected to.

DASH SIZE	TUBE O. D. (REF.)	TORQUE MAX		
		Nm	lbf in	lbf ft
-4	1/4	12	110	9
-5	5/16	20	180	15
-6	3/8	27	240	20
-8	1/2	40	360	30
-10	5/8	54	480	40
-12	3/4	95	840	70
-14	7/8	110	980	80
-16	1	120	1080	90
-20	1 1/4	160	1440	120
-24	1 1/2	180	1575	130
-32	2	400	3600	300
-40	2 1/2	540	4800	400
-48	3	680	6000	500

METRIC INFORMATION

	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



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SPECIAL TOOLING

Special tooling listed below may be required for removal, installation, disassembly or assembly of components of the machine.

These parts can be ordered from AGCO.

Part Number	Description
548008D1	Adapter GP - Communications
563181D1	Adapter GP (COM 3)
516201D1	Cable - Data Link
332272	36MM Wheel Bolt Wrench
332273	Collet Wrench
332274	Wrench Ext. - Torque
332275	Single Wheel Bolt Wrench
332276	Trans Disassembly Tubes
332281	Set Gear Lifting Rods
332282	FD Lifting Bracket 2
332283	Axle Lifting Tool
332284	Diff Shaft Bearing
332297	Top Link Support Bracket
332298	Wheel Weight Lifting Bracket
332299	Axle Lifting Bracket
332300	Cab Lifting Bracket
332301	Seal Installation Tool
332302	Pinion Nut Wrench
332310	Park Brake Alignment Tool
332311	Wheel Installation Guide Stud
332312	Brake Piston Guide Stud
332313	Final Drive Lifting Bracket
332314	Rolling Torque Bracket
332320	MT900FD Bearing Sleeve
536213D1	Driver GP - Bearing

NOTES

LUBRICATION AND MAINTENANCE

LUBRICANT VISCOSITIES AND REFILL CAPACITIES

Lubricant Viscosities

Proper oil viscosity grade is determined by minimum outside temperature while machine is started and operated. To determine proper oil viscosity grade, refer to minimum column in following table. This information reflects coldest ambient temperature condition for starting and operating a cold machine. Refer to maximum column in table to select oil viscosity grade for operating machine at highest temperature anticipated. Use highest oil viscosity allowed for ambient temperature when starting machine.

Machines operated continuously should use oils having higher oil viscosity in final drives and differentials. Oils with higher oil viscosity maintain highest possible oil film thickness. Consult dealer if additional information is needed.

Lubricant Viscosities for Ambient Temperatures

Compartment or System	Oil Type and Classification	Oil Viscosities	Celsius		Fahrenheit	
			Minimum	Maximum	Minimum	Maximum
Engine Crankcase	CI-4* CH-4* CG-4* *Meet requirements of Caterpillar ECF-1 specification	SAE 0W20	-40	10	-40	50
		SAE 0W30	-40	30	-40	86
		SAE 5W30	-30	30	-22	86
		SAE 5W40	-30	40	-22	104
		SAE 10W30	-20	40	-4	104
		SAE 15W40	-15	50	5	122
Hydraulic System	AGCO® Permatran® 821XL	SAE 10W30	-25	40	-13	104
Transmission and Axles		SAE 10W30	-25	40	-13	104

Refill Capacities

Approximate Refill Capacities			
Compartment or System	**Liters**	**US Gallon**	**Imperial Gallon**
Cooling system	49	13	11
Fuel tank (standard)	1476	390	325
Engine crankcase and filter (MT945 MT955)	30	7.9	6.6
Engine crankcase and filter (MT965 MT975)	34	9	7.5
Implement hydraulic system	145	38	32
Transmission and axles	185	48	40
Windshield washer reservoir	5.0	1.3	1.1

SERVICE INTERVALS

Initially check all hose clamps on engine at 10 hrs and again at 50 hrs, tighten and retorque as required, repeat when a hose is replaced.

When required, perform the following service items:

- Cab recirculation filter - clean/inspect/replace
- Cab air filter - clean/replace
- Primary engine air filter - clean
- Batteries - replace
- Air conditioner and alternator belt - replace
- Fan belt - replace
- Cooling cores - clean
- Drawbar wearplates and swing stops - replace
- Engine air precleaner - clean
- Ether starting aid cylinder - replace
- Fuel tank water and sediment - drain
- Fuses, circuit breakers, and relays - replace/reset
- Quick hitch - lubricate
- Fuel system water separator - drain
- Window washer reservoir - fill
- Window wipers - inspect/replace
- Windows - clean
- Water Temperature Regulator

Item	10 hrs or Daily	50 hrs or Weekly	Initial 250 hrs	250 hrs	Initial 500 hrs	500 hrs	1000 hrs	2000 hrs	3000 hrs
Cooling system level - check	X								
Engine oil level - check	X								
Fuel system - fill	X								
Hydraulic system oil level - check	X								
Fuel system water separator - check/drain	X								
Transmission oil level - check	X								
Articulation pivot pins - lubricate	X								
Articulation cylinder pins - lubricate	X								
Air tank - drain		X							
Hydraulic system oil filters (powertrain, implement, and brake systems) - replace			X						
Batteries - inspect				X					
Air conditioner belt - inspect/replace				X					
Fan belt - inspect/replace				X					
Engine oil and filter - change*				X					

Item	10 hrs or Daily	50 hrs or Weekly	Initial 250 hrs	250 hrs	Initial 500 hrs	500 hrs	1000 hrs	2000 hrs	3000 hrs
Primary fuel filter - replace				X					
Secondary fuel filter - replace				X					
Hydraulic implement system oil sample - obtain				X					
Powertrain system oil sample - obtain				X					
Engine oil sample - obtain				X					
Engine hose clamps - inspect and tighten				X					
Engine valve lash - check					X				
Cooling system sample - obtain						X			
Engine crankcase breather - clean						X			
Hydraulic system breather - clean						X			
Powertrain system breather - clean						X			
Fuel cap - clean/replace						X			
Driveline - grease						X			
Primary engine air filter - replace							X		
Secondary engine air filter - replace							X		
Hydraulic system oil - change							X		
Hydraulic system oil filter - replace							X		
Powertrain system oil - change							X		
Powertrain system oil filter - replace							X		
ROPS - inspect							X		
Seat belt - inspect							X		
Brake system filter - replace							X		
Air dryer cartridge - replace								X	
Engine valve lash - check								X	
Cooling system coolant - change									X
Refrigerant accumulator - replace									X

*185 hours on CG-4 oil

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NOTES

Challenger®

MT945C / MT955C / MT965C / MT975C Articulated Tractor

SERVICE MANUAL

79033097 E Rev.

02 - Engine

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ENGINE COMPONENT

INTRODUCTION

The machine utilizes a diesel engine manufactured by CAT for AGCO.

