21C, 21S, 21HC and 45BP Hand Held Products

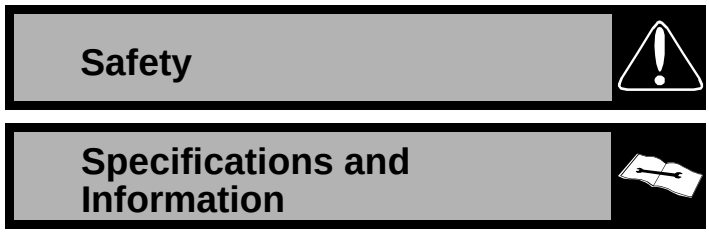
TECHNICAL MANUAL

John Deere
Lawn & Grounds Care Division

TM1524 (April 95)

Litho in U.S.A

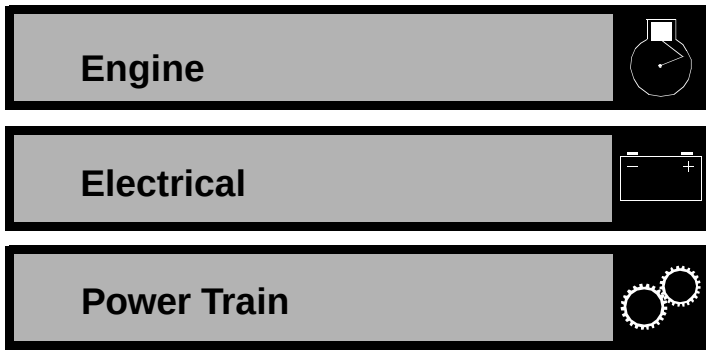
This technical manual is written for an experieced technician and contains sections that are specifically for this product. It is a part of a total product support program.



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
- Theory of Operation
- Troubleshooting Diagram
- Diagnostics
- Tests & Adjustments
- Repair

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



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

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.

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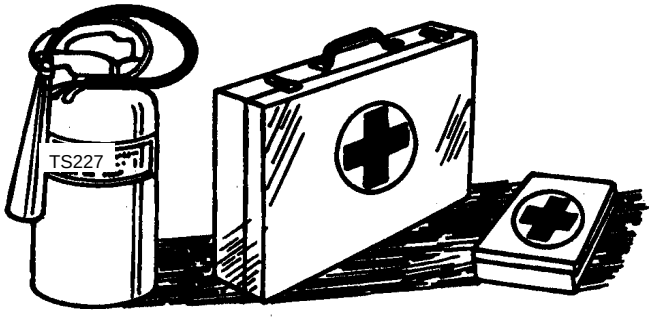
HANDLE FLUIDS SAFELY-AVOID FIRES

- **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

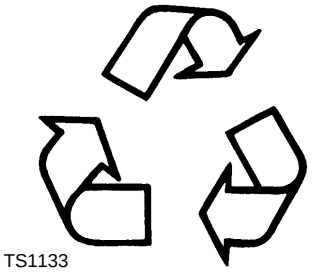
- Follow safe procedures and use recommended equipment..

TS1132

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.

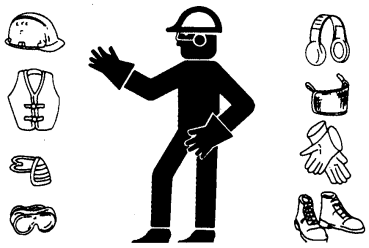
- **DISPOSE OF WASTE PROPERLY**


TS1133

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 SAFE SERVICE PROCEDURES

- **WEAR PROTECTIVE CLOTHING**


TS206

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

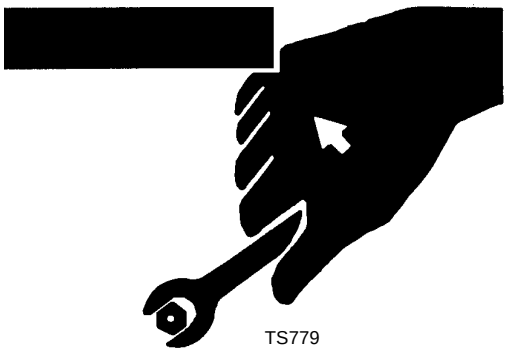
Prolonged exposure to loud noise can cause impairment or loss of hearing. Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.

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

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.

