

**4050,  
4250, 4450,  
4650 and 4850  
Tractors**



**JOHN DEERE**

**TECHNICAL MANUAL**  
4050, 4250, 4450, 4650 and 4850  
Tractors

TM1259 (01Sep87) English

**TM1259 (01Sep87)**

LITHO IN U.S.A.  
ENGLISH



# 4050,4250,4450,4650 AND 4850 TRACTORS TECHNICAL MANUAL TM-1259 (SEP-87)

## CONTENTS—OPERATION AND TESTS

*This manual covers Tractor Operation and Tests (yellow tabs). Repair (green tabs) is covered in TM-1353 (formerly TM-1257) (4050,4250 and 4450 Tractors), TM-1354 (formerly TM-1258) (4650 and 4850 Tractors), CTM1 (6466 Engines), and CTM7 (Radial Piston Pumps).*

### SECTION 210—GENERAL

Introduction and Safety Information

### SECTION 220—ENGINE OPERATION AND TESTS

Group 05—System Operation

Group 10—System Tests and Diagnosis

### SECTION 230—FUEL/AIR OPERATION AND TESTS

Group 05—Air Intake System

Group 10—Diesel Fuel System

Group 15—Control Linkage

### SECTION 240—ELECTRICAL SYSTEM

Group 05—Electrical System Information

Group 06—Phase I Electrical Wiring Diagrams

Group 07—Phase II Electrical Wiring Diagrams

Group 10—Electrical System Diagnosis

Group 15—Delcotron Charging Circuit

Group 16—John Deere Charging Circuit

Group 20—Starting Circuit

Group 25—Lighting Circuit

Group 30—INVESTIGATOR™ II and Digital  
Tachometer

Group 31—Gauge Cluster Instrumentation

Group 32—Analog Tachometer

Group 35—Accessories Circuit

Group 40—PERFORMANCE TRAK™ I Radar  
Sensor System (Tachometer Version)

Group 41—PERFORMANCE TRAK™ II Radar  
Sensor System (Mini-Monitor)

Group 42—PERFORMANCE TRAK™ III Radar  
Sensor System (Multi-Function  
Monitor)

### SECTION 250—POWER TRAIN (PERMA-CLUTCH TRANSMISSION)

Group 05—QUAD-RANGE™ System Operation

Group 10—PERMA-CLUTCH™ Operation

Group 15—QUAD-RANGE™ Planetary

Group 20—QUAD-RANGE™ Eight-Speed

Group 25—Transmission Oil Pump

Group 30—Transmission Lubrication Valve

Group 35—Transmission Control Valves

Group 40—Differential and Final Drive

Group 45—SYNCRO-RANGE™ Transmission

Group 55—PTO

Group 60—QUAD RANGE™ Transmissions  
Diagnosis

### SECTION 255—POWER SHIFT TRANSMISSION

Group 05—Mechanical Operation

Group 10—Hydraulic Controls

Group 15—PTO, Differential and Final Drives

Group 16—Power Shift Transmission Diagnosis

Group 20—Mechanical Front Wheel Drive

*Continued on next page*

*All information, illustrations and specifications contained in this technical 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.*

## CONTENTS—OPERATION AND TESTS —CONTINUED

### SECTION 260—STEERING/BRAKES OPERATION AND TESTS

- Group 05—4050, 4250, and 4450 Power Steering
- Group 06—4650 and 4850 Power Steering
- Group 10—Power Brakes

### SECTION 270—HYDRAULIC OPERATION AND TESTS

- Group 05—PERMA-CLUTCH™ Transmission Operation
- Group 10—Power Shift Transmission Hydraulic System Operation and Tests
- Group 15—Main Hydraulic Pump
- Group 20—QUAD-RANGE™ Transmission Hydraulic Valves
- Group 25—Power Shift Transmission Hydraulic Valves
- Group 30—Pressure Control Valve
- Group 35—HYDRACUSHIONED™ Seat
- Group 40—Rockshaft Operation (4050, 4250, 4450)
- Group 45—Rockshaft Operation (4650 and 4850)
- Group 50—Selective Control Valve
- Group 55—Remote Cylinder
- Group 60—QUAD-RANGE Hydraulic Diagnosis
- Group 65—Power Shift Transmission Hydraulic Diagnosis

### SECTION 290—OPERATOR STATION OPERATIONS AND TESTS

- Group 05—Air Conditioning System
- Group 10—Air Conditioning System Tests—Introduction
- Group 11—System Tests Without Timer Relay-Warning Lamps
- Group 12—System Tests With Timer Relay-Warning Lamps
- Group 15—Heating System Operation Tests
- Group 20—HYDRACUSHIONED™ Seat

