SABRE LAWN TRACTORS

TECHNICAL MANUAL

John Deere
Worldwide Commercial and
Consumer Equipment Division

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Litho in U.S.A

Models: 1438GS, 1438HS, 1438G, 1538HS, 1542HS, 1542G, 1542H, 15.538G, 15.538H, 15.542G, 15.542H, 1642G, 1642H, 1642HS, 1642HV, 1646H, 1646HS, 1646HV, 1742GS, 1742HS, 1846HV, 1846HMS, 2046HV

This technical manual is written for an experienced technician and contains sections that are specifically for this product. It is a part of a total product support program.

The manual is organized so that all the information on a particular system is kept together. The order of grouping is as follows:

- Table of Contents
- Specifications
- Component Location
- System Schematic
- Theory of Operation
- Troubleshooting Chart
- Diagnostics
- Tests & Adjustments
- Repair

Note: Depending on the particular section or system being covered, not all of the above groups may be used.

Each section will be identified with a symbol rather than a number. The groups and pages within a section will be consecutively numbered.

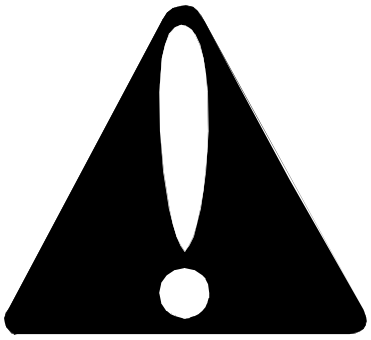
We appreciate your input on this manual. If you find any errors, or want to comment on the layout of the manual, please mail your comments back to us.

All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

Safety
Specifications and Information
Engine – Single Cylinder
Engine – V-Twin
Engine – Intek™ V-Twin
Electrical
Electrical with RIO System
Gear Power Train
Hydrostatic Power Train K51
Hydrostatic Power Train K55
Steering
Attachments
Miscellaneous M

SAFETY

RECOGNIZE SAFETY INFORMATION



This is the safety-alert symbol. When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.

Follow recommended precautions and safe servicing practices.

Understand Signal Words

A signal word—DANGER, WARNING, or CAUTION—is used with the safety-alert symbol. DANGER identifies the most serious hazards.

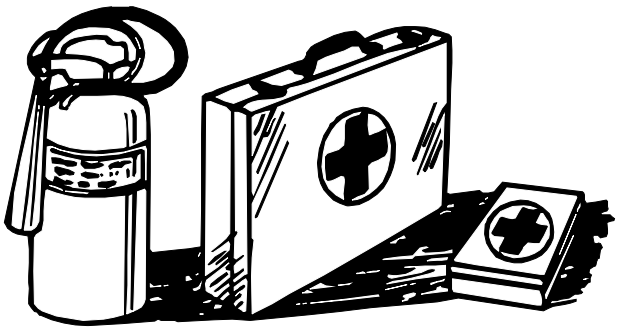
DANGER or WARNING safety signs are located near specific hazards. General precautions are listed on CAUTION safety signs. CAUTION also calls attention to safety messages in this manual.

REPLACE SAFETY SIGNS

Replace missing or damaged safety signs. See the machine operator's manual for correct safety sign placement.

HANDLE FLUIDS SAFELY-AVOID FIRES

Be Prepared For Emergencies



When you work around fuel, do not smoke or work near heaters or other fire hazards.

Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.

Make sure machine is clean of trash, grease, and debris.

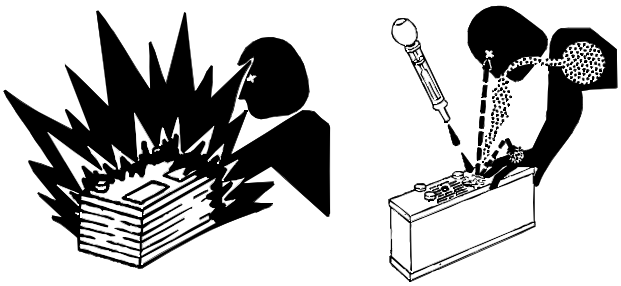
Do not store oily rags; they can ignite and burn spontaneously.

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.

USE CARE IN HANDLING AND SERVICING BATTERIES



Prevent Battery Explosions

- Keep sparks, lighted matches, and open flame away from the top of battery. Battery gas can explode.
- Never check battery charge by placing a metal object across the posts. Use a volt-meter or hydrometer.
- Do not charge a frozen battery; it may explode. Warm battery to 16°C (60°F).

Prevent Acid Burns

- Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

- **Avoid acid burns by:**

1. Filling batteries in a well-ventilated area.
2. Wearing eye protection and rubber gloves.
3. Avoiding breathing fumes when electrolyte is added.
4. Avoiding spilling or dripping electrolyte.
5. Use proper jump start procedure.