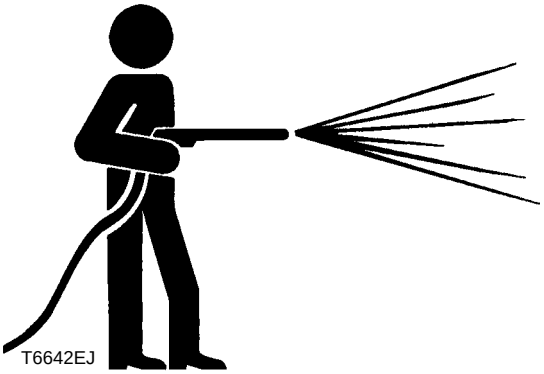
Remove rings and other jewelry to prevent electrical shorts and entanglement in moving parts.

- **USE PROPER TOOLS**


TS779

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 or vise versa. Avoid bodily injury caused by slipping wrenches. Use only service parts meeting John Deere specifications.

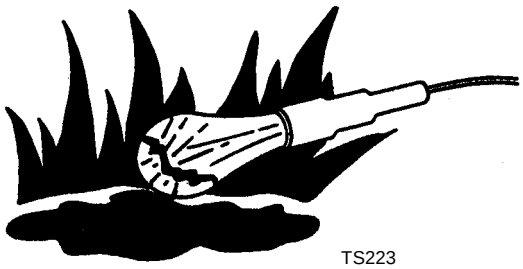
- **WORK IN CLEAN AREA**


T6642EJ

Before starting a job

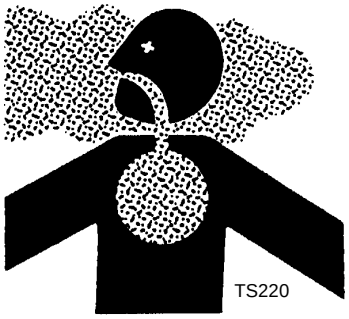
1. Clean work area and machine;
2. Make sure you have all necessary tools to do your job;
3. Have the right parts on hand;.
4. Read all instructions thoroughly; DO NOT attempt shortcuts;

- **ILLUMINATE WORK AREA SAFELY**


TS223

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.

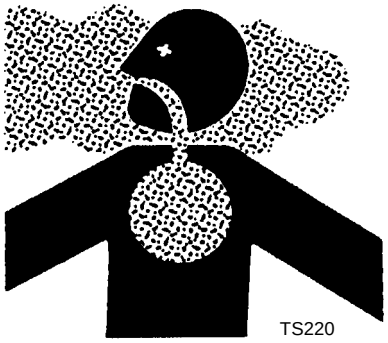
- **WORK IN VENTILATED AREA**


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.

- **AVOID HARMFUL ASBESTOS DUST**


TS220

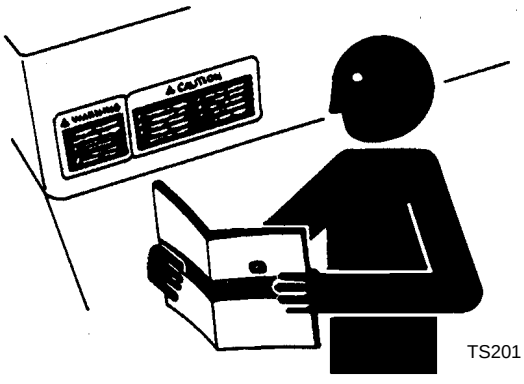
Avoid breathing dust that may be generated when handling components containing asbestos fibers. Inhaled asbestos fibers may cause lung cancer.

Components 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.

REPLACE SAFETY SIGNS



TS201

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

OPERATE HEDGE CLIPPER SAFELY


TY14128

Keep people and pets out of the area where you are using the hedge clipper.

DO NOT let children operate hand held equipment.

DO NOT point hand held cutting blade in the direction of people or pets.

Keep your hair from being drawn into hand held equipment.

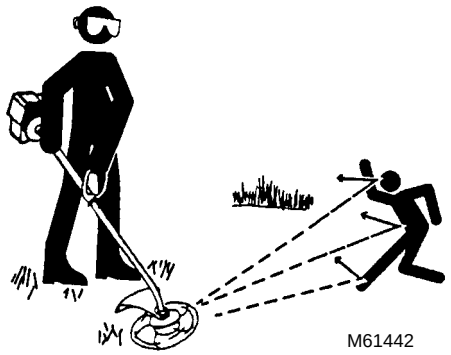
DO NOT touch cylinder or muffler assembly when you handle hand held equipment.