### SECTION 299—SPECIAL TOOLS

- Group 05—Purchased Tools
- Group 10—Fabricated Tools
- Group 15—Test Equipment Calibration

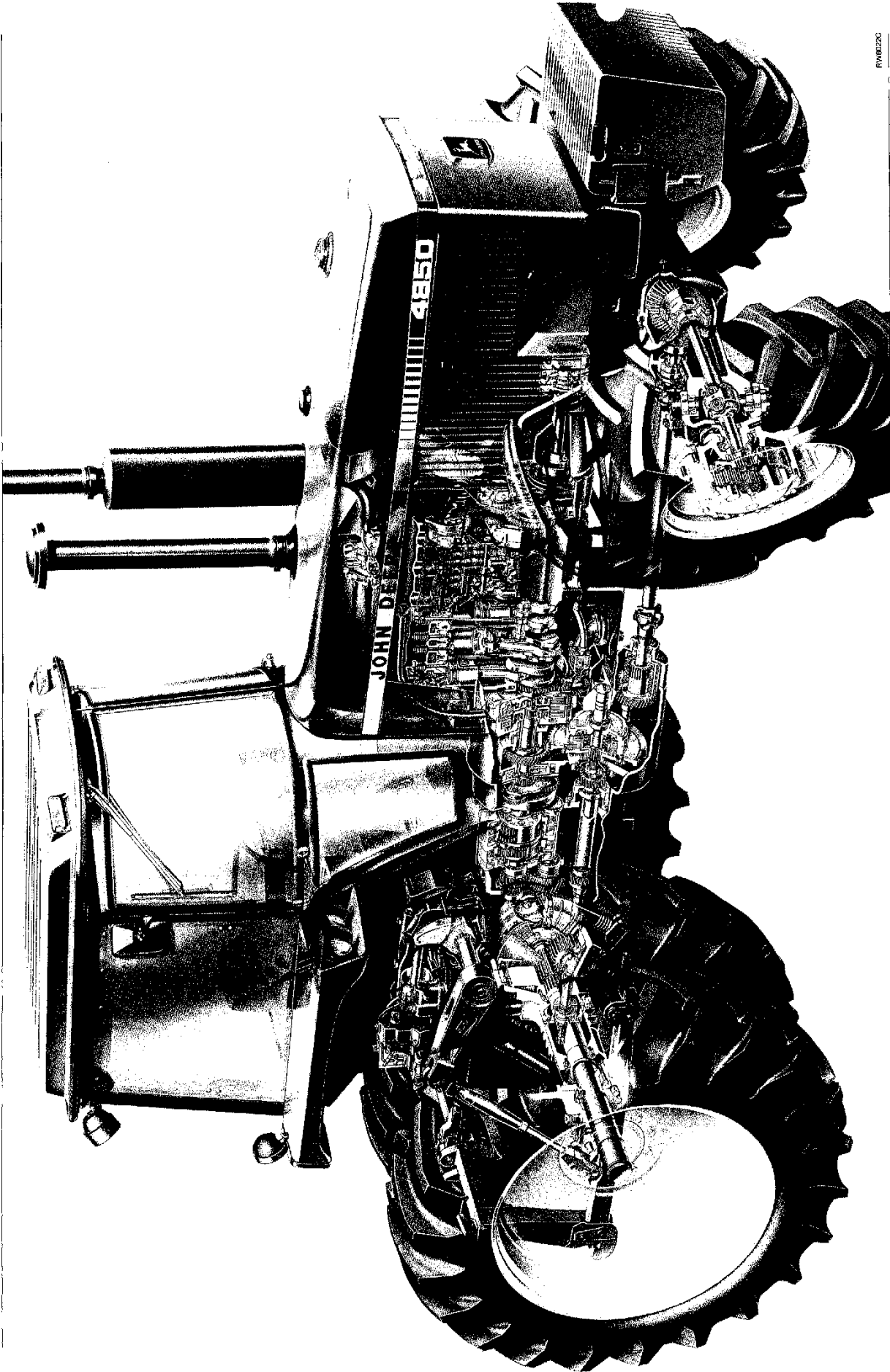
---

*Introduction and Safety Information*

---

Use this foldout illustration as a reference for locating the major components of each section

---



## INTRODUCTION

This manual is part of a total service support program.

