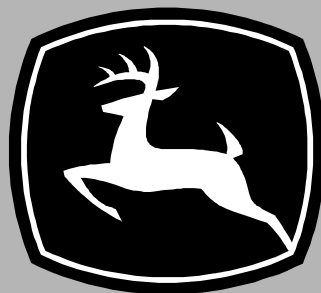


JOHN DEERE
WORLDWIDE COMMERCIAL & CONSUMER
EQUIPMENT DIVISION

Walk-Behind Rotary Mowers
JS60, JS60H, JS61, JS63, JS63H, JS63E

TM1710 NOVEMBER 2003

TECHNICAL MANUAL



JOHN DEERE

North American Version
Litho in U.S.A.

INTRODUCTION

Manual Description

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 and Information
- Identification Numbers
- Tools and Materials
- Component Location
- Schematics and Harnesses
- Theory of Operation
- Operation and Diagnostics
- Diagnostics
- Tests and Adjustments
- Repair
- Other

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

The bleed tabs for the pages of each section will align with the sections listed on this page. Page numbering is consecutive from the beginning of the Safety section through the last section.

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

Safety

Specifications and Information

Engine - Intek

Engine - Quantum

Power Train

Miscellaneous

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

COPYRIGHT© 2003
Deere & Co.
John Deere Worldwide Commercial and
Consumer Equipment Division
All rights reserved
Previous Editions
COPYRIGHT© 2001

**Thanks very much for your reading,
Want to get more information,
Please click here, Then get the complete
manual**

JustClickHere 

NOTE:

**If there is no response to click on the link above,
please download the PDF document first, and then
click on it.**

**Have any questions please write to me:
admin@servicemanualperfect.com**

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.

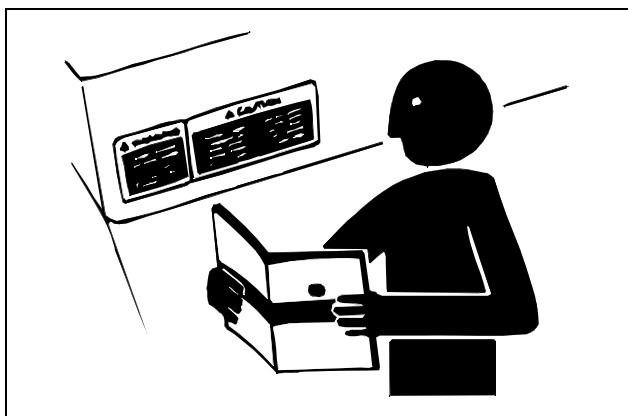
Understand Signal Words

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

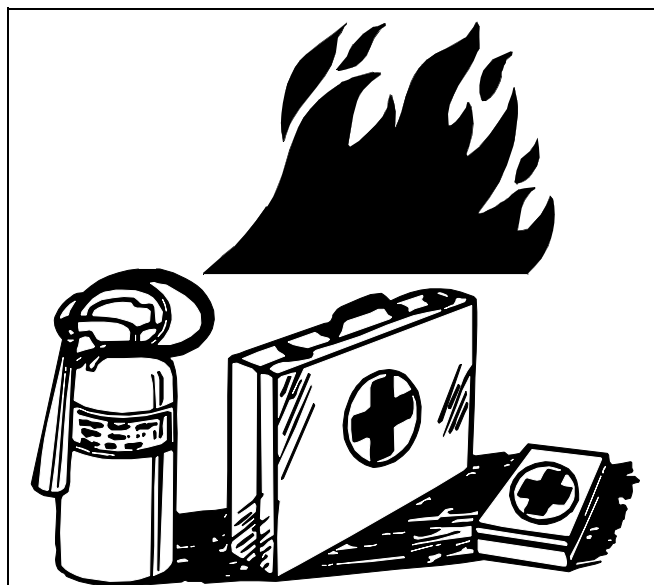
Replace missing or damaged safety signs. See the machine operator's manual for correct safety sign placement.