Many components are mounted and operate directly with CAT engine. This section describes proper procedures to remove and install components.

If an internal engine problem arises that warrants engine removal from frame of machine this section will describe proper procedure for removal and installation.

SPECIFICATIONS AND STANDARDS CONCERNING FUEL, OIL AND COOLANT

Engines fitted on machine series comply with standards concerning emissions imposed by authorities. (EU97/68/EC and 2007 US EPA and California Regulations for Large Non Road Compression Ignition Engines)

Quality of fluids used in these engines and servicing schedule, must be respected to keep pollution emission levels low and maintain machine's performance throughout its life.

Fuel Quality

Fuel must comply with standard DIN EN 590 and following specifications:

Density at 15 degrees C (59 degrees F): 0.82 to 0.84 kg/dm

Viscosity at 40 degrees C (104 degrees F): 2 to 4.5 mm/sec

Cetane index: min 51

Sulphur content: max 0.005p-%

Water content: max 200mg/kg

Oil Quality

Oil used must comply with API CI-4 standard.

Coolant Quality

Coolant used must comply with ASTM d 3306 standard and must consist of pure water and ethylene/propylene glycol type antifreeze in following proportions:

- 40-60% water
- 40-60% antifreeze

Ideal ratio is 50% water to 50% antifreeze.

SERPENTINE BELT REPLACEMENT

WARNING: Hot engine components can cause injury from burns. Before performing maintenance on engine, allow engine and components to cool.

Serpentine Belt Removal

FIG. 1: Location of battery disconnect switch (1).

IMPORTANT: Park machine on a hard, level surface.

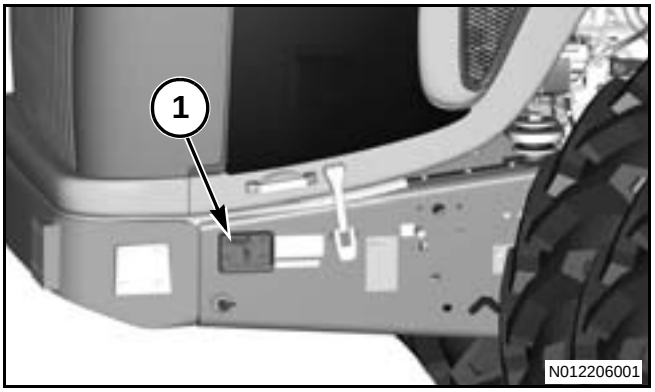

FIG. 1

FIG. 2: Rotate and remove key (1) to disconnect battery power.

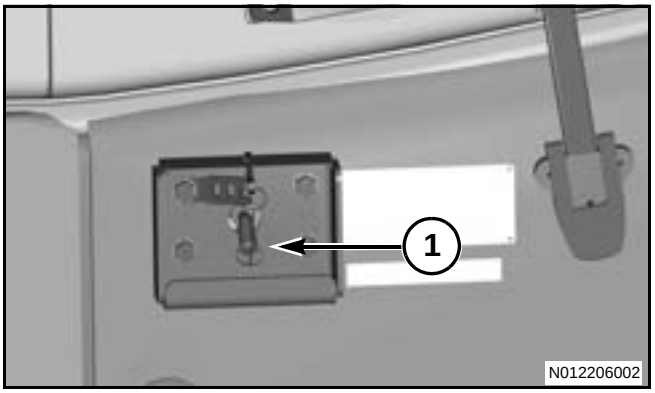

FIG. 2

FIG. 3: Remove bolts (1) and remove right guard (2).

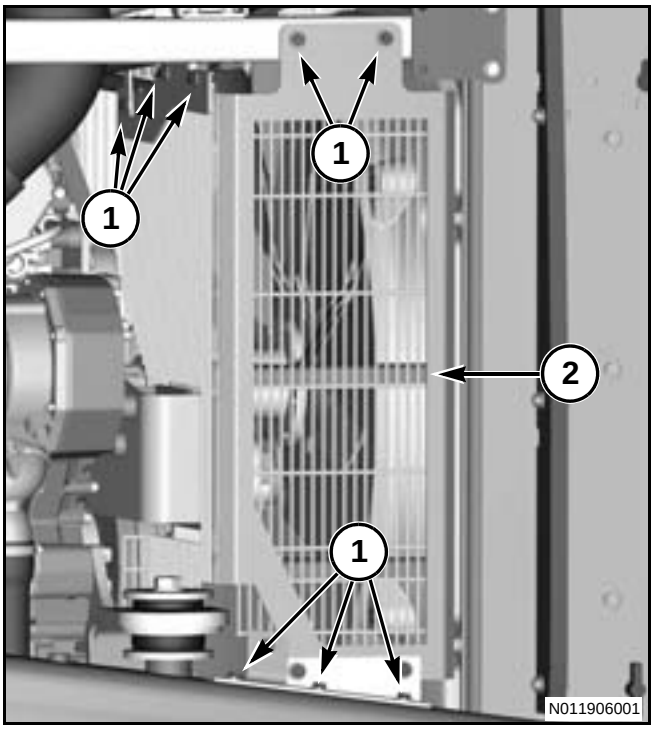

FIG. 3

FIG. 4: Remove bolts (1) and remove left guard (2).

NOTE: This guard does not need to be removed if replacing just fan drive serpentine belt.

