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2653 Professional Utility Mower

JOHN DEERE

TECHNICAL MANUAL

2653 Professional
Utility Mower

TM1533 (01JAN95) English

John Deere
Worldwide Commercial and
Consumer Equipment Division

TM1533 (01JAN95)

Replaces TM1533 (OCT94)

LITHO IN U.S.A.
ENGLISH

TM1533 01JAN95

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

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

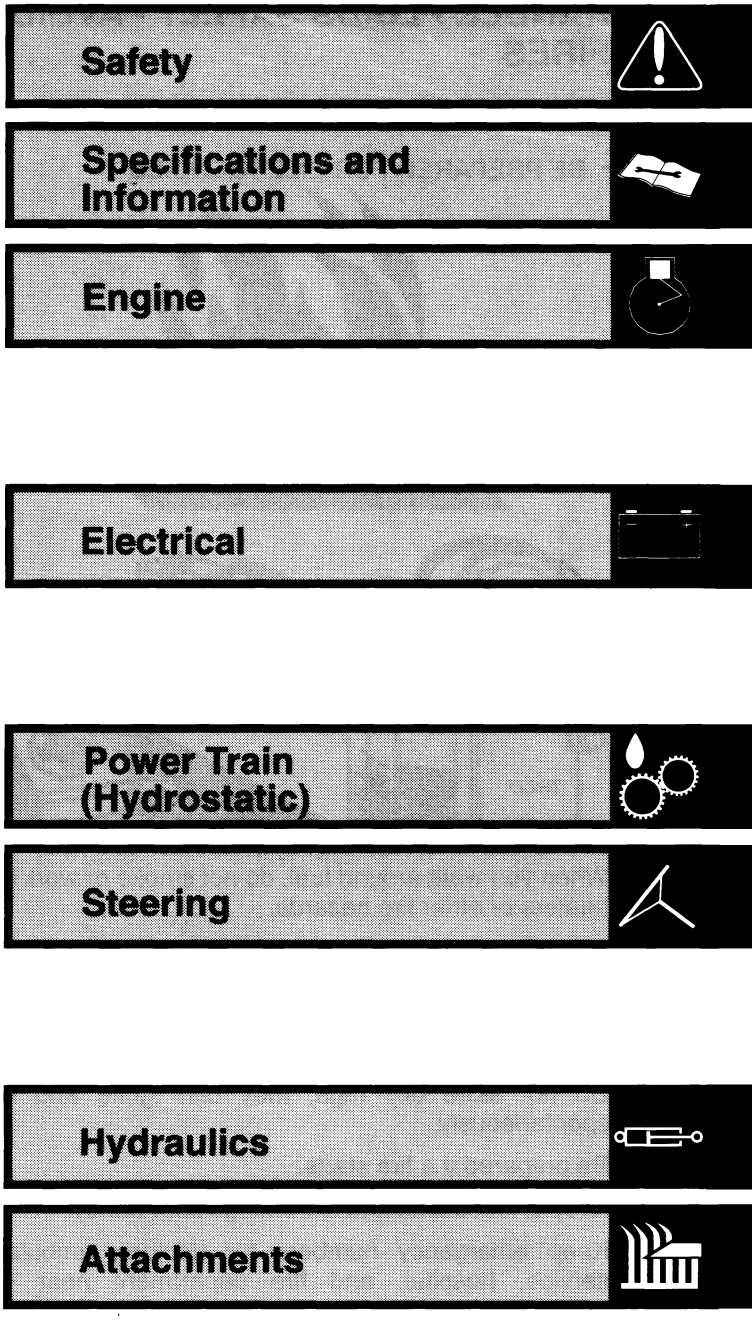
- Table of Contents
- Specifications
- Component Location
- Troubleshooting Diagram
- Theory of Operation
- Diagnostics
- Tests & Adjustments
- Assembly & Disassembly (Repair)

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

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

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

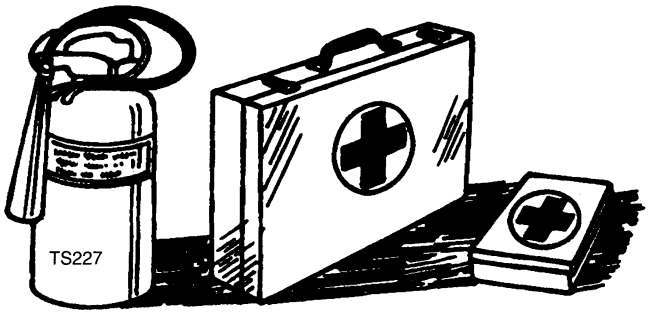
We appreciate your input on this manual. To help, there are postage paid post cards included at the back. If you find any errors or want to comment on the layout of the manual please fill out one of the cards and mail it back to us.



HANDLE FLUIDS SAFELY - AVOID FIRES

- **BE PREPARED FOR EMERGENCIES**


TS291


TS227

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.

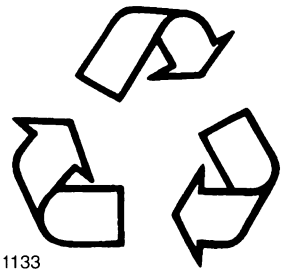
Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

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

HANDLE CHEMICAL PRODUCTS SAFELY

TS1132


1133

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.

