RX and SX Series Riding Mowers

TECHNICAL MANUAL

John Deere
Lawn & Grounds Care Division

TM1391 (JUN-88)

Litho in U.S.A

Introduction

FOREWORD

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

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

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

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

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

Binders, binder labels, and tab sets can be ordered by John Deere dealers direct from the John Deere Distribution Service Center.

This manual is part of a total product 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 type of failures and their causes. FOS Manuals are for training new personnel and for reference by experienced technicians.

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

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

O53,TMIFC -19-26JAN90

TO JOHN DEERE DEALERS

FILING INSTRUCTIONS

TM-1391 (JULY 1988)

RX63, RX73, TX75, SX75, RX95, SX95 Riding Mowers

This is a complete revision of TM-1391. Please discard old TM-1391 dated February 1987.

For complete engine repair information use CTM-5. Engine tests and adjustments are covered in Section 220 of this manual.

Model RX63 has been added.

An abundance of diagnostic information has been added to the operation and test sections.

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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.

TM1391-19-17APR90

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A John Deere ILLUSTRUCTION™ Manual

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Section 10
SAFETY AND SPECIFICATIONS

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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.

T81389 -UN-07DEC88

O53,ALERT -19-26JAN90

UNDERSTAND SIGNAL WORDS

A signal word—DANGER, WARNING, or CAUTION—is used with the safety-alert symbol. DANGER identifies the most serious hazards.

Safety signs with signal word DANGER or WARNING are typically near specific hazards.

General precautions are listed on CAUTION safety signs. CAUTION also calls attention to safety messages in this manual.

TS187 -19-30SEP88

O53,SIGNAL -19-26JAN90

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.

TS202 -UN-23AUG88

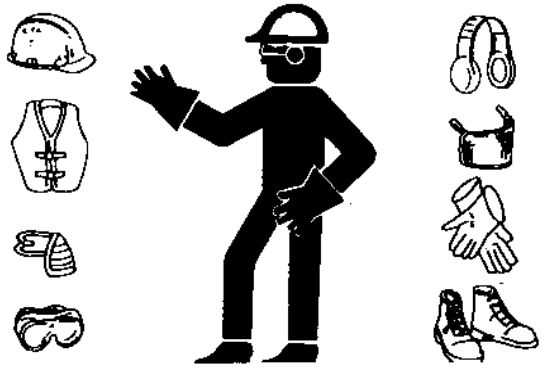
O53,FIRE1 -19-26JAN90

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.



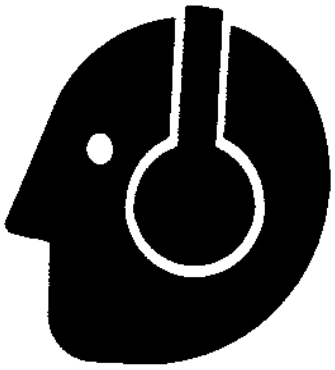
TS206 -UN-23AUG88

O53,WEAR -19-26JAN90

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.



TS207 -UN-23AUG88

O53,NOISE -19-26JAN90

PRACTICE SAFE MAINTENANCE

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

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. Stop the engine. Remove the key. Allow machine to cool.

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

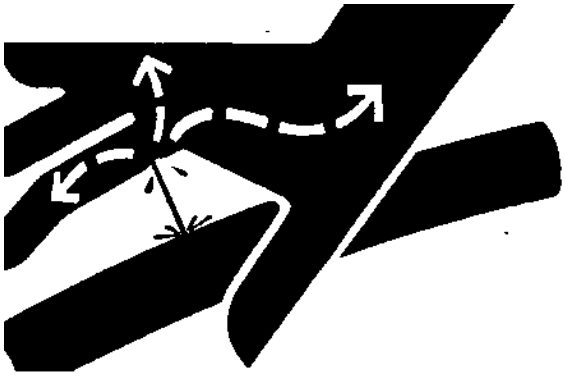
Keep all parts in good condition and properly installed. Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.

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

TS218 -UN-23AUG88

O53,SERV -19-26JAN90

AVOID HIGH-PRESSURE FLUIDS



X9811 -UN-23AUG88

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 may call the Deere & Company Medical Department in Moline, Illinois, or other knowledgeable medical source.

O53,FLUID -19-26JAN90

BOLT TORQUE CHART

Grade of Bolt		SAE-2	SAE-5	SAE-8		
Min. Tensile Strength		64,000 PSI	105,000 PSI	150,000 PSI		
Grade Marking on Bolt					Socket or Wrench Size	
U.S. Standard					U.S. Regular	
Bolt Dia.	U.S. Dec. Equiv.		TORQUE IN FOOT POUNDS		Bolt Head	Nut
1/4	0.250	(8.14 N-m) 6	(13.56 N-m) 10	(18.98 N-m) 14	7/16	7/16
5/16	0.3125	(17.63 N-m) 13	(27.12 N-m) 20	(40.68 N-m) 30	1/2	1/2
3/8	0.375	(31.19 N-m) 23	(47.46 N-m) 35	(67.80 N-m) 50	9/16	9/16
7/16	0.4375	(47.46 N-m) 35	(74.58 N-m) 55	(108.48 N-m) 80	5/8	11/16
1/2	0.500	(74.58 N-m) 55	(115.26 N-m) 85	(162.72 N-m) 120	3/4	3/4
9/16	0.5625	(101.70 N-m) 75	(176.28 N-m) 130	(237.30 N-m) 175	13/16	7/8
5/8	0.625	(142.38 N-m) 105	(230.52 N-m) 170	(325.44 N-m) 240	15/16	15/16
3/4	0.750	(250.86 N-m) 185	(406.80 N-m) 300	(576.30 N-m) 425	1-1/8	1-1/8
7/8	0.875	*(216.96 N-m) 160	(616.98 N-m) 445	(928.86 N-m) 685	1-5/16	1-5/16
1	1.000	(339.00 N-m) 250	(908.52 N-m) 670	(1396.68 N-m) 1030	1-1/2	1-1/2

Multiply readings by 12 for inch-pound values.

** "B" Grade bolts larger than 3/4-inch (19.1 mm) are sometimes formed hot rather than cold, which accounts fo the lower recommended torque.*

NOTE: Allow a tolerance of plus or minus 10 per cent on all torques given in this chart.

SET SCREW SEATING TORQUE CHART

Screw Size	Cup Point	Square Head
	Torque in Inch Pounds	
#5	(1.02 N-m) 9	—
#6	(1.02 N-m) 9	—
#8	(2.26 N-m) 20	—
#10	(3.73 N-m) 33	—
1/4	(9.83 N-m) 87	(23.96 N-m) 212
5/16	(18.65 N-m) 165	(47.46 N-m) 420
3/8	(32.77 N-m) 290	(93.79 N-m) 830
7/16	(48.59 N-m) 430	—
1/2	(70.06 N-m) 620	(237.30 N-m) 2100
9/16	(70.06 N-m) 620	—
5/8	(138.43 N-m) 1225	(480.25 N-m) 4250
3/4	(240.13 N-m) 2125	(870.10 N-m) 7700

Divide readings by 12 for foot-pound values
NOTE: Allow a tolerance of plus or minus 10 per cent on all torques given in this chart.

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M21,1010K,C -19-25AUG82

O-RING BOSS FITTINGS SERVICE RECOMMENDATIONS

1. Inspect boss O-ring boss seat. It must be free of dirt and defects. If repeated leaks occur, inspect for defects with a magnifying glass. Some raised defects can be removed with a slip stone.

Occasionally a lower durometer O-ring will seat against a rough seat. If neither of these solutions work, the component must be replaced.

2. Put hydraulic oil, petroleum jelly or soap on the O-ring. Put a thimble over the threads to protect O-ring from nicks. Slide O-ring over the thimble and into the turned down section of fitting.

For angle fittings, loosen special nut and push special washer against threads so O-ring can be installed into the turned down section of fitting.

3. Turn fitting into the boss by hand until special washer or washer face (straight fitting) contacts boss face and O-ring is squeezed into its seat.

4. To position angle fittings, turn the fitting counterclockwise a maximum of one turn.

5. Tighten straight fittings to torque valve shown on chart. For angle fittings, tighten the special nut to valve shown in the chart while holding body of fitting with a wrench.

STRAIGHT FITTING OR SPECIAL NUT TORQUE (1)

Thread Size	Torque[1] N·m	(lb-ft)	Number of Flats[2]
7/16-20 UNF	12	(9)	2
1/2-20 UNF	16	(12)	2
9/16-18 UNF	24	(18)	2
3/4-16 UNF	46	(34)	2
7/8-14 UNF	62	(46)	1-1/2
1-1/16-12 UN	102	(75)	1
1-3/16-12 UN	122	(90)	1
1-5/16-12 UN	142	(105)	3/4
1-5/8-12 UN	190	(140)	3/4
1-7/8-12 UN	217	(160)	1/2

1. Torque tolerance is ± 10 percent.

2. To be used if a torque wrench cannot be used. After tightening fitting by hand, put a mark on nut or boss; then tighten special nut or straight fitting the number of flats shown.

M45,1010A,4 -19-10JAN85

ENGINE

For complete specifications on repair of Kawasaki engines see CTM-5.

Engine sheave mounting cap screw torque	73 ± 13 N·m (54 ± 10 lb-ft)
Engine mounting cap screw torque	19 ± 2 N·m (14 ± 5 lb-ft)
Spark plug gap	0.76 N·M (0.030 in.)
Spark plug torque	9—20 N·m (80—180 lb-in.)
Idle mixture screw (initial setting)	
6 hp	1-1/8 turns open
9 hp	1-1/8 turns open
12.5 hp	1-1/2 turns open
Idle speed	1550 ± 75 rpm
Wide open throttle (no load)	3350 ± 75 rpm
Fuel pump output at 3000 rpm (12.5 hp only)	0.09 L (0.2 pt) in 15 seconds

TRANSAXLE

Cover cap screw torque	10 N·m (95 lb-in.)
Shift lever detent set screw torque	Flush with cover
Brake lever nut torque	10 N·m (95 lb-in.)

STEERING

Tie rod attaching nut torque	25—30 N·m (18.5—2 lb-ft)

BRAKE

Brake pedal free play	19 mm (1-1/4 in.)
Brake pad thickness (min.)	6 mm (1/4 in.)