Start hand held equipment on the ground.

Before you service, adjust, clean, fuel, or inspect hand held equipment:

- Stop engine;
- Wait for engine to cool;
- Keep hand held equipment engines clean; remove grass, leaves, oil, and dirt before you start;
- Unauthorized modifications to the machine may impair the function and/or safety and affect machine life and warranty;
- DO NOT run engine in an enclosed area. Exhaust fumes contain carbon monoxide, an odorless and deadly poison;
- Keep machine hand grips clean and dry;
- When operating machine, hold firmly with both hands. Maintain proper footing and balance. DO NOT reach or lean too far to make a cut;
- Move machine away from your body. DO NOT draw blades toward you;
- If cutting blade or blades are cracked, replace immediately and;
- DO NOT attempt to fill fuel tank, make adjustments, or clean hand held equipment while engine is running or hot;

INSPECT CUTTING AREA

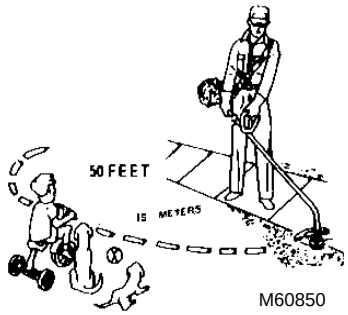


M61442

Remove all debris (string, wire, or cords) which might clog cutting head.

Remove objects (bottles, cans, or sticks) that might be thrown by clipper, trimmer/edger or cutter.

OPERATE TRIMMERS SAFELY



M60850

Keep people and pets out of the area where you are using the machine.

Unauthorized modifications to the machine may impair the function and/or safety and affect machine life.

DO NOT run engine in an enclosed area. Exhaust fumes contain carbon monoxide, an odorless and deadly poison.

Keep machine hand grips clean and dry.

When operating machine, hold firmly with both hands. Keep proper footing and balance.

Move machine away from your body. DO NOT draw blades or cutting head toward you. DO NOT reach to make a cut.

When operating hand held equipment with optional blade installed, always use shoulder harness and grip handlebars securely.

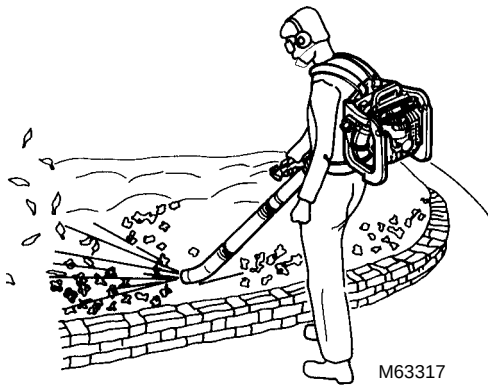
Use metal shield when using blades on hand held equipment.

Take precautions to avoid “kickback”.

If cutting blade or blades are cracked, replace immediately.

DO NOT attempt to fill fuel tank, make adjustments, or clean while engine is running.

OPERATE BLOWER SAFELY



M63317

Keep people and pets out of the area where you are using the hand held equipment.

DO NOT let children operate hand held equipment.

DO NOT point blower air pipes in the direction of people or pets.

Keep your hair from being drawn into hand held equipment.

DO NOT touch cylinder or muffler assembly when you handle hand held equipment.

Start hand held equipment on the ground, not on operator’s back.

Move air pipe or fan intake to avoid air flow restriction.

Before you service, adjust, clean, fuel, or inspect hand held equipment:

Stop engine.

Wait for engine to cool.

Keep hand held equipment engines clean. Remove grass, leaves, oil, and dirt before you start engine.