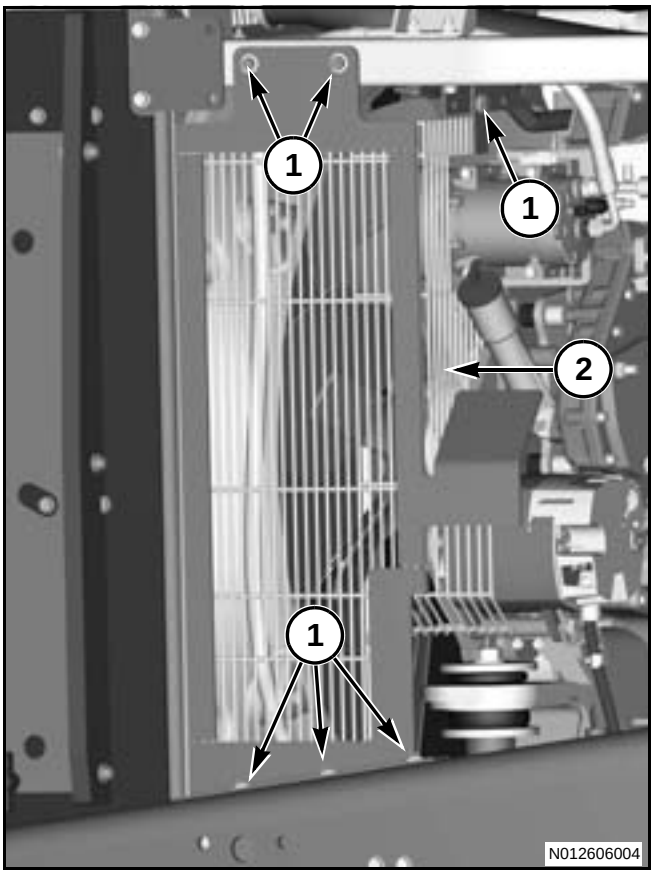

FIG. 4

FIG. 5: Use a ratchet wrench in square hole (1) on belt tensioner (2) and turn counter clockwise to relieve belt tension. Remove serpentine belt (3). Slowly release belt tensioner to relax into a neutral position.

WARNING: Equipment or parts under spring tension can cause bodily injury. Use caution in releasing belt tension.

NOTE: Be sure to allow enough room for swing of ratchet to allow belt tensioner to relax into a neutral position.

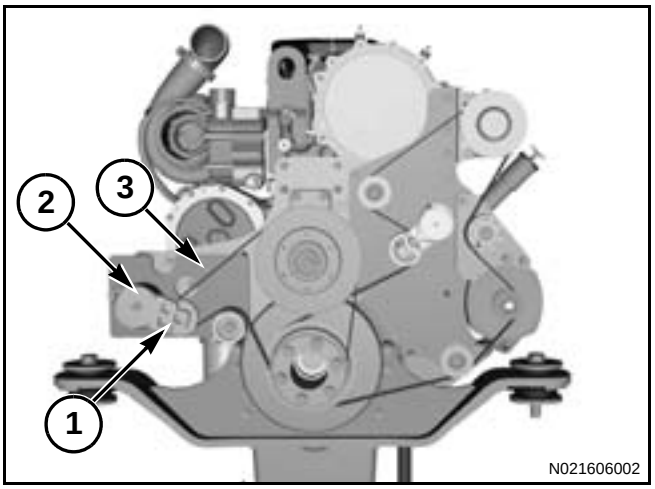

FIG. 5

FIG. 6: Use a ratchet wrench in square hole (1) on belt tensioner (2) and turn clockwise to relieve belt tension. Remove serpentine belt (3). Slowly release belt tensioner to relax into a neutral position.

WARNING: Equipment or parts under spring tension can cause bodily injury. Use caution in releasing belt tension.

NOTE: Be sure to allow enough room for swing of ratchet to allow belt tensioner to relax into a neutral position.

NOTE: Fan drive serpentine belt must be removed to replace accessories serpentine belt.

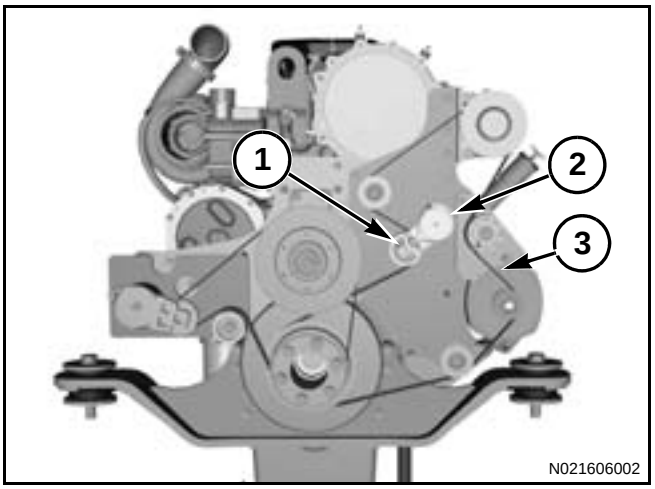

FIG. 6

Serpentine Belt Installation

FIG. 7: Install accessories serpentine belt (3) over pulleys on front of engine, leaving it off of alternator pulley. Ensure that belt ribs are properly seated in pulley valleys.

Insert square drive of ratchet into square hole (1) on belt tensioner (2) and rotate tensioner clockwise and hold.

NOTE: Skip this step if accessories serpentine belt was not removed.

WARNING: Equipment or parts under spring tension can cause bodily injury. Use caution in applying pressure to belt tensioner.

Carefully place belt onto alternator pulley (4) ensuring belt ribs are properly seated in pulley valleys and slowly allow belt tensioner to release until it makes contact with belt.

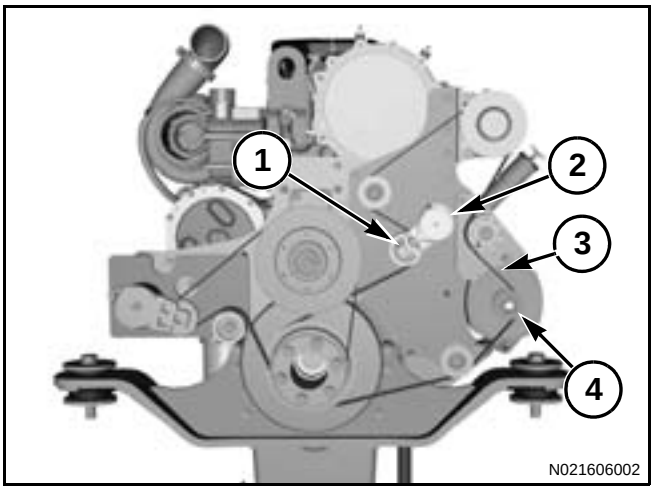

FIG. 7

FIG. 8: Install fan drive serpentine belt (3) over pulleys on front of engine, leaving it off of fan drive. Ensure that belt ribs are properly seated in pulley valleys.