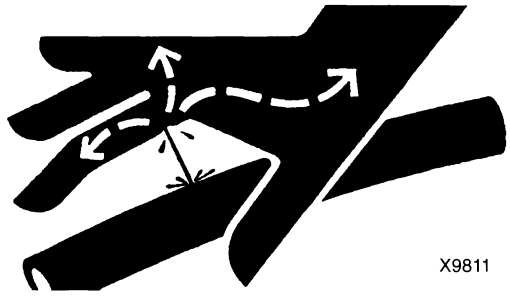
A Material Safety Data Sheet (MSDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques. Check the MSDS before you start any job using a hazardous chemical. That way you will know exactly what the risks are and how to do the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

USE CARE AROUND HIGH-PRESSURE FLUID LINES

- **AVOID HIGH-PRESSURE FLUIDS**


X9811

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

Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.

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

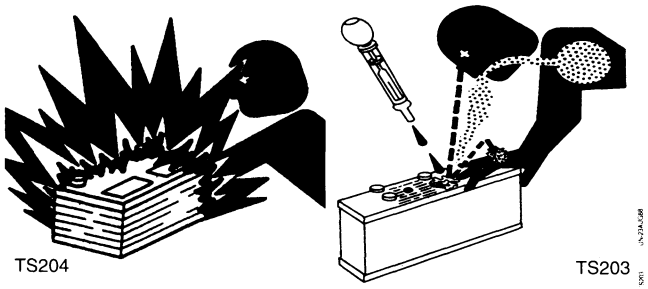
If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical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

- **AVOID HEATING NEAR PRESSURIZED FLUID LINES**


TS953

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

USE CARE IN HANDLING AND SERVICING BATTERIES


TS204 TS203

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

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

- **Avoid acid burns by:**

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

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

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

- **If acid is swallowed:**

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

USE SAFE SERVICE PROCEDURES

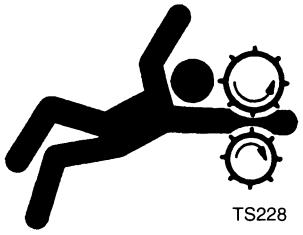
• WEAR PROTECTIVE CLOTHING

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

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

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

TS206



TS228

• SERVICE MACHINES SAFELY

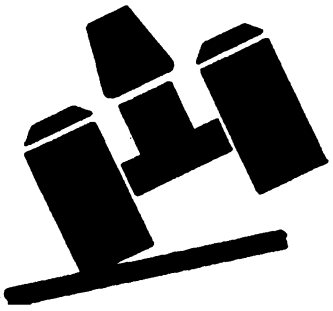
Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing, or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

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 hand tools on metric fasteners. Avoid bodily injury caused by slipping wrenches. Use only service parts meeting John Deere specifications.

• PARK MACHINE SAFELY



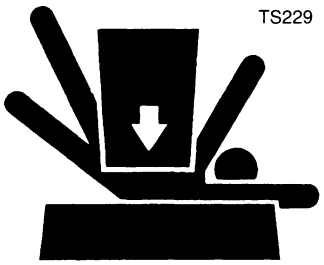
M46459

• Before working on the machine:

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

• SUPPORT MACHINE PROPERLY AND USE PROPER LIFTING EQUIPMENT

TS229



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

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

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

• WORK IN CLEAN AREA

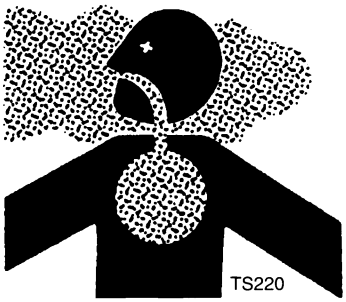
• Before starting a job

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

- **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**


TS220

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.

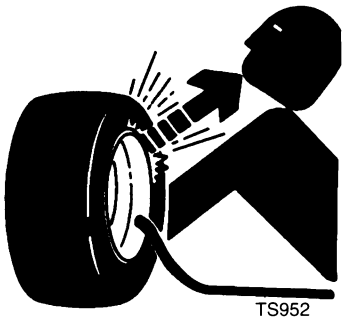
- **AVOID HARMFUL ASBESTOS DUST**

: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.

- **SERVICE TIRES SAFELY**


TS952

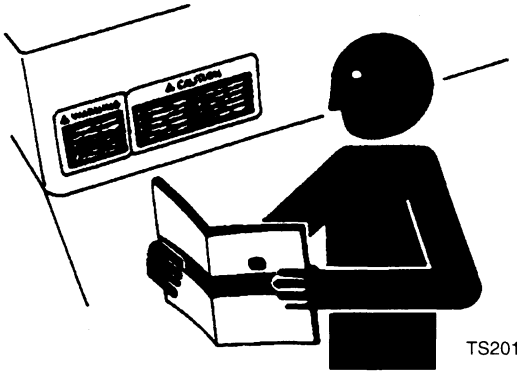
Explosive separation of a tire and rim parts can cause serious injury or death.

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.