### FOS Manuals—reference

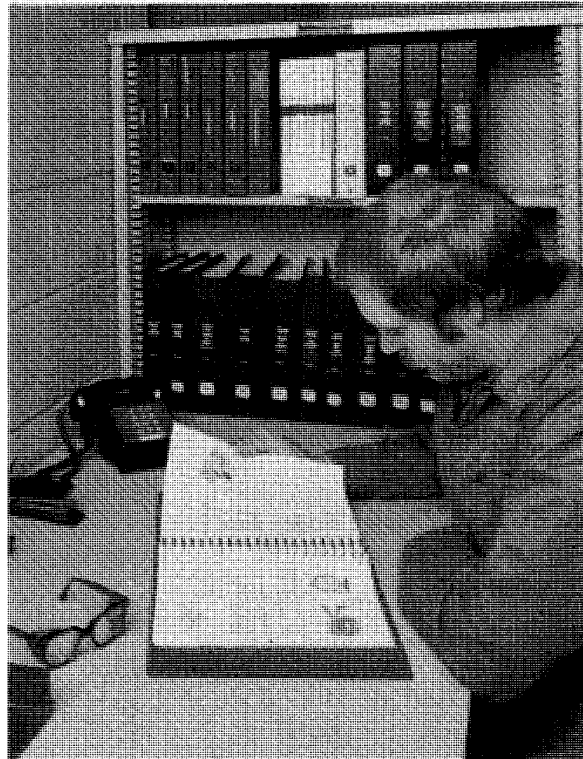
### Technical Manuals—machine service

### Component Manuals—component service

*Fundamentals of Service (FOS) Manuals* cover basic theory of operation, fundamentals of troubleshooting, general maintenance, and basic types of failures and their causes. FOS Manuals are for training new personnel and for reference by experienced technicians.

*Technical Manuals* are concise service guides for specific machines. Technical manuals are on-the-job guides containing only the vital information needed by an experienced service technician.

*Component Technical Manuals* are concise service guides for specific components. Component technical manuals are written as stand alone manuals covering multiple machine applications.



AB6;RW5559 053;INTR02 030785

## FEATURES OF THIS TECHNICAL MANUAL

John Deere ILLUSTRATION format emphasizing illustrations and concise instructions in easy-to-use modules.

Emphasis on diagnosis, analysis, and testing so you can understand the problem and correct it.

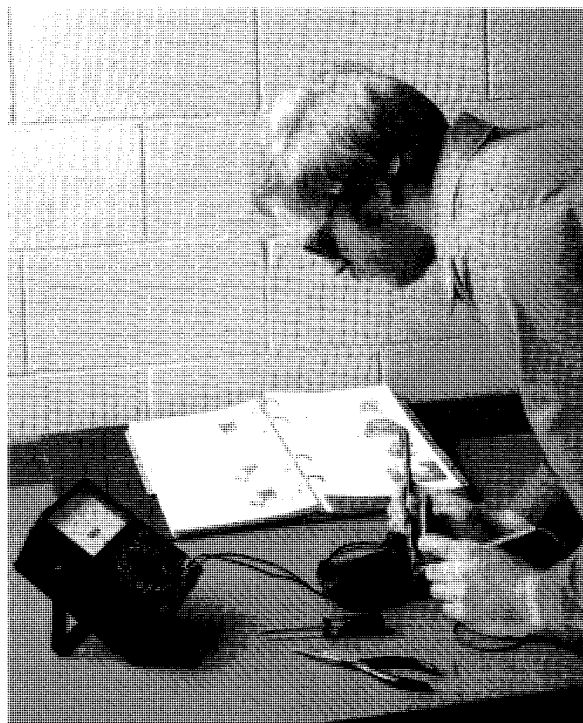
Diagnostic information presented with the most logical and easiest to isolate problems first to help you identify the majority of routine failures quickly.

Step-by-step instructions for teardown and assembly.

Summary listing at the beginning of each group of all applicable specifications, wear tolerances, torque values, essential tools, and materials needed to do the job.

An emphasis throughout on safety—so you do the job right without getting hurt.

This technical manual was planned and written for you—an experienced service technician. Keep it in a permanent binder in the shop where it is handy. Refer to it when you need to know correct service procedures or specifications.