Insert square drive of ratchet into square hole (1) on belt tensioner (2) and rotate tensioner counter clockwise and hold.

WARNING: Equipment or parts under spring tension can cause bodily injury. Use caution in applying pressure to belt tensioner.

Carefully place belt onto fan drive pulley (4) ensuring belt ribs are properly seated in pulley valleys and slowly allow belt tensioner to release until it makes contact with belt.

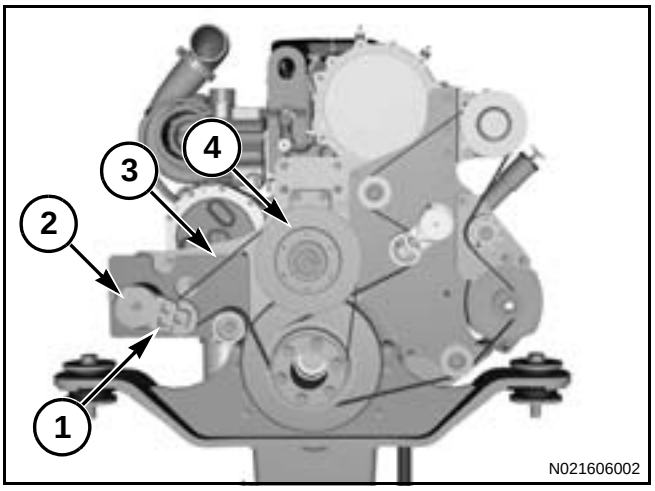

FIG. 8

FIG. 9: Install guard.

Install right guard (2) with bolts and washers (1). Tighten bolts to 55 Nm (40 lbf ft).

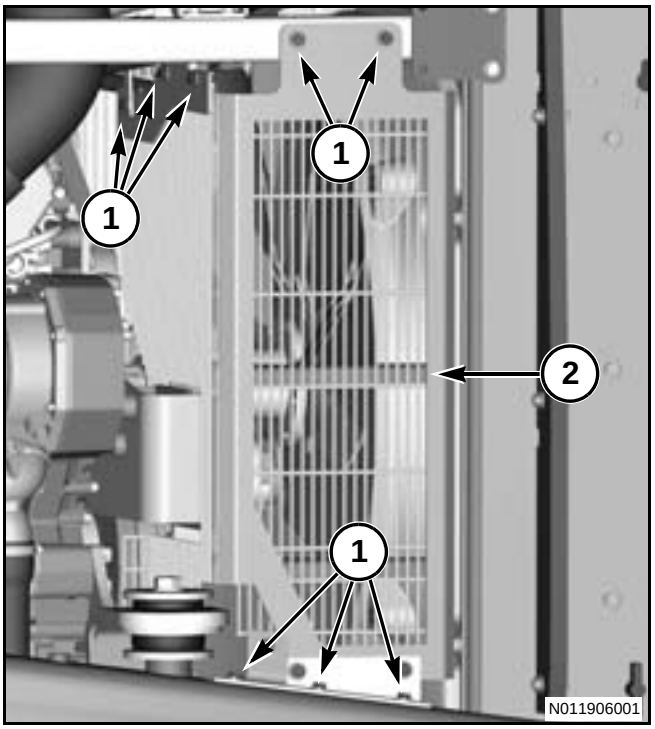

FIG. 9

FIG. 10: Install left guard (2) with bolts and washers (1). Tighten bolts to 55 Nm (40 lbf ft).

NOTE: This step can be skipped if left guard was not removed.

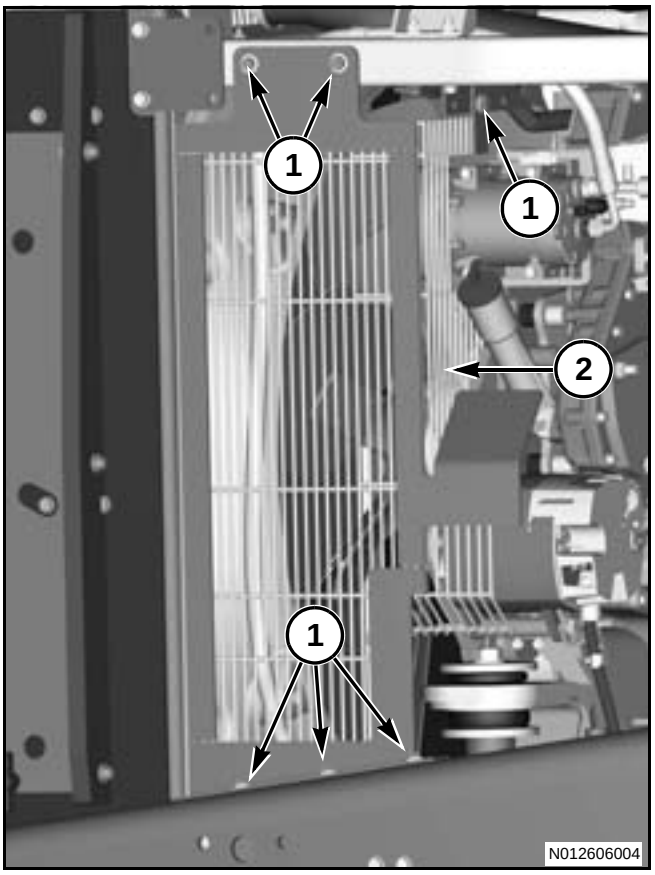

FIG. 10

FIG. 11: Install key (1) and rotate to connect battery power.