WARNING: California Proposition 65 Warning

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

Be Prepared For Emergencies



Handle fluids safely - 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.

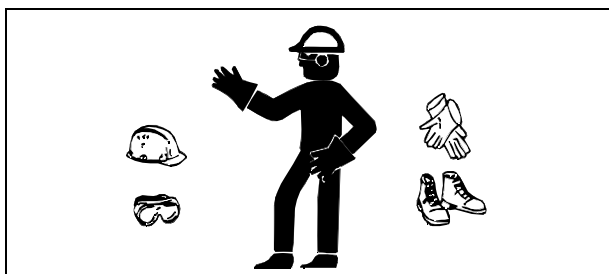
Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

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

SAFETY

Wear Protective Clothing

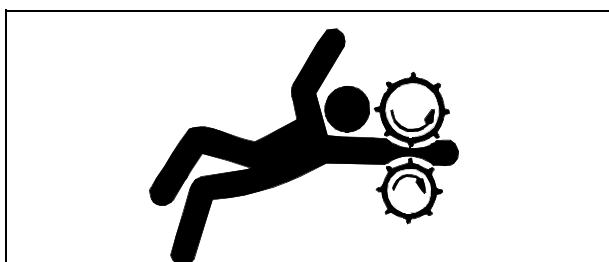


Wear close fitting clothing and safety equipment appropriate to the job.

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



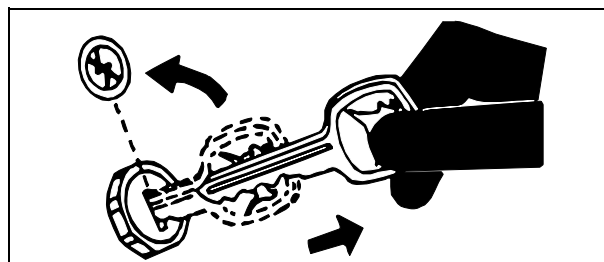
Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing, or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

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.

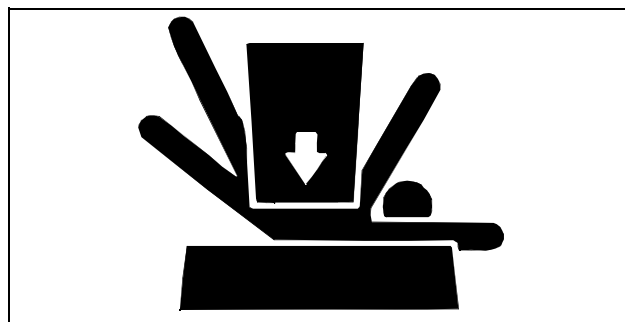
Park Machine Safely



Before working on the machine:

1. Lower all equipment to the ground.
2. Stop the engine and remove the key.
3. Hang a "DO NOT OPERATE" tag in operator station.

Support Machine Properly And Use Proper Lifting Equipment



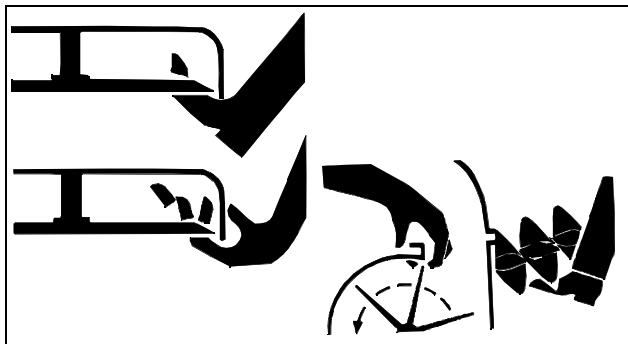
If you must work on a lifted machine or attachment, securely support the machine or attachment.

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.

SAFETY

Avoid Injury From Rotating Blades and PTO Shafts



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

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.