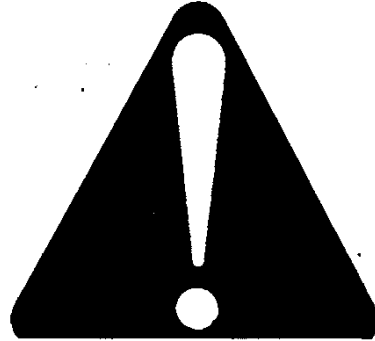


AB6;RW5560 053;INTR03 071085

## 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 operating practices.



AB6;T81389 053;ALERT 160687

## IMPORTANT

The **IMPORTANT** message identifies potential problems which may cause consequential damage to tractor. Following recommended procedure will instruct technician how to avoid problem.

U10;0101NT 0 101281

## NOTES

The word *NOTE* is followed by a statement that identifies a qualification or exception to a previous statement. A "NOTE" may also identify nice-to-know information pertinent to, but not directly related to previous statement.

U10;0101NT E 101281



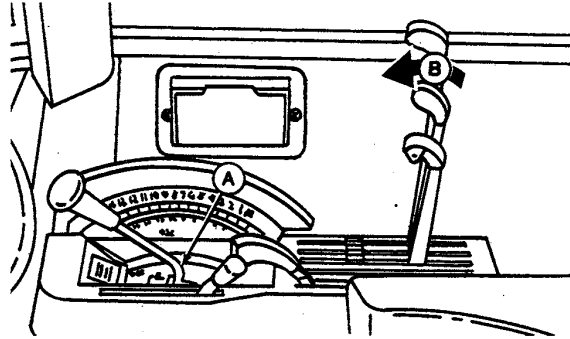
## STAY CLEAR OF MOVING TRACTOR

Always place transmission in PARK (A) before dismounting. Leaving transmission in gear with engine stopped will NOT prevent the tractor from moving.

Be sure everyone is clear of tractor and attached equipment before starting engine. Some movement may occur as engine starts.

Never try to get on or off a moving tractor.

When tractor is left unattended, lower implements to the ground (B), stop the engine, and remove the key.



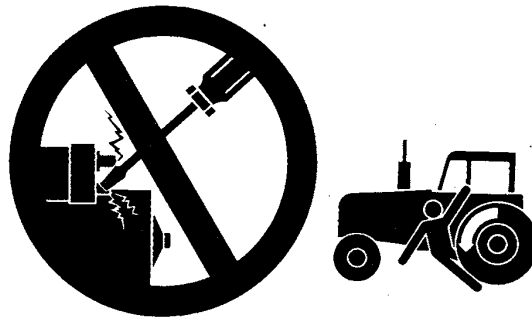
AJ7;RW5696L U01;STAY CLEAR2 200585

## PREVENT MACHINE RUNAWAY

Avoid possible injury or death from machinery runaway.

Do not start engine by shorting across starter terminals. Machine will start in gear if normal circuitry is bypassed.

NEVER start engine while standing on ground. Start engine only from operator's seat, with transmission in neutral or park.



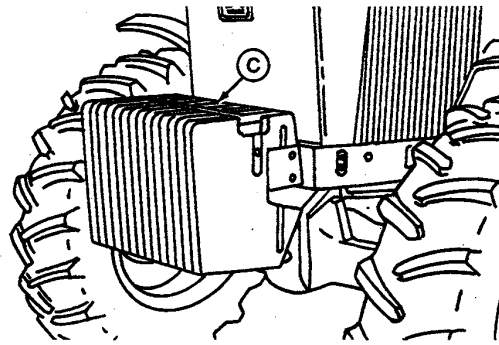
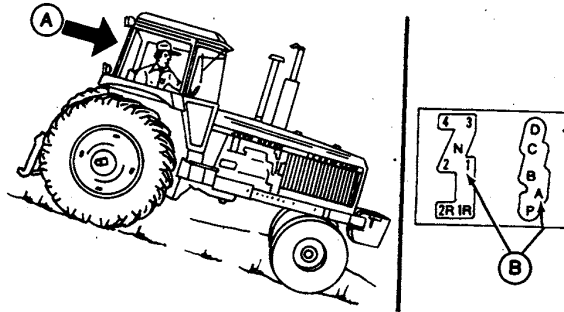
AB6;TS177 053;BYPAS1 210585

### SHIFT TO LOW GEAR ON HILLS

Shift to a low gear (B) before descending a steep hill (A), to improve your control of the tractor with little or no braking. Make sure brake pedals are locked together. Never coast downhill.

When driving on icy or graveled surfaces, reduce speed and be sure tractor is properly ballasted to avoid skidding and loss of steering control.

