D100, D105, D110, D120, D125, D130, D140, D150, D155, D160, and D170 Lawn Tractors Diagnostic and Repair

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TECHNICAL MANUAL

Lawn Tractors models D100, D110, D120, D130, D140, D150, D160, D170, D155, D125, D105 (SN. 010001-)

TM113219 10 MAR 16 (ENGLISH)

John Deere Commercial and Consumer Equipment Lawn and Garden
Pinted by Belgreen

TM113219

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Foreword

This manual is written for an experienced technician. Essential tools required in performing certain service work are identified in this manual and are recommended for use.

Live with safety: Read the safety messages in the introduction of this manual and the cautions presented throughout the text of the manual.

CAUTION:

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

Technical manuals are divided in two parts: repair and operation and tests. Repair sections tell how to repair the components. Operation and tests sections help you identify the majority of routine failures quickly.

Information is organized in groups for the various components requiring service instruction. At the beginning of each group are summary listings of all applicable essential tools, service equipment and tools, other materials needed to do the job, service parts kits, specifications, wear tolerances, and torque values.

Technical Manuals are concise guides for specific machines. They are on-the-job guides containing only the vital information needed for diagnosis, analysis, testing, and repair.

Fundamental service information is available from other sources covering basic theory of operation, fundamentals of troubleshooting, general maintenance, and basic type of failures and their causes.

Section 10 - GENERAL INFORMATION

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Group 05 - Safety

Recognize Safety Information

Safety-alert symbol

This is a 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 operating practices.

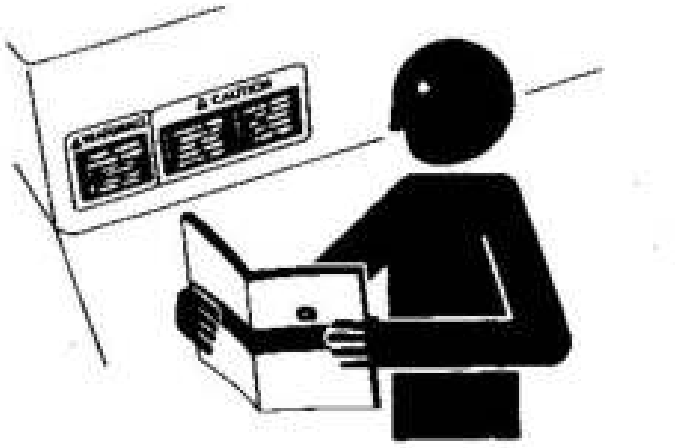
Understand Signal Words

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.

Follow Safety Instructions



Safety Messages

Carefully read all safety messages in this manual and on your machine safety signs. Keep safety signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from your John Deere dealer.

There can be additional safety information contained on parts and components sourced from suppliers that is not reproduced in this operator′s manual.

Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.

Keep your machine in proper working condition. Unauthorized modifications to the machine may impair the function and/or safety and affect machine life.

If you do not understand any part of this manual and need assistance, contact your John Deere dealer.

Practice Safe Maintenance

Keep Area Clean

Understand service procedure before doing work. Keep area clean and dry.

Never lubricate, service, or adjust machine while it is moving. Keep hands, feet , and clothing from power-driven parts. Disengage all power and operate controls to relieve pressure. Lower equipment to the ground. Stop the engine. Remove the key. Allow machine to cool.

Securely support any machine elements that must be raised for service work.

Keep all parts in good condition and properly installed. Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.

On self-propelled equipment, disconnect battery ground cable (-) before making adjustments on electrical systems or welding on machine.

On towed implements, disconnect wiring harnesses from tractor before servicing electrical system components or welding on machine.

Use Proper Tools

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.

Handle Fluids Safely—Avoid Fires

Avoid Fires

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.

Drain Gasoline When Storing Machine

Storing Gasoline

Gasoline stored in fuel tank can explode.

Never store equipment with gasoline in the tank inside a building where fumes may reach an open flame or spark.

Always drain gasoline from fuel tank and carburetor bowl when storing machine. Allow engine to cool before storing.

Prevent Acid Burns

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 the hazard 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.

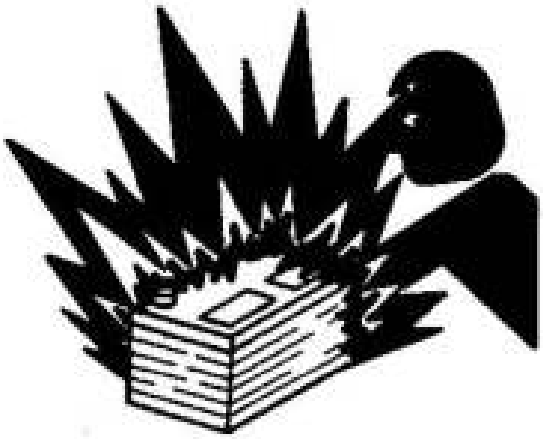
If you spill acid on yourself:

1. Flush your skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush your eyes with water for 15—30 minutes. Get medical attention immediately.

If acid is swallowed:

1. Do not induce vomiting.
2. Drink large amounts of water or milk, but do not exceed 2 L (2 quarts).
3. Get medical attention immediately.

Prevent Battery Explosions



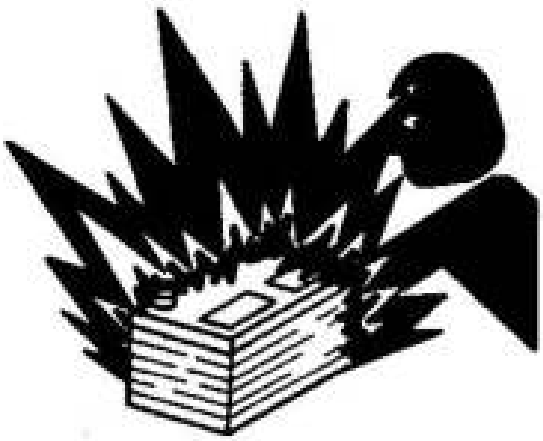
Battery Explosions

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).

Handling Batteries Safely



Caution

Caution

Battery gas can explode. Keep sparks and flames away from batteries. Use a flashlight to check battery electrolyte level.

Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.

Always remove grounded (-) battery clamp first and replace grounded clamp last.

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

Avoid hazards by:

- Filling batteries in a well-ventilated area
- Wearing eye protection and rubber gloves
- Avoiding use of air pressure to clean batteries
- Avoiding breathing fumes when electrolyte is added
- Avoiding spilling or dripping electrolyte
- Using correct battery booster or charger procedure.

If acid is spilled on skin or in eyes:

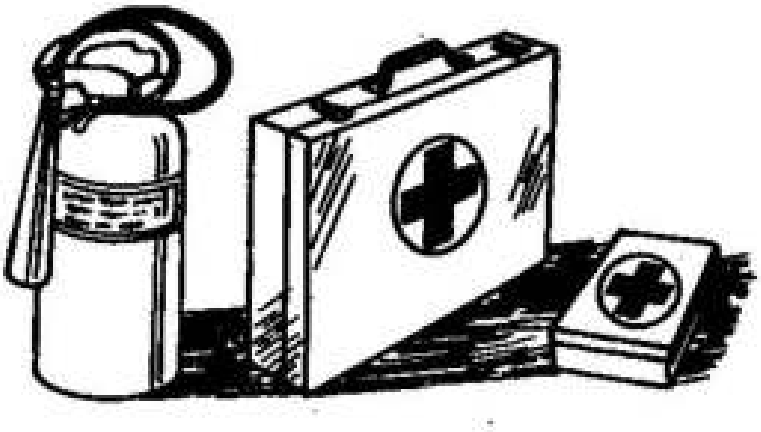
1. Flush skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush eyes with water for 15—30 minutes. Get medical attention immediately.

If acid is swallowed:

1. Do not induce vomiting.
2. Drink large amounts of water or milk, but do not exceed 2 L (2 qt.).
3. Get medical attention immediately.

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

Prepare for Emergencies



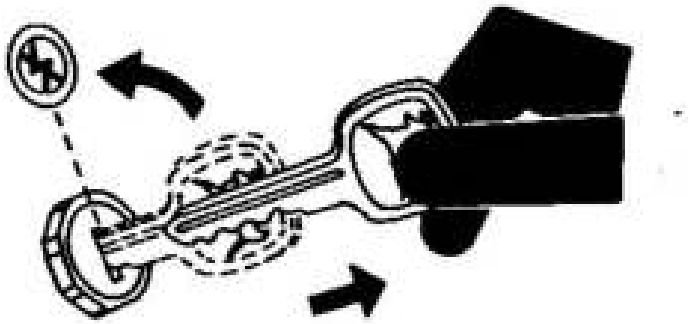
First Aid Kit

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.

Park Machine Safely

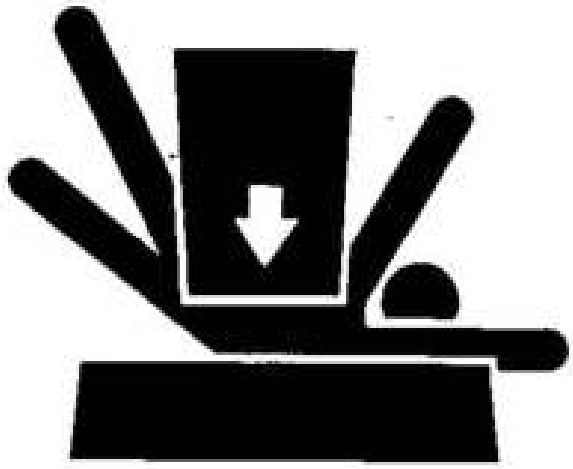


Remove the Key

Before working on the machine:

- Lower all equipment to the ground.
- Stop the engine and remove the key.
- Disconnect the battery ground strap.
- Hang a "DO NOT OPERATE" tag in operator station.

Support Machine Properly



Support Properly

Always lower the attachment or implement to the ground before you work on the machine. If the work requires that the machine or attachment be lifted, provide secure support for them. If left in a raised position, hydraulically supported devices can settle or leak down.

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.

When implements or attachments are used with a machine, always follow safety precautions listed in the implement or attachment operator’s manual.

Wear Protective Clothing

Protective Clothing

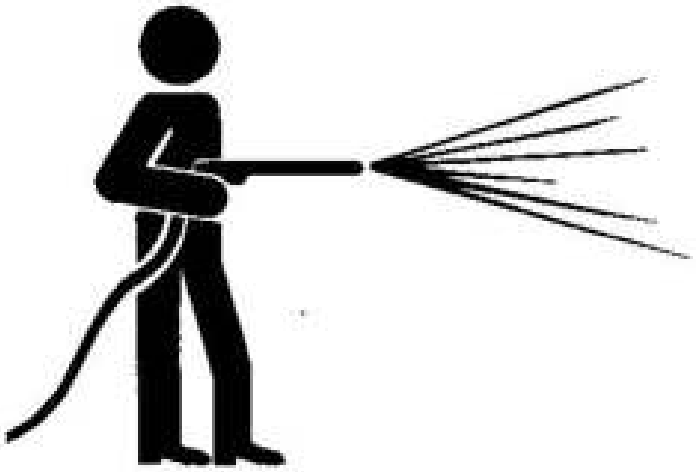
Wear close fitting clothing and safety equipment appropriate to the job.

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.