- **If you spill acid on yourself:**

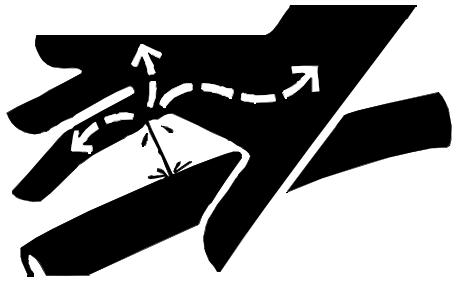
1. Flush your skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush your eyes with water for 10_15 minutes.
4. Get medical attention immediately.

- **If acid is swallowed:**

1. Drink large amounts of water or milk.
2. Then drink milk of magnesia, beaten eggs, or vegetable oil.
3. Get medical attention immediately.

USE CARE AROUND HIGH-PRESSURE FLUID LINES

Avoid High-pressure Fluids



Escaping fluid under pressure can penetrate the skin causing serious injury.

Avoid injury from escaping fluid under pressure by stopping the engine and relieving pressure in the system before disconnecting or connecting hydraulic or other lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

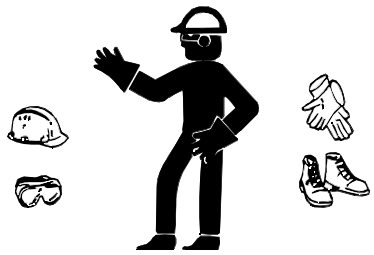
If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.

Avoid Heating Near Pressurized Fluid Lines

Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials. Pressurized lines can be accidentally cut when heat goes beyond the immediate flame area.

USE SAFE SERVICE PROCEDURES

Wear Protective Clothing

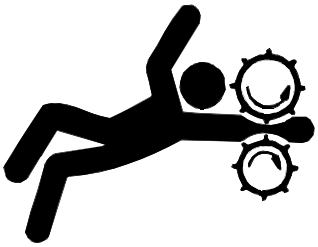


Wear close fitting clothing and safety equipment appropriate to the job.

Prolonged exposure to loud noise can cause impairment or loss of hearing. Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.

Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating machine.

Service Machines Safely



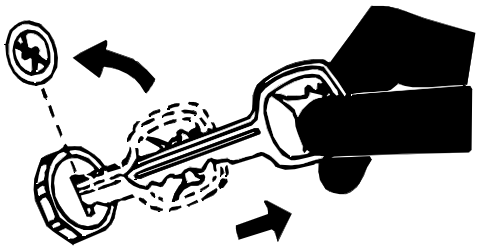
Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing, or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

Remove rings and other jewelry to prevent electrical shorts and entanglement in moving parts.

Use Proper Tools

Use tools appropriate to the work. Makeshift tools and procedures can create safety hazards. Use power tools only to loosen threaded parts and fasteners. For loosening and tightening hardware, use the correct size tools. **DO NOT** use U.S. measurement tools on metric fasteners. Avoid bodily injury caused by slipping wrenches. Use only service parts meeting John Deere specifications.

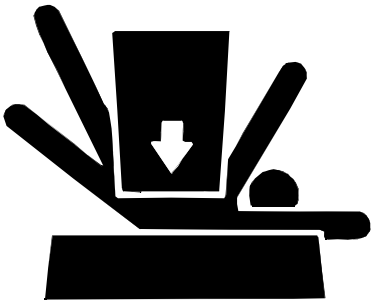
Park Machine Safely



Before working on the machine:

1. Lower all equipment to the ground.
2. Stop the engine and remove the key.
3. Disconnect the battery ground strap.
4. Hang a “DO NOT OPERATE” tag in operator station.

Support Machine Properly And Use Proper Lifting Equipment



If you must work on a lifted machine or attachment, securely support the machine or attachment.

Do not support the machine on cinder blocks, hollow tiles, or props that may crumble under continuous load. Do not work under a machine that is supported solely by a jack. Follow recommended procedures in this manual.

Lifting heavy components incorrectly can cause severe injury or machine damage. Follow recommended procedure for removal and installation of components in the manual.

Work In Clean Area

Before starting a job:

1. Clean work area and machine.
2. Make sure you have all necessary tools to do your job.
3. Have the right parts on hand.
4. Read all instructions thoroughly; do not attempt shortcuts.

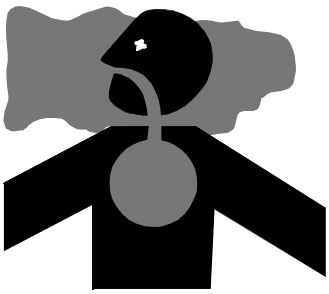
Using High Pressure Washers

Directing pressurized water at electronic/electrical components or connectors, bearings, hydraulic seals, fuel injection pumps or other sensitive parts and components may cause product malfunctions. Reduce pressure and spray at a 45 to 90 degree angle.

Illuminate Work Area Safely

Illuminate your work area adequately but safely. Use a portable safety light for working inside or under the machine. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.

Work In Ventilated Area



Engine exhaust fumes can cause sickness or death. If it is necessary to run an engine in an enclosed area, remove the exhaust fumes from the area with an exhaust pipe extension.

If you do not have an exhaust pipe extension, open the doors and get outside air into the area.