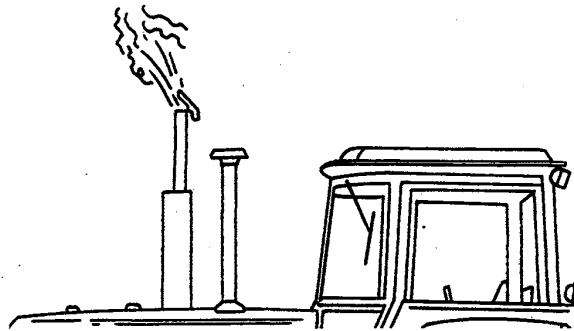
Additional ballast (C) may be needed for transporting heavy integral implements. When implement is raised, drive slowly over rough ground, regardless of how much ballast is used.



AJ7;RW5692 L,RW5693 L U01;DRIVE SAFE1 281085

### AVOID EXHAUST FUMES

Never run engine in a closed building. Make sure service area is adequately ventilated.



AJ7;RW5703 L U01;AVOID FUMES 090585

### KEEP RIDERS OFF MACHINE

Only allow the operator on the machine. Keep riders off.

Riders on machine are subject to injury such as being struck by foreign objects and being thrown off of the machine. Riders also obstruct the operator's view resulting in the machine being operated in an unsafe manner.



AB6;TS213 053;RIDER 160687

## HANDLE FUEL SAFELY—AVOID FIRES

Handle fuel with care: it is highly flammable. Do not refuel the machine while smoking or when near open flame or sparks.

Always stop engine before refueling machine. Fill fuel tank outdoors.

Prevent fires by keeping machine clean of accumulated trash, grease, and debris. Always clean up spilled fuel.



AB6;TS202 053;FIRE1 230487

## PREPARE FOR EMERGENCIES

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.



AB6;TS186 053;FIRE2 080785

## HANDLE STARTING FLUID SAFELY

Starting fluid is highly flammable.

Keep all sparks and flame away when using it. Keep starting fluid away from batteries and cables.

To prevent accidental discharge when storing the pressurized can, keep the cap on the container, and store in a cool, protected location.

Do not incinerate or puncture a starting fluid container.



AB6;T6098A U 053;FIRE3 160687

## PREVENT BATTERY EXPLOSIONS

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 it last.



AB6;TS204 U01;EXPLO 021087

## AVOID 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:

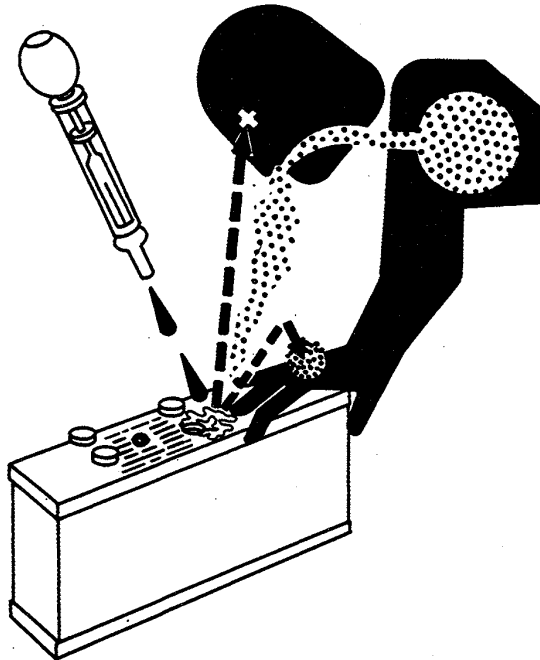
1. Filling batteries in a well-ventilated area.
2. Wearing eye protection and rubber gloves.
3. Avoid breathing fumes when electrolyte is added.
4. Avoid spilling or dripping electrolyte.

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. 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.

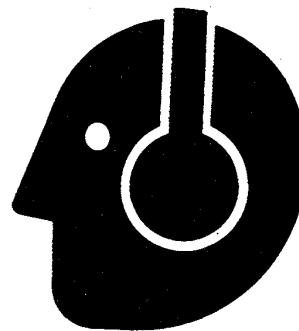


AB6;TS203 U01;ACID 021087

## PROTECT AGAINST NOISE

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.

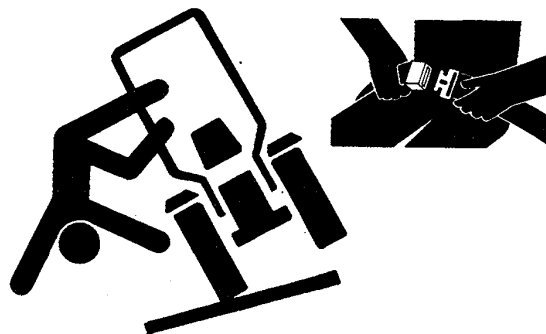


AB6;TS207 053;NOISE 230487

## USE SEAT BELT PROPERLY

Use a seat belt when you operate with a roll-over protective structure (ROPS) to minimize chance of injury from an accident such as an overturn.