Work in Clean Area



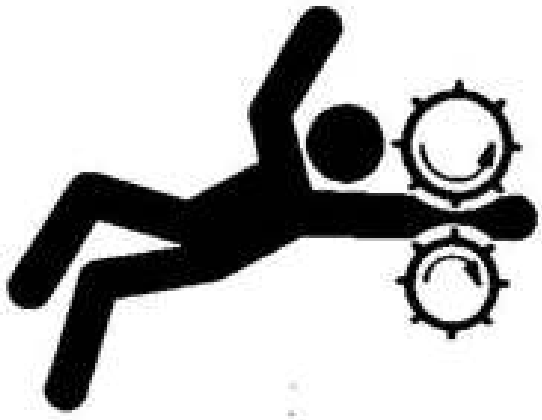
Clean Work Area

Before starting a job:

- Clean work area and machine.
- Make sure you have all necessary tools to do your job.
- Have the right parts on hand.

- Read all instructions thoroughly; do not attempt shortcuts.

Service Machines Safely

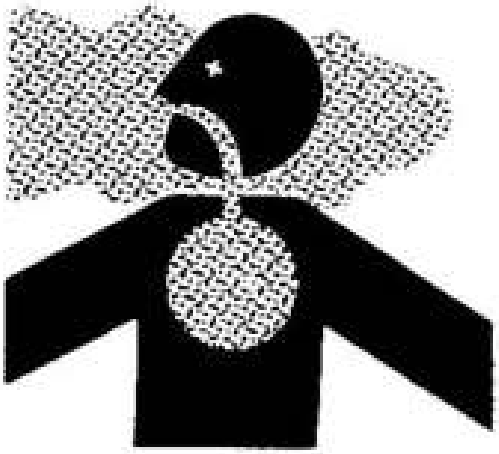


Moving Parts

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.

Work In Ventilated Area



Engine exhaust fumes

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.

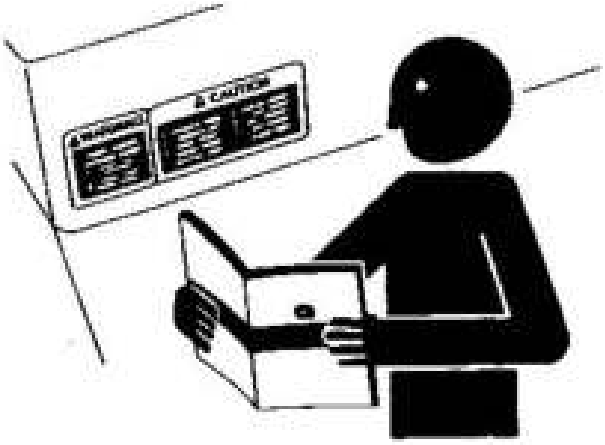
If you do not have an exhaust pipe extension, open the doors and get outside air into the area.

Illuminate Work Area Safely

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.

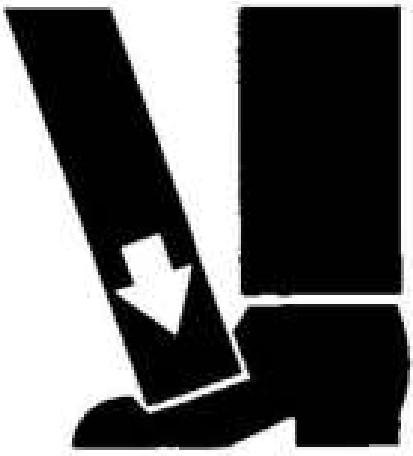
Replace Safety Signs



Safety Signs

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

Use Proper Lifting Equipment

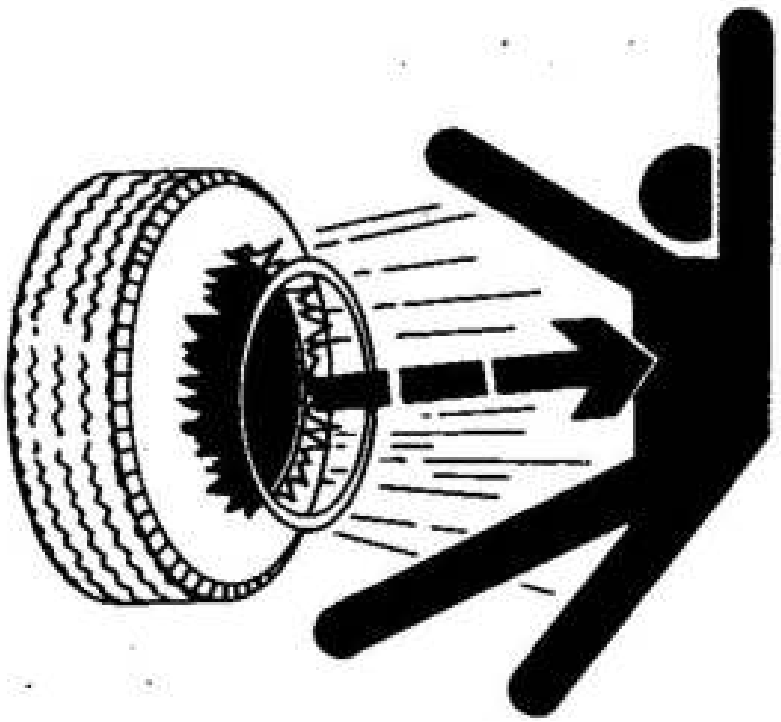


Proper Lifting Equipment

Lifting heavy components incorrectly can cause severe injury or machine damage.

Follow recommended procedure for removal and installation of components in the manual.

Service Tires Safely



Explosive Tire and Rim Parts

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

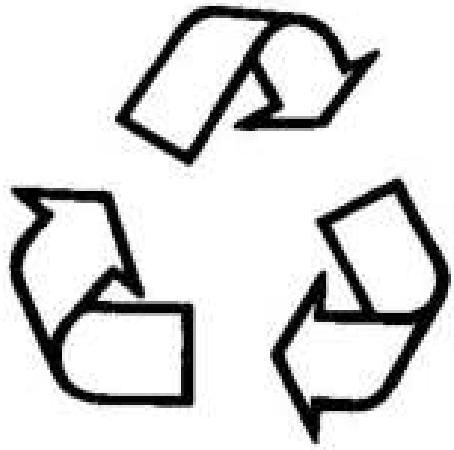
Do not attempt to mount a tire unless you have the proper equipment and experience to perform the job.

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.

Decommissioning — Proper Recycling and Disposal of Fluids and Components



Recycle Waste

Safety and environmental stewardship measures must be taken into account when decommissioning a machine and/or component. These measures include the following:

- Use appropriate tools and personal protective equipment such as clothing, gloves, face shields or glasses, during the removal or handling of objects and materials.
- Follow instructions for specialized components.
- Release stored energy by lowering suspended machine elements, relaxing springs, disconnecting the battery or other electrical power, and releasing pressure in hydraulic components, accumulators, and other similar systems.
- Minimize exposure to components which may have residue from agricultural chemicals, such as fertilizers and pesticides. Handle and dispose of these components appropriately.
- Carefully drain engines, fuel tanks, radiators, hydraulic cylinders, reservoirs, and lines before recycling components. Use leak-proof containers when draining fluids. Do not use food or beverage containers.
- Do not pour waste fluids onto the ground, down a drain, or into any water source.
- Observe all national, state, and local laws, regulations, or ordinances governing the handling or disposal of waste fluids (example: oil, fuel, coolant, brake fluid); filters; batteries; and, other substances or parts. Burning of flammable fluids or components in other than specially designed incinerators may be prohibited by law and could result in exposure to harmful fumes or ashes.
- Service and dispose of air conditioning systems appropriately. Government regulations may require a certified service center to recover and recycle air conditioning refrigerants which could damage the atmosphere if allowed to escape.
- Evaluate recycling options for tires, metal, plastic, glass, rubber, and electronic components which may be recyclable, in part or completely.
- Contact your local environmental or recycling center, or your John Deere dealer for information on the proper way to recycle or dispose of waste.

Protect Against High Pressure Spray

High Pressure Spray

Spray from high pressure nozzles can penetrate the skin and cause serious injury. Keep spray from contacting hands or body.

If an accident occurs, see a doctor immediately. Any high pressure spray 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.

Live With Safety

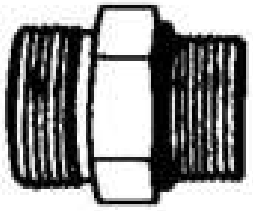
Safety Systems

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

Group 20 - General Specifications

Service Recommendations for O-Ring Boss Fittings

Straight Fitting



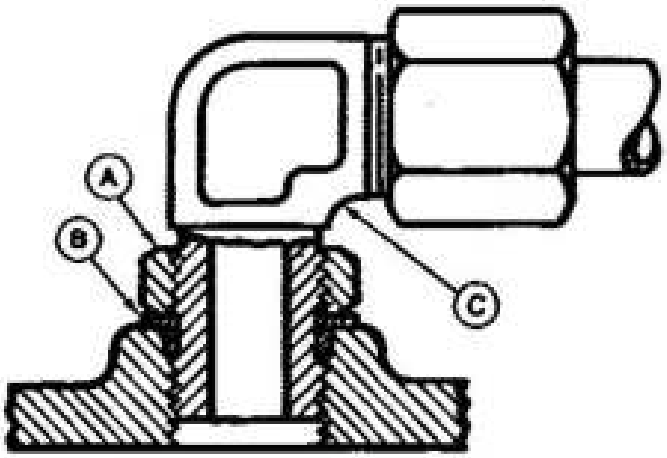
Straight Fitting

[1] - Inspect O-ring boss seat for dirt or defects.

[2] - Lubricate O-ring with petroleum jelly. Place electrical tape over threads to protect O-ring. Slide O-ring over tape and into O-ring groove of fitting. Remove tape.

[3] - Tighten fitting to torque value shown on chart.

Angle Fitting



Angle Fitting

[1] - Back-off lock nut (A) and back-up washer (B) completely to head-end (C) of fitting.

[2] - Turn fitting into threaded boss until back-up washer contacts face of boss.

[3] - Turn fitting head-end counterclockwise to proper index (maximum of one turn).

[4] -

→NOTE:

Do not allow hoses to twist when tightening fittings.

Hold fitting head-end with a wrench and tighten locknut and back-up washer to proper torque value.

Straight Fitting or Special Nut Torque Chart

STRAIGHT FITTING OR SPECIAL NUT TORQUE CHART		
Thread Size	**N˙m**	**lb-ft**
3/8-24 UNF	8	6
7/16-20 UNF	12	9
1/2-20 UNF	16	12
9/16-18 UNF	24	18
3/4-16 UNF	46	34
7/8-14 UNF	62	46
1-1/16-12 UN	102	75
1-3/16-12 UN	122	90
1-5/16-12 UN	142	105
1-5/8-12 UN	190	140
1-7/8-12 UN	217	160

→NOTE:

Torque tolerance is ± 10%.

Service Recommendations For Flat Face O-Ring Seal Fittings

[1] - Inspect the fitting sealing surfaces and O-ring. They must be free of dirt or defects.

[2] - Lubricate O-rings and install into grove using petroleum jelly to hold in place.

[3] - Index angle fittings and tighten by hand pressing joint together to insure O-ring remains in place.

[4] - Tighten fitting or nut to torque value shown on the chart. Do not allow hoses to twist when tightening fittings, use backup wrench on straight hose couplings.

IMPORTANT:

Tighten fittings to 150% of listed torque value if indexing is necessary or if fitting is attached to an actuating device.