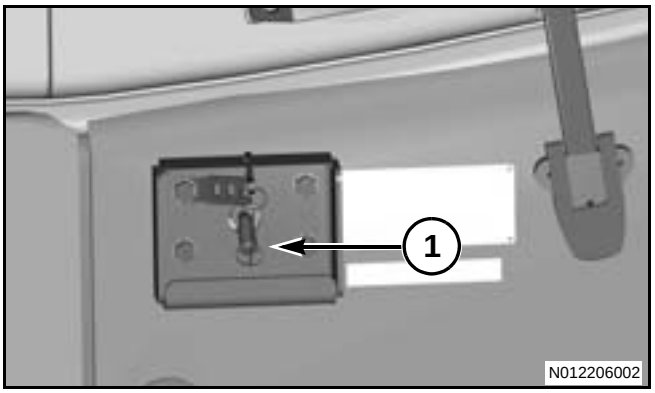

FIG. 11

ALTERNATOR - REMOVAL AND INSTALLATION

Removal Procedure

WARNING: Hot engine components can cause injury from burns. Before performing maintenance on the engine, allow the engine and the components to cool.

FIG. 12: Location of battery disconnect switch (1).

IMPORTANT: Park the machine on a hard, level surface.

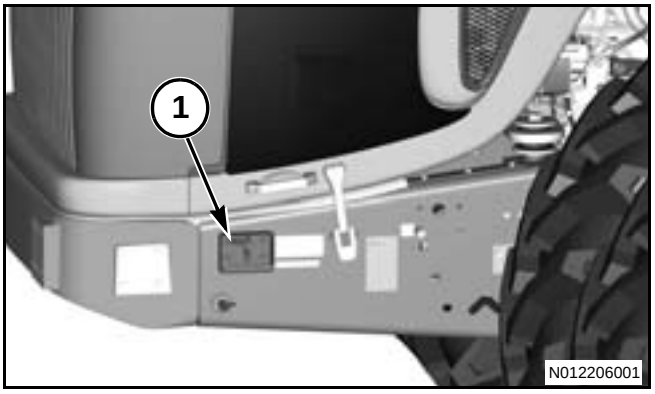

FIG. 12

FIG. 13: Rotate and remove key (1) to disconnect battery power.

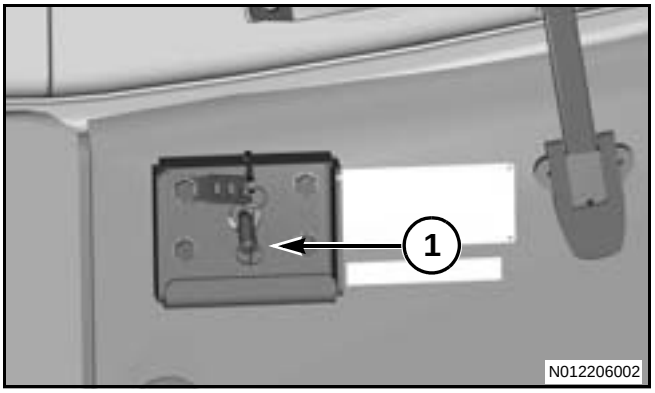

FIG. 13

FIG. 14: Remove bolts (1) and remove left guard (2).

NOTE: This guard does not need to be removed if replacing just fan drive serpentine belt.

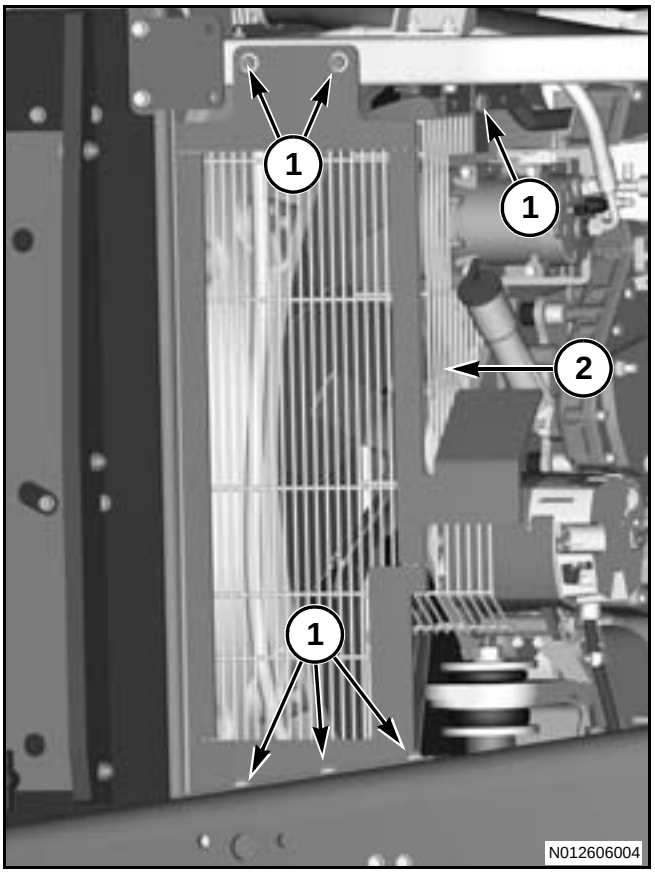

FIG. 14

FIG. 15: Mark and disconnect wiring (1), (2), and (3) from alternator (4).

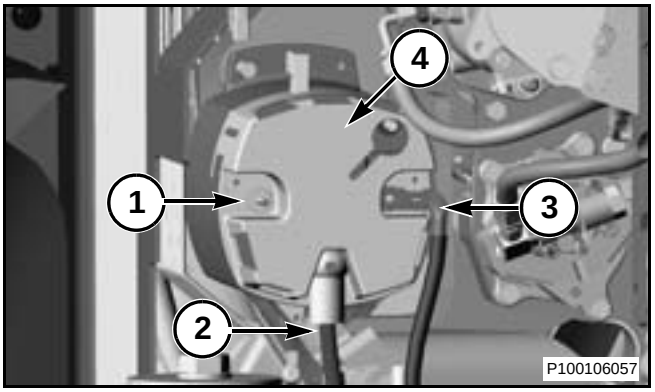

FIG. 15

FIG. 16: Use a ratchet wrench in square hole (1) on belt tensioner (2) and turn clockwise to relieve belt tension. Remove serpentine belt (3). Slowly release belt tensioner to relax into a neutral position.