MOWER DECK

Mower spindle sheave locknut torque	140 N·m (103 lb-ft)

M22,1010G,A -19-01JUL88

OTHER MATERIAL

Number	Name	Use
T43511	John Deere LOCTITE® Clean and Cure Primer	Clean threads
TY9369	John Deere LOCTITE Threadlock and Sealer (low strength)	
T43512	John Deere LOCTITE Threadlock and Sealer (medium strength)	
TY6305	John Deere Flexible Sealant	
T43514	John Deere LOCTITE Plastic Gasket	
PT502	John Deere GASKET MAKER®	
	PLASTIGAGE®	Measure engine bearing clearance
TY6431	John Deere SLIP-PLATE® Lubricant	
PT569	John Deere NEVER-SEEZ® Lubricant	
	John Deere LUBRIPLATE®	
	ALVANIA® EP2 Lubricant	
TY6333	Moly High-Temperature EP Grease	
	TEFLON® Material	
TY9375	John Deere LOCTITE Pipe Sealant with TEFLON	

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M22,1010G,2 -19-01DEC86

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JOHN DEERE ENGINE REPAIR—USE CTM-5

For complete repair information the component technical manual (CTM) is also required.

Use the component technical manual in conjunction with this machine manual.

TS225 -UN-17JAN89

M22,2001G,1 -19-10JUN88

REMOVE ENGINE—12.5 HP MODELS

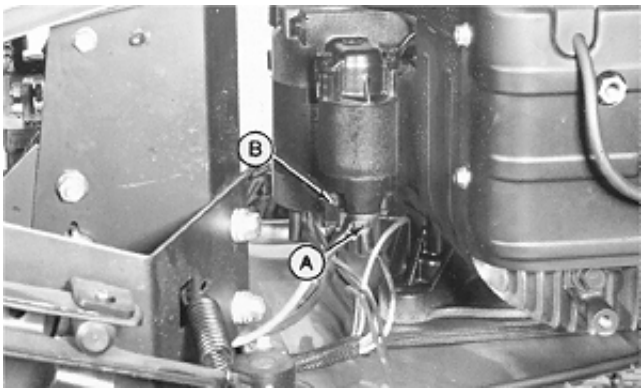
1. Remove engine cowl (SX95 Rider only).

2. Remove engine shroud. See Section 80, Group 15.

3. Remove negative cable from battery.

4. Remove battery cable and leads from starter terminal (A).

5. Disconnect electrical lead (B).



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M49043

M22,2005G,A -19-14JUN88

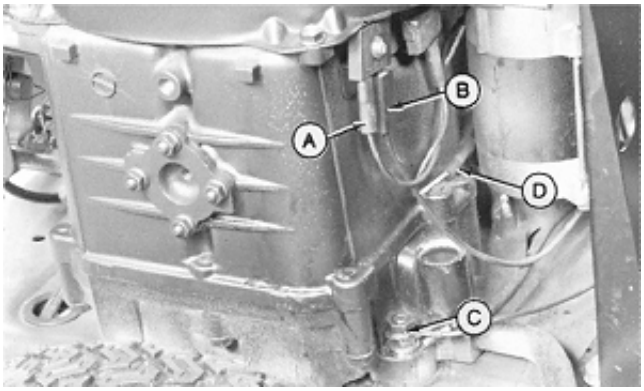
6. Drain oil from crankcase.

NOTE: Oil filler tube removed for clarity of photograph only.

7. Disconnect electrical leads (A) and (B).

8. Remove electrical lead and battery negative cable (C) from base of engine.

9. Disconnect electrical lead (D).



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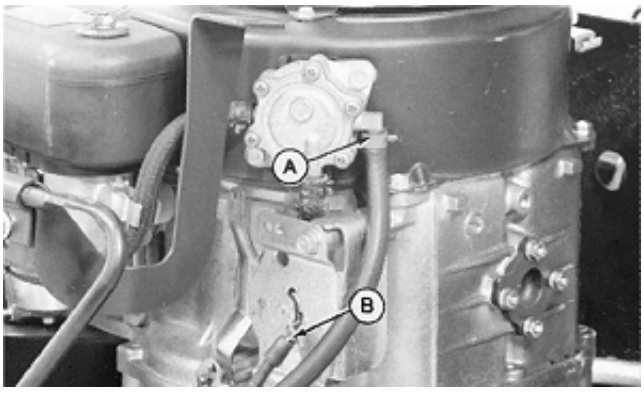
M22,2005G,B -19-14JUN88

10. Remove fuel line (A) from inlet side of fuel pump.

11. Disconnect throttle cable (B).



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M49045

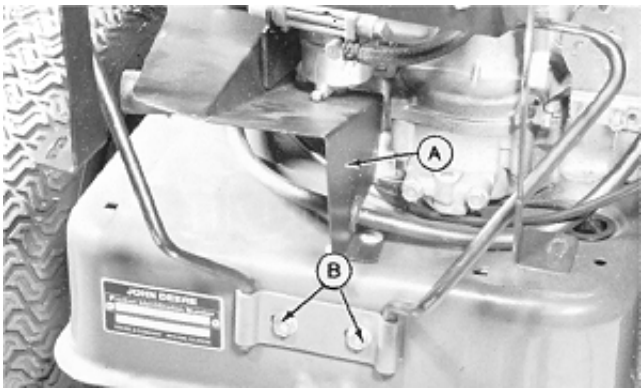
M22,2005G,C -19-14JUN88

12. Remove muffler.

13. Remove muffler heat shield (A).

14. Loosen cap screws (B) and remove engine cowl bracket (SX95 Rider).

15. Remove battery.



M22,2005G,D -19-14JUN88

16. Attach hoist to drawbar hole in frame. Raise machine.

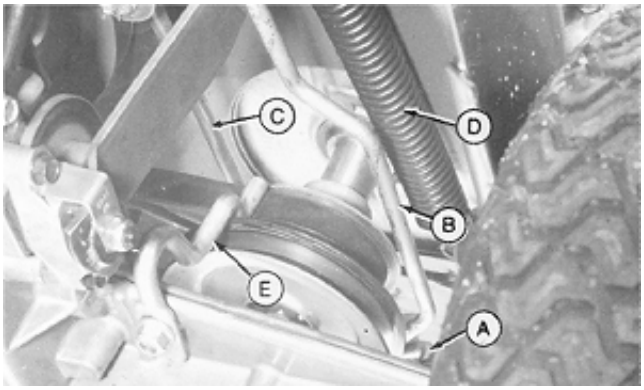
17. Remove belt guides (A & E). Remove belt from engine sheave.

18. Disconnect brake linkage (B).

19. Disconnect transaxle linkage (C).

20. Remove secondary clutch spring (D).

A—Belt Guide
B—Brake Linkage
C—Transaxle Linkage
D—Secondary Clutch Spring
E—Belt Guide



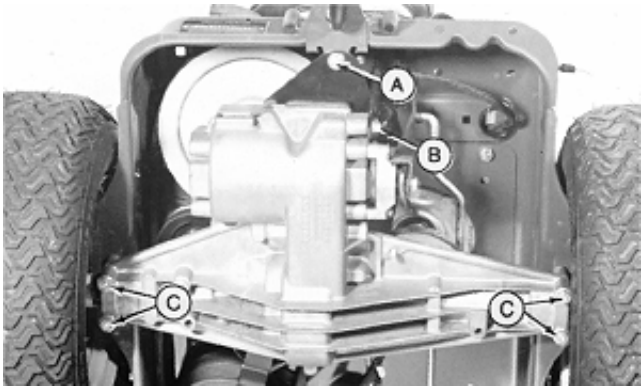
M22,2005G,E -19-14JUN88

21. Lower machine.

22. Loosen nut (A).

23. Remove cap screw (B).

24. Loosen four cap screws (C) and raise machine slightly off transaxle. DO NOT remove transaxle.

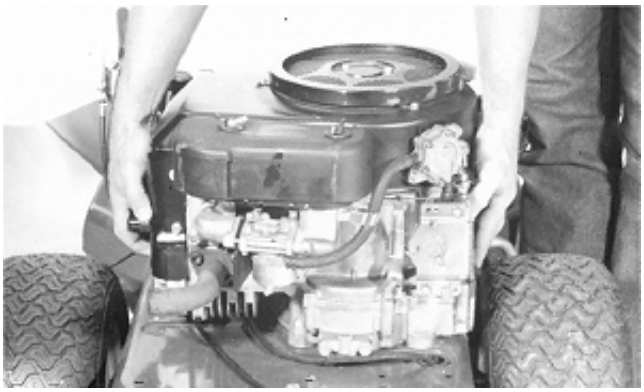


M22,2005G,F -19-14JUN88

25. Remove four cap screws holding engine to frame.

26. Secure transaxle to frame.

27. Lift engine from machine.



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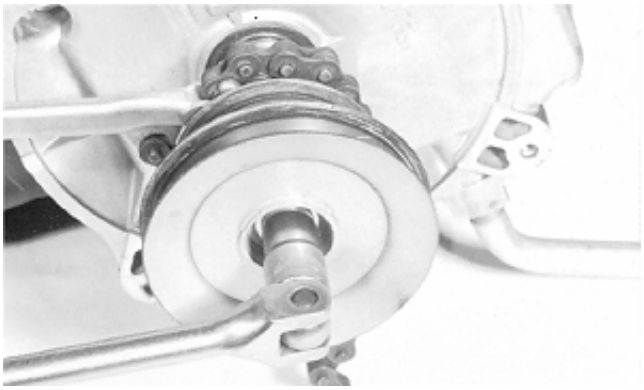
M22,2005G,G -19-14JUN88

28. Remove cap screw from end of shaft by holding shaft with chain wrench or similar device. DO NOT hold sheave.

29. Remove sheave from crankshaft. If sheave sticks, lightly tap with soft-faced hammer.



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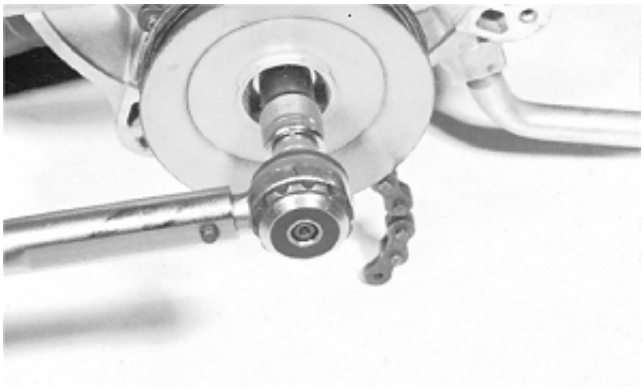
M22,2005G,H -19-14JUN88

INSTALL ENGINE—12.5 HP MODELS

1. Install key in keyway.

2. Coat crankshaft end with NEVER-SEEZE lubricant or equivalent.

3. Install sheave. Tighten cap screw to 73 ± 13 N·m (54 ± 10 lb-ft).



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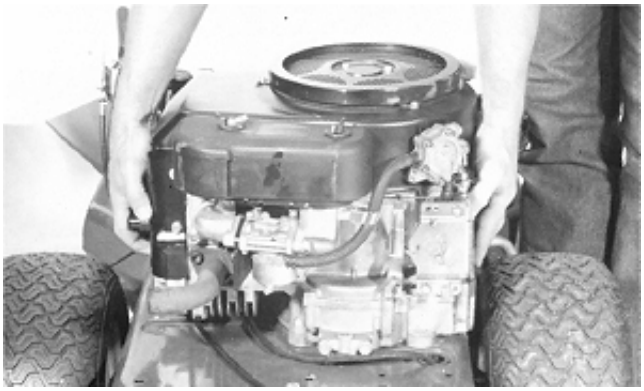
M22,2005G,I -19-01JUL88

4. Put engine on frame.

5. Loosely install three accessible cap screws holding engine to frame.

6. Install negative battery cable on front right cap screw between engine block and nut.



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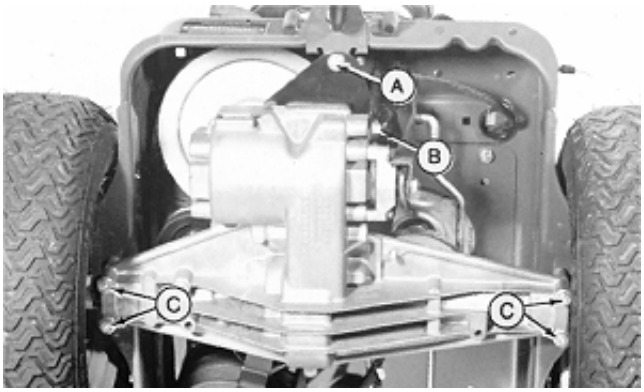
M22,2005G,J -19-14JUN88

7. Loosen nut (A) and remove cap screw (B).

8. Loosen four cap screws (C) and raise machine clear of transaxle until fourth engine-to-frame cap screw can be installed.