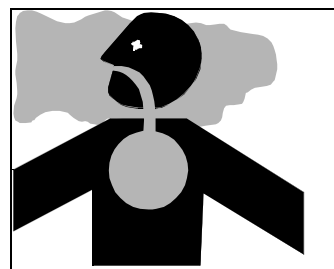
Using High Pressure Washers

Directing pressurized water at electronic/electrical components or connectors, bearings, 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.

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

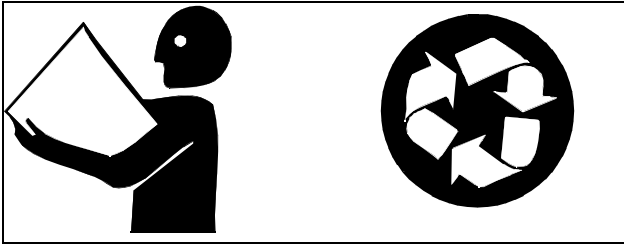
Avoid breathing dust that may be generated when handling components containing asbestos fibers. Inhaled asbestos fibers may cause lung cancer.

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.

SAFETY

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.

SPECIFICATIONS & INFORMATION TABLE OF CONTENTS

Table of Contents

Fastener Torques	7
Metric Fastener Torque Values	7
Metric Fastener Torque Value - Grade 7.....	8
Inch Fastener Torque Values	9
General Information	10
Gasoline	10
Gasoline Storage.....	10
Engine Oil.....	10
Engine Break-In Oil	11
Lubricants	12
Anti-Corrosion Grease	12
Chassis Grease.....	12
Alternative Lubricants.....	13
Synthetic Lubricants	13
Lubricant Storage	13
Mixing Of Lubricants.....	13
Identification Numbers	13
Product Identification Number	13
Engine	13
Transaxle PIN (1 Speed Shown).....	13

SPECIFICATIONS & INFORMATION TABLE OF CONTENTS



SPECIFICATIONS & INFORMATION FASTENER TORQUES

Fastener Torques

Metric Fastener Torque Values

Property Class and Head Markings				
Property Class and Nut Markings				

MIF

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	
	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft
M6	4.8	3.5	6	4.5	9	6.5	11	8.5	13	9.5	17	12	15	11.5	19	14.5
M8	12	8.5	15	11	22	16	28	20	32	24	40	30	37	28	47	35
M10	23	17	29	21	43	32	55	40	63	47	80	60	75	55	95	70
M12	40	29	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	47	80	60	120	88	150	110	175	130	225	165	205	150	260	109
M16	100	73	125	92	190	140	240	175	275	200	350	225	320	240	400	300
M18	135	100	175	125	260	195	330	250	375	275	475	350	440	325	560	410
M20	190	140	240	180	375	275	475	350	530	400	675	500	625	460	800	580
M22	260	190	330	250	510	375	650	475	725	540	925	675	850	625	1075	800
M24	330	250	425	310	650	475	825	600	925	675	1150	850	1075	800	1350	1000
M27	490	360	625	450	950	700	1200	875	1350	1000	1700	1250	1600	1150	2000	1500
M30	675	490	850	625	1300	950	1650	1200	1850	1350	2300	1700	2150	1600	2700	2000
M33	900	675	1150	850	1750	1300	2200	1650	2500	1850	3150	2350	2900	2150	3700	2750
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2750	4750	3500

DO NOT use these hand torque values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only and include a $\pm 10\%$ variance factor. Check tightness of fasteners periodically. DO NOT use air powered wrenches.

Shear bolts are designed to fail under predetermined loads.

Always replace shear bolts with identical grade.

Fasteners should be replaced with the same class. Make sure fastener threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

When bolt and nut combination fasteners are used, torque

SPECIFICATIONS & INFORMATION FASTENER TORQUES

values should be applied to the NUT instead of 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 (Yellow Dichromate - Specification JDS117) without any lubrication.