Do not use a seat belt if operating without a ROPS.



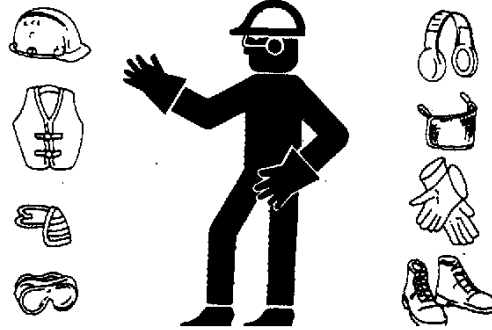
AB6;TS205 053;ROPS1 230487

### 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.

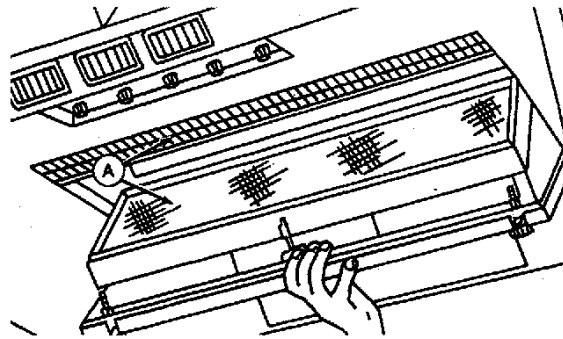
Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.



AB6;TS206 053;WEAR 230487

### HANDLE CHEMICALS PROPERLY

SOUND-GARD body air filters (A) are not designed to filter out harmful chemicals. Follow instructions given in the implement operator's manual and those given by the chemical manufacturer when using agricultural chemicals.



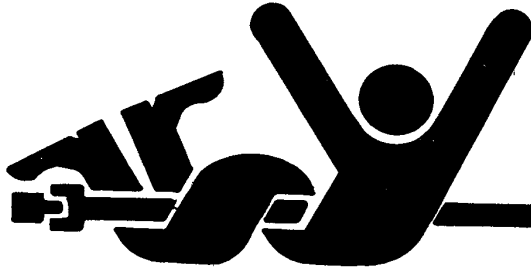
AJ7;RW5704 L U01;HANDLE CHEM 090585

### STAY CLEAR OF ROTATING DRIVELINES

Entanglement in rotating driveline can cause serious injury or death.

Keep tractor master shield and driveline shields in place at all times. Make sure rotating shields turn freely.

Wear close fitting clothing. Stop the engine and be sure PTO driveline is stopped before making adjustments, connections, or cleaning out PTO driven equipment.



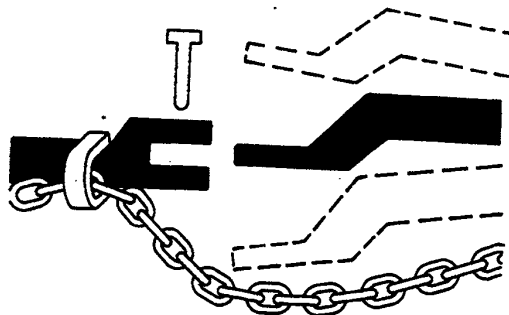
AB6;TS198 053;PTO 160687

### USE A SAFETY CHAIN

A safety chain will help control drawn equipment should it accidentally separate from the drawbar.

Using the appropriate adapter parts, attach the chain to the tractor drawbar support or other specified anchor location. Provide only enough slack in the chain to permit turning.

See your John Deere dealer for a chain with a strength rating equal to or greater than the gross weight of the towed machine. Do not use safety chain for towing.



AB6;TS208 053;CHAIN 180987

### TOW EQUIPMENT PROPERLY

Use caution when towing loads at transport speeds. Reduce speed if towed load weighs more than the tractor and is not equipped with brakes. Avoid hard braking applications. (Consult implement operator's manual for recommended transport speeds.)

Use additional caution when transporting towed loads under adverse surface conditions, when turning, or on inclines.