LIVE WITH SAFETY

TS231

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

CONTENTS

Page

SPECIFICATIONS & INFORMATION

TRIMMERS—21C/21S

ENGINE

Type	2 Cycle, Air Cooled
Displacement	21.2 cc (1.294 cu. in.)
Bore	32.2 mm (1.27 in.)
Stroke	26.0 mm (1.024 in.)
Horsepower	.66 kW (.88 hp.)
Compression Ratio	6.5:1
Compression Pressure	833 kPa (125 PSI)
Carburetor	Diaphragm type w/ starting primer
Exhaust System	Spark arrestor type
Fuel/Oil Ratio	
John Deere 2-cycle Oil	50:1
BIA Cert. TC-W service	32:1
Fuel Type	Regular or Unleaded
Fuel Tank Capacity	0.4 L (13.5 fl. oz.)
Starter	Auto-rewind
Low Idle Speed	2500/3000 RPM
High Idle Speed	9000 RPM
Clutch Engagement Speed	3500 RPM

ELECTRICAL

Ignition	Flywheel Magneto, CDI System
Spark Plug	John Deere AM54611 (Champion CJ-7Y) or TY15207 (NGK BPM7A)
Spark Plug Gap	0.6—0.7 mm (0.024—0.028 in.)
Spark Plug Torque	15.0—17.0 N•m (130—150 lb-in.)
CDI Module Air Gap	0.3—0.4 mm (0.012—0.016 in.)
Secondary Coil Resistance	1500—2500 ohms

POWER TRAIN

Drive	
Clutch Type	Auto-centrifugal
Drive Shaft	4-layer flexible steel cable
Shaft Length	[21C] 1422 mm (56 in.)—[21S] 1524 mm (60 in.)
Rotation (Viewed from top)	[21C] Clockwise—[21S] Counterclockwise
Gear Case Reduction	[21S only] 1:1.4
Cutter Head	
Line Diameter	[21C] 2 mm (.080 in.)—[21S] 2.4 mm (.095 in.)
Exits	Dual
Line Advance	Semi-auto
Cutting Width	[21C] 406 mm (16 in.)—[21S] 432 mm (17 in.)

HEDGE CLIPPER—21HC

ENGINE

Type	2 Cycle, Air Cooled
Displacement	21.2 cc (1.294 cu. in.)
Bore	32.2 mm (1.27 in.)
Stroke	26.0 mm (1.024 in.)
Horsepower	.66 kW (.88 hp.)
Compression Ratio	6.5:1
Compression Pressure	758 kPa (110 PSI)
Carburetor	Diaphragm type w/ starting primer
Exhaust System	Spark arrester type
Fuel/Oil Ratio	
John Deere 2-cycle Oil	50:1
BIA Cert. TC-W service	32:1
Fuel Type	Regular or Unleaded
Fuel Tank Capacity	500 cc (16.9 fl. oz.)
Starter	Auto-rewind
Low Idle Speed	2500/3000 RPM
High Idle Speed	6000/8000 RPM
Clutch Engagement Speed	3700 RPM

ELECTRICAL

Ignition	Flywheel Magneto, CDI System
Spark Plug	John Deere AM54611 (Champion CJ-7Y)
Spark Plug Gap	0.6—0.7 mm (0.024—0.028 in.)
Spark Plug Torque	15.0—17.0 N•m (130—150 lb-in.)
CDI Module Air Gap	0.3—0.4 mm (0.012—0.016 in.)
Secondary Coil Resistance	1500—2500 ohms

POWER TRAIN

Gear Case	
Reduction Ratio	1:5.13
Drum Gear	8 Teeth
Drive Gear	41 Teeth
Lubrication	John Deere Moly High Temp Grease TY6333
Capacity	70g (2.5 oz.)
Cutter Blades	
Cutting Action	Reciprocating Dual-Action Type
Length	750 mm (29.5 in.)
Blade Knifes	
Type	Double-edged
Number of Knifes	21 per blade
Length	23 mm (0.906 in.)
Thickness	3 mm (0.118 in.)
Pitch	35 mm (1.378 in.)
Cutting Direction	Single-forward Sweep only
Lubrication	Engine oil every 4 hours

BACKPACK BLOWER—45BP

ENGINE

Type	2 Cycle, Air Cooled
Displacement	44 cc (2.69 cu. in.)
Bore	40.0 mm (1.58 in.)
Stroke	35.0 mm (1.38 in.)
Horsepower	@ 7000 RPM 1.5 kW (2.0 hp.)
Compression Ratio	7.0:1
Compression Pressure	758 kPa (110 PSI)
Carburetor	Diaphragm type w/ starting primer
Exhaust System	Spark arrester type
Fuel/Oil Ratio	
John Deere 2-cycle Oil	50:1
BIA Cert. TC-W service	32:1
Fuel Type	Regular or Unleaded
Fuel Tank Capacity	67.6 fl. oz. (1.9 L.)
Starter	Auto-rewind
Low Idle Speed	2500/2800 RPM
High Idle Speed	6400/6600 RPM