REPLACE SAFETY SIGNS



TS201

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

LIVE WITH SAFETY

TS231

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

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SPECIFICATIONS & INFORMATION

Page

SPECIFICATIONS

ENGINE

ITEM	SPECIFICATION
Make	John Deere "K" Series
Model	FD620D
Horsepower	13.4 kW (18HP)

(For detailed engine specifications, see Engine Section)

MACHINE

Battery

Voltage	11.8-13.2 VDC
Reserve Capacity @ 25 Amps	80 min.
Cold Cranking Amps @ -18° C (0° F)	430 CCA

Capacities

Crankcase	
W/Filter	2.1 L (4.44 U.S. pt.)
W/O Filter	1.9 L (4.0 U.S. pt.)
Coolant	0.95 L (1 U.S. qt.)
Fuel Tank	28 L (7.4 U.S. gal)
Hydraulic Fluid Reservoir	15.1 L (4 U.S. gal)

Brakes

Type	Dual Disc (mechanical)15.2 cm (6 in.)

Wheels/Tires

Front	20 x 10 - 8
Steer	20 x 10 - 8
Mowing Speed	0 - 8 km (0 - 5 mph)
Transport Speed	0 - 13.7 km (0 - 8.5 mph)
Reverse Speed	0 - 4.8 km (0 - 3 mph)

INSTRUMENTATION

Engine Oil Pressure	Warning Light
Alternator	Warning Light
Hydraulic Oil Temperature	Warning Light
Engine Coolant Temperature	Warning Light
Hourmeter	Gauge

FUEL SYSTEM

Fuel	an antinock index of 87 or higher
Fuel Filter	Replaceable in-line filter
Fuel Pump	Electric

Weight and Dimensions

Wheel Base	140 cm (55 in.)
Tread Width	132 cm (52 in.)
Mowing Position Width	183 cm (72 in.)
Turning Radius uncut circle	50.8 cm (20 in.)
Vehicle Weight	703 kg (1550 lb.)
Full Fluids, no operator	748 kg (1650 lbs.)
Ground Clearance	7.6 cm (3 in.)

HYDRAULIC SYSTEM

Reservoir

Capacity	15.1 L (4 U.S. gal.)
Fluid Type	
Filtration	10 micron
Reel Circuit Pressure	20685 kPa (3000 psi)
Maximum Back Pressure	1034 kPa (150 psi
Maximum System Operating Temperature	93° C (200° F)

Steering & Lift System

Input Torque	
(Powered)	1.7-2.8 N•m @ 47.5 kPa Tank Pressure
	15-25 lb-in. @ 100 PSI Tank Pressure
(Non-Powered)	81.4 N•m (60 lb-ft.)
Rotation Limits	None

Reel Drive System

Reel Drive	Hydraulic
Pump	Gear
Reel Control Valves	Electro-hydraulic

Wheel Drive System

Drive Wheels	Front, with optional third (rear) wheel drive
Traction Drive	Hydrostatic, treadle pedal
Pump	Gear

MOWER

Number	3
Size	66 cm (26 in.) Floating Standard
Backlapping	(Optional) On Machine, Variable adjustment
Clip frequency	
5 blade cutting units	0.211/MPH
8 blade cutting units	0.132/MPH
Front Rollers	Optional, grooved or smooth
Reel diameter	17.8 cm (7 in.)
Bedknife or reel adjustment	Reel-to-bedknife
Height of cut	9.5 mm - 76 mm (3/8 - 3.00 in.)
Number of Blades	5 or 8

SAFETY INTERLOCKS

. . . . . Neutral Start switch
. . . . . Operator Presence switch
. . . . . Mow/transport switch
. . . . . Park Brake set switch

SERVICE RECOMENDATIONS

O-RING BOSS FITTINGS

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

1. Back-off locknut (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. Hold fitting head-end with a wrench and tighten locknut and back-up washer to proper torque value.
5. Do not allow hoses to twist when tightening fittings.

TORQUE VALUE		
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%.

FLAT FACE O-RING SEAL FITTINGS

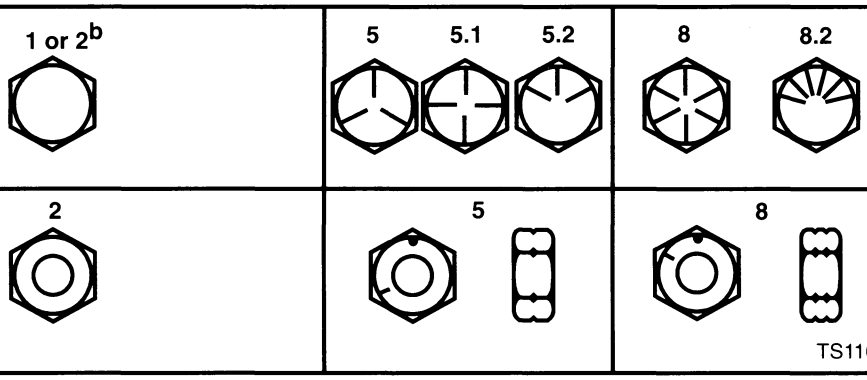
1. Inspect the fitting sealing surfaces. They must be free of dirt or defects.
2. Inspect the O-ring. It must be free of damage or defects.
3. Lubricate O-rings and install into groove using petroleum jelly to hold in place.
4. Push O-ring into the groove with plenty of petroleum jelly so O-ring is not displaced during assembly.
5. Index angle fittings and tighten by hand pressing joint together to ensure O-ring remains in place.
6. Tighten fitting or nut to torque value shown on the chart per dash size stamped on the fitting.