WARNING: California Proposition 65

Warning:

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

Gasoline engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

Remove Paint Before Welding Or Heating

Avoid potentially toxic fumes and dust. Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch. Do all work outside or in a well ventilated area. Dispose of paint and solvent properly. Remove paint before welding or heating: If you sand or grind paint, avoid breathing the dust. Wear an approved respirator. If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

Avoid Harmful Asbestos Dust

Avoid breathing dust that may be generated when handling components containing asbestos fibers. Inhaled asbestos fibers may cause lung cancer.

Components in products that may contain asbestos fibers are brake pads, brake band and lining assemblies, clutch plates, and some gaskets. The asbestos used in these components is usually found in a resin or sealed in some way. Normal handling is not hazardous as long as airborne dust containing asbestos is not generated.

Avoid creating dust. Never use compressed air for cleaning. Avoid brushing or grinding material containing asbestos. When servicing, wear an approved respirator. A special vacuum cleaner is recommended to clean asbestos. If not available, apply a mist of oil or water on the material containing asbestos. Keep bystanders away from the area.

SERVICE TIRES SAFELY

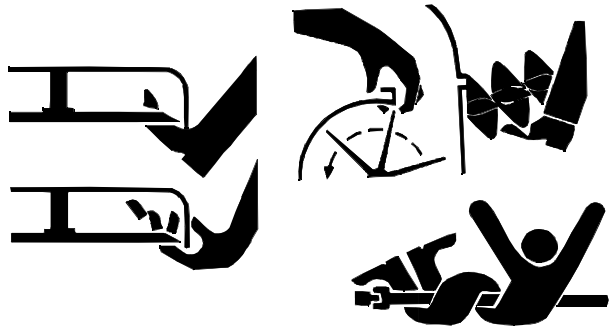
Explosive separation of a tire and rim parts can cause serious injury or death.

Do not attempt to mount a tire unless you have the proper equipment and experience to perform the job. Always maintain the correct tire pressure. Do not inflate the tires above the recommended pressure. Never weld or heat a wheel and tire assembly. The heat can cause an increase in air pressure resulting in a tire explosion. Welding can structurally weaken or deform the wheel.

When inflating tires, use a clip-on chuck and extension hose long enough to allow you to stand to one side and NOT in front of or over the tire assembly. Use a safety cage if available.

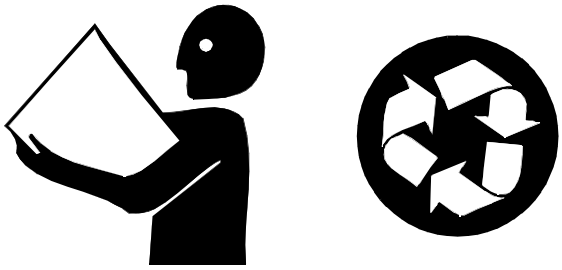
Check wheels for low pressure, cuts, bubbles, damaged rims or missing lug bolts and nuts.

AVOID INJURY FROM ROTATING BLADES, AUGERS AND PTO SHAFTS



Keep hands and feet away while machine is running. Shut off power to service, lubricate or remove mower blades, augers or PTO shafts.

HANDLE CHEMICAL PRODUCTS SAFELY



Direct exposure to hazardous chemicals can cause serious injury. Potentially hazardous chemicals used with John Deere equipment include such items as lubricants, coolants, paints, and adhesives.

A Material Safety Data Sheet (MSDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques. Check the MSDS before you start any job using a hazardous chemical. That way you will know exactly what the risks are and how to do the job safely. Then follow procedures and recommended equipment.

Dispose of Waste Properly

Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries. Use leakproof containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them. Do not pour waste onto the ground, down a drain, or into any water source. Inquire on the proper way to recycle or dispose of waste from your local environmental or recycling center, or from your John Deere dealer.

LIVE WITH SAFETY

Before returning machine to customer, make sure machine is functioning properly, especially the safety systems. Install all guards and shields.

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SPECIFICATIONS

Engine (Single Cylinder):

Make . . . . . Briggs and Stratton
Style . . . . . Vertical Shaft
Models:
14 Horsepower 287707
15 Horsepower 28N700
15.5 Horsepower 28N700
16 Horsepower (Cast Iron Sleeve) 28Q777
Type. . . . . Gasoline, Air Cooled, Single Cylinder, 4-Cycle
Lubrication. . . . . Splash type
Crankcase Oil Capacity. . . . . 1.42 L (1.5 qt)
Oil: Warm Climate (Above 40°F) . . . . . SE, SF, SG, SAE 30W
Cold Climate (Below 40°F). . . . . SE, SF, SG, SAE 10W30
Ignition System . . . . . Magnetron® Magneto Ignition
Magneto Air Gap . . . . . 0.25 - 0.35 mm (0.010 - 0.014 in.)
Charging System. . . . . Dual Circuit (AC/DC)
Charging Capacity. . . . . 2 - 4 amps, 14 volts DC@3600 rpm (Unregulated)
Spark Plugs. . . . . M78543 (Champion RC-12 YC)
Spark Plug Air Gap . . . . . 0.76 mm (0.030 in.)
Starter Type. . . . . Bendix Inertia Drive
Fuel Shut-Off Solenoid . . . . . Replaceable (Below Carburetor Float Bowl)