ELECTRICAL

Ignition	Flywheel Magneto, CDI System
Spark Plug	John Deere M122747 (NGK BPM7Y)
Spark Plug Gap	0.6—0.7 mm (0.024—0.028 in.)
Spark Plug Torque	15.0—17.0 N•m (130—150 lb-in.)
CDI Module Air Gap	0.3—0.4 mm (0.012—0.016 in.)
Secondary Coil Resistance	1000—1500 ohms

POWER TRAIN

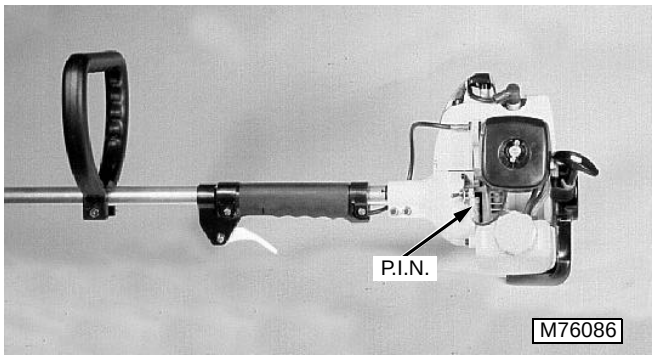
Blower Type	Direct-drive
Maximum Air Speed	180 MPH (288 km/h)
Maximum Air Volume	@ 7000 RPM 371 cu. ft./min. (10.5 m^3/min.)

SERIAL NUMBER LOCATION

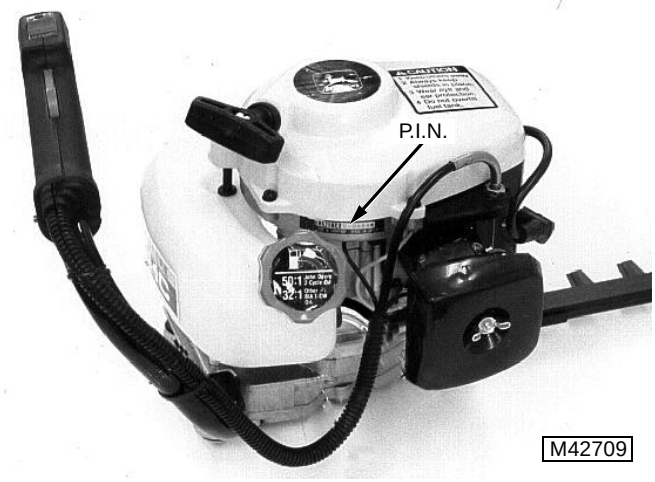
When ordering parts or submitting a warranty claim, it is IMPORTANT that you include the machine product identification number and the model number.

The locations of the product identification numbers are shown.