NOTE: Do not allow hoses to twist when tightening fittings.

FLAT FACE O-RING SEAL FITTING TORQUE							
NOMINAL TUBE O.D.		THREAD SIZE		SWIVEL NUT TORQUE		BULKHEAD NUT TORQUE	
(mm)	(in.)	DASH	(in.)	N•m	(lb-ft.)	N•m	(lb-ft.)
6.35	0.250	-4	9/16-18	16	12	5.0	3.5
9.52	0.375	-6	11/16-16	24	18	9.0	6.5
12.70	0.500	-8	13/16-16	50	37	17.0	12.5
15.88	0.625	-10	1-14	69	51	17.0	12.5
19.05	0.750	-12	1 3/16-12	102	75	17.0	12.5
22.22	0.875	-14	1 3/16-12	102	75	17.0	12.5
25.40	1.000	-16	1 7/16-12	142	105	17.0	12.5
31.75	1.250	-20	1 11/16-12	190	140	17.0	12.5
38.10	1.500	-24	2-12	217	160	17.0	12.5
NOTE: Torque tolerance is +15% -20%							

UNIFIED INCH BOLT AND CAP SCREW TORQUE VALUES

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



	Grade 1				Grade 2[b]				Grade 5, 5.1 or 5.2				Grade 8 or 8.2			
	Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]	
SIZE	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft
1/4	3.7	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 values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

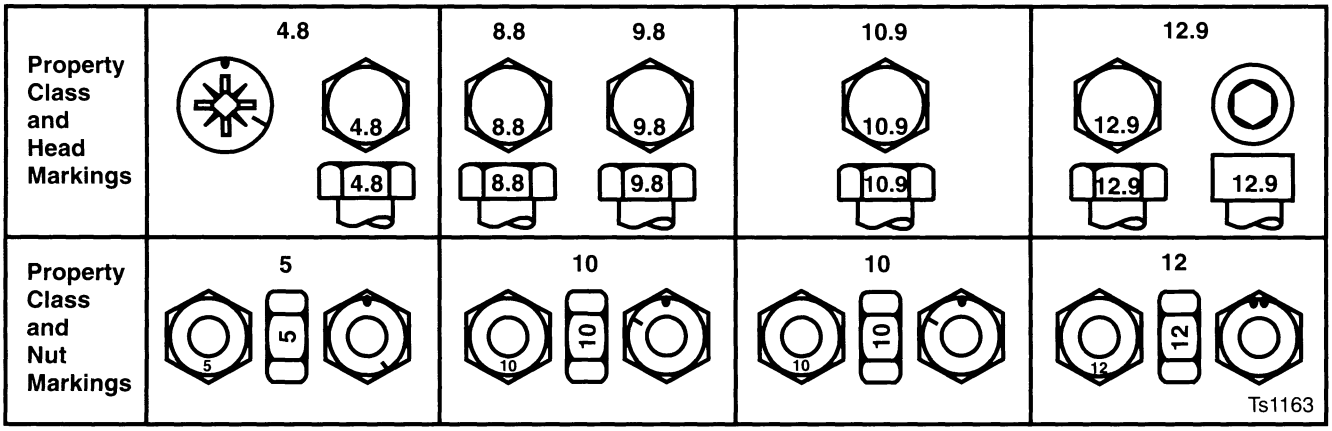
Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original. Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

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

[a] "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication[b] Grade 2 applies for hex cap screws (not hex bolts) up to 152 mm (6-in.) long. Grade 1 applies for hex cap screws over 152 mm (6-in.) long, and for all other types of bolts and screws of any length.

METRIC BOLT AND CAP SCREW TORQUE VALUES



	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]	
SIZE	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft
M6	48	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 values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

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

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original. Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

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

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

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

GASOLINE SPECIFICATIONS

⚠ CAUTION:

Handle fuel with care, it is highly flammable. DO NOT refuel machine:

- **Indoors. Always fill fuel tank outdoors.**
- **While you smoke.**
- **When machine is near and open flame or sparks.**
- **When engine is running. STOP engine.**
- **When engine is hot. Allow it to cool.**

Help prevent fires:

- **Fill fuel tank only to bottom of filler neck.**
- **Clean oil, grease and dirt from machine.**
- **Clean up spilled fuel immediately.**
- **Do not store machine with fule in tank in a building where fumes may reach an open flame or spark.**

To prevent fire and explosion caused by static electric discharge while you fill tank:

- **Use approved, non-metal fuel container.**
- **When using a funnel, MAKE SURE it is PLASTIC.**
- **Avoid using a funnel which has a metal screen or filter.**

IMPORTANT: To avoid engine damage:

- DO NOT mix oil with gasoline
- Use only clean oil and fuel
- Use clean approved containers and funnels.
- Store oil and fuel in an area protected from dust, moisture and other contamination.