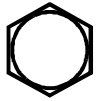

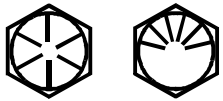





Reference: JDS - G200

Metric Fastener Torque Value - Grade 7

Size	Steel or Gray Iron Torque		Aluminum Torque	
	N•m	lb-ft	N•m	lb-ft
M6	11	8	8	6
M8	24	18	19	14
M10	52	38	41	30
M12	88	65	70	52
M14	138	102	111	82
M16	224	165	179	132

SPECIFICATIONS & INFORMATION FASTENER TORQUES

Inch Fastener Torque Values

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

MIF

SIZE	Grade 1		Grade 2b				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	Lubricated a	Dry a	Lubricated a	Dry a				
	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft
1/4	3.7	2.8	4.7	3.5	6	4.5	7.5	5.5	9.5	7	12	9	13.5	10	17	12.5
5/16	7.7	5.5	10	7	12	9	15	11	20	15	25	18	28	21	35	26
3/8	14	10	17	13	22	16	27	20	35	26	44	33	50	36	63	46
7/16	22	16	28	20	35	26	44	32	55	41	70	52	80	58	100	75
1/2	33	25	42	31	53	39	67	50	85	63	110	80	120	90	150	115
9/16	48	36	60	45	75	56	95	70	125	90	155	115	175	130	225	160
5/8	67	50	85	62	105	78	135	100	170	125	215	160	215	160	300	225
3/4	120	87	150	110	190	140	240	175	300	225	375	280	425	310	550	400
7/8	190	140	240	175	190	140	240	175	490	360	625	450	700	500	875	650
1	290	210	360	270	290	210	360	270	725	540	925	675	1050	750	1300	975
1-1/8	470	300	510	375	470	300	510	375	900	675	1150	850	1450	1075	1850	1350
1-1/4	570	425	725	530	570	425	725	530	1300	950	1650	1200	2050	1500	2600	1950
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2150	1550	2700	2000	3400	2550
1-1/2	1000	725	1250	925	990	725	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

DO NOT use these hand torque values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only and include a ±10% variance factor. Check tightness of fasteners periodically. DO NOT use air powered wrenches.

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

Fasteners should be replaced with the same grade. Make sure fastener threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

When bolt and nut combination fasteners are used, torque values should be applied to the NUT instead of 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 (yellow dichromate - Specification JDS117) 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.

Reference: JDS-G200

SPECIFICATIONS & INFORMATION GENERAL INFORMATION

General Information

Gasoline



CAUTION: Avoid injury! 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:**

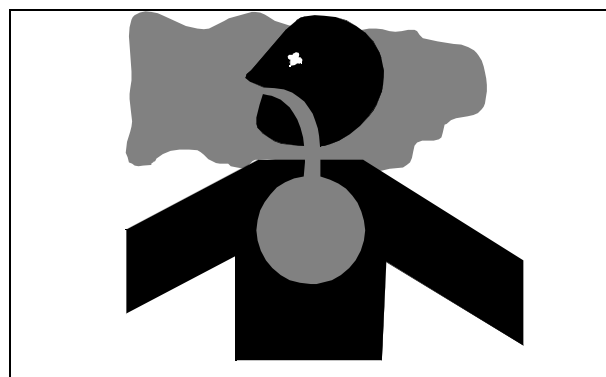
**ONLY use a clean, approved POLYETHYLENE
PLASTIC fuel container and funnel WITHOUT
any metal screen or filter**

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



MIF

- methyl tertiary butyl ether (MTBE) blends DO NOT exceed 15% by volume

IMPORTANT: Avoid damage! DO NOT use METHANOL gasolines because METHANOL is harmful to the environment and to your health.