U01;TOW 061284

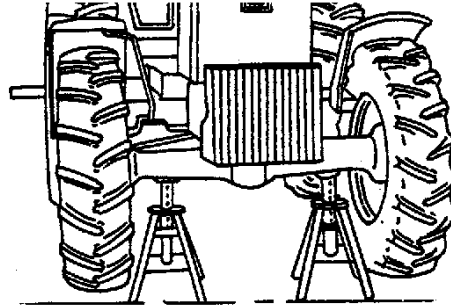
## SERVICE TRACTOR SAFELY

Do not service the tractor while it is in motion or while the engine is running.

If servicing front-wheel drive equipped tractor with rear wheels supported off ground and rotating wheels by engine power, always support front wheels in a similar manner. If front wheels are not raised, loss of electrical power or transmission-hydraulic system pressure will engage front driving wheels and pull rear wheels off support. Under these conditions, the front-drive wheels can engage even with switch in disengaged position.

Reinstall all shields removed during service.

The air conditioning system is pressurized. Improper servicing may cause refrigerant to penetrate eyes and skin or cause burns. Special equipment and procedures are required to service air conditioning system. (See your John Deere dealer.)

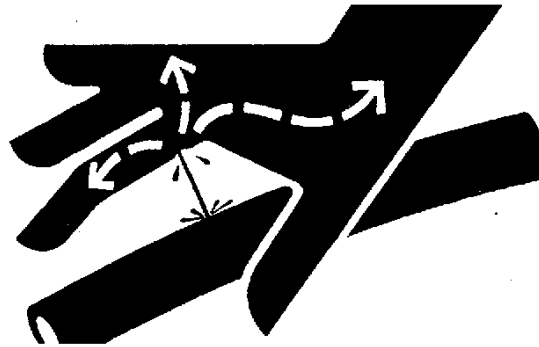


AJ7;RW5700 L U01;WORK SAFE1 090585

## AVOID HIGH-PRESSURE FLUIDS

Escaping fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles which eject fluids under high pressure. Use a piece of cardboard to search for leaks.

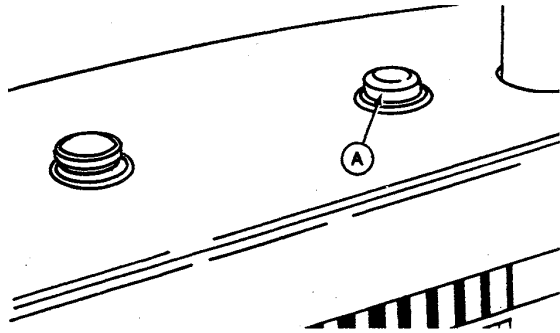
If ANY fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type injury or gangrene may result.



A86;X9811 053;FLUID 180987

### SERVICE COOLING SYSTEM SAFELY

Do not remove radiator cap (A) when engine is hot. Shut the engine off and wait until it cools. Then turn the cap slowly to the first stop to relieve pressure before removing it completely.

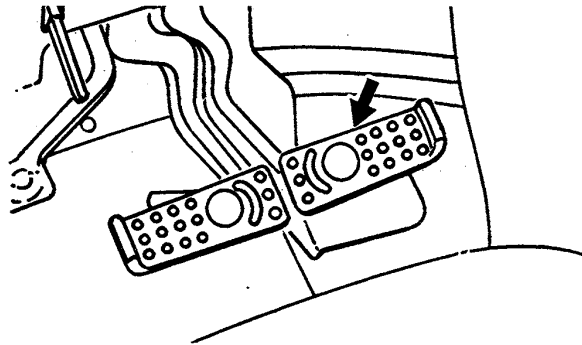


AJ7;RW5702 L U01;COOL IT 090585

### SERVICE BRAKE ACCUMULATOR SAFELY

Accumulator contains gas and oil under pressure. To avoid injury from escaping fluid, relieve all pressure from accumulator before disconnecting brake accumulator or brake valve. To do so open bleed screws and pump brake pedal with engine stopped, until pedal easily goes all the way down.

The accumulator is charged with dry nitrogen to a pressure of 500 psi (3450 kPa) (35 bar). If it needs recharging, have job done only by a qualified service person and only with dry nitrogen.



AJ7;RW8630 L U01;FIX BRAKE 311085

### PRACTICE SAFE MAINTENANCE

Understand service procedure before doing work.

Never lubricate or service 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. 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.

Disconnect battery ground cable (-) before making adjustments on electrical systems or welding on machine.