Unleaded fuel is recommended because it burns cleaner and leaves less unburned deposits in engine combustion chamber. Regular leaded gasoline with an anti-knock index of 87 or higher may be used.Use of gasohol is acceptable as long as the ethyl alcohol blend does not exceed 11 percent. Unleaded gasohol is preferred over leaded gasohol.

Fill fuel tank at end of each day's operation. Fill only to bottom of filler neck. *Fuel Tank Capacity.20 L (5.3 gal)*

FUEL STORAGE

Keep fuel in a clean container in a protected area. Water and sediment must be removed before fuel gets to the engine. Do not use deicers to remove water from fuel. Do not depend on fuel filters to remove water.

If possible, install a water separator at the storage tank outlet.

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

If transporter is either stored or used during the winter, add TY6295 John Deere Gasoline Storage Stabilizer or an equivalent to the fuel. Follow directions on can.

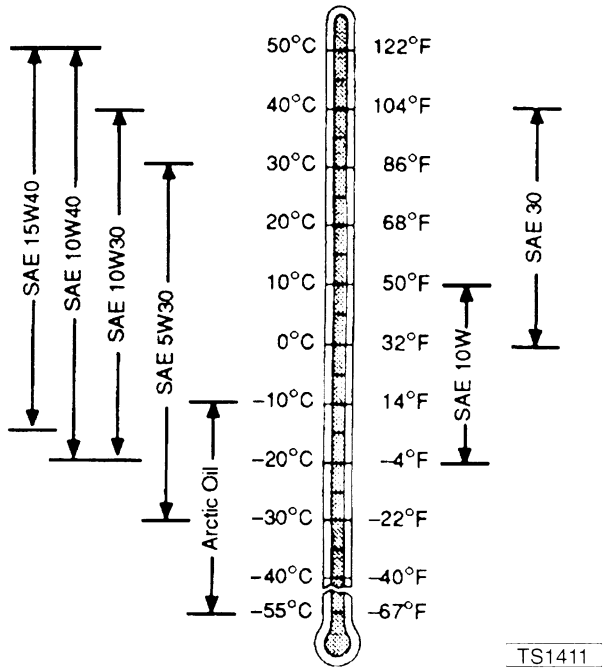
LUBRICANT SPECIFICATIONS

ENGINE OIL

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

The following oil is preferred:

- John Deere PLUS-4®



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

- API Service Classification SG
- API Service Classification SF
- CCMC Specification G4

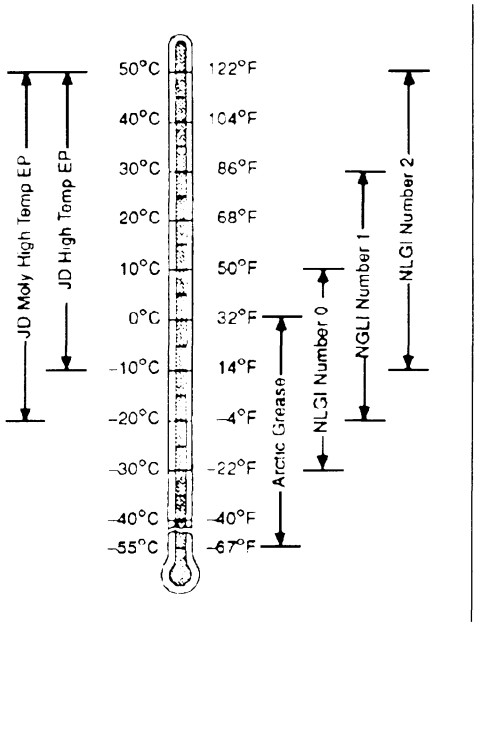
Oils meeting Military Specification MIL-L-46167B may be used as arctic oils.

GREASE

Use grease based on the expected air temperature range during the service interval.

The following greases are preferred:

- John Deere MOLY HIGH TEMPERATURE EP GREASE
- John Deere HIGH TEMPERATURE EP GREASE
- John Deere GREASE-GARD™



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

- SAE Multipurpose EP Grease with a maximum of 5% molybdenum disulfide.
- SAE Multipurpose EP Grease

Greases meeting Military Specification MIL-G-10924F may be used as arctic grease.

ANTI-CHATTER TRANSMISSION/ HYDRAULIC OIL

NOTE: This transmission is filled with John Deere Hy-Gard™ (J20C) Transmission and Hydraulic oil at the factory. DO NOT mix oils.

This transmission is equipped with wet disk brakes. To avoid chatter, use only John Deere HY-GARD™ (J20C or J20D) Transmission/Hydraulic Oil. It is specifically formulated to minimize wet brake chatter, and to provide maximum protection against mechanical wear, corrosion, and foaming.

DO NOT use type "F" automatic transmission fluid.

Use J20C Transmission/Hydraulic Oil when ambient operating temperatures are **above** -18° C. (0° F.).

Use J20D Low Viscosity HY-Gard Transmission/ Hydraulic Oil when ambient operating temperatures are **below** -18° C. (0° F.).

ALTERNATIVE LUBRICANTS

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

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 earlier in this group.

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

Avoid mixing different brands, grades, or types of oil. Oil manufacturers blend additive 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.

OIL FILTERS

Filtration of oils is critical to proper lubrication. Always change filters regularly.

Use filters meeting John Deere performance specification.