CAUTION: Avoid injury! California Proposition 65 Warning: 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: Avoid damage! 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 machine 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:

SPECIFICATIONS & INFORMATION GENERAL INFORMATION

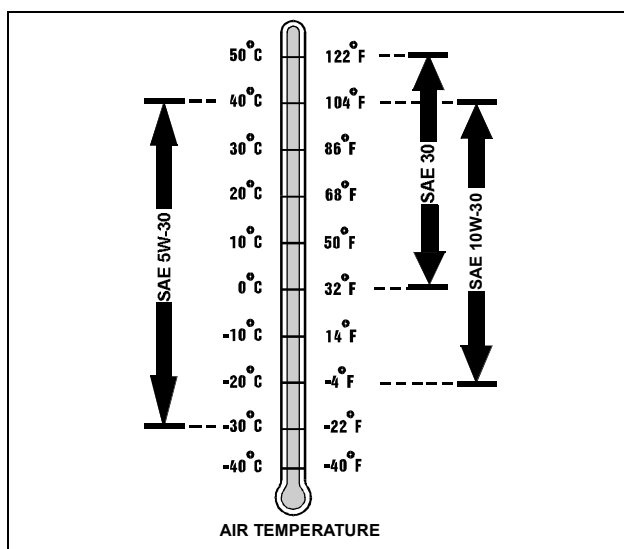
- TORQ-GARD SUPREME® - SAE 5W-30;
- UNI-GARD™ - SAE 5W-30

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

- TURF-GARD® - SAE 10W-30;
- PLUS-4® - SAE 10W-30;
- TORQ-GARD SUPREME® - SAE 30;
- TORQ-GARD SUPREME® - SAE 10W-30;
- UNI-GARD™ - SAE 10W-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 SJ or higher;
- SAE 10W-30 - API Service Classification SJ or higher;
- SAE 30 - API Service Classification SJ 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: Avoid damage! 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, these oils will not allow rebuilt or remanufactured engines to break-in properly.

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

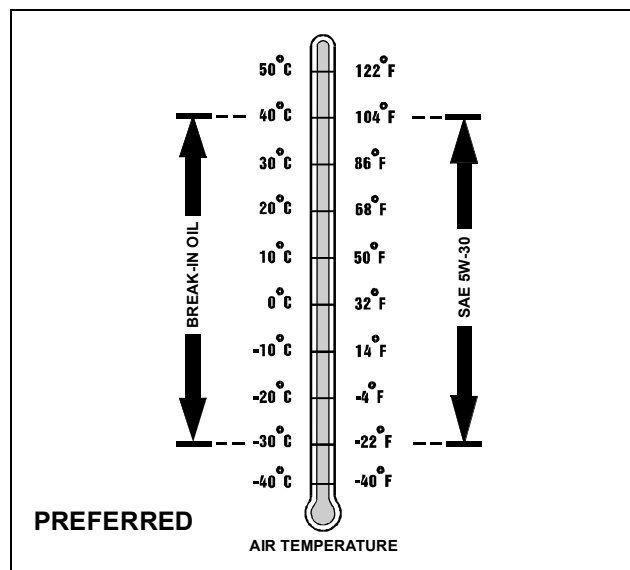
- **Break-in Engine Oil.**

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 SJ or higher.
- SAE 5W-30 - CCMC Specification G4 or higher.

SPECIFICATIONS & INFORMATION LUBRICANTS

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

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

- Module DX, ENOIL4 in JDS-G135;
- Section 530, Lubricants & Hydraulics, of the John Deere Merchandise Sales Guide;
- Lubrication Sales Manual PI7032.

Lubricants

Anti-Corrosion Grease

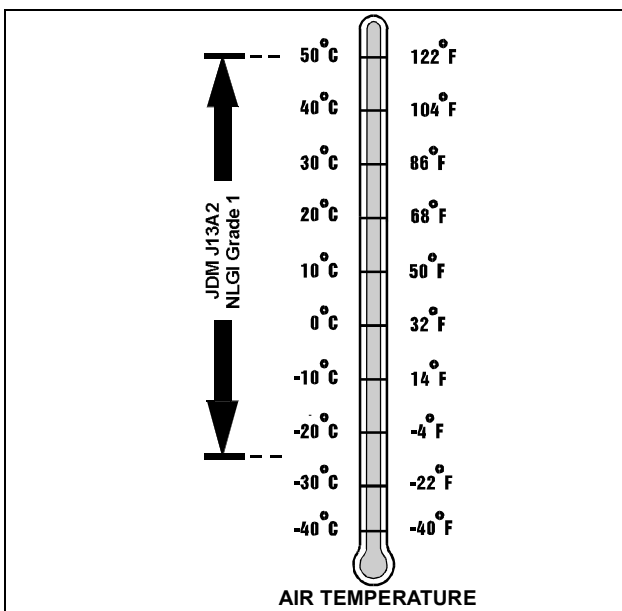
This anti-corrosion grease is formulated to provide the best protection against absorbing moisture, which is one of the major causes of corrosion. This grease is also superior in its resistance to separation and migration.