WARNING: Equipment or parts under spring tension can cause bodily injury. Use caution in releasing belt tension.

NOTE: Be sure to allow enough room for swing of ratchet to allow belt tensioner to relax into a neutral position.

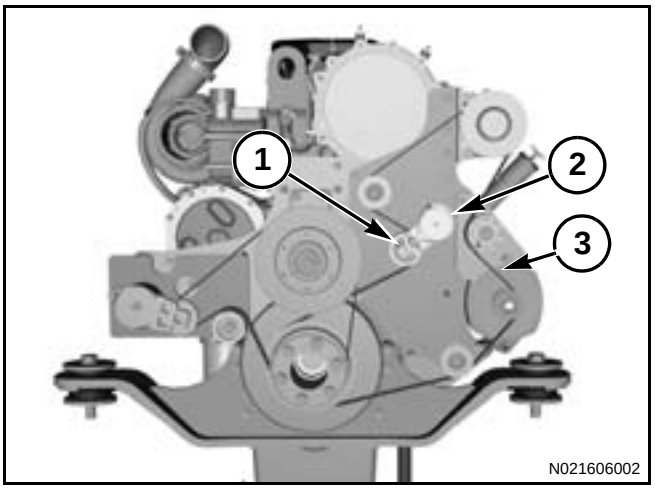

FIG. 16

FIG. 17: Remove two top bolts (1) and bottom bolt (2). Remove alternator (3).

Weight of alternator is approximately 27 kg (60 lb).

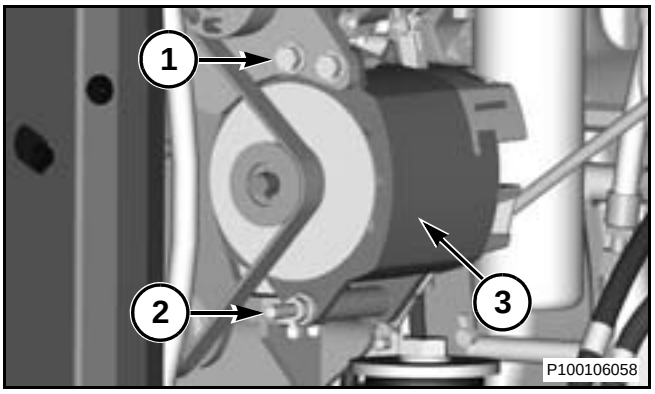

FIG. 17

Alternator Install

FIG. 18: Install pulley (1) onto alternator shaft and tighten nut (2) to 95 to 109 Nm (75 to 80 lbf ft).

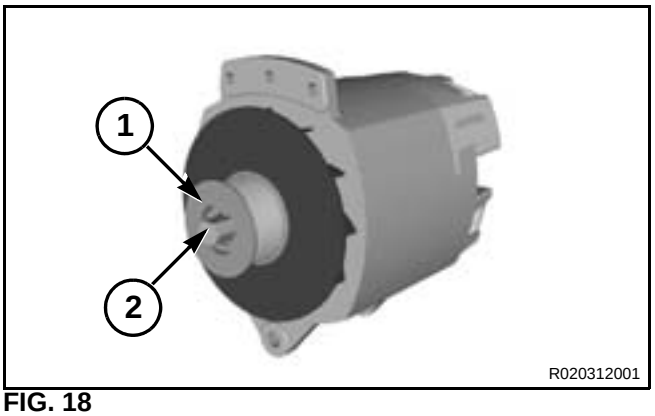

FIG. 18

FIG. 19: Mount alternator (3) and install top bolt (1) and bottom bolt (2).

Tighten top two bolts to 71 Nm (52 lbf ft). Tighten bottom bolt to 105 Nm (77 lbf ft).

Weight of alternator is approximately 27 kg (60 lb).

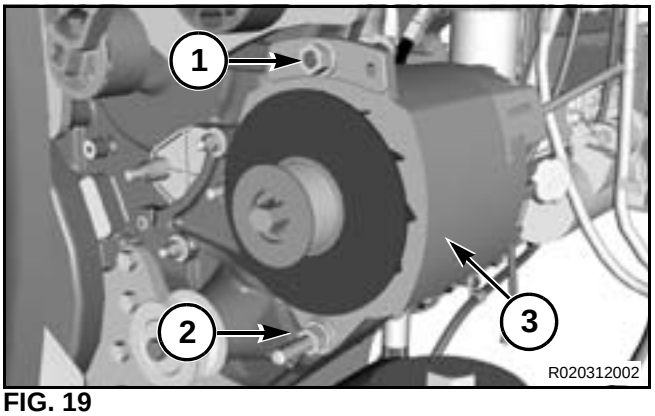

FIG. 19

FIG. 20: Install serpentine belt (3) over pulleys on front of engine, leaving it off of alternator pulley. Ensure that belt ribs are properly seated in pulley valleys.

Insert square drive of ratchet into square hole (1) on belt tensioner (2) and rotate tensioner clockwise and hold.

WARNING: Equipment or parts under spring tension can cause bodily injury. Use caution in applying pressure to belt tensioner.

Carefully place belt onto alternator pulley (4) ensuring belt ribs are properly seated in pulley valleys and slowly allow belt tensioner to release until it makes contact with belt.

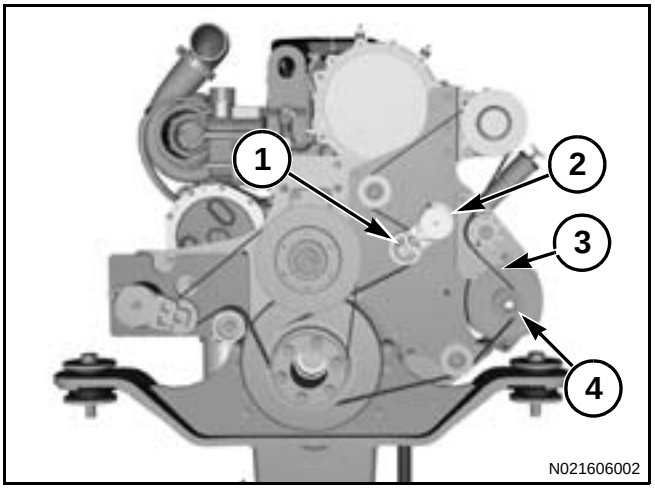

FIG. 20

FIG. 21: Connect electrical wires (1), (2) and (3) to posts on back of alternator (4).