LUBRICANT STORAGE

This machine can operate at top efficiency only if clean lubricants are used.

Use clean containers to handle all lubricants. Store them in an area protected from dust, moisture, and other contamination. Store drums on their sides.

ENGINE COOLANT

Use ethylene glycol base coolant. These coolants usually have labels stating "For Automobile and Light Duty Service." These products are also often labeled for use in aluminum engines. Check container label before using.

IMPORTANT: To prevent engine damage, DO NOT use pure antifreeze or more than 50% antifreeze in the cooling system. DO NOT mix or add any other type additives to the cooling system.

Mix approximately 50 percent antifreeze with 50 percent distilled or deionized water. This mixture will provide freeze protection to -34° F (-37 ° C).

Certain geographical areas may require lower temperature protection. See the label on your antifreeze container or consult your John Deere dealer to obtain the latest information and recommendations.

The recommended antifreeze provides:

- Adequate heat transfer.
- Corrosion-resistant environment within the cooling system.
- Compatibility with cooling system hose and seal material.
- Protection during cold and hot weather operations.

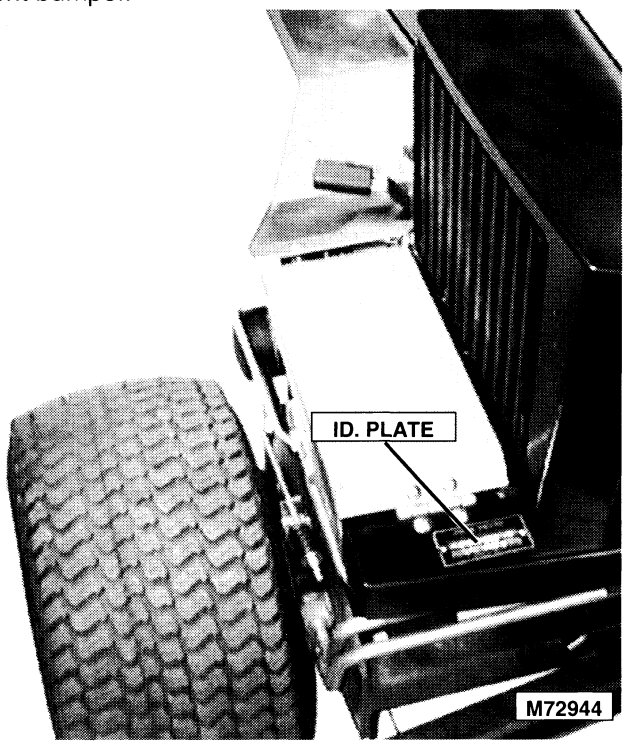
SERIAL NUMBER LOCATION

When ordering parts or submitting a warranty claim, it is IMPORTANT that you include the mower product identification number and the component serial numbers.

The location of the 2653 Professional Utility Mower Identification number is shown below.

MOWER IDENTIFICATION NUMBER

The Mower Identification Number is located on the right front bumper.



NOTES:

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ENGINE

SPECIFICATIONS

GENERAL ENGINE SPECIFICATIONS:

Engine

Make	Kawasaki
Model	FD620D
Type	Gasoline
Horsepower	13.4 kW (18HP)
Cylinders	2
Cycles	4
Bore	76 mm (2.99 in.)
Stroke	68 mm (2.66 in.)
Displacement	585 cc (35.7 cu-in.)

REPAIR SPECIFICATIONS:

Rocker Arm

Minimum Shaft O.D.	11.95 mm (0.470 in.)
Maximum Bearing I.D.	12.07 mm (0.475 in.)
Adjusting Nut Torque	9 N•m (79 lb-in.)

Push Rod

Maximum Bend	0.80 mm (0.031 in.)
Runnout	0.80 mm (0.03 in.)

Valves and Springs

Valve Clearance	0.25 mm (.010 in.)
Spring Free Length	29.70 mm (1.170 in.)
Minimum Valve Stem O.D.	
Intake	0.94 mm (0.234 in.)
Exhaust	5.92 mm (0.233 in.)
Maximum Valve Guide I.D.	6.05 mm (0.238 in.)
Maximum Valve Stem Bend	0.03 mm (0.001 in.)
Standard Valve Seating Surface	0.5 -1.10 mm (.020-.043 in.)
Valve Seating Width Tolerance	2.0 mm (0.08 in.)
Valve Seat and Face Angle	45^{o}
Minimum Valve Margin	0.60 mm (0.024 in.)
Valve Narrowing Angle	30^{o}

Cylinder Head

Cylinder Head Flatness	0.06 mm (.002 in.)
Compression (Min.)	1171 kPa (170 psi)
Cap Screw Torque In Sequence	
Initial Torque	13 N•m (115 lb-in.)
Final Torque	21 N•m (186 lb-in.)
Spark Plug Torque	20 N•m (177 lb-in.)

Flywheel

Flywheel Nut Torque	108 N•m (80 lb-ft.)
Sheave Half Cap Screw	15 N•m (130 lb-in.)

Camshaft

Minimum End Journals	25.21 mm (.993 in.)
Minimum Lobe O.D.	
Intake	25.21 mm (0.993 in.)
Exhaust	25.46 mm (1.002 in.)
Maximum Cover and Crankcase Bearing I.D.	16.07 mm (.633 in.)