The following anti-corrosion grease is PREFERRED:

- DuBois MPG-2® Multi-Purpose Polymer Grease - M79292.

Other greases may be used if they meet or exceed the following specifications:

- John Deere Standard JDM J13A2, NLGI Grade 1.



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

- Module DX, GRE1 in JDS - G135;

- Section 530, Lubricants and Hydraulics, of the John Deere Merchandise Sales Guide;
- Lubrication Sales Manual PI7032.

Chassis Grease

Use the following grease based on the air temperature range. Operating outside of the recommended grease air temperature range may cause premature failures.

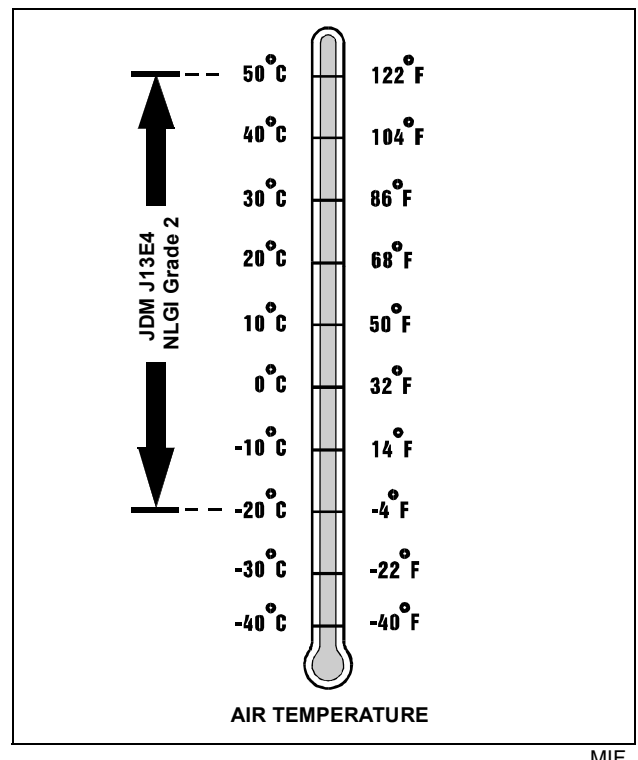
IMPORTANT: Avoid damage! ONLY use a quality grease in this application. DO NOT mix any other greases in this application. DO NOT use any BIO - GREASE in this application.

The following John Deere grease is PREFERRED:

- HIGH-TEMPERATURE EP GREASE® - JDM J13E4, NLGI Grade 2.
- GREASE-GARD™ - JDM J13E4, NLGI Grade 2.

Other greases may be used if above preferred John Deere grease is not available, provided they meet the following specification:

- John Deere Standard JDM J13E4, NLGI Grade 2.



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

- Module DX, GRE1 in JDS - G135;
- Section 530, Lubricants and Hydraulics, of the John

SPECIFICATIONS & INFORMATION IDENTIFICATION NUMBERS

Deere Merchandise Sales Guide;

- Lubrication Sales Manual P17032.

Alternative Lubricants

Conditions in certain geographical areas outside the United States and Canada may require different lubricant recommendations than the ones printed in this technical manual or the operator's manual. Consult with your John Deere Dealer, or Sales Branch, to obtain the alternative lubricant recommendations.

IMPORTANT: Avoid damage! Use of alternative lubricants could cause reduced life of the component.