9. Tighten cap screw to 19 ± 2 N·m (14 ± 1.5 lb-ft).

10. Lower machine. Install cap screw (B) and four cap screws (C). Tighten securely. Tighten nut (A) securely.



M22,2005G,11 -19-28OCT86

11. Tighten three engine-to-frame cap screws to 19 ± 2 N·m (14 ± 1.5 lb-ft).

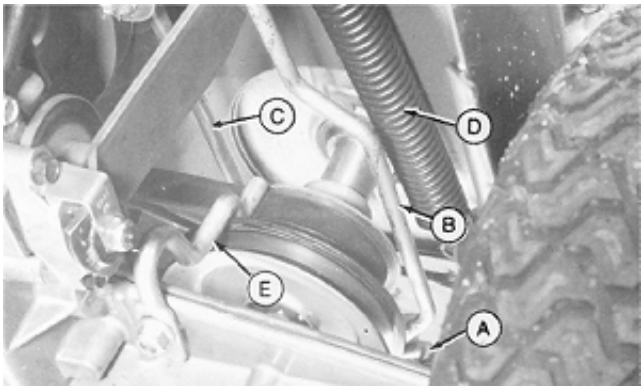
12. Set speed control lever in 7th to tension belt.

13. Install belt guide (A). Leave 1.0 mm (0.04 in.) clearance between guide and belt.

14. Install belt guide (E). Leave 2.0—4.0 mm (0.08—0.16 in.) clearance between guide and belt.

15. Install secondary clutch spring (D).

16. Install linkage (B) and transaxle linkage (C).



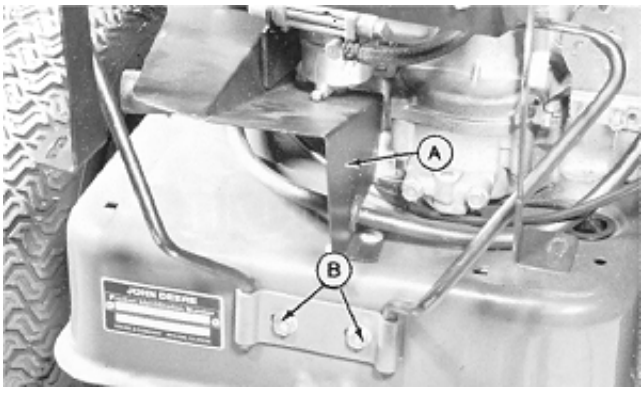
A—Belt Guide
B—Brake Linkage
C—Transaxle Linkage
D—Secondary Clutch Spring
E—Belt Guide

M22,2005G,K -19-14JUN88

17. Install muffler heat shield (A).

18. Install muffler.

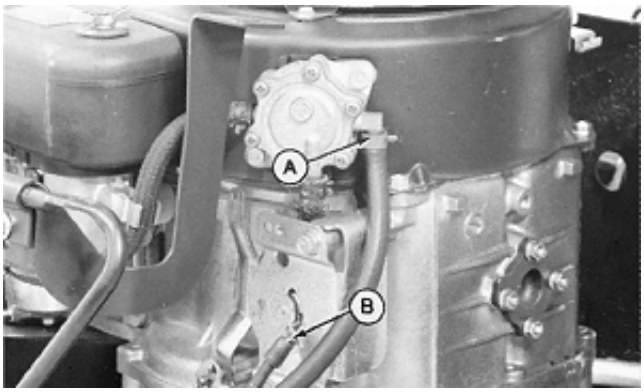
19. Install engine cowl bracket (B). (SX95 Rider)



M22,2005G,L -19-14JUN88

20. Install fuel line (A) to inlet side of fuel pump.

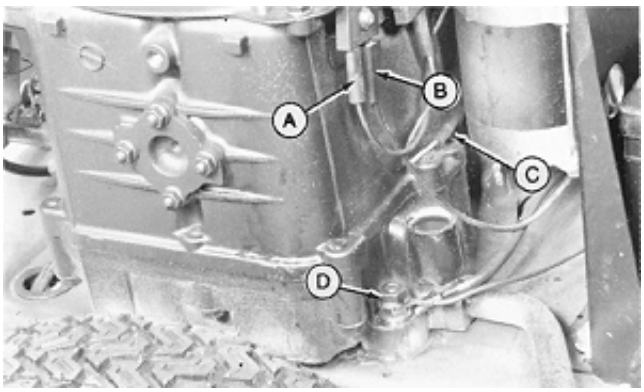
21. Connect throttle cable (B).



M22,2005G,M -19-14JUN88

22. Connect electrical leads (A, B and C).

23. Connect electrical lead (D) to engine mount cap screw with battery cable.



M22,2005G,N -19-14JUN88

24. Connect battery cable and leads to starter terminal (A).

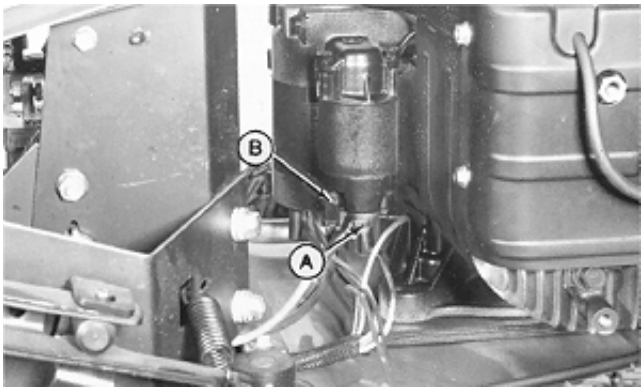
25. Connect electrical lead (B).

26. Install battery and battery holder. Install pumper wire across seat switch connector.

27. Fill crankcase with oil.

28. Adjust throttle cable and choke linkage. See Section 220.

29. Install engine shroud. See Section 80, Group 15. If equipped, install engine cowl.



M22,2005G,O -19-14JUN88

REMOVE ENGINE—9 HP AND 6 HP MODELS

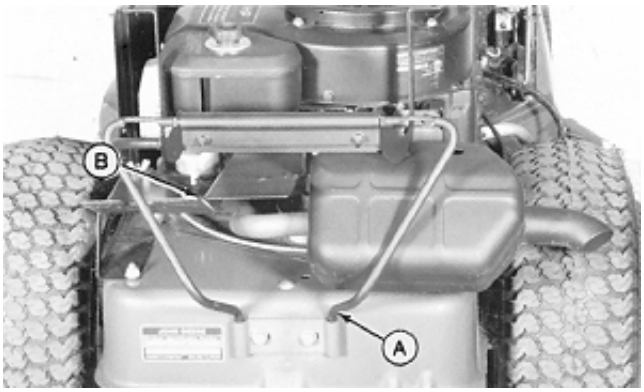
1. Remove engine cowl. (SX75 Rider only)

2. Remove engine shroud (except RX63). See Section 80, Group 15.

3. Remove engine cowl bracket (A).

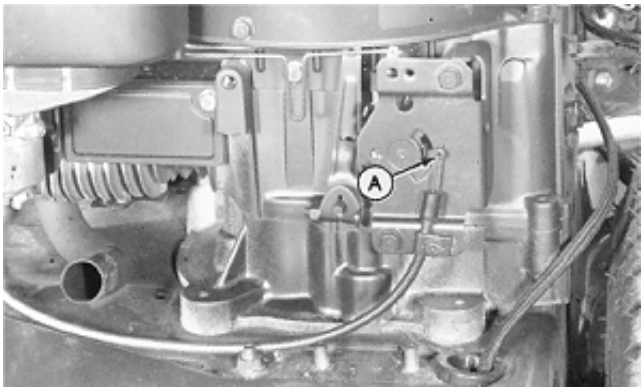
4. Remove muffler.

5. Remove heat shields (B).



M22,2005G,P -19-14JUN88

6. Disconnect throttle cable (A).



M22,2005G,21 -19-22DEC86

7. Remove battery on electric start models.

8. Separate electrical connectors (A) and (B).

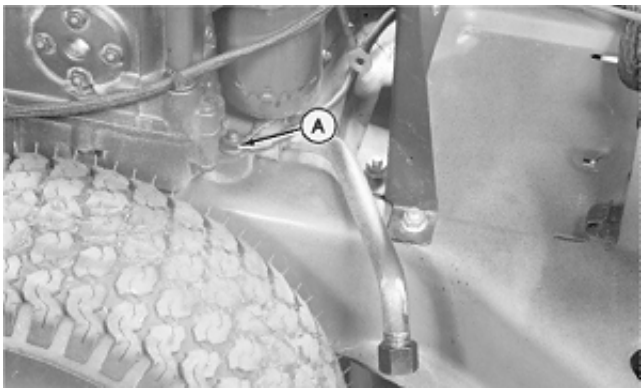
9. Disconnect starter cable (C) on electric start models.