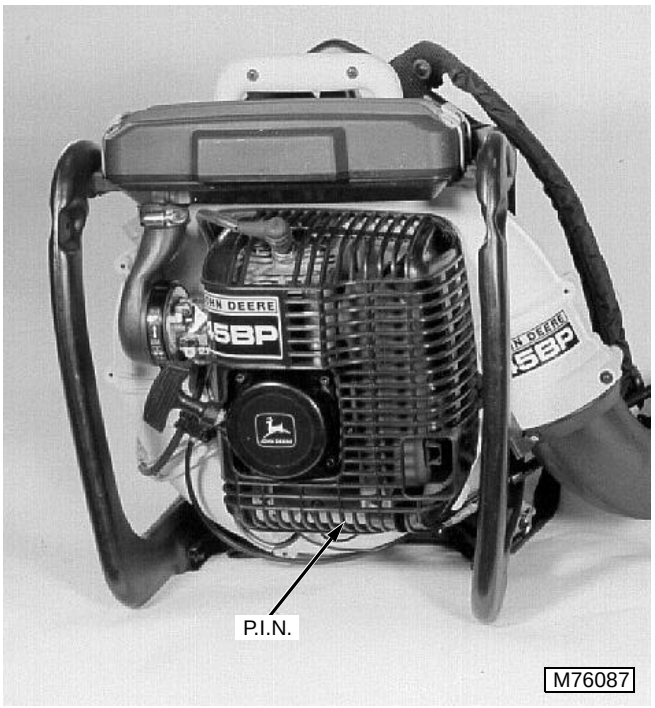
TRIMMERS—21C, 21S



HEDGECLIPPER—21HC



BLOWER—45BP



CONTENTS

Page

ENGINE

Page

SPECIFICATIONS

TORQUE SPECIFICATIONS

STRING TRIMMERS–21C/21S

Carburetor	3.5–4.5 N•m (30–40 lb-in.)
Carburetor Insulator	3.5–4.5 N•m (30–40 lb-in.)
CDI Module	2.0–2.5 N•m (17–22 lb-in.)
Clutch Hub	18.0–20.0 N•m (160–175 lb-in.)
Crankcase	3.5–4.5 N•m (30–40 lb-in.)
Cylinder	7.5–8.5 N•m (65–75 lb-in.)
Fan Cover	2.0–2.5 N•m (17–22 lb-in.)
Muffler	5.5–6.5 N•m (50–55 lb-in.)
Pawl Carrier	8.0–10.0 N•m (70–90 lb-in.)
Spark Plug	15.0–17.0 N•m (130–150 lb-in.)

HEDGE CLIPPER–21HC

Blade Fastener	5.0–6.0 N•m (45–50 lb-in.)
Blade Supporter	5.5–6.5 N•m (50–55 lb-in.)
Carburetor	3.5–4.5 N•m (30–40 lb-in.)
Carburetor Insulator	3.5–4.5 N•m (30–40 lb-in.)
CDI Module	2.0–2.5 N•m (17–22 lb-in.)
Clutch Hub	18.0–20.0 N•m (160–175 lb-in.)
Crankcase	3.5–4.5 N•m (30–40 lb-in.)
Cylinder	7.5–8.5 N•m (65–75 lb-in.)
Fan Cover	2.0–2.5 N•m (17–22 lb-in.)
Muffler	5.5–6.5 N•m (50–55 lb-in.)
Pawl Carrier	8.0–10.0 N•m (70–90 lb-in.)
Pawl Carrier Nut	16.0–20.0 N•m (140–175 lb-in.)
Spark Plug	15.0–17.0 N•m (130–150 lb-in.)

BLOWER–45BP

Carburetor	3.5–4.5 N•m (30–40 lb-in.)
Carburetor Insulator	5.0–6.0 N•m (45–55 lb-in.)
CDI Module	3.5–4.0 N•m (30–35 lb-in.)
Crankcase	3.5–4.5 N•m (30–40 lb-in.)
Cylinder	7.5–8.5 N•m (65–75 lb-in.)
Engine Mount	3.5–4.5 N•m (30–40 lb-in.)
Fan	7.5–8.5 N•m (65–75 lb-in.)
Fan Case	3.0–3.5 N•m (25–30 lb-in.)
Muffler	13.0–15.0 N•m (110–130 lb-in.)
Muffler Bracket	3.5–4.5 N•m (30–40 lb-in.)
Pawl Carrier	8.0–10.0 N•m (70–90 lb-in.)
Pawl Carrier Nut	28.0–32.0 N•m (245–280 lb-in.)
Rubber Cushion	3.0–4.0 N•m (25–35 lb-in.)
Spark Plug	15.0–17.0 N•m (130–150 lb-in.)

ENGINE WEAR TOLERANCES—ALL ENGINES

Connecting Rod—

Maximum Side Clearance . . . . . 0.4 mm (0.016 in.)

Crankshaft Bearings—

Inner Diameter . . . . . 15 mm (0.59 in.)
Outer Diameter. . . . . 35 mm (1.38 in.)
Width . . . . . 11 mm (0.43 in.)

Piston—

Maximum Out-of-Round. . . . . 0.05 mm (0.002 in.)
Pin-to-Bore Clearance . . . . . 0.03 mm (0.001 in.)
Ring Side Clearance . . . . . 0.10 mm (0.040 in.)
Top ring of 45BP . . . . . 0.15 mm (0.059 in.)
Ring End Gap. . . . . 0.50 mm (0.020 in.)