If alternative lubricants are to be used, it is recommended that the factory fill be thoroughly removed before switching to any alternative lubricant.

Synthetic Lubricants

Synthetic lubricants may be used in John Deere equipment if they meet the applicable performance requirements (industry classification and/or military specification) as shown in this manual.

The recommended air temperature limits and service or lubricant change intervals should be maintained as shown in the operator's manual.

Avoid mixing different brands, grades, 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.

Lubricant Storage

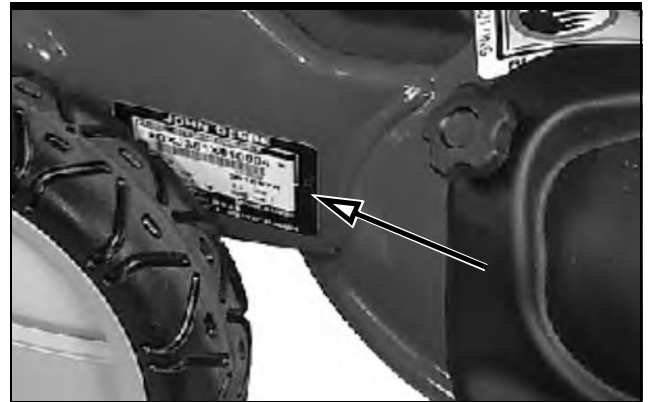
All machines operate at top efficiency only when clean lubricants are used. Use clean storage containers to handle all lubricants. Store them in an area protected from dust, moisture, and other contamination. Store drums on their sides. Make sure all containers are properly marked as to their contents. Dispose of all old, used containers and their contents properly.

Mixing Of Lubricants

In general, avoid mixing different brands or types of lubricants. Manufacturers blend additives in their lubricants to meet certain specifications and performance requirements. Mixing different lubricants can interfere with the proper functioning of these additives and lubricant properties which will downgrade their intended specified performance.

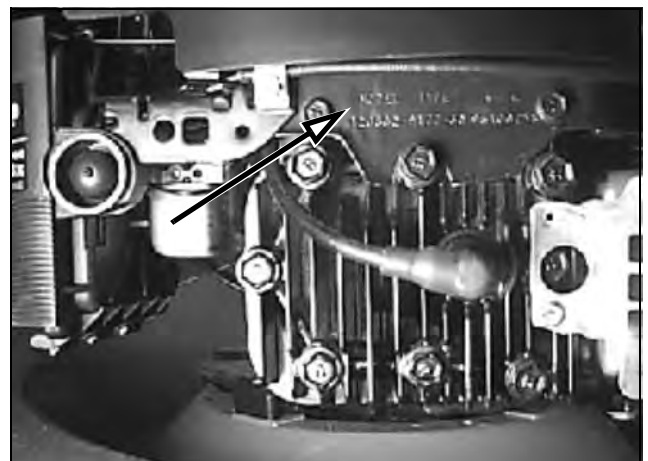
Identification Numbers

Product Identification Number



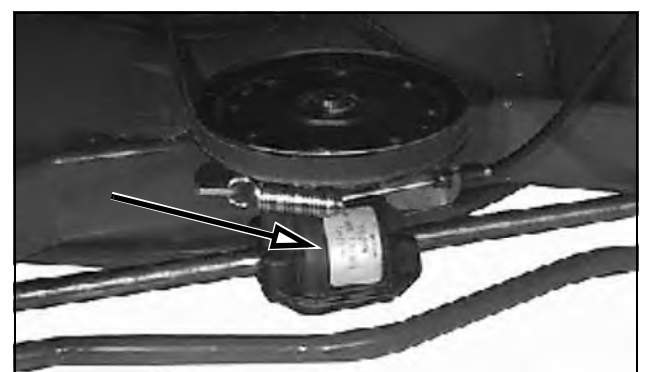
M91003

Engine



M91001

Transaxle PIN (1 Speed Shown)