ART NOT FOUND
M49073

M22,2005G,22 -19-28OCT86

10. Remove battery negative cable and electrical lead (A) on electric start models.

11. Drain oil from crankcase.



M22,2005G,23 -19-14JUN88

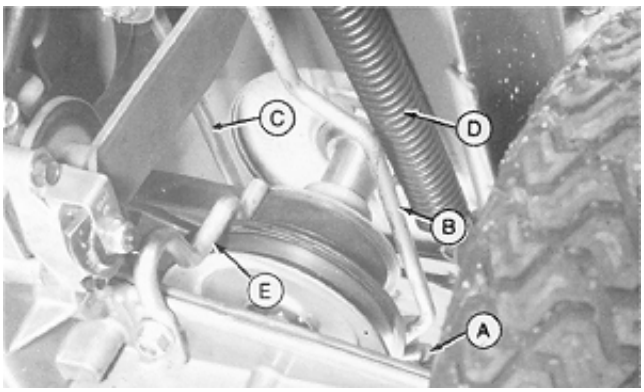
12. Remove belt guides (A & E). Remove belt from engine sheave.

13. Disconnect brake linkage (B).

14. Disconnect transaxle linkage (C).

15. Remove secondary clutch spring (D).

A—Belt Guide
B—Brake Linkage
C—Transaxle Linkage
D—Secondary Clutch Spring
E—Belt Guide



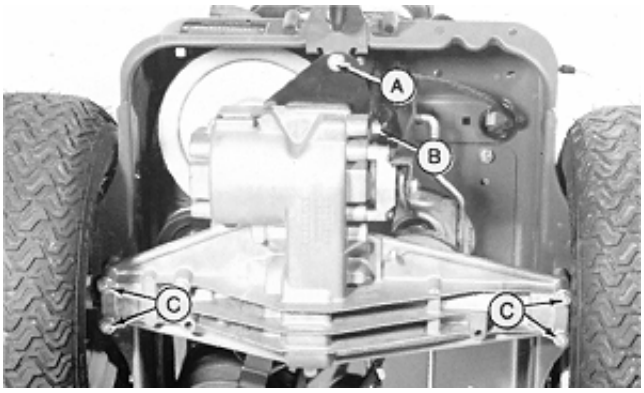
M22,2005G,R -19-01JUL88

16. Lower machine.

17. Loosen nut (A).

18. Remove cap screw (B).

19. Loosen four cap screws (C) and raise machine slightly off transaxle. DO NOT remove transaxle.

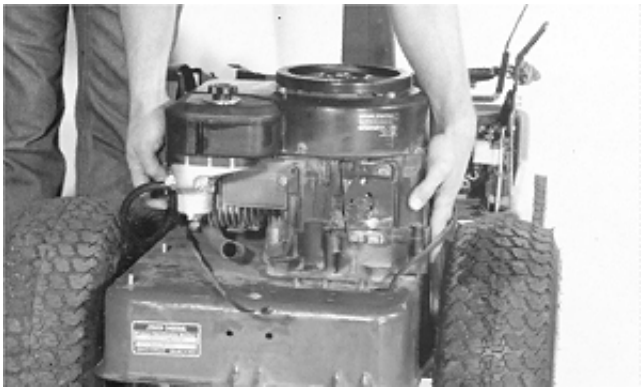


M22,2005G,25 -19-22DEC86

20. Remove four cap screws holding engine to frame.

21. Secure transaxle to frame.

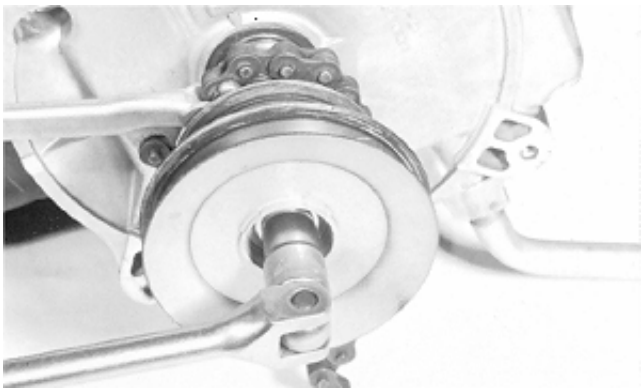
22. Lift engine from machine.



M22,2005G,26 -19-22DEC86

23. Remove cap screw from end of crankshaft by holding shaft with chain wrench or similar device. DO NOT hold sheave.

24. Remove sheave from crankshaft. If sheave sticks, lightly tap with soft-faced hammer.



-UN-08JAN90
M49050

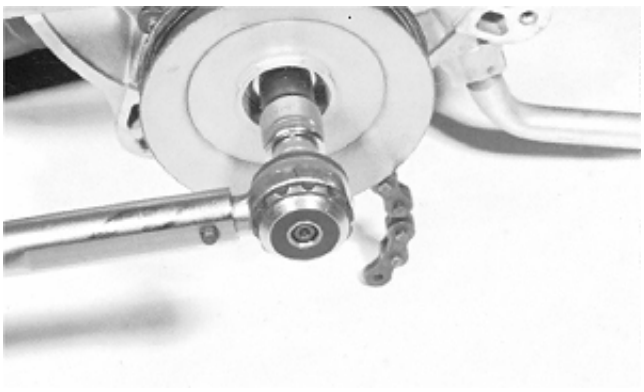
M22,2005G,27 -19-22DEC86

INSTALL ENGINE—9 HP AND 6 HP MODELS

1. Install key in keyway.

2. Coat crankshaft end with NEVER SEEZE lubricant or equivalent.

3. Install sheave. Tighten cap screw to 73 ± 13 N·m (54 ± 10 lb-ft).



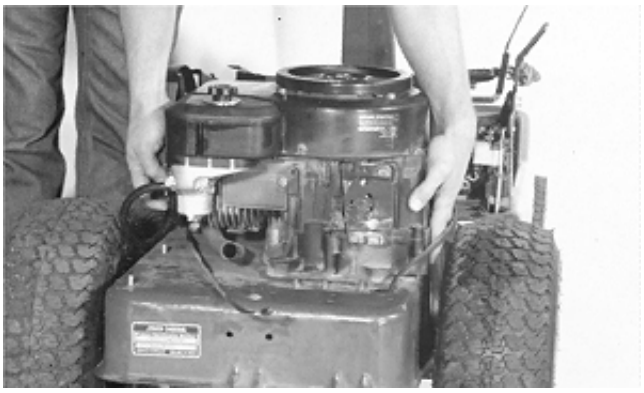
-UN-21JAN90
M49051

M22,2005G,S -19-01JUL88

4. Put engine on frame.

5. Loosely install three accessible cap screws holding engine to frame.

6. Install battery negative cable on front right cap screw between engine block and nut.



-UN-20DEC89
M49103

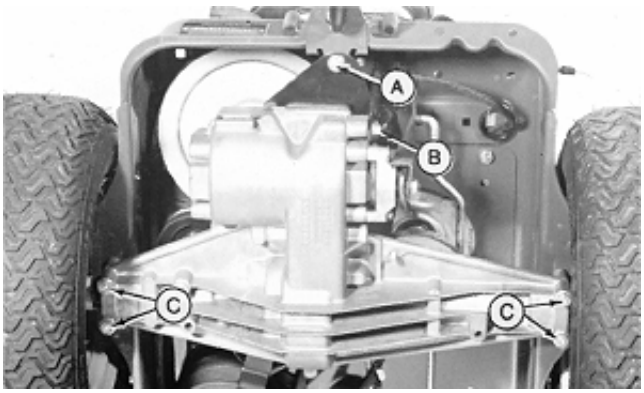
M22,2005G,T -19-14JUN88

7. Loosen nut (A) and remove cap screw (B).

8. Loosen four cap screws (C) and raise machine clear of transaxle until fourth engine to frame cap screw can be installed.

9. Tighten cap screw to 19 ± 2 N·m (14 ± 1.5 lb-ft).

10. Lower machine. Install cap screw (B) and four cap screws (C). Tighten securely. Tighten nut (A) securely.



-UN-08JAN90
M49048

M22,2005G,30 -19-28OCT86

11. Tighten three engine-to-frame cap screws to 19 ± 2 N·m (14 ± 1.5 lb-ft).

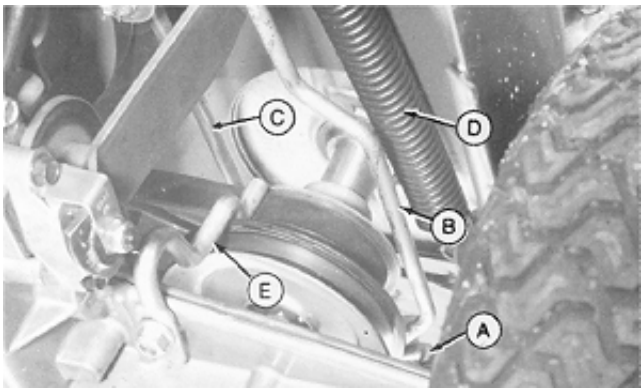
12. Set speed control lever in 7th to tension belt.

13. Install belt guide (A). Leave 1.0 mm (0.04 in.) clearance between guide and belt.

14. Install belt guide (E). Leave 2.0—4.0 mm (0.08—0.16 in.) clearance between guide and belt.

15. Install secondary clutch spring (D).

16. Install linkage (B) and transaxle linkage (C).



M48137 -UN-08JAN90

A—Belt Guide
B—Brake Linkage
C—Transaxle Linkage
D—Secondary Clutch Spring
E—Belt Guide

M22,2005G,K -19-14JUN88

17. Install starter cable (C) on electric start models.

18. Connect electrical leads (A) and (B).

19. Install battery on electric start models. Fill crankcase with oil.

20. Install jumper wire across seat switch connector. Start engine.

21. Install throttle cable, adjust throttle and choke linkage. See Section 220.

ART NOT FOUND
M49073

M49073 -UN-

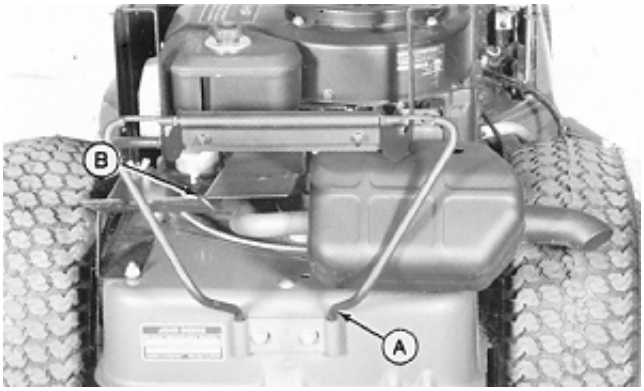
M22,2005G,U -19-14JUN88

22. Install muffler and heat shields (B).

23. Install engine cowl bracket (A).

24. Install engine shroud. See Section 80, Group 15.

25. Install engine cowl. (SX75 Rider only)



M49071 -UN-20DEC89

M22,2005G,V -19-14JUN88

Section 30
FUEL AND AIR SYSTEM REPAIR

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Air Cleaner, Breather and Carburetor
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Group 05—Fuel Transfer System
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Group 10—Fuel and Air System
Fuel and Air System
12.5 HP Models 30-10-1
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AIR CLEANER, BREATHER AND CARBURETOR

For complete repair information the component technical manual (CTM) is also required.