Tighten fittings to 50% of listed torque value if used in aluminum housing.

O-ring Seal Fitting Torque

FLAT FACE O-RING SEAL FITTING TORQUE*						
Nomial Tube O.D.		**Thread Size**	**Swivel Nut**		**Bulkhead Nut**	
mm	**in.**	**in.**	**N˙m**	**lb·ft**	**N˙m**	**lb·ft**
6.35	0.250	9/16-18	16	12	12	9
9.52	0.375	11/16-16	24	18	24	18
12.70	0.500	13/16-16	50	37	46	34
15.88	0.625	1-14	69	51	62	46
19.05	0.750	1 3/16-12	102	75	102	75
22.22	0.875	1 3/16-12	102	75	102	75
25.40	1.000	1 7/16-12	142	105	142	105
31.75	1.250	1 11/16-12	190	140	190	140
38.10	1.500	2-12	217	160	217	160
*Torque tolerance is +15 -20% unless otherwise specified.						

Stud End O-ring Seal Torque for Straight and Adjustable Fittings*				
Thread Size	**Straight Hex Size**	**Locknut Hex Size**	**Straight Fitting or Locknut Toque**	
Inch	**Inch**	**Inch**	**N˙m**	**lb·ft**
3/8-24	5/8	9/16	12	9
7/16-20	5/8	5/8	21	15
1/2-20	3/4	11/16	26	19
9/16-18	3/4	3/4	34	25
3/4-16	7/8	15/16	73	55
7/8-14	1 1/16	1 1/16	104	76
1 1/16-12	1 1/4	1 3/8	176	130
1 3/16-12	1 3/8	1 1/2	230	170
1 5/16-12	1 1/2	1 5/8	285	210
*Torque tolerance is +15 -20% unless otherwise specified.				

Metric Cap Screw Torque Values—Grade 7

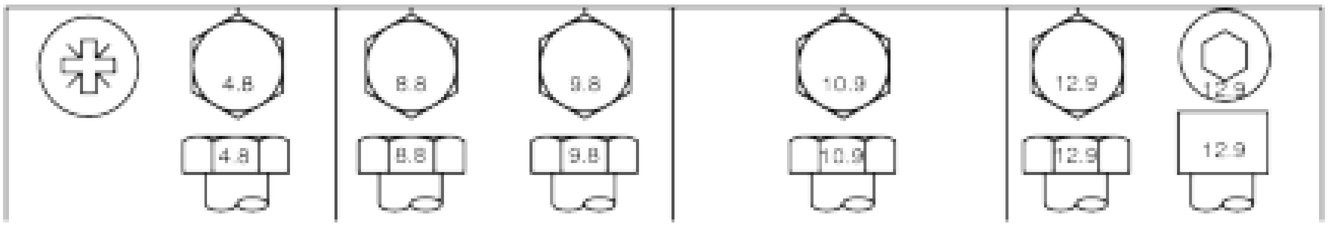
→NOTE:

When bolting aluminum parts, tighten to 80% of torque specified in table.

Metric Cap Screw Torque Values—Grade 7

Size	N˙m	(lb-ft)
M6	9.5—12.2	(7—9)
M8	20.3—27.1	(15—20)
M10	47.5—54.2	(35—40)
M12	81.4—94.9	(60—70)
M14	128.8—146.4	(95—108)
M16	210.2—240	(155—177)

Metric Bolt and Screw Torque Values



Metric Bolt and Screw

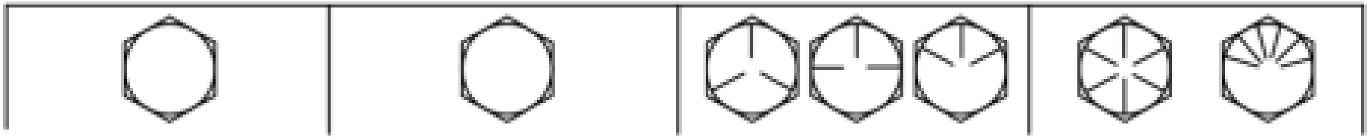
Metric Torque Values

Bolt or Screw Size	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated ["Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or M20 and larger fasteners with JDM F13C, F13F or F13J zinc flake coating.]		**Dry** ["Dry" means plain or zinc plated without any lubrication, or M6 to M18 fasteners with JDM F13B, F13E or F13H zinc flake coating.]		**Lubricated** ["Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or M20 and larger fasteners with JDM F13C, F13F or F13J zinc flake coating.]		**Dry** ["Dry" means plain or zinc plated without any lubrication, or M6 to M18 fasteners with JDM F13B, F13E or F13H zinc flake coating.]		**Lubricated** ["Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or M20 and larger fasteners with JDM F13C, F13F or F13J zinc flake coating.]		**Dry** ["Dry" means plain or zinc plated without any lubrication, or M6 to M18 fasteners with JDM F13B, F13E or F13H zinc flake coating.]		**Lubricated** ["Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or M20 and larger fasteners with JDM F13C, F13F or F13J zinc flake coating.]		**Dry** ["Dry" means plain or zinc plated without any lubrication, or M6 to M18 fasteners with JDM F13B, F13E or F13H zinc flake coating.]	
	N˙m	**lb.-in.**	**N˙m**	**lb.-in.**	**N˙m**	**lb.-in.**	**N˙m**	**lb.-in.**	**N˙m**	**lb.-in.**	**N˙m**	**lb.-in.**	**N˙m**	**lb.-in.**	**N˙m**	**lb.-in.**
M6	4.7	42	6	53	8.9	79	11.3	100	13	115	16.5	146	15.5	137	19.5	172
									N˙m	**lb.-ft.**	**N˙m**	**lb.-ft.**	**N˙m**	**lb.-ft.**	**N˙m**	**lb.-ft.**
M8	11.5	102	14.5	128	22	194	27.5	243	32	23.5	40	29.5	37	27.5	47	35
			N˙m	**lb.-ft.**	**N˙m**	**lb.-ft.**	**N˙m**	**lb.-ft.**								
M10	23	204	29	21	43	32	55	40	63	46	80	59	75	55	95	70
	N˙m	**lb.-ft.**														
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	255	320	235	400	300
M18	135	100	170	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	1080	800
M24	330	245	425	315	650	480	820	600	920	680	1150	850	1080	800	1350	1000
M27	490	360	625	460	950	700	1200	885	1350	1000	1700	1250	1580	1160	2000	1475
M30	660	490	850	625	1290	950	1630	1200	1850	1350	2300	1700	2140	1580	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

Torque values listed are for general use only, based on the strength of the bolt or screw. DO NOT use these values if a different torque value or tightening procedure is given for a specific application. For stainless steel fasteners or for nuts on U-bolts, see the tightening instructions for the specific application. Tighten plastic insert or crimped steel type lock nuts by turning the nut to the dry torque shown in the chart, unless different instructions are given for the specific application.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical property class. Replace fasteners with the same or higher property class. If higher property class fasteners are used, tighten these to the strength of the original. Make sure fastener threads are clean and that you properly start thread engagement. When possible, lubricate plain or zinc plated fasteners other than lock nuts, wheel bolts or wheel nuts, unless different instructions are given for the specific application.

Unified Inch Bolt and Screw Torque Values



Unified Inch Bolt and Screw

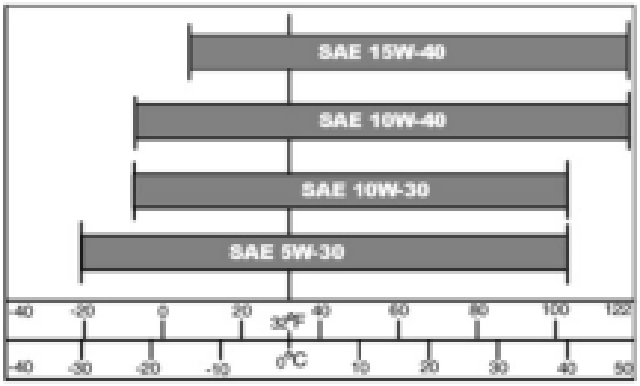
Unified Inch Bolt and Screw Torque Values

Bolt or Screw Size	SAE Grade 1				SAE Grade 2 [Grade 2 applies for hex cap screws (not hex bolts) up to 6 in. (152 mm) long. Grade 1 applies for hex cap screws over 6 in. (152 mm) long, and for all other types of bolts and screws of any length.]				SAE Grade 5, 5.1 or 5.2				SAE Grade 8 or 8.2			
	Lubricated ["Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or 7/8 in. and larger fasteners with JDM F13C, F13F or F13J zinc flake coating.]		Dry ["Dry" means plain or zinc plated without any lubrication, or 1/4 to 3/4 in. fasteners with JDM F13B, F13E or F13H zinc flake coating.]		Lubricated ["Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or 7/8 in. and larger fasteners with JDM F13C, F13F or F13J zinc flake coating.]		Dry ["Dry" means plain or zinc plated without any lubrication, or 1/4 to 3/4 in. fasteners with JDM F13B, F13E or F13H zinc flake coating.]		Lubricated ["Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or 7/8 in. and larger fasteners with JDM F13C, F13F or F13J zinc flake coating.]		Dry ["Dry" means plain or zinc plated without any lubrication, or 1/4 to 3/4 in. fasteners with JDM F13B, F13E or F13H zinc flake coating.]		Lubricated ["Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or 7/8 in. and larger fasteners with JDM F13C, F13F or F13J zinc flake coating.]		Dry ["Dry" means plain or zinc plated without any lubrication, or 1/4 to 3/4 in. fasteners with JDM F13B, F13E or F13H zinc flake coating.]	
	N˙m	lb.-in.	N˙m	lb.-in.	N˙m	lb.-in.	N˙m	lb.-in.	N˙m	lb.-in.	N˙m	lb.-in.	N˙m	lb.-in.	N˙m	lb.-in.
1/4	3.7	33	4.7	42	6	53	7.5	66	9.5	84	12	106	13.5	120	17	150
													N˙m	lb.-ft.	N˙m	lb.-ft.
5/16	7.7	68	9.8	86	12	106	15.5	137	19.5	172	25	221	28	20.5	35	26
									N˙m	lb.-ft.	N˙m	lb.-ft.				
3/8	13.5	120	17.5	155	22	194	27	240	35	26	44	32.5	49	36	63	46
			N˙m	lb.-ft.	N˙m	lb.-ft.	N˙m	lb.-ft.								
7/16	22	194	28	20.5	35	26	44	32.5	56	41	70	52	80	59	100	74
	N˙m	lb.-ft.														
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
Torque values listed are for general use only, based on the strength of the bolt or screw. DO NOT use these values if a different torque value or tightening procedure is given for a specific application. For plastic insert or crimped steel type lock nuts, for stainless steel fasteners, or for nuts on U-bolts, see the tightening instructions for the specific application. Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.									Replace fasteners with the same or higher grade. If higher grade fasteners are used, tighten these to the strength of the original. Make sure fastener threads are clean and that you properly start thread engagement. When possible, lubricate plain or zinc plated fasteners other than lock nuts, wheel bolts or wheel nuts, unless different instructions are given for the specific application.							

Group 15 - Fuel and Lubricants

Engine Oil

Use oil viscosity based on the expected air temperature range during the period between oil changes.



Oil Chart

The following John Deere oils are preferred:

- TURF-GARD™
- PLUS- 4™

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

- API Service Classification SJ or higher

Oil Filters

Filtration of oils is critical to proper operation and lubrication.