Piston

Maximum Ring Groove Clearance	
Top Ring	0.15 mm (.006 in.)
Second Ring	0.12 mm (.005 in.)
Oil Ring	Not Measured
Ring Thickness (Top, Second)	1.12 mm (0.044 in.)
Maximum Ring End Gap (Top, Second)	1.20 mm (.050 in.)
Oil Ring	1.5 mm (0.06 in.)
Minimum Pin O.D.	16.98 mm (.668 in.)
Maximum Pin Bore I.D.	17.04 mm (.671 in.)
Piston O.D.(measured at 11 mm (.433 in.) from bottom of piston skirt)	75.935-75.95 mm (2.989-2.99 in.)
Piston-to-Cylinder Bore Clearance	0.030-.170 mm (.00118-.00670 in.)

Connecting Rod

Maximum Crankshaft Bearing I.D.	34.06 mm (1.341 in.)
Maximum Piston Pin Bearing I.D.	17.05 mm (.671 in.)
End-Cap Screw Torque	21 N•m (186 lb-in.)

Crankshaft

Minimum Side Journal O.D.	33.91 mm (1.335 in.)
Minimum Connecting Rod Journal	33.93 mm (1.336 in.)
Maximum T.I.R.	.05 mm (.002 in.)

Plain Bearings

Maximum Crankcase Cover I.D.	34.07 mm (1.341 in.)
Maximum Crankcase I.D.	34.11 mm (1.343 in.)

Cylinder Bore

Standard I.D.	75.98-76 mm(2.994-2.995 in.)
Maximum I.D.	76.07 mm (2.997 in.)
Out of Round	0.056 mm (0.0022 in.)

Cylinder Oversize Diameter

.25 mm	76.21-76.23 mm (3.002-3.003 in.)
.50 mm	76.46-76.48 mm (3.012-3.013 in.)
.75 mm	6.71-76.73 mm (3.022-3.023 in.)

Oil Pump

Minimum Rotor Shaft O.D.	0.92 mm (.430 in.)
Maximum Rotor Shaft Bearing I.D.	11.07 mm (.436 in.)
Minimum Outer Rotor O.D.	40.43 mm (1.592 in.)
Minimum Outer Rotor Bearing I.D.	40.80 mm (1.606 in.)
Minimum Valve Spring Free Length	19.50 mm (.770 in.)

Governor

Governor Arm Nut Torque	8 N•m (72 lb-in.)

Crankcase

Cover Cap Screw Torque . . . . . 21 N•m (186 lb-in.)
Drain Plug Torque . . . . . 23 N•m (204 lb-in.)

Intake Manifold

Cap Screw Torque . . . . . 6 N•m (53 Lb-in.)

Sheave /Half

Cap Screw Torque . . . . . 15 N•m (130 lb-in.)

Thermostat

Begin Opening Temperature . . . . . 65° C (148° F)
Fully Open Temperature. . . . . 80° C (176° F)

Water Pump

Minimum Shaft O.D.. . . . . 9.94 mm (0.391 in.)
Maximum Pump and Crankcase Housing Bore I.D.. . . . . 10.09 mm (0.397 in.)
Cap Screw Torque . . . . . 8 N•m (70 lb-in.)
Crankcase Cover Cap Screw Torque. . . . . 21 N•m (186 lb-in.)