Use the component technical manual in conjunction with this machine manual.

TS225 -UN-17JAN89

M22,3001G,1 -19-10JUN88

30
01
1

TEST FUEL PUMP (12.5 HP MODELS)

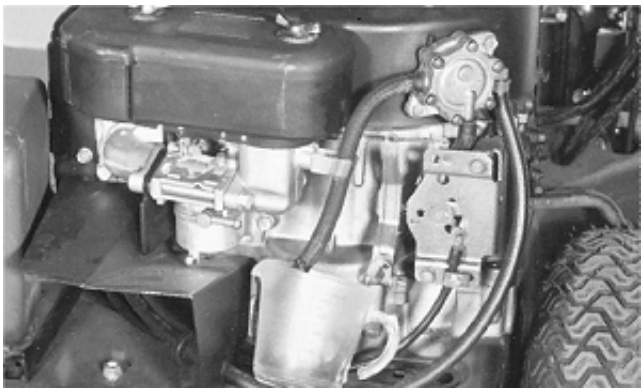
CAUTION: Gasoline is dangerous. Avoid fires due to smoking or careless maintenance.

1. Remove hose from carburetor. Put end of hose in clean container.

2. Run engine at 3000 rpm for 15 seconds. Stop engine and measure amount of gasoline in container. Output of pump should be 0.09 L (0.2 pt) in 15 seconds.

3. Install pressure gauge in fuel line. Start engine and run at 3000 rpm. Read gauge, pressure should be 3.68 kPa (0.54 psi).

4. If output or pressure are low, check fuel level or plugged line from fuel tank. Remove and inspect pump. Check crankcase vacuum.



Engine shroud removed for clarity

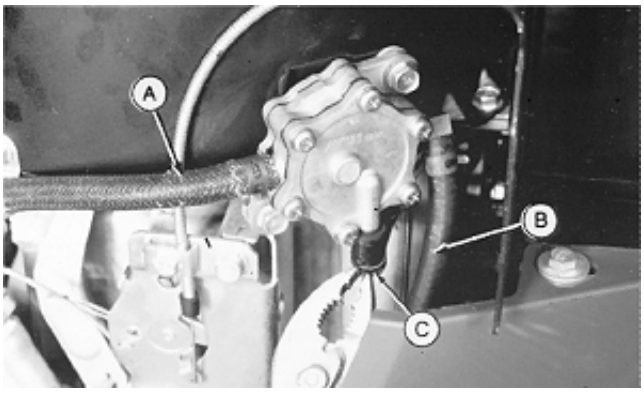
M22,3005G,A -19-14JUN88

REMOVE FUEL PUMP (12.5 HP MODELS)

CAUTION: Gasoline is dangerous. Avoid fires due to smoking or careless maintenance practices.

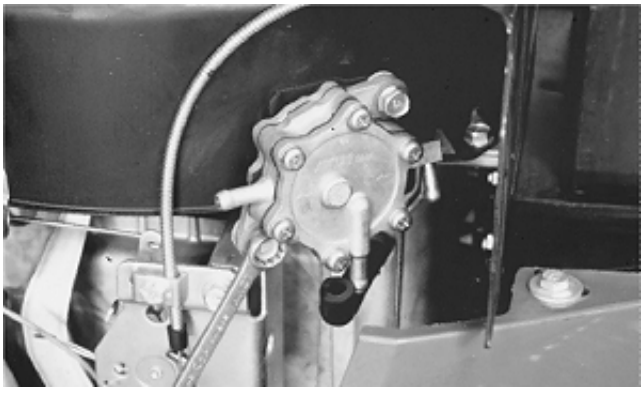
1. Test fuel pump before removal.

2. Disconnect vacuum line and fuel lines (A and B).



M22,3005G,B -19-14JUN88

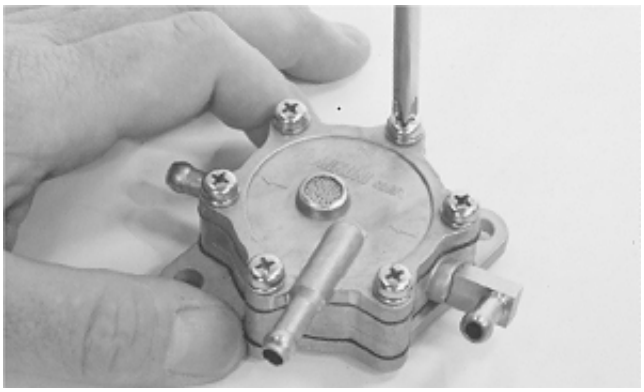
3. Remove fuel pump.



M21,3005S,B -19-11DEC85

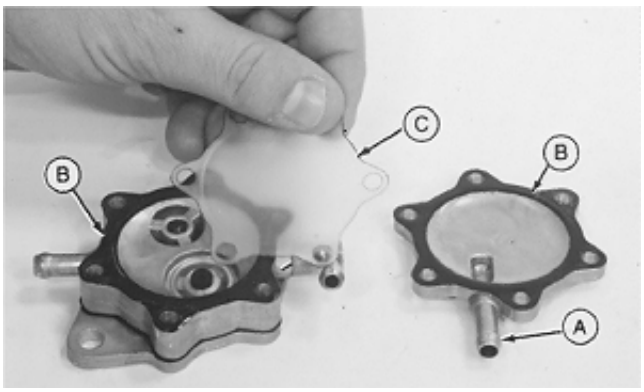
DISASSEMBLE FUEL PUMP

1. Remove six screws and washers.



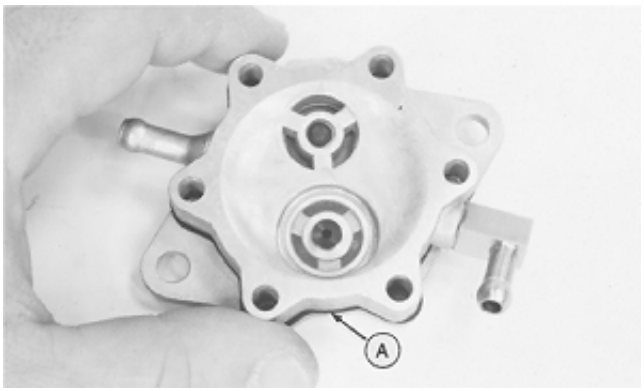
M21,3005S,C -19-11DEC85

2. Remove cover (A), gaskets (B), and diaphragm (C). Make sure vent in cover is not plugged. Inspect diaphragm for hairline cracks or wear.



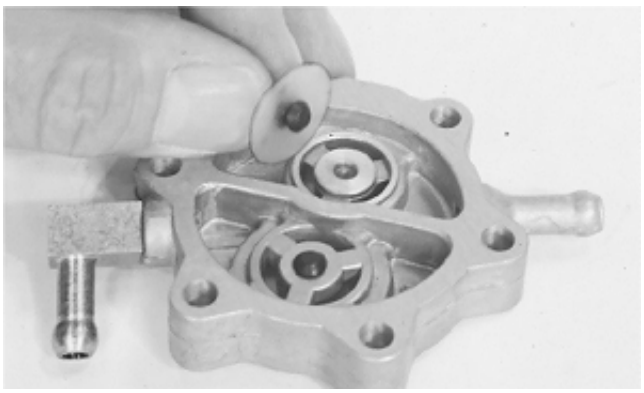
M21,3005S,D -19-11DEC85

3. Remove pump body and gasket (A).



M21,3005S,E -19-11DEC85

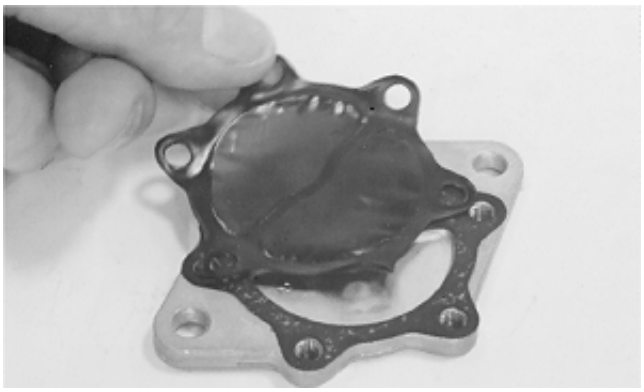
4. Remove valves by pulling rubber grommet. Inspect valves and seats for hairline cracks, wear or dirt.



M22,3005G,C -19-14JUN88

5. Remove bottom diaphram and gasket. Inspect diaphram for holes, wrinkles or wear.

6. Inspect all pump mounting surfaces. They must be free of any nicks or burrs. Replace any worn or damaged gaskets or diaphragms.

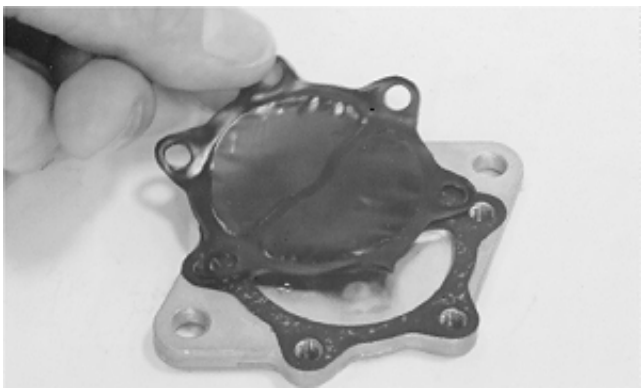


M50203 -UN-31AUG88

M21,3005S,G -19-11DEC85

ASSEMBLE FUEL PUMP

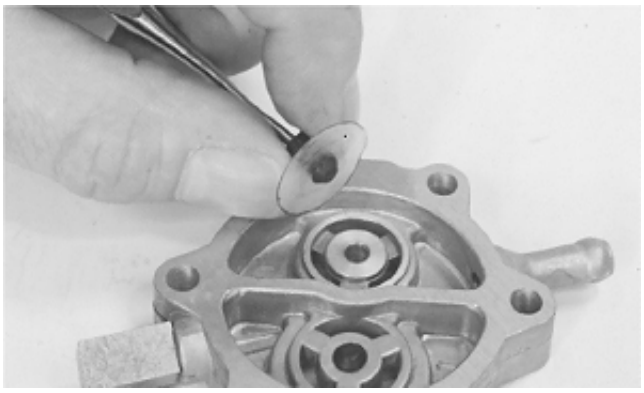
1. Install bottom gasket and diaphram.