Always change filters regularly as specified in this manual.

Use filters meeting John Deere performance specifications.

Gasoline Fuel for 4-Cycle Engines

Use unleaded gasoline with a minimum octane rating of 87 AKI (anti-knock index) or 90 RON (research octane number). Gasoline fuels specified to EN 228 or ASTM D4814 are recommended.

Fuel blends of unleaded gasoline with a maximum 10% ethanol or 15% MTBE (methyl tertiary-butyl ether) are also acceptable.

CAUTION:

Reduce the risk of fire. Handle fuel carefully. DO NOT fill the fuel tank when the engine is running or hot. Stop engine and allow it to cool for several minutes before filling fuel tank. Fill fuel tank only to the bottom of the filler neck.

Refuel outdoors. DO NOT smoke while you fill the fuel tank or service the fuel system.

Store fuel in properly identified polyethylene containers.

When storing fuel, add John Deere Gasoline Conditioner and Stabilizer (or equivalent) at the specified concentration.

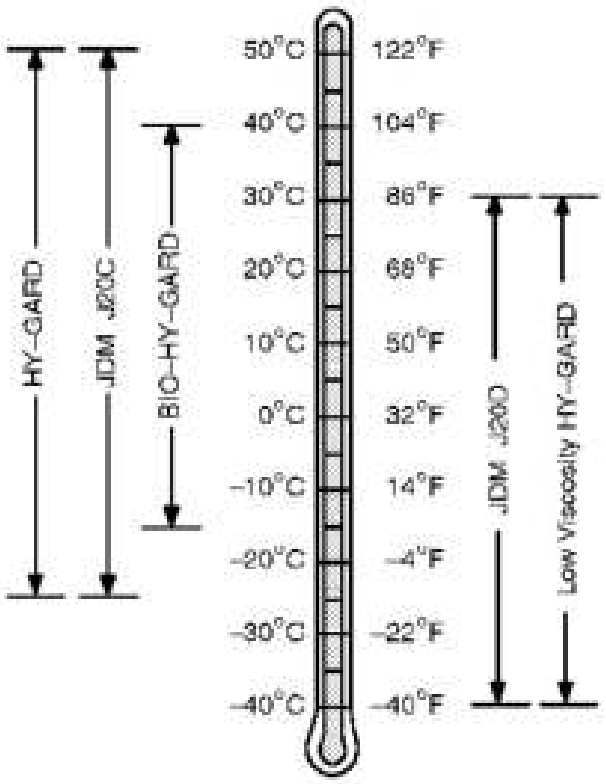
IMPORTANT:

DO NOT use methanol or fuel blends that contain methanol.

Avoid spilling fuel. Gasoline can damage plastic and painted surfaces.

DO NOT mix oil with gasoline.

Transmission and Hydraulic Oil



Transmission and Hydraulic Oil

Use oil viscosity based on the expected air temperature range during the period between oil changes.

The following oils are preferred:

- John Deere HY-GARD ™
- John Deere Low Viscosity HY-GARD ™

Other oils may be used if they meet one of the following:

- John Deere Standard JDM J20C
- John Deere Standard JDM J20D

Use John Deere BIO-HY-GARD ™ oil when a biodegradable fluid is required.

[BIO-HY-GARD meets or exceeds the minimum biodegradability of 80% within 21 days according to CEC-L-33-T-82 test method. BIO-HY-GARD should not be mixed with mineral oils, because this reduces the biodegradability and makes proper oil recycling impossible.]

Grease

IMPORTANT:

Avoid Damage! Use recommended John Deere greases to avoid component failure and premature wear.

The following grease is recommended for service:

- John Deere Multi-Purpose HD Lithium Complex Grease
- Grease-Gard™ Premium Plus

Not all grease types are compatible; John Deere does not recommend mixing greases. If using any product other than the recommended grease in service, purge any remaining grease from the system prior to application. If this is not practical, grease twice as often until all old grease is purged from the system.

Mixing of Lubricants

In general, avoid mixing different brands or types of oil. Oil manufacturers blend additives in their oils to meet certain specifications and performance requirements.

Mixing different oils can interfere with the proper functioning of these additives and degrade lubricant performance.

Consult your John Deere dealer to obtain specific information and recommendations.

Alternative and Synthetic Lubricants

Conditions in certain geographical areas may require lubricant recommendations different from those printed in this manual.

Some John Deere brand coolants and lubricants may not be available in your location.

Consult your John Deere dealer to obtain information and recommendations.

Synthetic lubricants may be used if they meet the performance requirements as shown in this manual.

The temperature limits and service intervals shown in this manual apply to both conventional and synthetic lubricants.

Re-refined base stock products may be used if the finished lubricant meets the performance requirements.

Lubricant Storage

Your equipment can operate at top efficiency only when clean lubricants are used.

Use clean containers to handle all lubricants.

Store lubricants and containers in an area protected from dust, moisture, and other contamination. Store containers on their side to avoid water and dirt accumulation.

Make certain that all containers are properly marked to identify their contents.

Properly dispose of all old containers and any residual lubricant they may contain.

Carburetor Cleaning

Debris, corrosion, rust, or varnish can build up in the internal air/fuel passages. Many times the contamination is located in an area of the carburetor that is not visible. In most cases proper cleaning can resolve these issues.

Carburetors and carburetor components can be cleaned by using one of several types of commercial cleaning methods: aerosol sprays, caustic dip tanks, and ultrasonic cleaners.

→NOTE:

Some cleaning chemicals may be flammable and have toxic fumes. Always follow the chemical manufacturer's recommendations. Always wear personal protection gear such as safety glasses protective gloves and work in a well ventilated area. Do not use drill or hard wire to clean carburetor passage ways.

Cleaning Procedure

Always follow the solvent manufacturer's recommendations for material compatibility because some solvents may attack metal, plastic or rubber components.

[1] - Clean debris off the outside of the carburetor before disassembly.

[2] - Completely disassemble the carburetor per the instructions in the Technical Manual and visually inspect.

[3] - Determine if carburetor is repairable, excessive corrosion may determine this is not practical.

[4] - If repairable, clean any remaining dirt and old gaskets from the carburetor.

The preferred method of cleaning is to use an ultrasonic cleaner.

IMPORTANT:

Wires and metal instruments should not be used. Light damage or deposits on the surface of the float valve seat can be removed using a cotton swab with a mild abrasive such as toothpaste or 800 grit lapping compound.

Carburetor Assembly

When the carburetor is ready for assembly, lay out all the necessary components on a clean surface. Be aware that even clean shop rags may contain dirt and metal shavings. Assemble the carburetor in accordance with the instructions in the Technical Manual. Keep the following in mind:

- Check the throttle shaft for excessive play or movement and any signs of binding.
- Never use oil on the throttle shaft because it attracts dirt which can cause premature wear of the throttle shaft seals.
- If the throttle shaft was removed use new screws and follow the service manual torque specifications.
- Always check the float and float valve for binding with the float valve installed in its proper position.
- Replacement of all gaskets and seals is necessary when servicing any carburetor.
- Inspect the carburetor insulator for damage and replace if necessary. Be sure to install the insulator using the correct orientation.
- Clean and flush the complete fuel system.
- Fuel lines must be replaced if they are brittle, cracked, excessively soft or damaged.
- Replace the fuel filter and air filter after cleaning the carburetor.

Carburetor Cleaning Methods

Ultrasonic Cleaning Systems

Ultrasonic cleaners use environmentally friendly cleaning solution and sound waves to penetrate deep into carburetor passages. Heating the solution is an option on ultrasonic cleaners that significantly increases the effectiveness of the system. Ultrasonic cleaner systems work by creating sound wave pulses that are transmitted through a cleaning solution. Manufactures of ultrasonic cleaners claim the pulses create small bubbles that loosen and pulverizes contaminates. Select a chemical solution that is designed specifically for carburetor cleaning.

Generally, chemicals will need to be diluted with water prior to use. When choosing a chemical, consider dilution rates to help determine which chemical is the most cost effective. Consider disposal of cleaning solution before ordering chemicals. Check with local authorities on recommended disposal methods before disposing of any cleaning solution. Ultrasonic cleaners come in many sizes. Most 5.7— 7.6 L (1.5-2 gal.) tanks will be sufficient for carburetors used by John Deere gas engines.

If an Ultrasonic Cleaner is used, place carburetor in and run for 30 minutes at 43.4° C (110° F) in the proper solution mix. If the solution is too strong or the carburetor is left in the cleaner for too long, the aluminum body will have a residue on the surface from the aluminum oxidizing.

Rinse the parts in water and dry with compressed air (up to 210 kPa [30 psi]).

CAUTION:

Compressed air can cause debris to fly a long distance

- ***Clear work area of bystanders***
- ***Wear eye protection when using compressed air for cleaning purposes.***
- ***Reduce compressed air pressure to 210 kPa (30 psi).***

Wash off and blow ports out in carburetor body, fuel transfer tubes, and discharge port. Blow compressed air through carburetor passages in the opposite direction of the air and fuel flow (into the smallest passages to flush debris out of the larger passages). This will prevent debris lodging in difficult to clean areas.

Aerosol Cleaner

Personal safety, environmental concerns and cleaning effectiveness make this method the least desirable. This method can be used on carburetor components that may be damaged by caustic cleaners (rubber seals or other non-metallic components). When cleaning with aerosol sprays, it is always best to spray in the opposite direction of the air/fuel circuit (into the smallest passages to flush debris out of the larger passages). This will prevent debris lodging in difficult to clean areas.

CAUTION:

Vapors from solvents can be explosive and flammable. Follow the instructions on the container label for safe use of the solvent.

- ***Work in a well-ventilated area.***
- ***Wear protective clothing when handling solvent.***
- ***Do not smoke while handling solvents.***
- ***Keep solvent away from flames or sparks***

Caustic Dip Tanks

Caustic dip tanks use aggressive chemicals to dissolve carbon based contamination. This method is effective for most carburetor cleaning needs.

Rotating the parts in the tank will ensure the cleaning solution flushes out any air pockets left in the passages. Follow the recommendation on the cleaner for submersion times. Disadvantages of the caustic dip tanks are that some carburetor parts may be damaged if left in solution too long.

Personal safety and chemical disposal are additional concerns. Because the chemical is caustic, exposure may cause injury or death. Disposal of used solution can be difficult because most cleaners are considered hazardous waste.

Group 25 - Machine Specifications

Machine Specifications

→NOTE:

Specifications and design subject to change without notice.

General Specifications

	D100 Series
Ground Speed (Hydrostatic Machines):	
Forward	0—8.9 km/h (0—5.5 mph)
Reverse	0—5.1 km/h (0—3.2 mph)
Ground Speed (CVT Machines):	
Forward	0—8.9 km/h (0—5.5 mph)
Reverse	0—4.8 km/h (0—3.0 mph)

Engines:		
Make	Briggs & Stratton	
Engine Power Information	http://www.briggsandstratton.com	
Engine	Model Number	Series
Model D100, D105 (-MY2013)	31G777 (M31)	Intek™ Single cylinder
Model D105 (MY2014-)	31R977 (M31)	Intek™ Single cylinder
Model D110 (-MY2013)	31P677 (M31)	Intek™ Single cylinder
Model D110 (MY2014-)	33R877 (M33)	Intek™ Single cylinder
Model D115	40R877 (M40)	Intek™ V-Twin
Model D120	331877 (M33)	Intek™ Single cylinder
Model D125	40R877 (M40)	Intek™ V-Twin
Model D130 (-MY2013), D140	407777 (M40)	Intek™ V-Twin
Model D130 (MY2014-)	44R677 (M44)	Intek™ V-Twin
Model D150	40H777 (M40)	Extended Life Series™ V-Twin
Model D160 (-MY2013)	44M777 (M44)	Extended Life Series™ V-Twin
Model D170 (-MY2013)	44P777 (M44)	Extended Life Series™ V-Twin
Model D155, D160, D170 (MY2014-)	44S977 (M44)	Extended Life Series™ V-Twin

Fuel System:	
Type	Mechanical Vacuum Pump
Tank Capacity	9 L (2.4 gal.)