AB6;TS209 053;SERV 160687

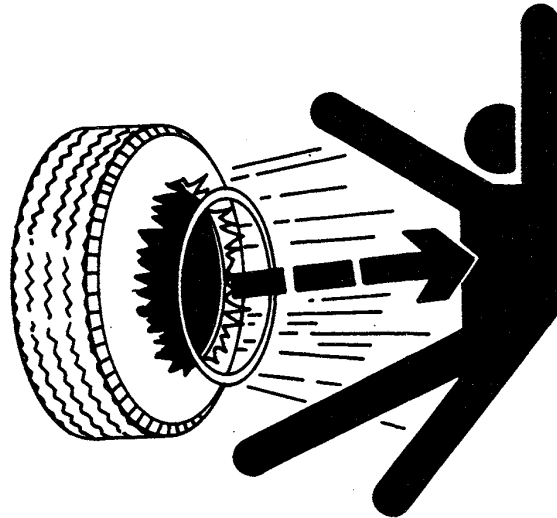


## SERVICE TIRES SAFELY

Failure to follow proper procedures when mounting a tire on a wheel or rim can produce an explosion which may result in serious injury or death. Do not attempt to mount a tire unless you have the proper equipment and experience to perform the job. Have it done by your John Deere dealer or a qualified tire repair service.

When sealing tire beads on rims, never exceed 35 psi (241 kPa) (2.4 bar) or maximum inflation pressures specified by tire manufacturers for mounting tires. Inflation beyond this maximum pressure may break the bead, or even the rim, with dangerous explosive force. If both beads are not seated when the maximum recommended pressure is reached, deflate, reposition tire, relubricate bead and reinflate.

Detailed tire mounting instructions, including necessary safety precautions, are contained in John Deere Fundamentals of Service (FOS) Manual 55, Tires and Tracks, available through your John Deere dealer. Such information is also available from the Rubber Manufacturers Association and from tire manufacturers.

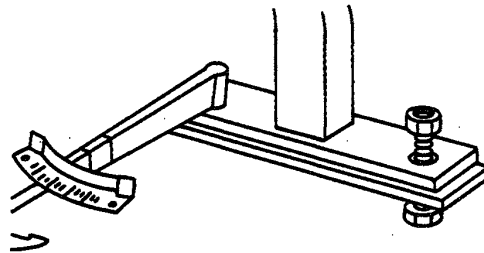


AB6;TS211 U01;TIRE 051087

## KEEP ROPS INSTALLED PROPERLY

Make certain all parts are reinstalled correctly if the roll-over protective structure (ROPS) is loosened or removed for any reason. Tighten mounting bolts to proper torque.

The protection offered by ROPS will be impaired if ROPS is subjected to structural damage, is involved in an overturn incident, or is in any way altered by welding, bending, drilling, or cutting. A damaged ROPS should be replaced, not reused.

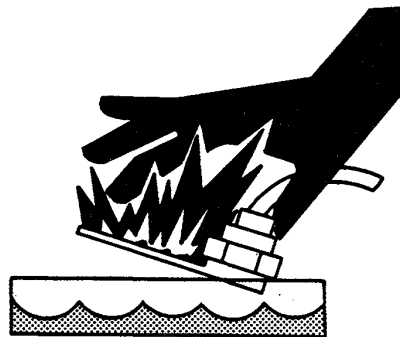


AB6;TS212 053;ROPS3 230487

## TEST COOLANT HEATER IN LIQUID ONLY

Do not plug coolant heater into electrical power unless heating element is immersed in coolant. Sheath could burst and result in personal injury.

Use a heavy-duty grounded cord to connect coolant heater to electrical power.



AB6;TS210 U01;HEAT 201087

*Introduction and Safety Information*

# Section 220 ENGINE

## CONTENTS

### GROUP 05 - SYSTEM OPERATION

Cooling System .....	220-05-01
Lubrication System .....	220-05-04

### GROUP 10 - SYSTEM TESTS AND DIAGNOSIS

Special Tools .....	220-10-01
Specifications .....	220-10-02
Dynamometer Test .....	220-10-03
Engine Break-In Instructions .....	220-10-04

Diagnosing Engine Malfunctions .....	220-10-05
Compression Gauge Modification .....	240-10-06
Test Engine Compression Pressure .....	220-10-07
Check Valve Lift .....	220-10-08
Check Valve Clearance .....	220-10-08
Check Crankshaft End Play .....	220-10-10
Check Damper Run Out .....	220-10-10
Check Oil Pressure .....	220-10-11
Test Radiator and Cap .....	220-10-12
Test Viscous Fan Drive .....	220-10-13

*Contents*

**BUY NOW**

**Then Instant Download  
the Complete Manual  
Thank you very much!**