M50203 -UN-31AUG88

M21,3005S,H -19-11DEC85

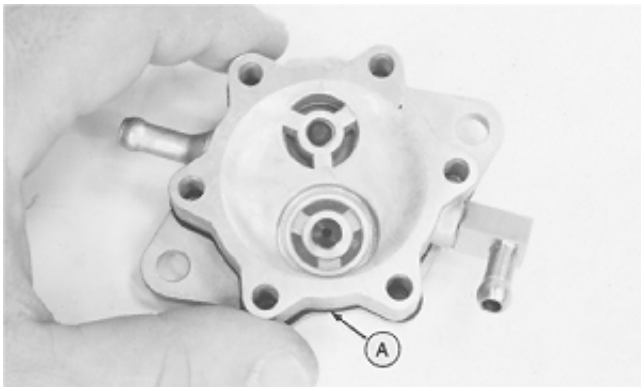
2. Install inlet and outlet valve assemblies. Use a punch or small dull shaft to stretch rubber grommet. Push stretched assembly into pump body.



M50204 -UN-31AUG88

M21,3005S,I -19-11DEC85

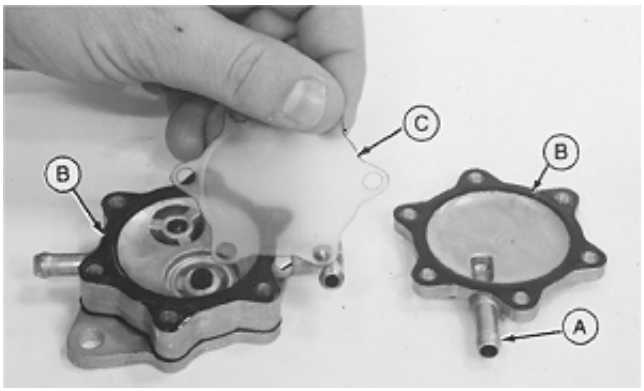
3. Install gasket (A) and pump body. Make sure flat area on bottom plate and pump body match.



M50201 -UN-31AUG88

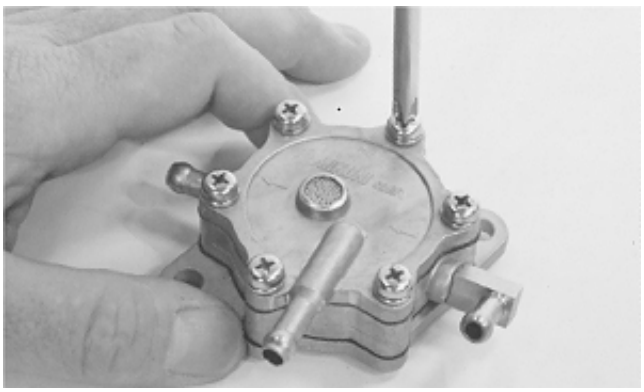
M21,3005S,J -19-11DEC85

4. Install gaskets (B), diaphram (C), and cover (A).



M21,3005S,K -19-22DEC85

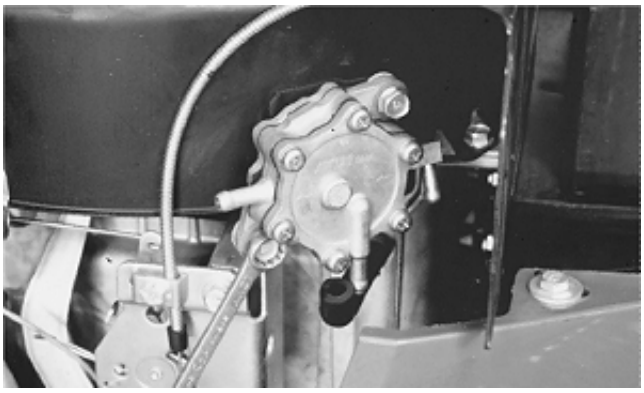
5. Install and tighten six screws and washers.



M21,3005S,L -19-11DEC85

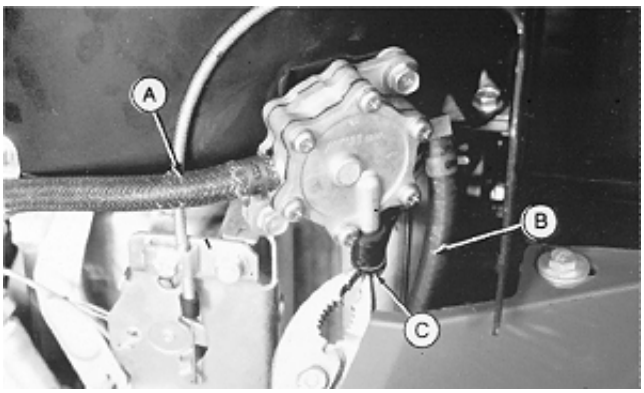
INSTALL FUEL PUMP

1. Fasten fuel pump with two cap screws.



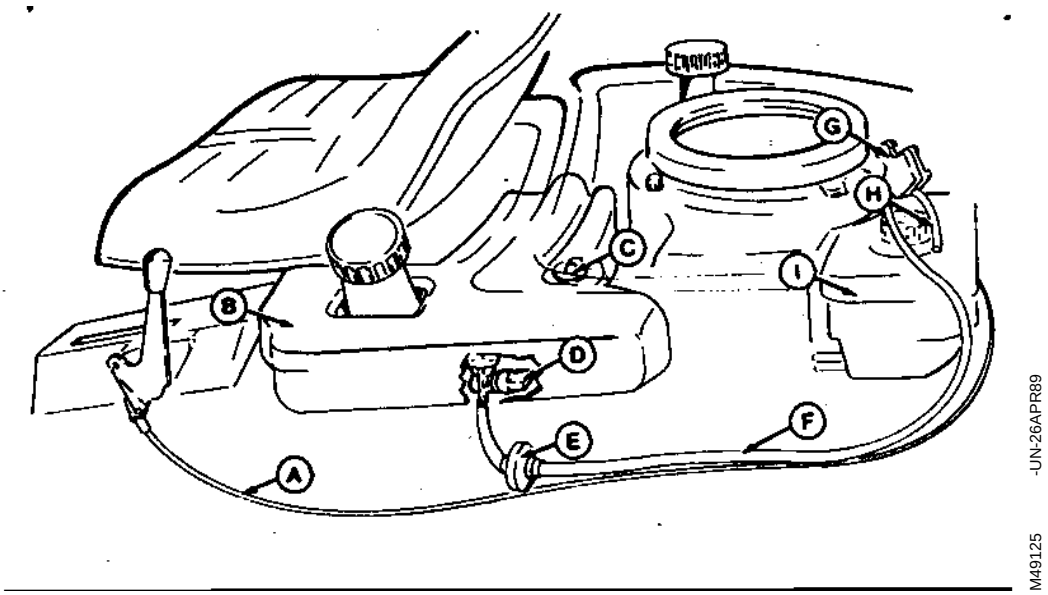
M21,3005S,M -19-11DEC85

2. Connect fuel lines (A and B) and vacuum line (C).



M22,3005G,D -19-14JUN88

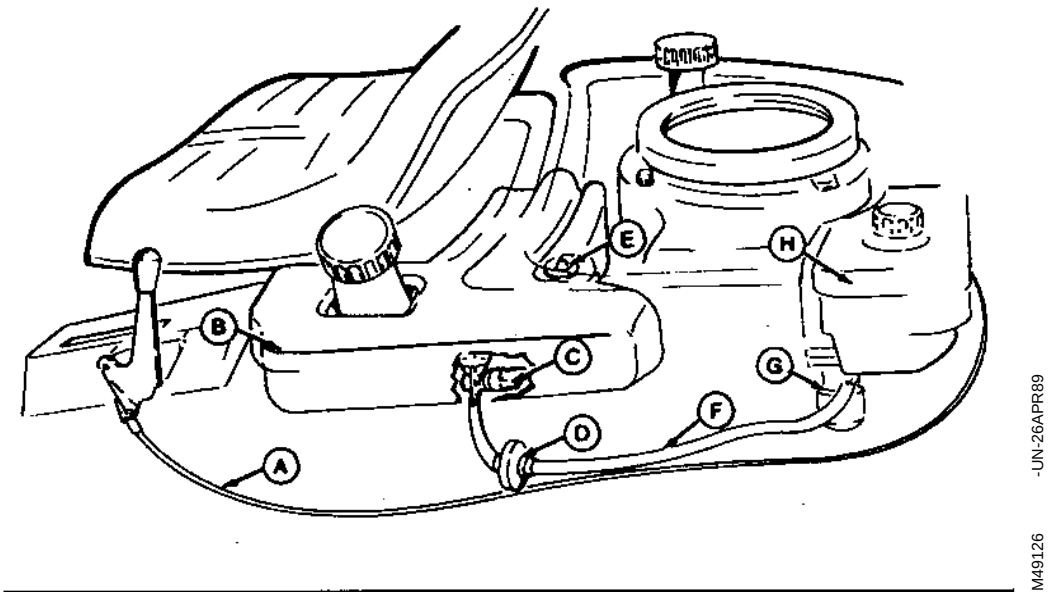
12.5 HP MODELS FUEL AND AIR SYSTEM



A—Throttle Cable
B—Fuel Tank
C—Low Fuel Sensor (SX95 only)
D—Fuel Shutoff Valve
E—Fuel Filter
F—Fuel Line to Inlet Side of Fuel Pump
G—Fuel Pump
H—Fuel Line to Carburetor
I—Air Cleaner

M22,3010G,1 -19-01DEC86

9 HP AND 6 HP MODELS FUEL AND AIR SYSTEM



A—Throttle Cable
B—Fuel Tank
C—Fuel Shutoff Valve
D—Fuel Filter
E—Low Fuel Sensor (SX75 only)
F—Fuel Line to Carburetor
G—Carburetor
H—Air Cleaner