Electrical System:	
Type	12 Volt Negative Ground
Stator Output	6—16.6 amp regulated at 12.2—13.8 VDC
Battery	12-volt
Battery Type	BCI Group U1
Spark Plug Torque	20 N·m (180 lb.-in.)
Spark Plug Gap	0.76 mm (0.030 in.)
Ignition Coil Air Gap	0.20—0.30 mm (0.008—0.012 in.)

Power Train:	
D100	Dana 4360 Gear Transaxle
D105	General Transmissions RT400 CVT Transaxle
D110, D125, D130 (S.N. -600000)	Tuff Torq® T40J Transaxle

D110, D125, D130 (S.N. 600001-)	Tuff Torq® TLT200A Transaxle
D120, D140, D150, D155	Tuff Torq® T40J Transaxle
D160, D170	Tuff Torq® K46AC Transaxle
Transaxle Oil (factory fill)	10W-30 Engine Oil
Transaxle Oil (extreme or high hour applications)	John Deere HY-GARD (J20C), or 5W-50

Engine Specifications

Engine Specifications:				
	M31	M33	M40	M44
Low Idle Speed (Governed)	1750 ± 100 rpm			
High Idle Speed	3350 ± 100 rpm			
Displacement	0.501 L (30.59 $in.^3$)	0.540 L (32.95 $in.^3$)	0.656 L (40.03 $in.^3$)	0.725 L (44.24 $in.^3$)
Bore	90.48 mm (3.562 in.)	94.02 mm (3.702 in.)	79.25 mm (3.12 in.)	
Stroke	77.78 mm (3.06 in.)		73.40 mm (2.89 in.)	
Alternator	9 amp		8 amp	14 amp

Lubrication	pressurized	
Crankcase Capacity	1.4 L (1.5 qt.)	1.8 L (1.9 qt.)
Crankcase (with Filter)	—	1.9 L (2.0 qt.)
Cooling	Air Cooled	
Air Cleaner	Cartridge	Paper with Foam Element, or Cartridge
Engine Shut Off	Key Switch	

Tire Specifications

Tire Specifications:				
	Front Tires		Rear Tires	
	Size	Pressure	Size	Pressure
D100, D105, D110, D120, D125	15 x 6.0 - 6	97 kPa (14 psi)	20 x 8.0 - 8	69 kPa (10 psi)
D130, D140, D155	15 x 6.0 - 6	97 kPa (14 psi)	20 x 10.0 - 8	69 kPa (10 psi)
D160, D170	16 x 6.5 - 8	83 kPa (12 psi)	22 x 9.5 - 12	83 kPa (12 psi)

Product Identification Number Location

If you need to contact an authorized Service Center for information on servicing, always provide the product model and identification numbers.

When ordering parts or submitting a warranty claim, it is IMPORTANT that the machine product identification number (PIN) and component serial numbers are included. The location of the PIN and component serial numbers are shown.

Machine Product Identification Number

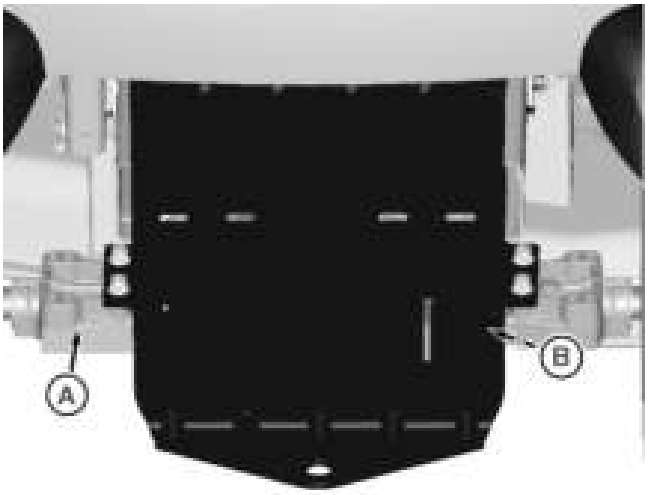
Located on left side of frame.

Engine Serial Number

Single Cylinder Engines

V-Twin Engines

Transaxle Serial Number



LEGEND:

A	(SN 060001-) Left Side
B	(SN -060000) Right Side

Transaxle Serial Number Location

The transaxle serial number is located on the back of the transaxle on either the left side (A) or the right side (B) based on the machine serial number.

Section 20 - SINGLE CYLINDER ENGINE REPAIR

Table of contents

Group 10 - Single Cylinder Engine Repair

Summary of References

Specifications

Item	Measurement	Specification
Blower Housing Screws	Torque	10 N·m (85 lb.-in.)
Carburetor Mounting Studs	Torque	8 N·m (70 lb.-in.)
Air Cleaner Base Hardware	Torque	4.5 N·m (40 lb.-in.)
Throttle Valve Screw	Torque	4.5 N·m (40 lb.-in.)
Fuel Shutoff Solenoid	Torque	5 N·m (44 lb.-in.)
Breather Cover Screws	Torque	3 N·m (25 lb.-in.)
Engine Mounting Cap Screws	Torque	50 N·m (37 lb.-ft.)
Pulley-to-Engine Output Shaft Cap Screw	Torque	75 N·m (55 lb.-ft.)
Exhaust Manifold Cap Screws	Torque	19 N·m (165 lb.-in.)
Muffler Mounting Cap Screws	Torque	19 N·m (165 lb.-in.)
Heat Shield Cap Screws	Torque	5 N·m (40 lb.-in.)
Cylinder Head Bolts	Torque	25 N·m (220 lb.-in.)
Rocker Arm Stud	Torque	17 N·m (150 lb.-in.)
Rocker Arm Nut	Torque	7 N·m (60 lb.-in.)
Valve Cover Screws	Torque	6 N·m (55 lb.-in.)
Intake Manifold Bolts	Torque	11 N·m (100 lb.-in.)
Valve Margin		
Valve Margin	Thickness	0.8 mm (0.030 in.)
Valve Margin Wear Limit	Thickness	0.4 mm (0.0156 in.)
Valve Seat	Width	0.8—1.6 mm (0.031—0.063 in.)
Valve Guide (Intake and Exhaust) Reject	ID	6.09 mm (0.240 in.)
Rocker Arm Studs	Torque	17 N·m (150 lb.-in.)
Oil Sump Cover Screws	Torque	20 N·m (180 lb.-in.)
Cylinder Specifications		
Cylinder Out of Round	Maximum	0.04 mm (0.002 in.)
Cylinder Oversized	Maximum	0.08 mm (0.003 in.)

Item	Measurement	Specification
Piston Ring End Gap		
Top Compression Ring	Gap (maximum)	0.64 mm (0.025 in.)
Center Compression Ring	Gap (maximum)	0.76 mm (0.030 in.)
Oil Control Ring	Gap (maximum)	0.76 mm (0.030 in.)
Cylinder Bore ID		
Standard Bore	ID	90.47 mm (3.562 in.)
Standard Bore (maximum)	ID	90.51 mm (3.563 in.)
Oversize Bore	ID	90.98 mm (3.582 in.)
Connecting Rod and Piston Pin Wear Limits		
Crankpin Bearing	ID	38.15 mm (1.502 in.)
Piston Pin Bearing	ID	20.35 mm (0.801 in.)
Piston Pin	OD	20.29 mm (0.799 in.)
Piston Pin Wear	OD (maximum)	0.01 mm (0.001 in.)
Connecting Rod Cap Bolts	Torque	17 N·m (150 lb.-in.)
Flywheel Bolt	Torque	136 N·m (100 lb.-ft.)
Flywheel Fan Cap Screws	Torque	16 N·m (140 lb.-in.)
Crankshaft Wear Limits		
PTO Journal	Diameter	41.20 mm (1.622 in.)
Magneto Journal	Diameter	34.95 mm (1.376 in.)
Crankshaft Pin	Diameter	38.02 mm (1.497 in.)
Eccentric Journal	Diameter	55.93 mm (2.202 in.)
Cam Gear Wear Limits		
Camshaft PTO Journal	Diameter	12.65 mm (0.498 in.)
Camshaft Magneto Journal	Diameter	12.65 mm (0.498 in.)
Cam Lobe	Diameter	30.07 mm (1.184 in.)
Compression Bearing	Diameter	12.8 mm (0.504 in.)
Crankcase Cover Bolts	Torque	20 N·m (180 lb.-in.)
Balance System Wear Limits		
Crankshaft Eccentric Journal	OD	55.93 mm

Item	Measurement	Specification
		(2.202 in.)
Counterweight Link Bearing	ID	56.13 mm
		(2.210 in.)
Magneto Bearing Wear Limit	ID	35.13 mm
		(1.383 in.)
Cam Bearing Wear Limit	ID	12.80 mm
		(0.504 in.)
PTO Journal and Oil Seal		
PTO Journal Wear Limit	ID	41.37 mm
		(1.629 in.)
Oil Seal	Depth	Flush
Starter (Inertia) Minimum Brush	Length	3.2 mm
		(0.125 in.)
Through Bolts	Torque	6 N·m
		(50 lb.-in.)
Mounting Bolts	Torque	16 N·m
		(140 lb.-in.)

Essential or Recommended Tools

→NOTE:

Order tools from the SERVICEGARD ™ Catalog.

ESSENTIAL TOOLS listed are required to perform the job correctly and are obtainable only from the SERVICEGARD ™ Catalog.

RECOMMENDED TOOLS, as noted, are suggested to perform the job correctly. Some tools may be available from local suppliers or may be fabricated.

Briggs & Stratton Flywheel Tool

19203

Remove Flywheel

Service Equipment and Tools

→NOTE:

Order tools according to information given in the SERVICEGARD ™ Catalog. Some tools may be available from a local supplier.

C-Ring Removal Tool

JDG1087

Use to remove retainer C-ring from inertia starting motor pinion gear.

C-Ring Installer Tool

JDG1086

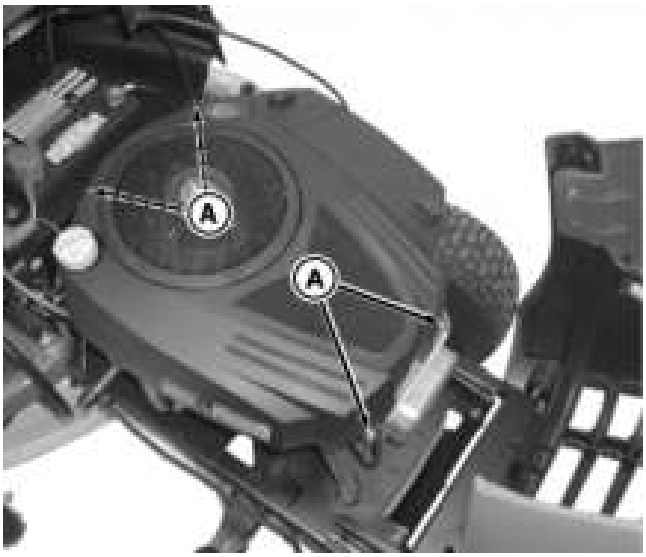
Use to install retainer C-ring to inertia starting motor pinion gear.