TESTS AND ADJUSTMENTS

Carburetor—

Slow Idle Screw Initial Adjustment . . . . . 1 Turn CCW
High Idle Screw Initial Adjustment
21C/21S/45BP . . . . . 1 Turn CCW
21HC. . . . . 1/2 Turn CCW
Slow Idle Speed RPM . . . . . 2500-3000 RPM
High Idle Speed RPM
21C/21S/21HC . . . . . 6000-8000 RPM
45BP . . . . . 6500-7400 RPM
Metering Lever Clearance . . . . . 0.1-0.25 mm (.004-.010 in.)

Engine—

Compression
21C/21S . . . . . 862 kPa (125 PSI)
21HC. . . . . 758 kPa (110 PSI)
45BP . . . . . 758 kPa (110 PSI)
Crankcase Pressure. . . . . 7 kPa (1 PSI) Loss Per Min.
Crankshaft Runout . . . . . Maximum TIR 0.05 mm (0.002 in.)

GENERAL INFORMATION


TS779

IMPORTANT: Use the proper tool(s) for each task. DO NOT use makeshift tools or shortcut procedures, these may lead to machine damage, poor performance, or safety hazards.

Support crankcase halves on wood blocks or in a soft-jaw vise to prevent any damage to housings.

NOTE: All models have very similar engines with slight variations between them. This manual will group the engines together and call out differences in the specific areas that are different. Photos may or may not match your model exactly since many different models of equipment are covered here. However, your model should be very similar. Where the differences are significant, separate illustrations are used.

The following sequence of procedures does not have to be followed exactly in the order they appear. You might want to only remove the carburetor and you wouldn't have to remove the fuel filter to accomplish this. However, you might have to page forward or backward in this group to help you complete a particular task.

SERVICE PARTS KITS

The following kits are available through your parts catalog for each model:

- Engine Gasket Kit
- Piston Kit
- Carburetor Repair Kit
- Carburetor Gasket/diaphragm Replacement Kit
- Decal Replacement Kit

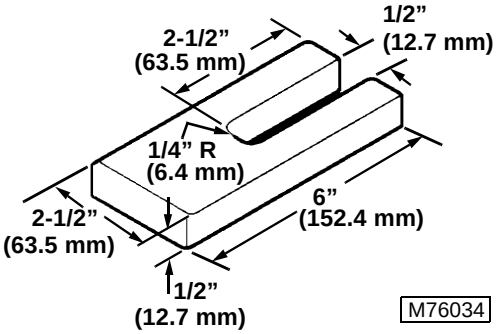
OTHER MATERIALS

Number	Name	Use
TY9370	John Deere Thread Lock and Sealer (Medium Strength)	Apply to threads of flywheel nut/ adapter.
TY9373	John Deere Plastic Gasket	To Seal Crankcase

FABRICATED TOOLS

NOTE: This tool can be fabricated if you prefer using it over the small diameter rope to prevent crankshaft rotation.

Piston Support Tool—Fabricate to stop crankshaft rotation for removal and installation of clutch brake assembly, flywheel, and recoil start pawl and housing. Tool can also be used to hold piston straight while installing the cylinder.