M22,3010G,A -19-14JUN88

Section 50
POWER TRAIN REPAIR

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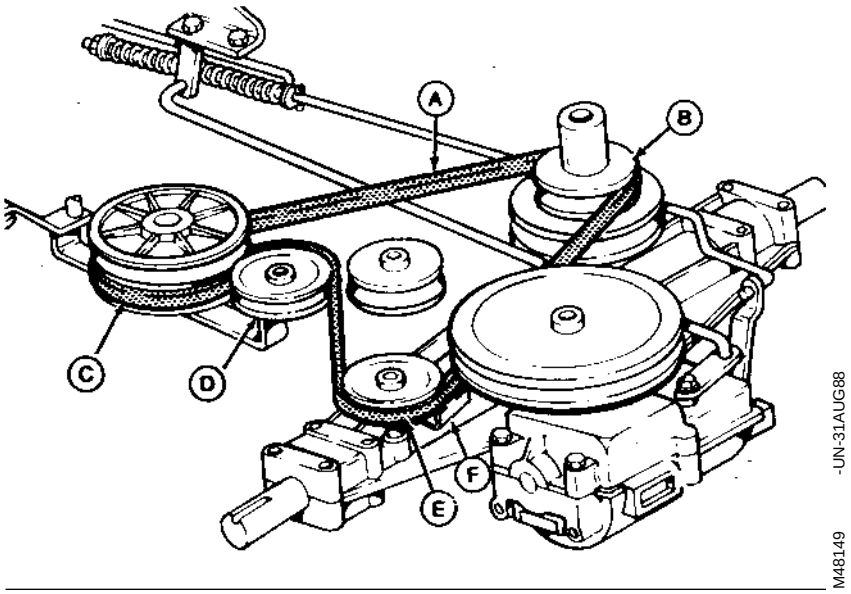
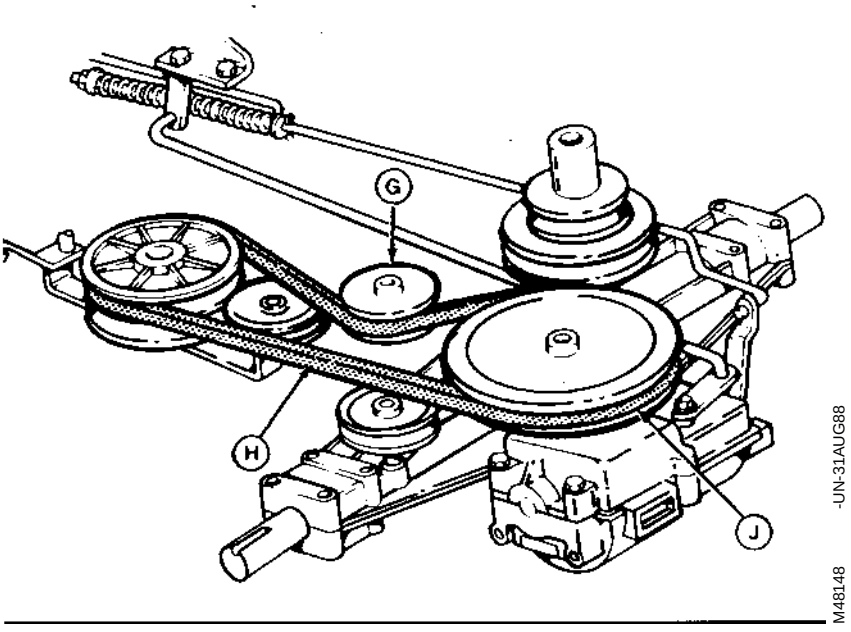
VARIATOR PRIMARY BELT ROUTING



A—Primary Belt
B—Engine Sheave
C—Variator
D—Primary Idler (Flat)
E—V-Idler
F—Belt Guide

M22,5005G,A -19-01JUL88

VARIATOR SECONDARY BELT ROUTING



G—Idler (Flat)
H—Secondary Belt
J—Transaxle Sheave

M22,5005G,B -19-01JUL88

REMOVE PRIMARY BELT

1. Put shift lever in neutral.

2. Engage parking brake.

3. Remove battery.

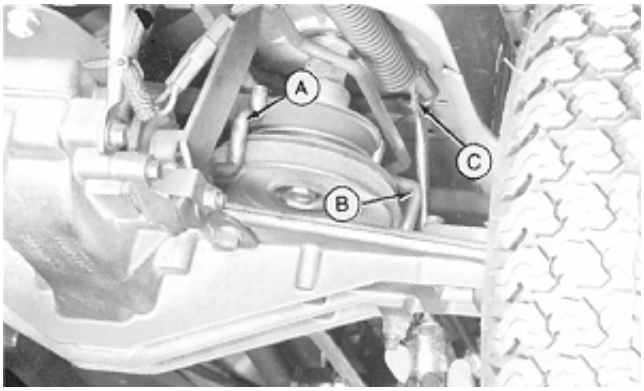
4. Lower mower deck to lowest cutting height.

5. Attach hoist to rear of riding mower and raise machine.

M22,5005G,3 -19-01DEC86

6. Loosen belt guides (A) and (B).

7. Remove secondary spring (C).



-UN-20DEC89
M49081

M22,5005G,4 -19-01DEC86

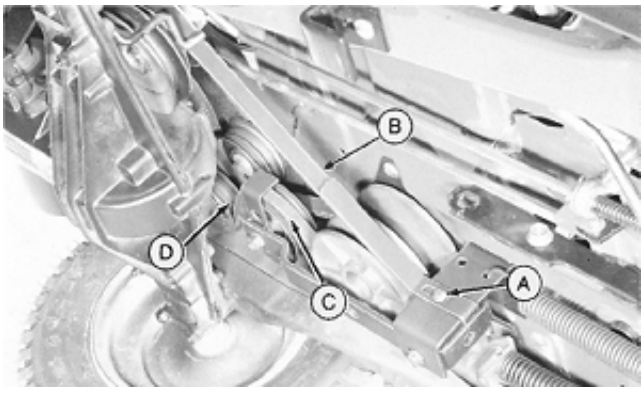
8. Loosen carriage bolt (A).

9. Remove primary belt (B) from variator.

10. Remove primary belt from primary idler (C).

11. Remove primary belt from V-idler (D).

A—Carriage Bolt
B—Primary Belt on Variator
C—Primary Idler
D—V-Idler

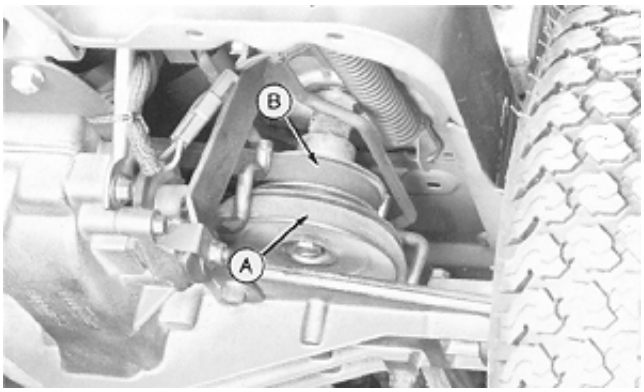


-UN-20DEC89
M49082

M22,5005G,5 -19-01DEC86

12. Remove mower belt (A) and primary belt (B) from engine drive sheave.

13. Pull primary belt out between V-idler and large driven sheave. Inspect belt for wear. Replace as necessary.



M22,5005G,6 -19-01DEC86

INSTALL PRIMARY BELT

1. Put shift lever in neutral.

2. Engage parking brake.

3. Remove battery.

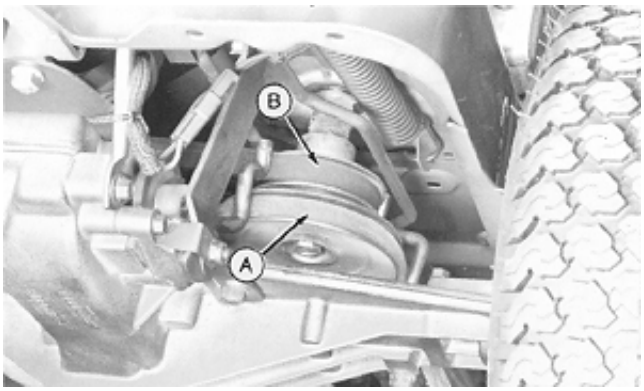
4. Lower mower deck to lowest cutting height.

5. Attach hoist to rear of riding mower and raise machine.

M22,5005G,7 -19-01DEC86

6. Install primary belt between V-idler and large driven sheave.

7. Install primary belt (B) and mower belt (A) on engine drive sheave.

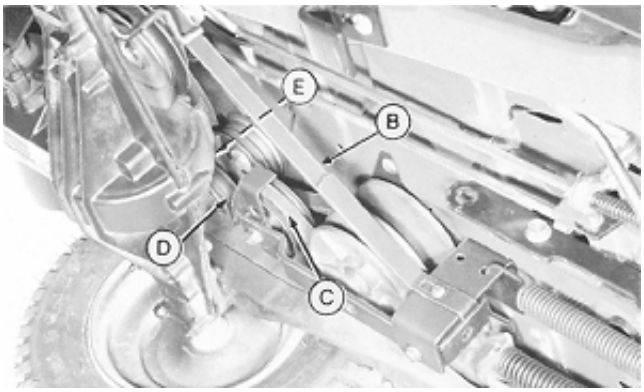


M22,5005G,8 -19-01DEC86

8. Install primary belt on V-idler (D). Make sure belt is located to V-idler side of belt guide (E).

9. Install primary belt on primary idler (C).

10. Install primary belt (B) on variator.

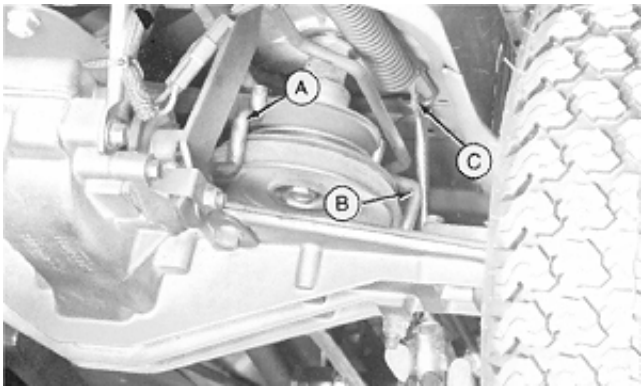


M22,5005G,C -19-14JUN88

11. Install secondary spring (C).

12. Set speed control lever in 7th to tension belt. Adjust belt guide (A) so that guide to belt clearance is 2.0—4.0 mm (0.08—0.160 in.).

13. Adjust belt guide (B) so that guide to belt clearance is 1.0 mm (0.04 in.).



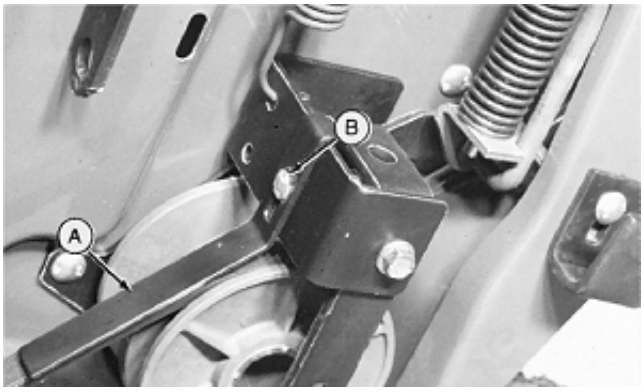
M22,5005G,D -19-14JUN88

14. Adjust belt guide (A) for 1.0—2.0 mm (0.04—0.08 in.) clearance from belt, then tighten carriage bolt (B).

15. Lower machine and remove hoist.

16. Install battery.

17. Adjust speed control linkage to compensate for difference in NEW belt length. See Section 250.



M22,5005G,E -19-01JUL88

REMOVE SECONDARY BELT

1. Put shift lever in neutral.

2. Engage parking brake.

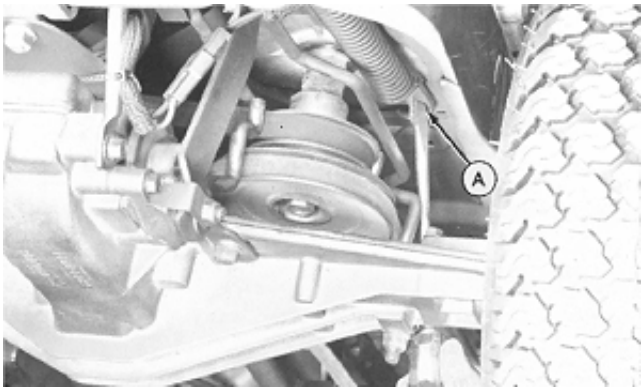
3. Remove battery.