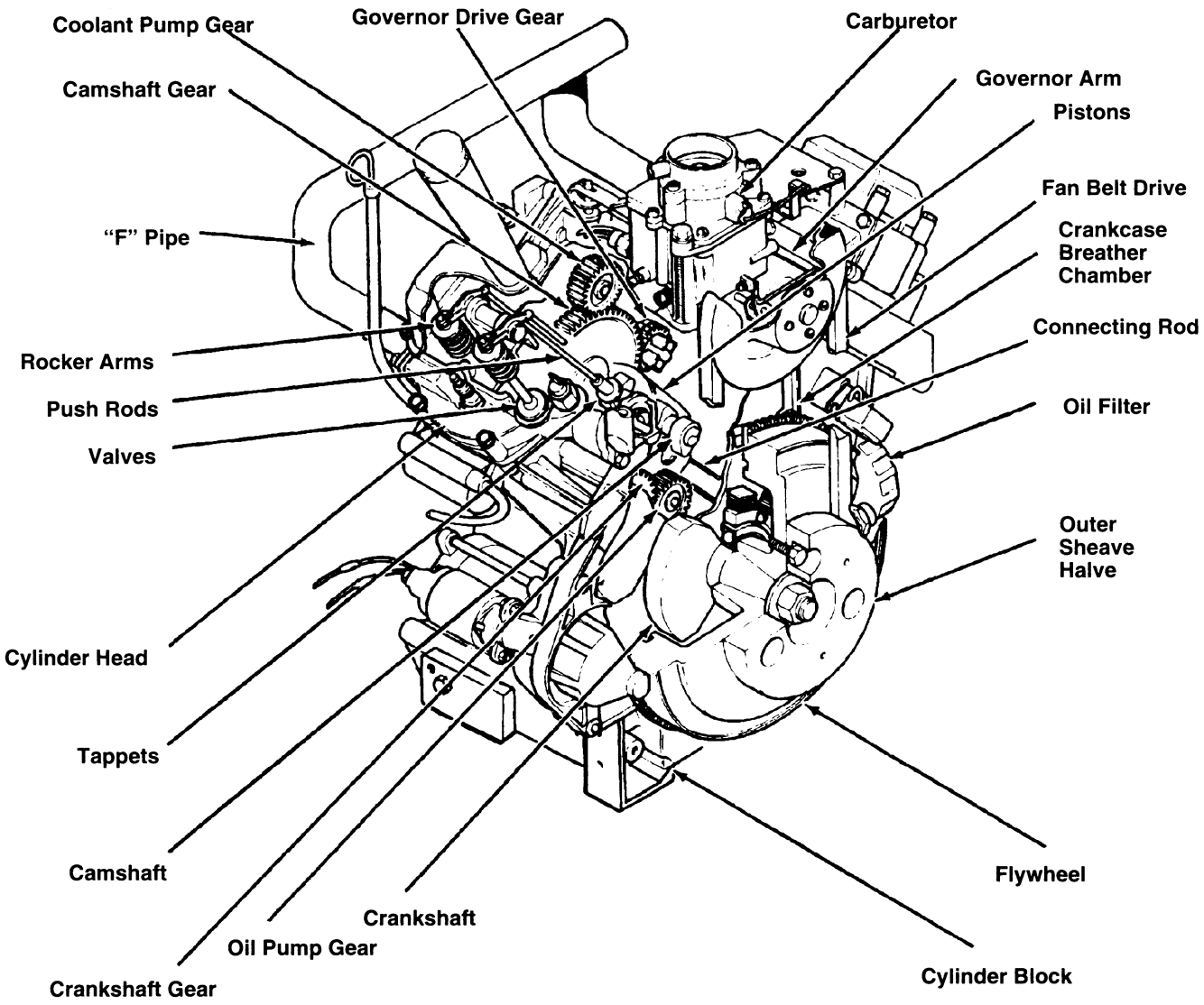
Ignition System

Type . . . . . Transistor Controlled
Pulsers . . . . . 85-270 ohms/Resistance
Ignition Coils
Primary Resistance . . . . . 3.4-4.6 ohms
Secondary Resistance . . . . . 10.4-15.5 K ohms

ENGINE AND COMPONENT TEST SPECIFICATIONS:

Compression . . . . . 1171 kPa (170 psi)
Thermo Switch . . . . . From off to on at 108°-114° C (226°-237° F)
. . . . . From on to off at 101°-107° C (214°-225° F)
. . . . . ON: Continuity
. . . . . OFF: Infinity

COMPONENT LOCATION



TROUBLESHOOTING

Problem or Symptom / Check or Solution	Engine cranks but will not start	Loss of power	Engine runs erratically	Engine misses at high rpm	Engine misses at low rpm	Excessive fuel consumption	Excessive oil consumption	Engine backfires	Engine knocks	Coolant leakage	Engine overheats	Engine RPM Low Or Engine Stalls
Weak or faulty spark plug	●	●	●		●							
Faulty high tension leads	●	●			●							
Faulty igniter	●	●			●	●			●			
Faulty ignition coil	●	●			●							
Faulty pulser coil	●	●			●			●				
No fuel in tank (contaminated)	●		●						●			
Fuel shut-off solenoid	●											
Defective fuel pump	●		●	●								
Air being drawn in through a hole in the fuel line(s)	●	●	●						●			
Fuel shut-off valve closed	●											
Clogged fuel line or filter	●	●	●	●								
Fuel vent line clogged	●	●	●	●								
Vapor lock			●									
Improper use of choke	●					●						
Air filter restricted	●	●										
Defective breather valve		●					●					
Float level too high	●					●						
Worn piston/piston rings	●	●				●	●					
Stuck piston ring(s)	●	●				●	●					
Worn cylinder bore	●	●				●	●					

Problem or Symptom / Check or Solution	Engine cranks but will not start	Loss of power	Engine runs erratically	Engine misses at high rpm	Engine misses at low rpm	Excessive fuel consumption	Excessive oil consumption	Engine backfires	Engine knocks	Coolant leakage	Engine overheats	Engine RPM Low Or Engine Stalls
Cylinder head loose	●	●				●		●		●		
Worn valves or improper clearance	●	●			●	●						
Worn valve stem(s) or valve guide(s)							●					
Warped cylinder head	●	●						●				
Broken valve spring	●	●				●						
Defective head gasket	●	●						●		●		
Low oil level		●										
Too much oil in crankcase		●					●					
Carburetor out of adjustment		●	●	●	●	●		●	●			
Air/fuel passages clogged		●			●							
Carbon deposits in exhaust pipe/muffler		●										
Carbon deposits in combustion chamber		●							●			
Lack of coolant			●						●		●	
Governor linkage out of adjustment			●									
Faulty governor spring			●									
Governor gear assembly binding or broken			●									
Air being drawn through carburetor or intake manifold flanges					●				●			
Incorrect timing gear alignment					●							
Plugged oil ring groove							●					
Oil leakage along governor shaft							●					