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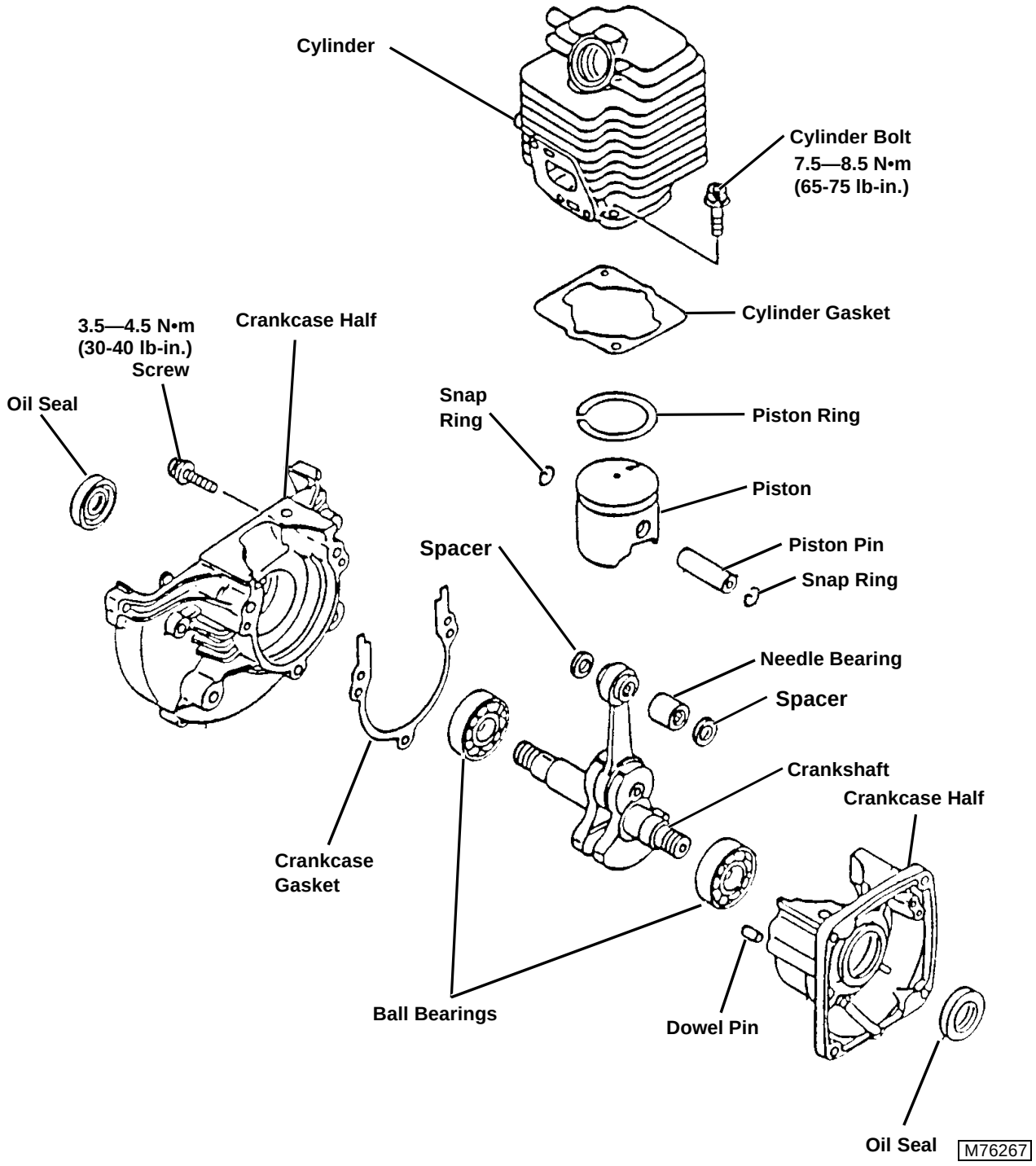
SERVICE TOOLS

NOTE: Order tools from the U.S. SERVICEGARD™ Catalog or from the European Microfiche Tool Catalog (MTC). Some tools may be available from a local supplier.

Number	Name	Use
JDZ23	Piston Pin Tool	Remove piston pin
D01203AA	2-Jaw Puller	Remove flywheel
D01217AA	Knife Edge Puller	Remove crankcase ball bearings, if they stay on the crankshaft
JDG319	Clutch Brake Shoe Assembly Tool	Remove clutch brake shoe assembly from end of crankshaft
JTO5827 or D01007AA and D01045AA	Hydraulic Press and Meter Driver Set	Press out crankcase ball bearings and seals, if they remain in the crankcase halves
D01061AA	Blind-Hole Puller Set	To pull crankcase ball bearings, if you don't have the above hydraulic press and master driver set
JDM44	Crankcase and Carburetor Pressure Tester Kit	Pressure test 2-cycle engine crankcase
JDM59	Compression Gauge	Test engine compression
JDM71	Vibration Tachometer	Test and set engine rpm
JDM101A	Crankcase Pressure Test Fitting	Test crankcase for leaks (use with JDM44, JDZ25A, or JDZ2A)
JDZ25-2	Pressure Test Set	Test crankcase for cracks and casting faults
JDG444	Flywheel Puller	Used to remove flywheel
D17517CI or D17525CI	Magnetic Base	Test Crankshaft Runout
D17526CI or D17527CI	Dial Indicator	Test Crankshaft Runout

COMPONENT LOCATION—21C/21S/21HC



COMPONENT LOCATION—45BP