Engine (V-Twin Vanguard):

Make . . . . . Briggs and Stratton
Style . . . . . Vertical Shaft
Models:
16 Horsepower (V-Twin) 303777
18 Horsepower (V-Twin) 350777
Type. . . . . Gasoline, Air Cooled, V-Twin Cylinder, 4-Cycle
Lubrication. . . . . Fully Pressurized
Oil Filter. . . . . Single Element, Full Flow, Spin-On Filter
Crankcase Oil Capacity:
without oil filter. . . . . 1.42 L (1.5 qt)
with oil filter . . . . . 1.66 L (1.75 qt)
Oil: Warm Climate (Above 40°F) . . . . . SE, SF, SG, SAE 30W
Cold Climate (Below 40°F). . . . . SE, SF, SG, SAE 10W30
Ignition System . . . . . Magnetron® Magneto Ignition
Magneto Air Gap . . . . . 0.20 - 0.30 mm (0.008 - 0.012 in.)
Charging System. . . . . Dual Circuit (AC/DC)
Charging Capacity. . . . . 2 - 4 amps, 14 volts DC@3600 rpm (Unregulated)
Spark Plugs. . . . . M78543 (Champion RC-12 YC)
Spark Plug Air Gap . . . . . 0.76 mm (0.030 in.)
Starter Type. . . . . Bendix Inertia Drive
Fuel Shut-Off Solenoid . . . . . Replaceable (Below Carburetor Float Bowl)

Engine (V-Twin Intek™):

Make . . . . . Briggs and Stratton
Style . . . . . Vertical Shaft
Model:
20 Horsepower (V-Twin) 407777
Type. . . . . Gasoline, Air Cooled, V-Twin Cylinder, 4-Cycle
Lubrication. . . . . Fully Pressurized
Oil Filter. . . . . Single Element, Full Flow, Spin-On Filter
Crankcase Oil Capacity:
without oil filter. . . . . 1.8 L (1.9 qt)
with oil filter . . . . . 1.9 L (2.0 qt)
Oil: Warm Climate (Above 40°F) . . . . . SE, SF, SG, SAE 30W
Cold Climate (Below 40°F). . . . . SE, SF, SG, SAE 10W30
Ignition System . . . . . Magnetron® Magneto Ignition
Magneto Air Gap . . . . . 0.20 - 0.30 mm (0.008 - 0.012 in.)
Charging System. . . . . Dual Circuit (AC/DC)
Charging Capacity. . . . . 2 - 4 amps, 14 volts DC@3350 rpm (Unregulated)
Spark Plugs. . . . . M78543 (Champion RC-12 YC)
Spark Plug Air Gap . . . . . 0.76 mm (0.030 in.)
Starter Type. . . . . Bendix Inertia Drive
Fuel Shut-Off Solenoid . . . . . Replaceable (Below Carburetor Float Bowl)

Electrical:

Battery Type . . . . . BCI Group, U1
Battery Cranking Amps . . . . . 230 amps at 0° C (32° F)
Battery Cold Cranking Amps. . . . . 190 amps at 0° C (32° F)
Battery Specific Gravity. . . . . Above 1.225 Points
Headlight Bulbs. . . . . Type 1156, 12 Volt

Fuel/Air System:

Carburetor Make . . . . . Briggs & Stratton
Carburetor Type. . . . . Side Draft
Throttle/Choke. . . . . Unitized Control Linkage
Carburetor Fuel Shut-Off Solenoid (Optional) . . . . . Electric
Fuel Delivery . . . . . Gravity Flow
Fuel Filter . . . . . Replaceable In-line type
Fuel Type. . . . . Unleaded (87 Octane Minimum)
Fuel Tank Capacity . . . . . 4.7 L (1.25 gal)
Air Filter. . . . . Paper Element with Foam Pre-cleaner
Muffler . . . . . Anti-Backfire Horizontal Discharge Below Frame

Brakes

Location. . . . . Transaxle
Type:
Gear Transaxle . . . . . Single, External Brake Disc With Dual Friction Pucks
Hydrostatic Transaxle . . . . . Single, Internal Brake Disc

Traction Drive Belt:

Gear
New Belt Length . . . . . 2686 ± 8 mm (105.75 ± 0.3 in.)
Minimum Effective Length . . . . . 2656 mm (104.57 in.)
Maximum Effective Length . . . . . 2736 mm (107.72 in.)

Hydro—K51 Transmission
- New Belt Length . . . . . 2435 ± 8 mm (95.87 ± 0.3 in.)
- Minimum Effective Length . . . . . 2427 mm (95.55 in.)
- Maximum Effective Length . . . . . 2443 mm (96.18 in.)

Hydro—K55 Transmission
- New Belt Length . . . . . 2485 ± 8 mm (97.8 ± 0.3 in.)
- Minimum Effective Length . . . . . 2477 mm (97.5 in.)
- Maximum Effective Length . . . . . 2530 mm (99.6 in.)