Position protective boot over power terminal(2).

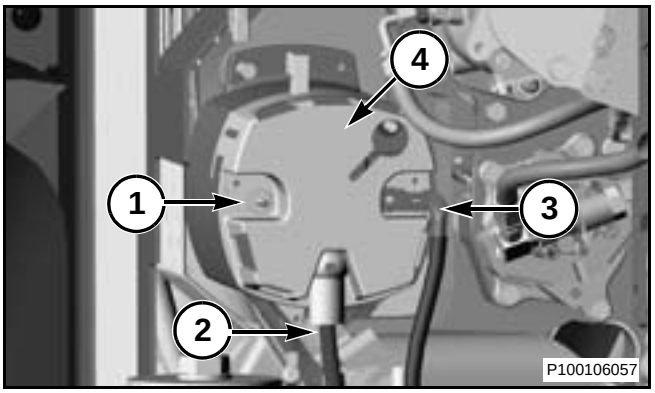

FIG. 21

FIG. 22: Install left guard (2) and install bolts and washers (1) and tighten. Tighten to 55 Nm (40 lbf ft).

NOTE: This step can be skipped if left guard was not removed.

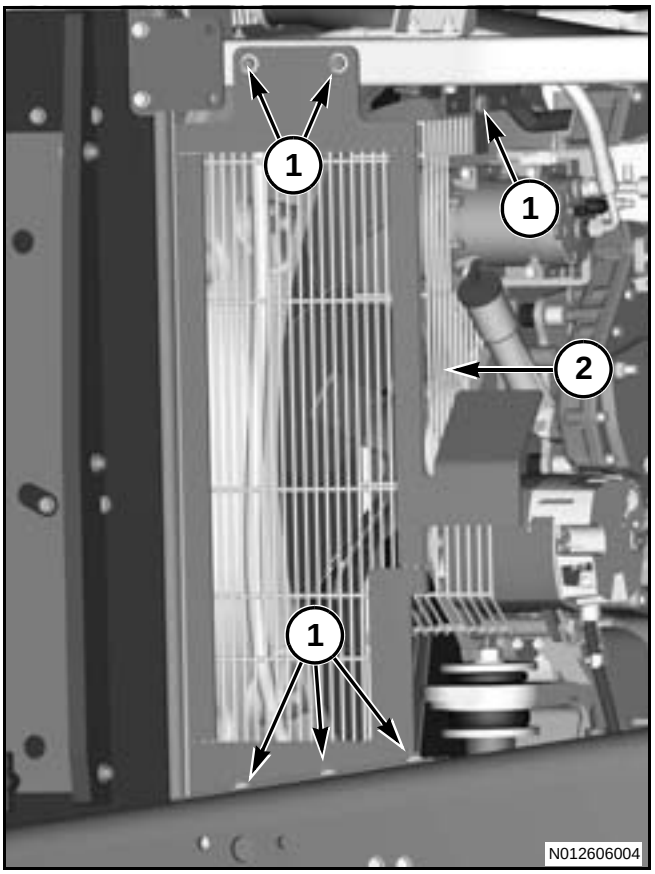

FIG. 22

FIG. 23: Insert and rotate key (1) to connect battery power.

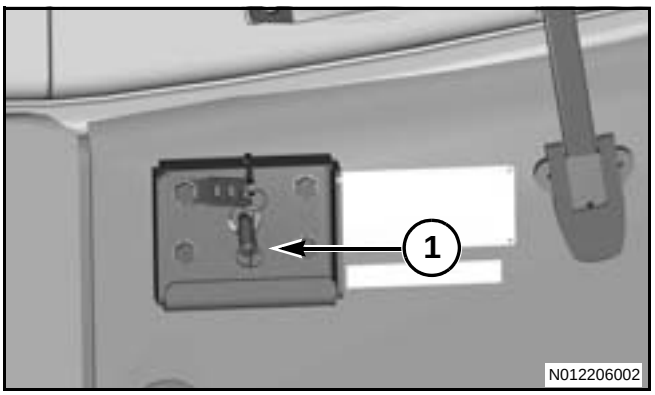

FIG. 23

COOLING ASSEMBLY - REMOVAL AND INSTALLATION

Cooling Assembly Removal Procedure

WARNING: Hot engine components can cause injury from burns. Before performing maintenance on engine, allow engine and components to cool.

IMPORTANT: Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids. Dispose of all fluids according to local regulations and mandates.

NOTE: Put identification marks on all hoses, on all hose assemblies, wires, and tube assemblies for installation purposes. Any engine openings such as turbo charger, intake manifold ports and coolant ports should be plugged or capped while their respective tubes, hoses and any other connections are removed. This helps to prevent fluid loss, and helps keep contaminants from entering the system.

NOTE: Cleanliness is an important factor. Before beginning disassembly procedure, exterior of components should be thoroughly cleaned. This will help prevent dirt from entering internal mechanism. Precision components can be damaged by contaminants or dirt. Perform disassembly procedures on a clean work surface. Keep components covered and protected at all times.

WARNING: Personal injury can result from contact with refrigerant.

Contact with refrigerant can cause frost bite. Keep face and hands away to help prevent injury.

Protective goggles must always be worn when refrigerant lines are opened, even if gauges indicate the system is empty of refrigerant.

Always use precaution when a fitting is removed. Slowly loosen fitting. If system is still under pressure, release it slowly in a well ventilated area.

Inhaling air conditioner refrigerant gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting air conditioner refrigerant gas, can cause bodily harm or death.

Use a certified recovery and recycling cart to properly remove the refrigerant from the air conditioning system.

IMPORTANT: Only a certified technician with certified equipment should service air conditioning system.

IMPORTANT: Whenever air conditioning system is opened, air conditioning accumulator must be replaced. See air conditioning accumulator removal and installation section.

FIG. 24: Location of battery disconnect switch (1).

IMPORTANT: Park machine on a hard, level surface.