Remove and Install Upper Blower Housing

LEGEND:

A	Screws

D100, D110 Shown.



D120 Shown.

[1] - Remove 4 screws (A) holding the outer blower housing in place.

[2] - Remove the air cleaner cover and air cleaner.

[3] - Lift outer blower housing up and off of engine.

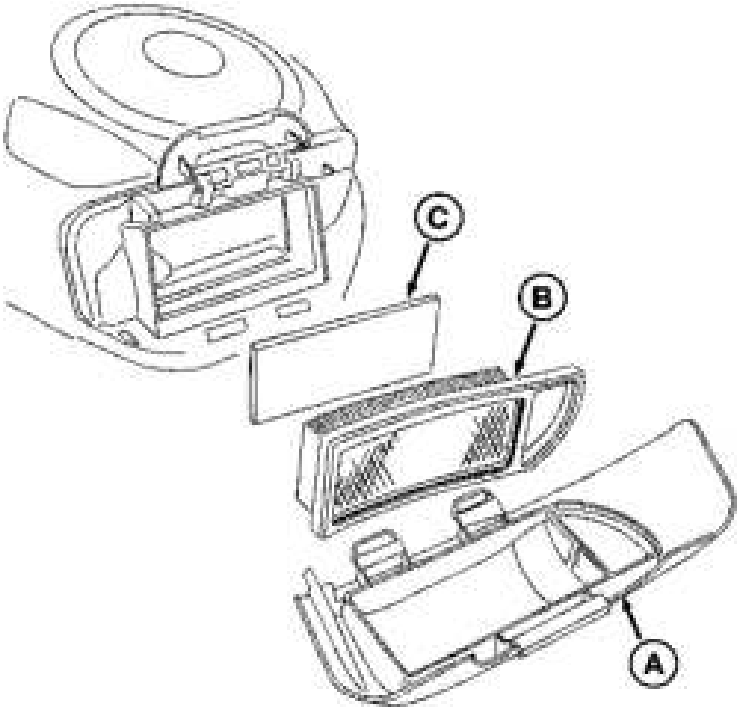
[4] - Remove the screw holding the dipstick tube in place.

[5] - Install in reverse order of removal.

[6] - Tighten screws to specification.

Item	Measurement	Specification
Blower Housing Screws	Torque	10 N·m (85 lb.-in.)

Service Air Cleaner



LEGEND:

A	Cover
B	Cartridge
C	Foam Pre-Cleaner

Flat Air Filter

Flat Filter

[1] -

IMPORTANT:

Avoid Damage! DO NOT use petroleum solvents, such as kerosene, to clean paper cartridge. They may cause cartridge to deteriorate. DO NOT oil paper cartridge. DO NOT use pressurized air to clean or dry paper cartridge.

Remove cover (A) to service dual element air cleaner.

[2] - Remove cartridge (B) and pre-cleaner (C).

[3] - Wash pre-cleaner in liquid detergent and water and squeeze it dry in a clean cloth. Saturate it in engine oil. Wrap it in a clean absorbent cloth and squeeze it to remove excess oil.

[4] - Clean cartridge by tapping gently on a flat surface. Replace if dirty.

[5] - Reinstall pre-cleaner, cartridge, and cover.

High Flow Filter

Air Cleaner with Foam Pre-Cleaner

Air Cleaner Paper Cartridge

[1] - Remove cover to service high flow air cleaner.

[2] - Inspect the air filter element without removing it. If the paper or foam pre-cleaner (where used) is damaged or dirty, replace with new filter.

a. Clean air cleaner base carefully, preventing any dirt from falling into carburetor.
b. Remove the paper element from the cleaner elbow.
c. Clean cartridge by tapping gently on a flat surface. Replace if dirty.

[3] -

IMPORTANT:

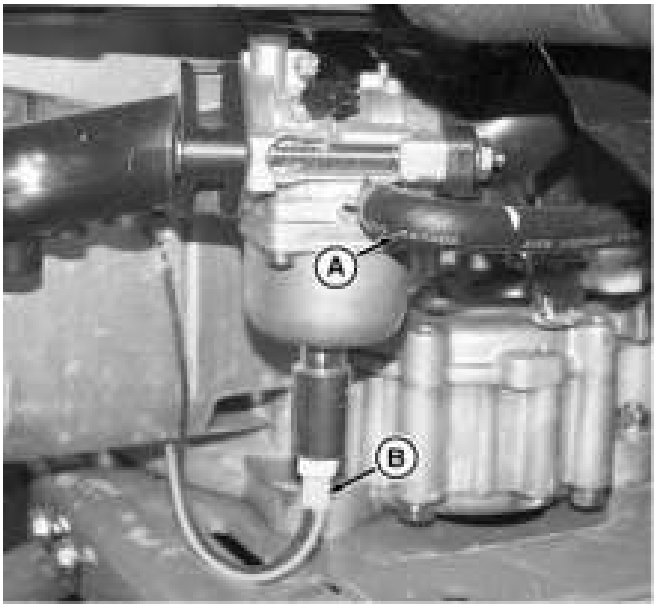
DO NOT use petroleum solvents, such as kerosene, to clean filter. DO NOT use pressurized air to clean or dry filter. DO NOT dry with heat.

Wash foam filter in mild detergent and water.

[4] - Allow the foam pre-cleaner to dry completely.

[5] - Install filter.

Remove Carburetor



LEGEND:

A	Fuel Line
B	Wire Connector

Carburetor and Solenoid

[1] - Park machine safely.

[2] -

CAUTION:

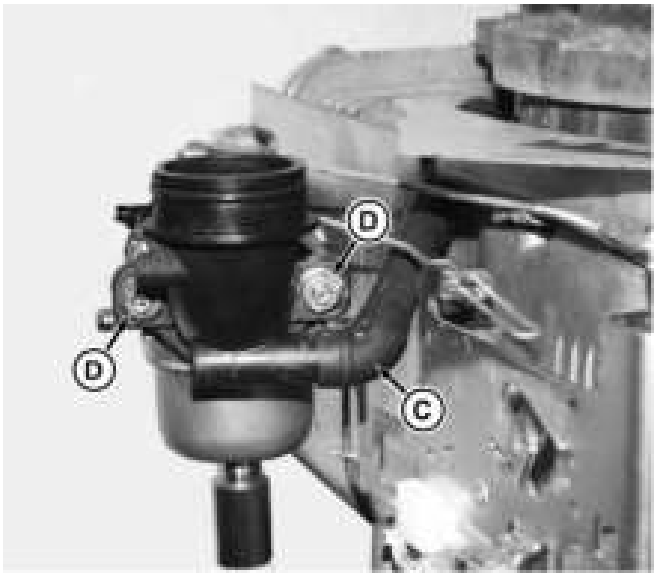
Gasoline is extremely flammable. Do not smoke. Always work in a well ventilated area away from open flame or spark producing equipment; including equipment that utilizes pilot lights.

Disconnect fuel line (A) and drain fuel in line into an approved container.

[3] - Disconnect wire connector (B) to fuel shutoff solenoid.

[4] - Remove blower housing and air cleaner assembly.

[5] -



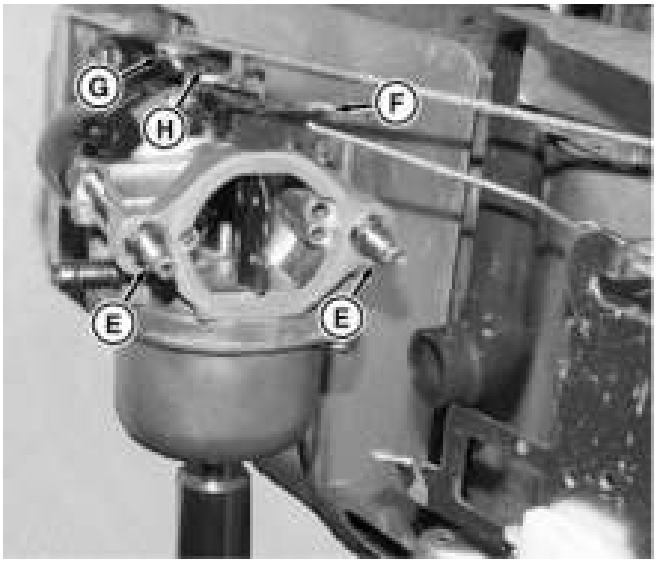
LEGEND:

C	Breather Tube
D	Nuts

Carburetor Breather Tube

Disconnect breather tube (C). Remove nuts (D) securing the air cleaner base.

[6] -



LEGEND:

E	Studs
F	Choke Linkage
G	Governor Linkage
H	Spring

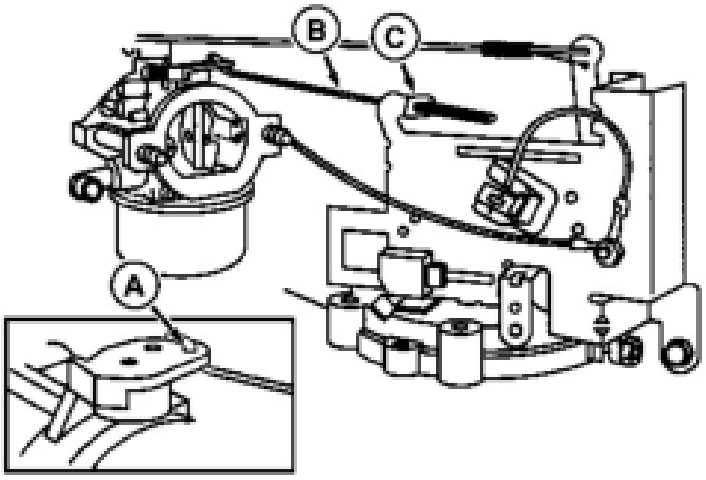
Carburetor Disconnect and Remove

While supporting the carburetor in one hand, loosen and remove the two studs (E) holding the carburetor to the intake manifold.

[7] - Carefully pull the carburetor away from the intake manifold and rotate the carburetor to disengage the choke linkage (F), governor link (G) and governor link spring (H).

[8] - Remove carburetor and gasket.

Install Carburetor



LEGEND:

A	Outer Hole
B	Choke Link
C	Slot

Carburetor Linkage

[1] -

CAUTION:

Before starting or running engine, static adjustment of the governor must be made. Failure to make static adjustments first, could result in engine overspeeding, and may result in engine or equipment damage, personal injury and/or property damage.

Connect governor link and governor link spring to throttle lever.

[2] - Install choke link to outer hole (A) of choke lever on carburetor.

[3] - Position gasket in place on the carburetor and slide choke link (B) into slot (C) in choke control bracket.

[4] - Making certain that the gasket is in place, install the carburetor bolts and tighten to specification.

Item	Measurement	Specification
Carburetor Mounting Studs	Torque	8 N·m (70 lb.-in.)

[5] - Install the air cleaner base and breather tube. Tighten the base screw and nuts to specification.

Item	Measurement	Specification
Air Cleaner Base Hardware	Torque	4.5 N·m (40 lb.-in.)

[6] - Install air cleaner base support bracket.