Gear Transaxle

- Make . . . . . Dana
- Model . . . . . Spicer H-D 4360 Transaxle
- Type. . . . . Five-Speed/Linear Shift
- Domestic Ground Speeds (at FAST idle—2950 rpm) and Gear Ratios:
  - 1st Gear. . . . . 2.4 km/hr (1.5 mph)
  - 2nd Gear . . . . . 3.2 km/hr (2.0 mph)
  - 3rd Gear . . . . . 5.0 km/hr (3.1 mph)
  - 4th Gear . . . . . 6.4 km/hr (4.0 mph)
  - 5th Gear . . . . . 8.0 km/hr (5.0 mph)
  - Reverse . . . . . 3.7 km/hr (2.3 mph)
- Lubrication—Input Shaft Needle Bearings . . . . . Unirex® N3 Grease Only (M120263)
- Lubrication—Transaxle . . . . . Shell Darina® D Grease Only (AM119608)
- Capacity—Transaxle . . . . . 0.64 kg (1.406 lbs)

Hydro Transaxle K51

- Make . . . . . Kanzaki
- Model . . . . . Tuff Torq® K-51 Transaxle
- Type. . . . . Hydrostatic
- Ground Speeds (at FAST idle—2950 rpm):
  - Forward . . . . . 0—8.5 km/hr (0—5.3 mph)
  - Reverse . . . . . 0—5.3 km/hr (0—3.3 mph)
- Lubrication. . . . . 10W30 Engine Oil, Class CD
- Reservoir. . . . . Internal
- Capacity . . . . . 2.5 L (2.4 qt)

Hydro Transaxle K55

- Make . . . . . Kanzaki
- Model . . . . . Tuff Torq® K-55 Transaxle
- Type. . . . . Hydrostatic
- Ground Speeds (at FAST idle—2950 rpm):
  - Forward . . . . . 0—8.6 km/hr (0—5.3 mph)
  - Reverse . . . . . 0—4.2 km/hr (0—2.6 mph)
- Lubrication. . . . . 10W30 Engine Oil, Class CD
- Reservoir. . . . . Internal
- Capacity . . . . . 1.6 L (1.7 qt)

Chassis:

- Wheelbase . . . . . 1178.2 mm (46.39 in.)
- Overall Length . . . . . 1524 mm (60 in.)
- Overall Width (W/O Mower Deck) . . . . . 908 mm (35.75 in.)
- Height . . . . . 980 mm (38.6 in.)
- Average Overall Weight 38 inch (With Mower Deck, No Fuel) . . . . . 177.35 kg (391 lbs)
- Average Overall Weight 42 inch (With Mower Deck, No Fuel) . . . . . 185.52 kg (409 lbs)

Average Overall Weight 46 inch (With Mower Deck, No Fuel) . . . . . 191.42 kg (422 lbs)
Hitch Capacity—
Export:
Horizontal Pull Maximum. . . . . .25 kg (56 lbs)
Tongue Weight Maximum . . . . . 6.8 kg (15 lbs)
Domestic:
Trailer Load Maximum . . . . . .136 kg (300 lbs)
Trailer Tongue Weight Maximum . . . . . 22.6 kg (50 lbs)

Steering:

Type. . . . . Manual - Pinion/Sector
Axle Pivot Hub. . . . . Shim Adjustable
Lubrication. . . . . .Multipurpose Grease
Lubrication Interval . . . . . 10 hrs (Maximum)
Toe-In . . . . . .6 mm (0.24 in.) - Non-Adjustable
Turning Radius . . . . . .584 mm (23 in.)

Wheels:

Size—
Front . . . . . .6.0 x 4.50
Rear. . . . . .8.0 x 6.18

Tires:

Size—
Front . . . . . 13 x 6.50—6 NHS (2 ply)
Rear. . . . . 18 x 9.50—8 NHS (2 ply)
Pressure—
Front (with mower deck) . . . . . 97 kPa (14 psi)
Rear (with mower deck). . . . . 69 kPa (10 psi)

PTO Drive

Type. . . . . .V-Belt
Clutch Type . . . . . .Manual Belt Tensioning
Control Location . . . . . Lever on dash

Mower Deck Drive Belt

38-Inch Deck—
Actual effective length . . . . . .2407 ± 10 mm (94.76 ± 0.4 in.)
42-Inch Deck (Single Cylinder Engine)—
Actual effective length . . . . . .2930 ± 10 mm (115.03 ± 0.4 in.)
42-Inch Deck (V-Twin Engine)—
Actual effective length . . . . . 2921.8 ± 10 mm (154.40 ± 0.4 in.)
46-Inch Deck (Single Cylinder Engine)—
Actual effective length . . . . . .3665 ± 10 mm (144.29 ± 0.4 in.)
46-Inch Deck (V-Twin Engine)—
Actual effective length . . . . . .3640 ± 10 mm (143.10 ± 0.4 in.)