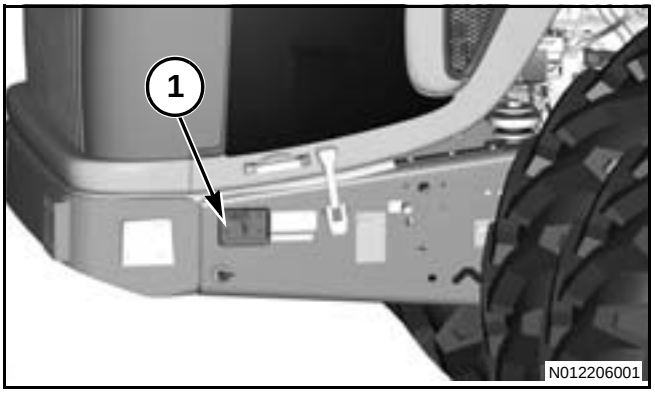

FIG. 24

FIG. 25: Rotate and remove key (1) to disconnect battery power.

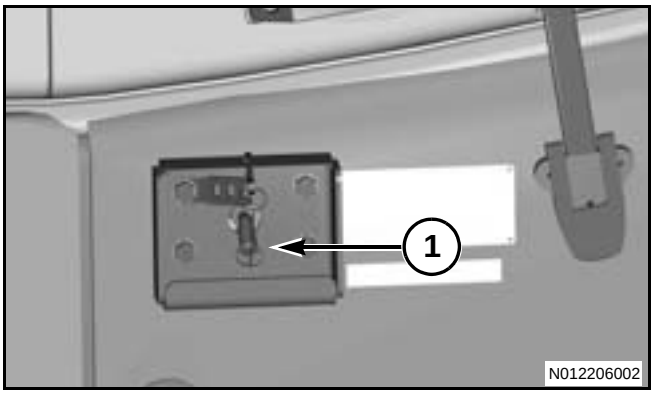

FIG. 25

FIG. 26: Remove four bolts (1) and fanblast guard (2).

Weight of fanblast guard is approximately 55 kg (121 lb).

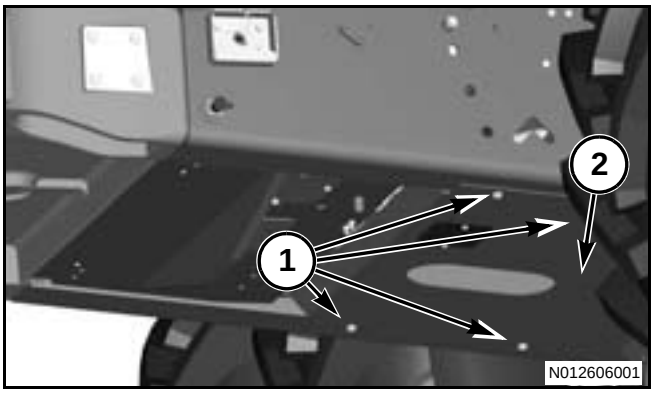

FIG. 26

FIG. 27: Special applications machine only: Remove pin (1) and tow cable (2) from front of machine.

Weight of tow cable is approximately 58 kg (128 lb).

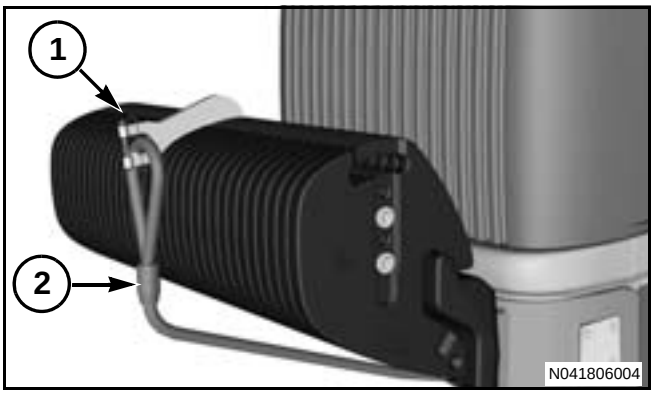

FIG. 27

FIG. 28: Special applications machine only: Remove bolts (1) and pin (2). Remove tow cable (3) from rear of machine.

Weight of tow cable is approximately 58 kg (128 lb).

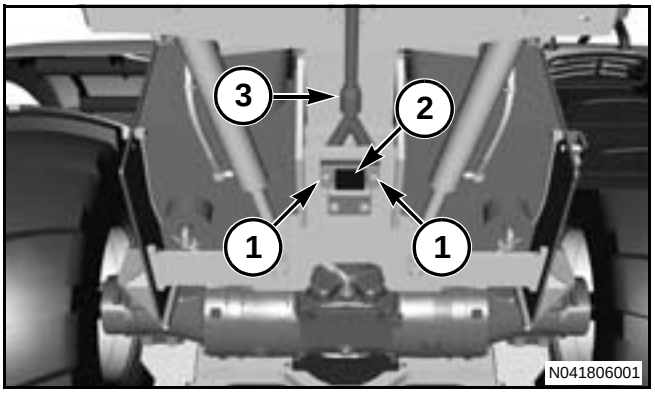

FIG. 28

FIG. 29: Special applications machine only: Remove bolts (1) and tow cable guide (2).

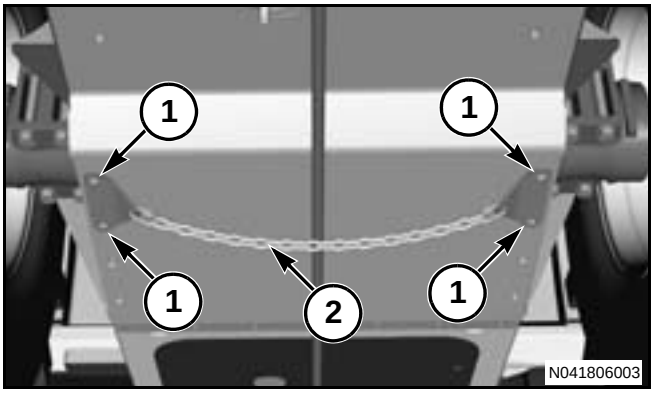

FIG. 29