[7] - Install fuel line and fuel line clamp.

[8] - Install air cleaner pre-cleaner, air filter, and cover.

Disassemble Carburetor

LEGEND:
A Float and Fuel Inlet Valve

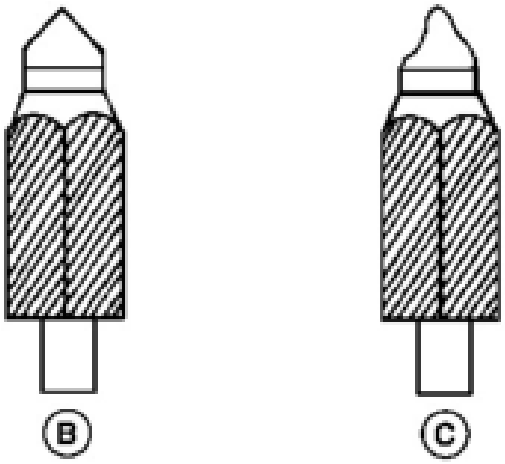
Float and Fuel Inlet Valve

[1] - Remove fuel shutoff solenoid and fuel bowl washer.

[2] - Remove float bowl and float bowl gasket from carburetor.

[3] - With a small punch, drive the float hinge pin out of float hinge. Remove float and fuel inlet valve assembly (A).

[4] -



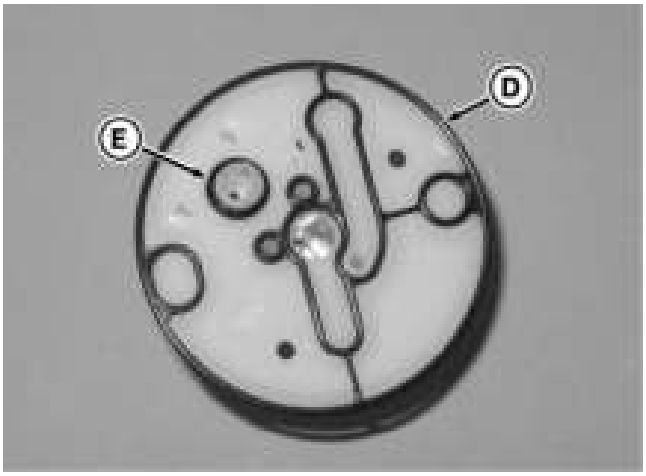
LEGEND:
B Good Valve
C Damaged Valve

Float Valve Condition

Inspect the float valve for excessive wear or damage.

- The tip should be smooth, without any grooves, scratches, or tears (B). The rod at the opposite end of the needle should move smoothly when pushed in and released.
- If either the valve or the valve seat is worn or damaged (C), replace the float assembly and carburetor as a set.

[5] -



LEGEND:

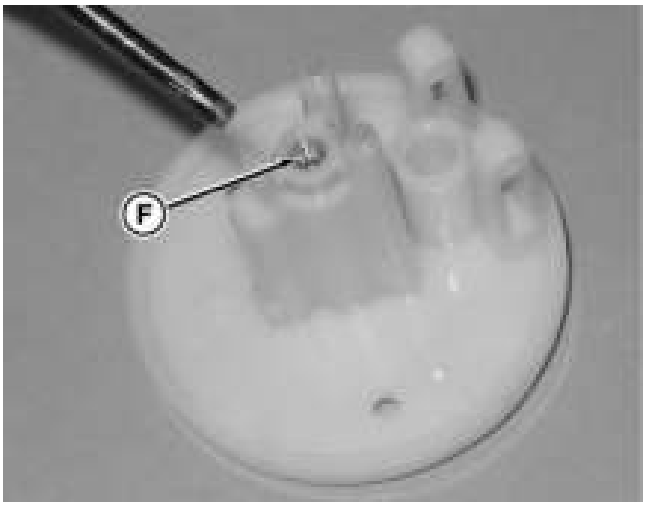
D	Gasket
E	O-ring

Gasket and O-ring

Lift the fuel transfer plate from the carburetor body.

[6] - Remove the rubber gasket (D) and the o-ring (E).

[7] -



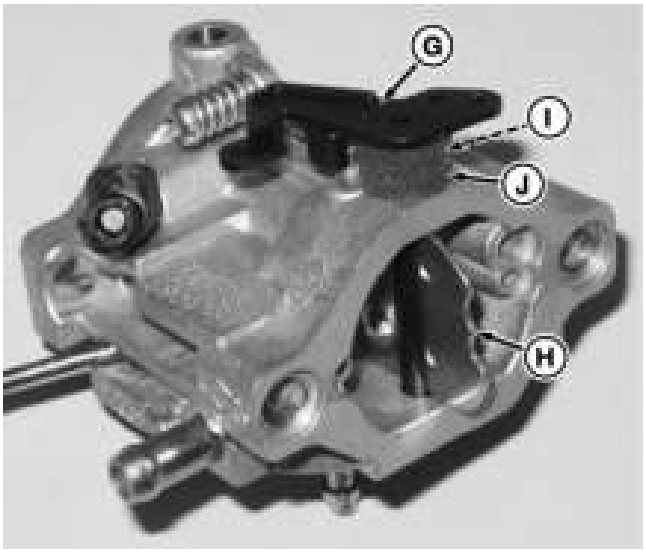
LEGEND:

F	Jet

Jet

Using a punch of close diameter, press the jet (F) out of the pick-up tube.

[8] -



LEGEND:

G	Choke Shaft
H	Choke Valve
I	Spring
J	Foam Washer

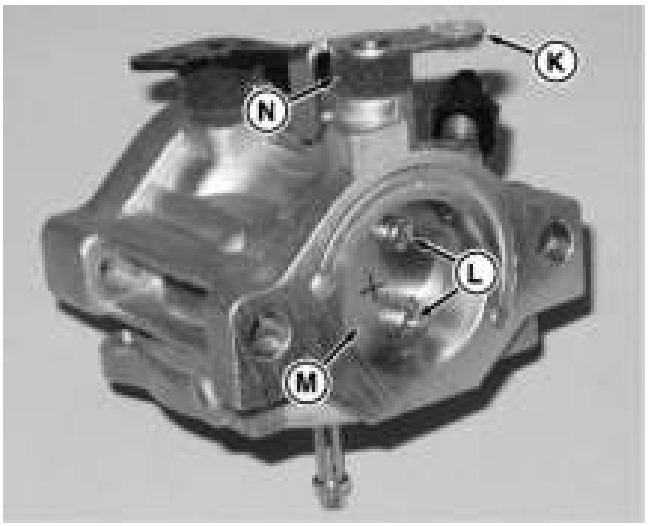
Choke Shaft Assembly

Allow the spring to rotate choke shaft (G) to wide open position.

[9] - Pull choke valve (H) out of choke shaft and lever.

[10] - Remove choke shaft and lever, return spring (I), and foam washer (J).

[11] -



LEGEND:

K	Throttle Shaft and Lever
L	Screws
M	Throttle Valve
N	Foam Seal

Throttle Shaft Assembly

Rotate throttle shaft and lever (K) closed. Mark throttle valve with a marker for installation. Remove two throttle valve screws (L).

[12] - Remove throttle valve (M), throttle shaft with lever, and foam seal (N).

[13] - Remove and replace the pilot screw in accordance with the following procedure, if necessary:

a. Carefully mark the position of the pilot screw limiter on the carburetor body so that it can be installed and set to its original position later.
b. Remove the limiter, being careful not to turn the pilot screw at this time.
c. Turn the pilot screw clockwise and count the number of turns until screw is gently seated in the pilot passage. Record the number of turns needed to close the screw.
d. Turn out the pilot screw to replace it with a new one.

[14] -

LEGEND:

O	Tapered End
P	Pilot Screw

Pilot Screw

Inspect the tapered end (O) of the pilot screw (P) for wear or damage.

- If the pilot screw is worn or damaged on the taper portion of it, replace it.
- Check the spring for a weakened condition; replace it, if necessary.

[15] - Install the new pilot screw until the screw is gently seated. Then open the screw the same number of turns as recorded prior to removal.

- Align the limiter with the mark on the carburetor body to install, taking care not to turn the pilot screw.

Inspect Carburetor

[1] -

IMPORTANT:

Avoid Damage! A clean fuel system is necessary in order to maintain proper operation of the engine. Gummy or dirty fuel tanks and carburetors should be cleaned in carburetor cleaner. Do not soak rubber, neoprene or plastic parts in cleaner.

Clean the carburetor body and metal carburetor parts in carburetor cleaner to remove any gummy material or dirt. DO NOT soak rubber, neoprene or plastic parts in cleaner.

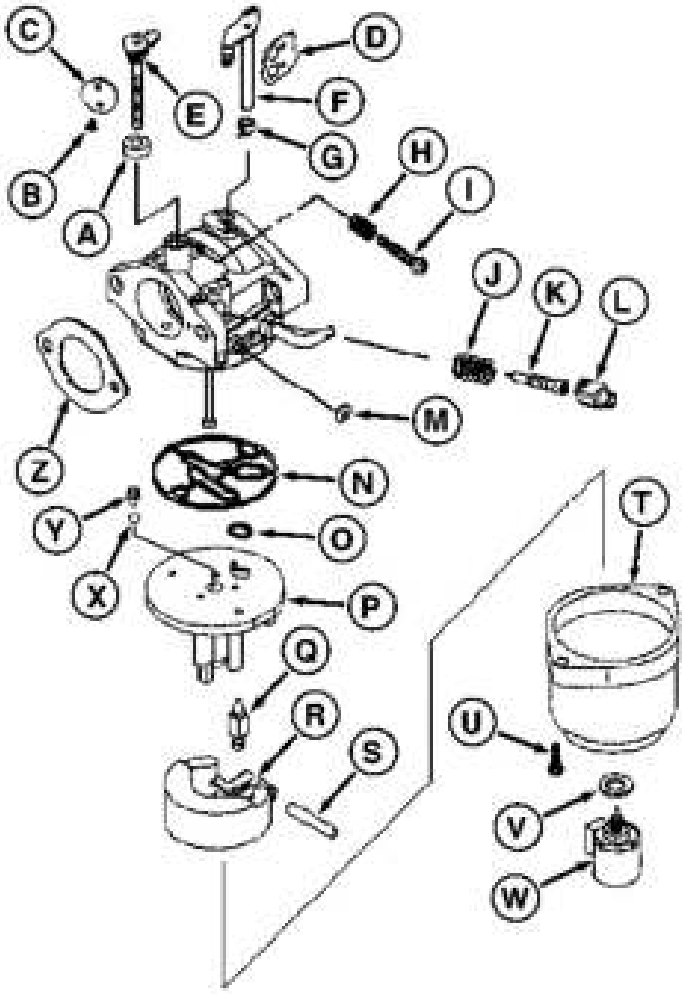
[2] - Check moving parts for wear, nicks and burrs. Replace if worn or damaged.

[3] - Check float for leaks or damage. Replace if damaged or leaking.

[4] - Carefully blow through all passages with dry, compressed air.

[5] - Inspect idle mixture needle for bent or grooved point. Replace if grooved or bent.