Mower Deck:

38-Inch Mower Deck—

Type	Rotary—Dual Spindles (Non-Serviceable)
Material Type	Stamped 2.5 mm (0.098 in.) Nominal Gauge Steel
Cutting Blade	Two - 76 x 5 x 496 mm (3 x 0.2 x 19.5 in.)
Blade Cutting Edge	30 ± 5° Angle
Blade Wing Lift/Height	40 ± 3 mm (1.57 ± 0.12 in.)
Overall Cutting Width	965 mm (38 in.)
Overall Width (w/o discharge chute)	1026 mm (40.4 in.)
Drive Type	Single V-Belt (With Spring Tension Idler)
Spindle Lubrication	None - Sealed Bearings
Lift Type	Manual - Operator's Station
Cutting Settings	Seven: 25.4 - 101.6 mm (1.0 - 4.0 in.)

42-Inch Mower Deck—

Type	Rotary—Dual Spindles (Non-Serviceable)
Material Type	Stamped 2.5 mm (0.098 in.) Nominal Gauge Steel
Cutting Blade	Two - 57 x 4 x 545 mm (2.25 x 0.16 x 21.4 in.)
Blade Cutting Edge	30 ± 5° Angle
Blade Wing Lift/Height	22 ± 2 mm (0.87 ± 0.08 in.)
Overall Cutting Width	1066 mm (42 in.)
Overall Width (w/o discharge chute)	1118 mm (44.0 in.)
Drive Type	Single V-Belt (With Spring Tension Idler)
Spindle Lubrication	None—Sealed Bearings
Lift Type	Manual - Operator's Station
Cutting Settings	Seven: 25.4 - 101.6 mm (1.0 - 4.0 in.)

46-Inch Mower Deck—

Type	Rotary—Triple Spindles (Non-Serviceable)
Material Type	Stamped 2.5 mm (0.098 in.) Nominal Gauge Steel
Cutting Blade	Three - 50.8 x 5 x 407.4 mm (2 x 0.2 x 16 in.)
Blade Cutting Edge	30 ± 5° Angle
Blade Wing Lift/Height	20.3 ± 3 mm (0.8 ± 0.12 in.)
Overall Cutting Width	1168.4 mm (46 in.)
Overall Width (W/O Discharge Chute)	1308 mm (51.5 in.)
Drive Type	Single V-Belt (With Spring Tension Idler)
Spindle Lubrication	None - Sealed Bearings
Lift Type	Manual - Operator's Station
Cutting Settings	Seven: 25.4 - 101.6 mm (1.0 - 4.0 in.)

Implement Lift

Lift System	Manual with Lift-Assist Spring
Lift Lever Location	Front of Seat between Legs

INCH TORQUE VALUES

SAE Grade and Head Markings	No Marks 1 or 2[b]	5 5.1 5.2	8 8.2
SAE Grade and Nut Markings	No Marks 2	5	8

Size	Grade 1				Grade 2[b]				Grade 5, 5.1 or 5.2				Grade 8 or 8.2			
	Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]	
	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft
1/4	3.8	2.8	4.7	3.5	6	4.4	7.5	5.5	9.5	7	12	9	13.5	10	17	12.5
5/16	7.7	5.7	9.8	7.2	12	9	15.5	11.5	19.5	14.5	25	18.5	28	20.5	35	26
3/8	13.5	10	17.5	13	22	16	27.5	20	35	26	44	32.5	49	36	63	46
7/16	22	16	28	20.5	35	26	44	32.5	56	41	70	52	80	59	100	74
1/2	34	25	42	31	53	39	67	49	85	63	110	80	120	88	155	115
9/16	48	35.5	60	45	76	56	95	70	125	92	155	115	175	130	220	165
5/8	67	49	85	63	105	77	135	100	170	125	215	160	240	175	305	225
3/4	120	88	150	110	190	140	240	175	300	220	380	280	425	315	540	400
7/8	190	140	240	175	190	140	240	175	490	360	615	455	690	510	870	640
1	285	210	360	265	285	210	360	265	730	540	920	680	1030	760	1300	960
1-1/8	400	300	510	375	400	300	510	375	910	670	1150	850	1450	1075	1850	1350
1-1/4	570	420	725	535	570	420	725	535	1280	945	1630	1200	2050	1500	2600	1920
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2140	1580	2700	2000	3400	2500
1-1/2	990	730	1250	930	990	730	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

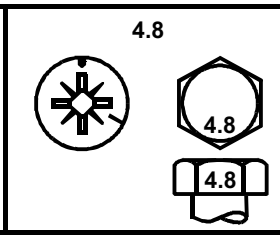
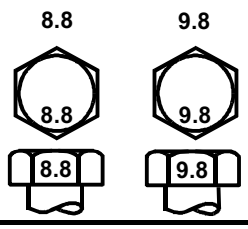
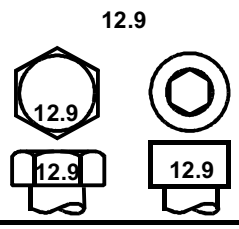
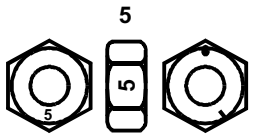
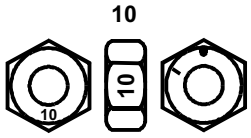
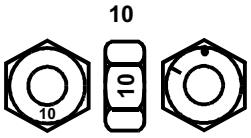
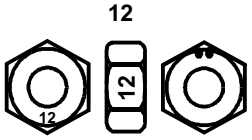
Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head.