M91018

SPECIFICATIONS & INFORMATION IDENTIFICATION NUMBERS



ENGINE - INTEK TABLE OF CONTENTS

Table of Contents

Specifications17

Engine Specifications	17
Travel Speed Range	17
Fuel	17
Electrical Specifications.....	18
Repair Specifications.....	18
Torque Specifications.....	19
Special Equipment Or Tools.....	19
Other Materials.....	19

Component Location20

Component Location - General	20
Component Location - Piston and Valves	21
Component Location -Carburetor.....	22
Air Intake Component Location	23

Theory Of Operation.....24

Cooling System	24
Crankcase Breather System	24
Lubrication System.....	24
Compression Release System	24
Fuel System	24
Carburetor Primer Circuit Operation.....	25
Carburetor Main Circuit Operation	26
Air Intake System Operation	26
Governor Operation.....	27
Flywheel Brake Operation.....	28
Ignition Circuit Operation.....	29

Diagnosis.....30

Engine Turns Over but Will Not Start	30
Engine Starts, Then Stops, Or Stops When Hot.....	30
Engine Uses Too Much Oil Or Blue Exhaust Smoke	31
Black Exhaust Smoke Or Engine Flooding ..	31
Engine Misses Or Sprays Fuel Out Of Carburetor Inlet	32
Engine Surges.....	32

Tests and Adjustments33

Automatic Compression Release (ACR) Test	33
Cylinder Leak-Down Test.....	34
Crankcase Vacuum Test.....	35
Valve-to-Rocker Arm Clearance Adjustment	36
Governor Adjustment	36
Engine Idle Adjustment	37

Spark Test	38
------------------	----

Ignition Air Gap Adjustment.....	38
----------------------------------	----

Flywheel Key Inspection.....	39
------------------------------	----

Carburetor Adjustment.....	39
----------------------------	----

Battery Test - JS63E.....	39
---------------------------	----

Alternator Diode Test - JS63E.....	40
------------------------------------	----

Repair..... 41

Carburetor Removal and Installation	41
---	----

Carburetor Inspection	42
-----------------------------	----

Muffler Removal and Installation	42
--	----

Engine Cover Removal.....	43
---------------------------	----

Fuel Tank Removal and Installation	44
--	----

Flywheel Brake Cable Removal and Installation	44
---	----

Engine Blower Housing Removal	45
-------------------------------------	----

Engine Blower Housing Installation	45
--	----

Governor Lever Removal and Installation ..	45
--	----

Flywheel Removal and Installation	46
---	----

Crankcase Breather Removal and Inspection	46
---	----

Crankcase Breather Installation.....	47
--------------------------------------	----

Cylinder Head Removal.....	47
----------------------------	----

Cylinder Head Inspection.....	48
-------------------------------	----

Cylinder Head Installation.....	48
---------------------------------	----

Valve Removal and Installation	49
--------------------------------------	----

Valve Guide Inspection.....	49
-----------------------------	----

Valve Seat Reconditioning.....	50
--------------------------------	----

Valve Face Reconditioning.....	51
--------------------------------	----

Engine Removal and Installation	51
---------------------------------------	----

Crankcase Cover Removal.....	52
------------------------------	----

Camshaft Inspection.....	53
--------------------------	----

Crankcase Cover Installation.....	54
-----------------------------------	----

Piston Removal and Disassembly	54
--------------------------------------	----

Piston Assembly and Installation	55
--	----

Connecting Rod Inspection.....	56
--------------------------------	----

Cylinder Bore Measurement	56
---------------------------------	----

Crankshaft Removal and Installation	56
---	----

Magneto Bearing Removal and Installation.	57
---	----

Recoil Starter Removal and Installation.....	57
--	----

Recoil Starter Inspection.....	58
--------------------------------	----

Key Switch Removal and Installation - JS63E	58
---	----

Interlock Switch Replacement - JS63E.....	59
---	----

Battery Removal and Installation - JS63E ...	59
--	----

Electric Starter Removal and Installation - JS63E	60
---	----

Electric Starter Assembly - JS63E.....	60
--	----