Assemble Carburetor



LEGEND:

A	Shaft Seal
B	Screw
C	Throttle Valve Plate
D	Throttle Shaft
E	Choke Valve Plate
F	Choke Shaft
G	Shaft Seal
H	Spring
I	Idle Speed Screw
J	Spring
K	Idle Needle Valve
L	Limiter Cap
M	Plug
N	Rubber Gasket
O	O-ring
P	Fuel Transfer Plate
Q	Fuel Inlet Valve
R	Float
S	Pin
T	Sediment Bowl
U	Screw
V	Seal Washer
W	Fuel Shutoff Solenoid
X	O-ring
Y	Jet
Z	Gasket, Intake

Carburetor Assembly Explode

[1] -

IMPORTANT:

Avoid Damage! When assembling the carburetor use new seals and gaskets.

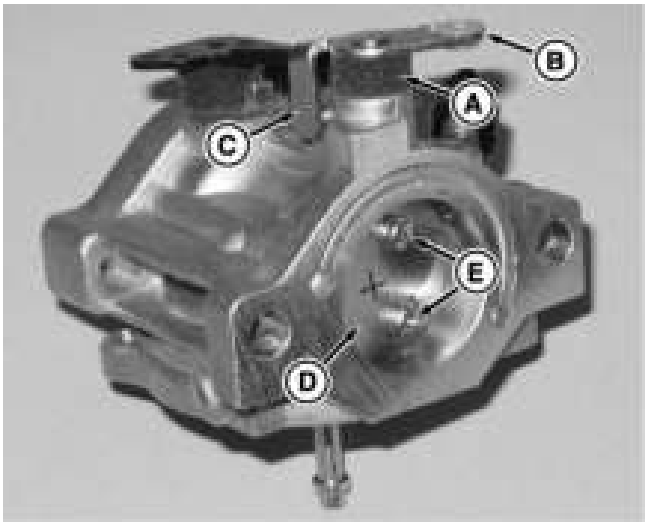
→NOTE:

A high altitude jet is available.

Install the new pilot screw until the screw is gently seated. Then open the screw the same number of turns as recorded prior to removal.

- Align the limiter with the mark on the carburetor body to install, taking care not to turn the pilot screw.

[2] -



LEGEND:

A	Foam Seal
B	Throttle Shaft
C	Tab
D	Throttle Valve
E	Screws

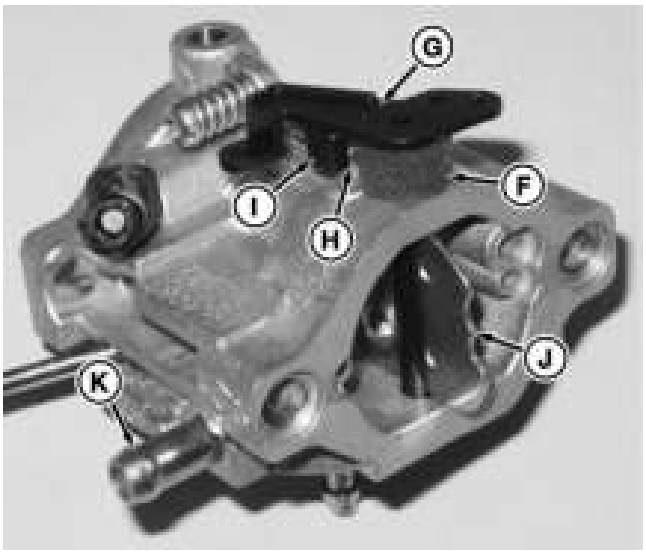
Throttle Shaft Assembly

Install the foam seal (A) onto the throttle shaft (B) and insert the shaft into the carburetor body so that the idle speed tab (C) contacts the idle speed screw and the flat portion of the shaft is facing outward.

[3] - Place the throttle valve (D) on the throttle shaft with mark from removal facing outward. Secure with two screws (E) and tighten to specification.

Item	Measurement	Specification
Throttle Valve Screw	Torque	4.5 N·m (40 lb.-in.)

[4] -



LEGEND:

F	Foam Seal
G	Choke Shaft
H	Anchor
I	Stop
J	Choke Valve
K	Fuel Inlet

Choke Shaft Assembly

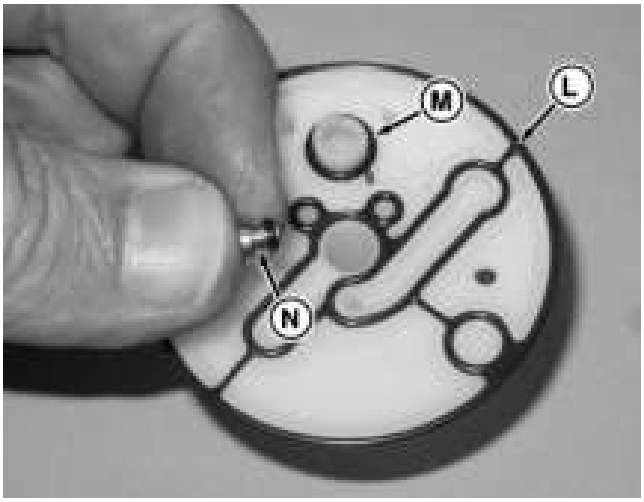
Insert spring inside foam seal (F). Slide seal and spring onto choke shaft (G) with straight end of spring up toward choke shaft lever.

[5] - Insert choke shaft into carburetor body until hook of spring hooks on spring anchor (H).

[6] - Lift choke shaft up slightly. Turn counterclockwise until stop (I) on lever clears spring anchor. Push shaft down.

[7] - Insert choke valve (J) into choke shaft with dimples away from fuel inlet (K) side of carburetor. Dimples help to hold and align choke valve on shaft.

[8] -



LEGEND:

L	Gasket
M	O-ring
N	Jet

Gasket, O-ring, and Jet

Install the rubber gasket (L) and the o-ring (M).

[9] - Using a punch of close diameter, press the jet (N) into the pick-up tube with the o-ring end.

[10] - Place the fuel transfer plate onto the carburetor body.

[11] - Insert inlet needle valve in slot on float.

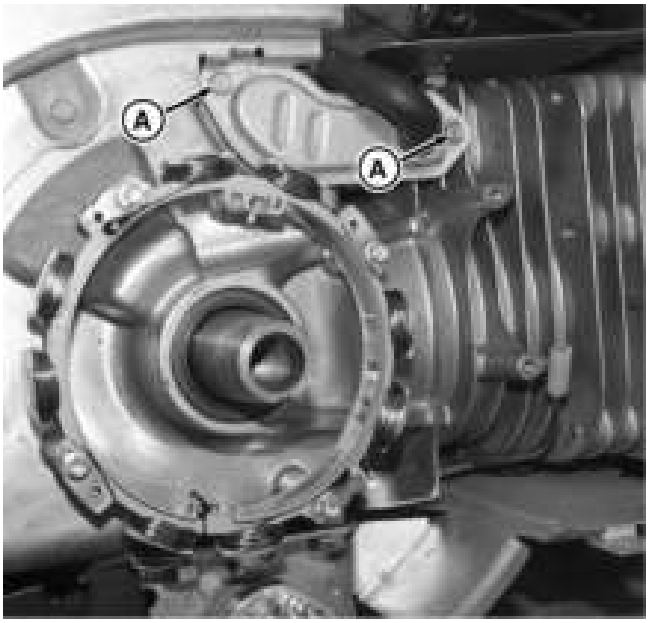
[12] - Place float and needle in carburetor and install float hinge pin, centering hinge pin.

[13] - Place bowl gasket on carburetor body.

[14] - Place bowl on carburetor and install float bowl washer and fuel shutoff solenoid and tighten to specification.

Item	Measurement	Specification
Fuel Shutoff Solenoid	Torque	5 N·m (44 lb.-in.)

Service Breather Valve, Single Cylinder Engine



LEGEND:

A	Screws

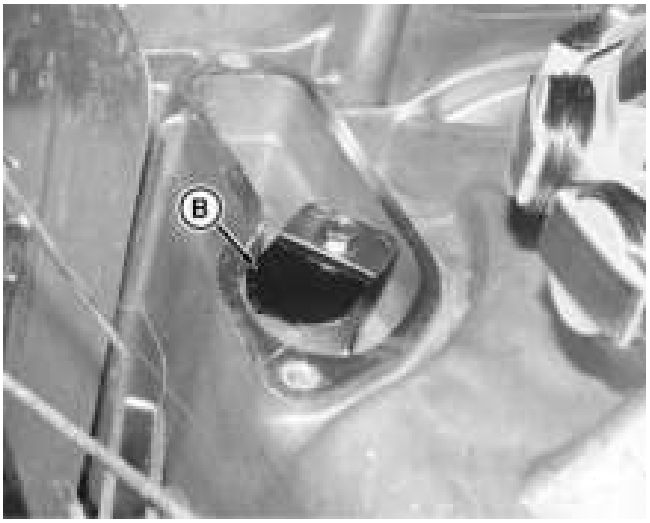
Breather Valve Cover

[1] - Remove flywheel. (See Remove and Install Flywheel .)

[2] - Remove breather tube from breather.

[3] - Remove 2 screws (A) from breather cover. Remove cover and gasket. Discard old gasket.

[4] -



LEGEND:

B	Reed Valve

Breather Reed Valve

Check the breather reed valve (B). Replace the reed if worn or bent.

[5] - Install breather using a new gasket. Tighten the screws to specification.

Item	Measurement	Specification
Breather Cover Screws	Torque	3 N·m (25 lb.-in.)

[6] - Install breather tube in breather.

[7] - Install flywheel.

Remove Muffler, Single Cylinder Engine

[1] - Park machine safely on flat level surface. (See “Park Machine Safely.”)

[2] - Disconnect battery negative (—) cable.

[3] -

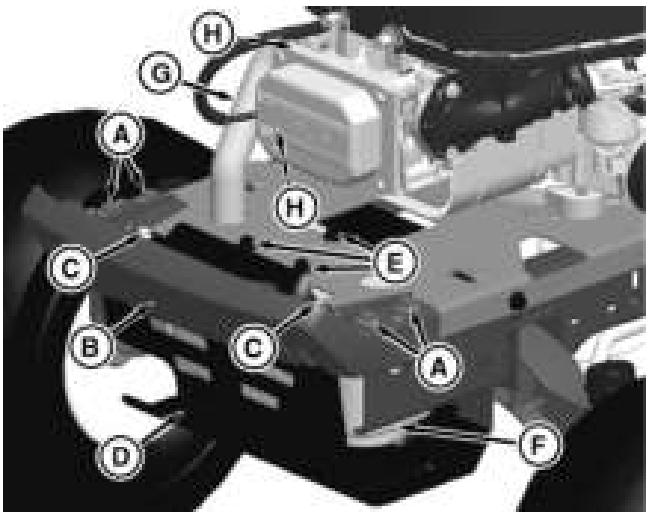
CAUTION:

Avoid Injury! Touching hot surfaces can burn skin. The engine and components are hot if the engine has been running. Allow the engine to cool before removing hood.

Raise hood. Disconnect light harness on right side of hood. Lower hood to approximately 3/4 open. Slide the hood off the bracket.

(MY -2014)

[1] -



LEGEND:

A	Cap Screw
B	Hood Pivot Bracket
C	Cap Screw
D	Heat Shield
E	Cap Screw
F	Muffler
G	Cap Screw
H	Exhaust Tube

(MY -2014)

Remove 4 cap screws (A) and hood pivot bracket (B).

[2] - Remove 2 cap screws (C) and heat shield (D).

[3] - Remove 3 cap screws (E) and muffler (F).

[4] - Remove 2 cap screws (G) and exhaust tube (H) from engine.

(MY 2014-)

[1] -