Tighten toothed or serrated-type lock nuts to the full torque value.

[a] *"Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings.*
"Dry" means plain or zinc plated without any lubrication.

[b] *Grade 2 applies for hex cap screws (not hex bolts) up to 152 mm (6 in.) long. Grade 1 applies for hex cap screws over 152 mm (6 in.) long, and for all other types of bolts and screws of any length.*

METRIC TORQUE VALUES

Property Class and Head Markings	4.8 	8.8 9.8 	10.9 	12.9 
Property Class and Nut Markings	5 	10 	10 	12 

Size	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]	
	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft
M6	4.7	3.5	6	4.4	9	6.6	11.5	8.5	13	9.5	16.5	12.5	15.5	11.5	19.5	14.5
M8	11.5	8.5	14.5	10.7	22	16	28	20.5	32	23.5	40	29.5	37	27.5	47	35
M10	23	17	29	21	43	32	55	40	63	46	80	59	75	55	95	70
M12	40	29.5	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	46	80	59	120	88	150	110	175	130	220	165	205	150	260	190
M16	100	74	125	92	190	140	240	175	275	200	350	225	320	235	400	300
M18	135	100	175	125	265	195	330	245	375	275	475	350	440	325	560	410
M20	190	140	245	180	375	275	475	350	530	390	675	500	625	460	790	580
M22	265	195	330	245	510	375	650	480	725	535	920	680	850	625	108	800
M24	330	245	425	315	650	480	820	600	920	680	115	850	108	800	135	100
M27	490	360	625	460	950	700	1200	885	1350	1000	1700	1250	1580	1160	200	1500
M30	660	490	850	625	1290	950	1630	1200	1850	1350	2300	1700	2140	1700	2700	2000
M33	900	665	1150	850	1750	1300	2200	1625	2500	1850	3150	2325	2900	2150	3700	2730
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2770	4750	3500

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical property class.

Fasteners should be replaced with the same or higher property class. If higher property class fasteners are used, these should only be tightened to the strength of the original.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

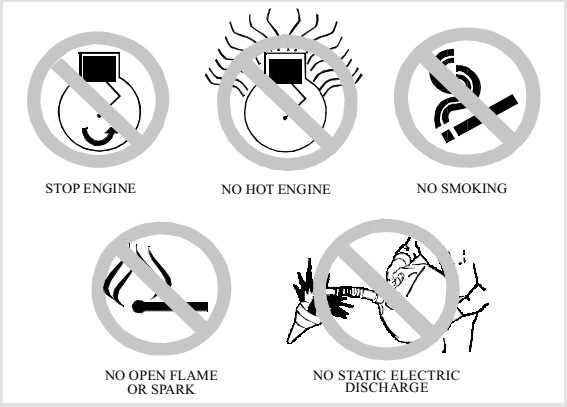
Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

[a] *"Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings.*
"Dry" means plain or zinc plated without any lubrication.

GASOLINE

⚠ CAUTION

Gasoline is HIGHLY FLAMMABLE, handle it with care.



DO NOT refuel machine while:

- **indoors, always fill gas tank outdoors;**
- **machine is near an open flame or sparks;**
- **engine is running, STOP engine;**
- **engine is hot, allow it to cool sufficiently first;**
- **smoking.**

Help prevent fires:

- **fill gas tank to bottom of filler neck only;**
- **be sure fill cap is tight after fueling;**
- **clean up any gas spills IMMEDIATELY;**
- **keep machine clean and in good repair–free of excess grease, oil, debris, and faulty or damaged parts;**
- **any storage of machines with gas left in tank should be in an area that is well ventilated to prevent possible igniting of fumes by an open flame or spark, this includes any appliance with a pilot light.**

To prevent fire or explosion caused by STATIC ELECTRIC DISCHARGE during fueling:

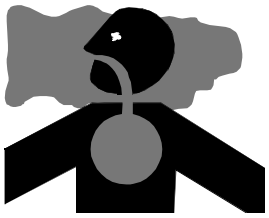
- **ONLY use a clean, approved POLYETHYLENE PLASTIC fuel container and funnel WITHOUT any metal screen or filter.**

To avoid engine damage:

- DO NOT mix oil with gasoline;
- **ONLY use clean, fresh unleaded gasoline with an octane rating (anti-knock index) of 87 or higher**;
- fill gas tank at the end of each day's operation to help prevent condensation from forming inside a partially filled tank;
- keep up with specified service intervals.

Use of alternative oxygenated, gasohol blended, unleaded gasoline is acceptable as long as:

- the ethyl or grain alcohol blends DO NOT exceed 10% by volume or
- methyl tertiary butyl ether (MTBE) blends DO NOT exceed 15% by volume.



IMPORTANT: DO NOT use METHANOL gasoline because METHANOL is harmful to the environment and to your health.

⚠ WARNING

<u>California Proposition 65 Warning:</u> Gasoline engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

GASOLINE STORAGE

IMPORTANT: Keep all dirt, scale, water or other foreign material out of gasoline.

Keep gasoline stored in a safe, protected area. Storage of gasoline in a clean, properly marked **("UNLEADED GASOLINE") POLYETHYLENE PLASTIC container WITHOUT** any metal screen or filter is recommended. **DO NOT** use de-icers to attempt to remove water from gasoline or depend on fuel filters to remove water from gasoline. Use a water separator installed in the storage tank outlet. **BE SURE** to properly discard unstable or contaminated gasoline. When storing unit or gasoline, it is recommended that you add **John Deere Gasoline Conditioner and Stabilizer (TY15977)** or an equivalent to the gasoline. **BE SURE** to follow directions on container and to properly discard empty container.

ENGINE OIL

Use the appropriate oil viscosity based on the expected air temperature range during the period between recommended oil changes. Operating outside of these recommended oil air temperature ranges may cause premature engine failure.

The following John Deere oil is **PREFERRED**:

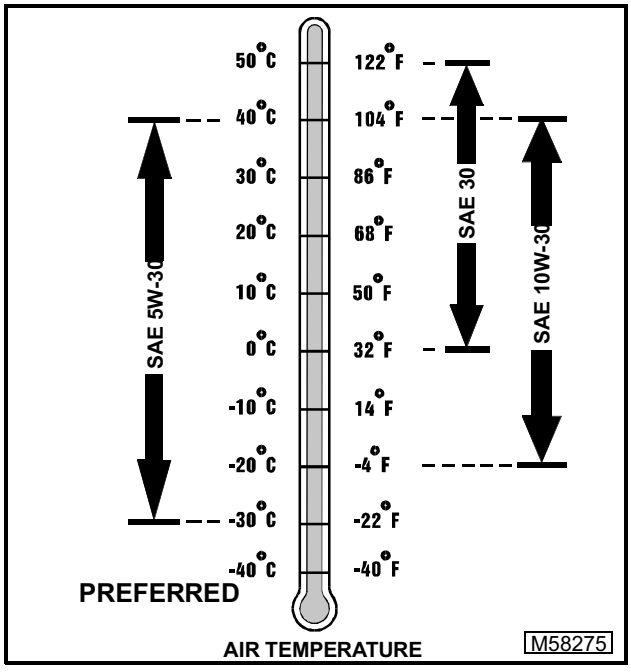
- **TORQ-GARD SUPREME®—SAE 5W-30.**
- **UNI–GARD™—SAE 5W-30.**

The following John Deere oils are **also recommended**, based on their specified temperature range:

- **TURF–GARD®—SAE 10W-30;**
- **UNI–GARD™—SAE 10W-30;**
- **PLUS–4®—SAE 10W-30;**
- **TORQ–GARD SUPREME®—SAE 30.**
- **UNI–GARD™—SAE 30.**

Other oils may be used if above John Deere oils are not available, provided they meet one of the following specifications:

- SAE 5W-30—API Service Classification SG or higher;
- SAE 10W-30—API Service Classification SG or higher;
- SAE 30—API Service Classification SC or higher.
- CCMC Specification G4 or higher.



John Deere Dealers: You may want to cross-reference the following publications to recommend the proper oil for your customers:

- Module DX,ENOIL2 in JDS–G135;
- Section 530, Lubricants & Hydraulics, of the John Deere Merchandise Sales Guide;
- Lubrication Sales Manual PI7032.

ENGINE BREAK–IN OIL

IMPORTANT: ONLY use a quality break-in oil in rebuilt or remanufactured engines for the first 5 hours (maximum) of operation. DO NOT use oils with heavier viscosity weights than SAE 5W-30 or oils meeting specifications API SG or SH (North America); or oils meeting CCMC Specification G5 (Europe). These oils will not allow rebuilt or remanufactured engines to break-in properly.

The following John Deere oil is **PREFERRED**:

- **BREAK–IN ENGINE OIL**.

John Deere BREAK–IN ENGINE OIL is formulated with special additives for aluminum and cast iron type engines to allow the power cylinder components (pistons, rings, and liners as well) to “wear-in” while protecting other engine components, valve train and gears, from abnormal wear. Engine rebuild instructions should be followed closely to determine if special requirements are necessary.

John Deere BREAK–IN ENGINE OIL is also recommended for non-John Deere engines, both aluminum and cast iron types.

The following John Deere oil is **also recommended** as a break-in engine oil:

- **TORQ–GARD SUPREME®—SAE 5W-30.**

If the above recommended John Deere oils are not available, use a break-in engine oil meeting the following specification during the first 5 hours (maximum) of operation:

- SAE 5W-30—API Service Classification SE or higher.
- SAE 5W-30—CCMC Specification G4 or higher.

IMPORTANT: After the break-in period, use the John Deere oil that is recommended for this engine.