4. Lower mower deck to lowest cutting height.

5. Attach hoist to rear of riding mower and raise machine.

M22,5005G,12 -19-01DEC86

6. Remove secondary spring (A).



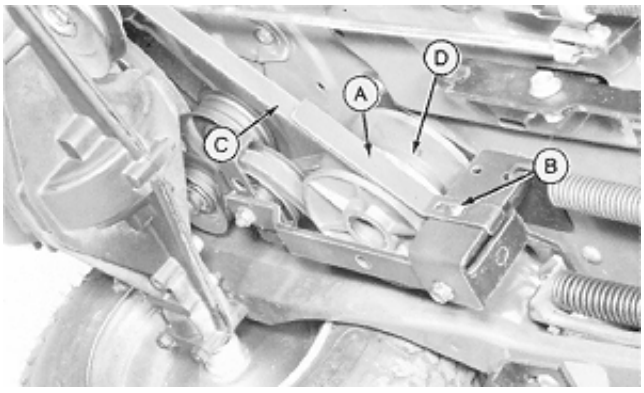
-UN-20DEC89
M49086

M22,5005G,13 -19-01DEC86

7. Loosen carriage bolt (B) and belt guide (A).

8. Remove primary belt (C) and secondary belt (D) from variator.

A—Belt Guide
B—Carriage Bolt
C—Primary Belt
D—Secondary Belt



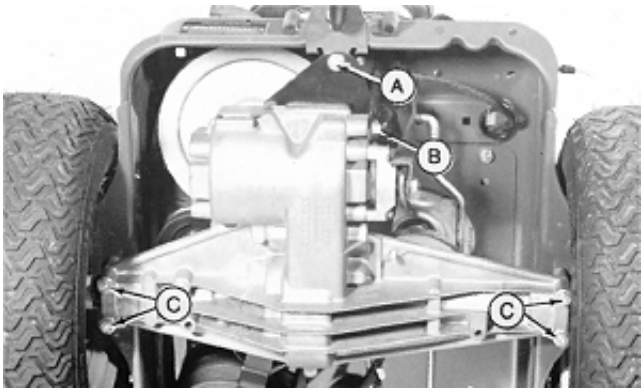
-UN-20DEC89
M49085

M22,5005G,14 -19-01DEC86

9. Loosen nut (A).

10. Remove cap screw (B).

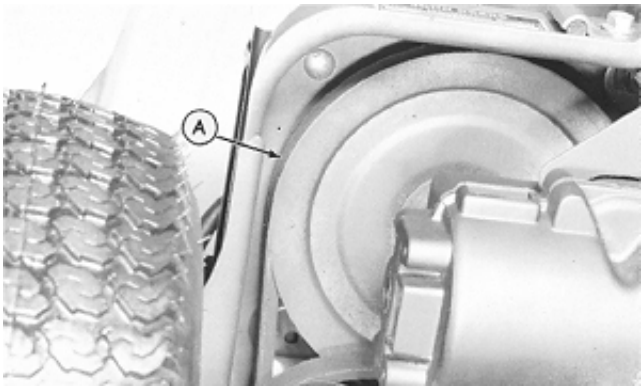
11. Loosen four cap screws (C).



M22,5005G,15 -19-01DEC86

12. Remove secondary belt (A) over top of large driven sheave.

13. Pull secondary belt out left rear corner of frame. Inspect belt for wear. Replace as necessary.



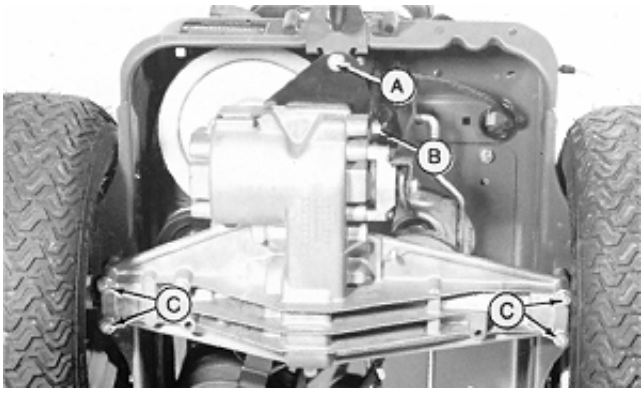
M22,5005G,F -19-14JUN88

INSTALL SECONDARY BELT

1. Loosen nut (A).

2. Remove cap screw (B).

3. Loosen four cap screws (C).

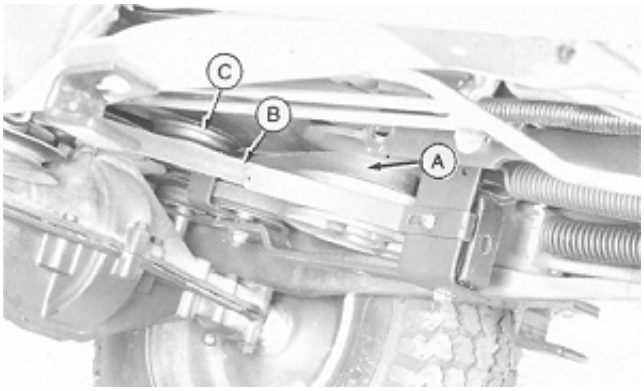


M22,5005G,G -19-14JUN88

4. Install secondary belt in left rear corner of frame and across the top of the large driven sheave.

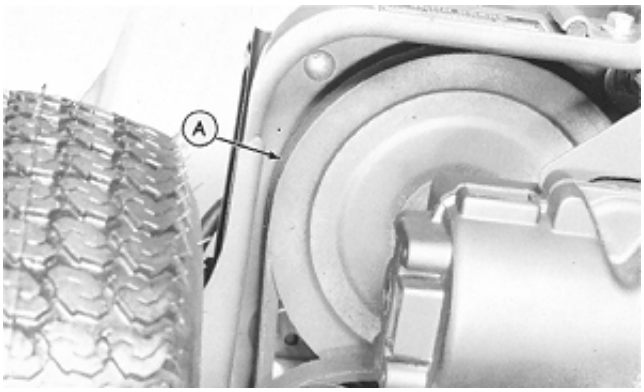
5. Install secondary belt (A) and primary belt (B) on variator.

6. Install secondary belt (A) on secondary idler (C).



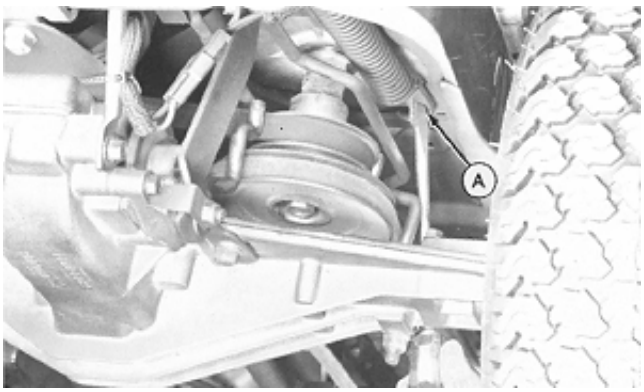
M22,5005G,H -19-14JUN88

7. Install secondary belt on large driven sheave (A).



M22,5005G,I -19-14JUN88

8. Install secondary spring (A).

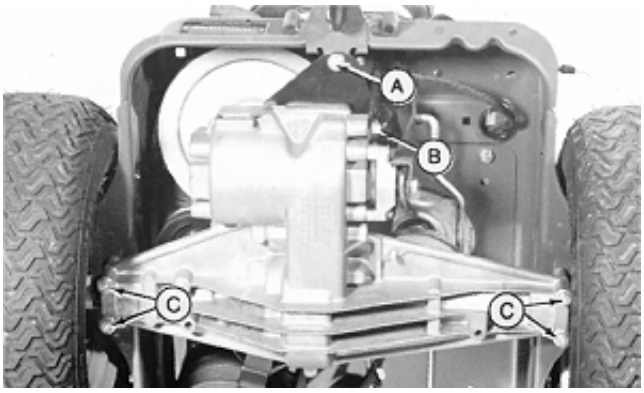


M22,5005G,J -19-14JUN88

9. Tighten four cap screws (C).

10. Tighten nut (A).

11. Install cap screw (B).

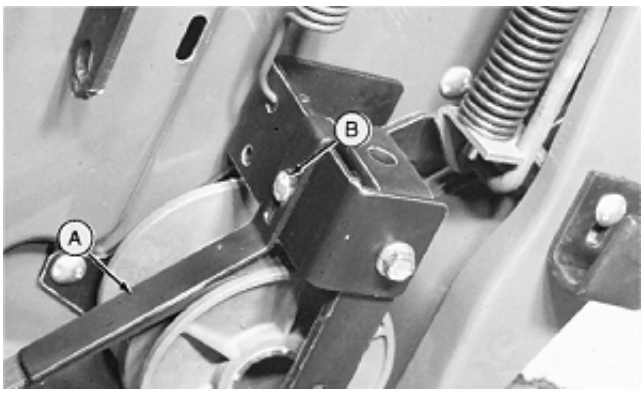


M22,5005G,K -19-14JUN88

12. Adjust belt guide (A) for 1.0—2.0 mm (0.04—0.08 in.) clearance from belt, then tighten carriage bolt (B).

13. Lower machine and remove hoist.

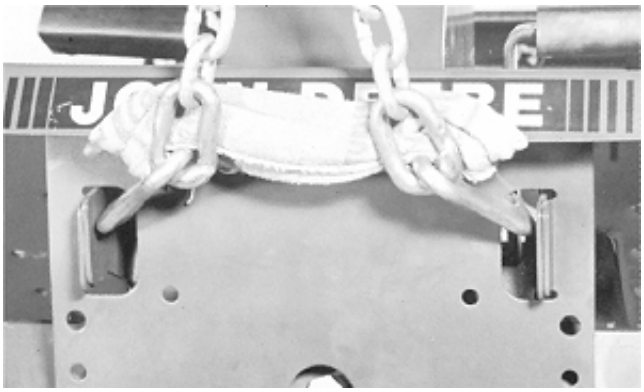
14. Install battery.



M22,5005G,L -19-14JUN88

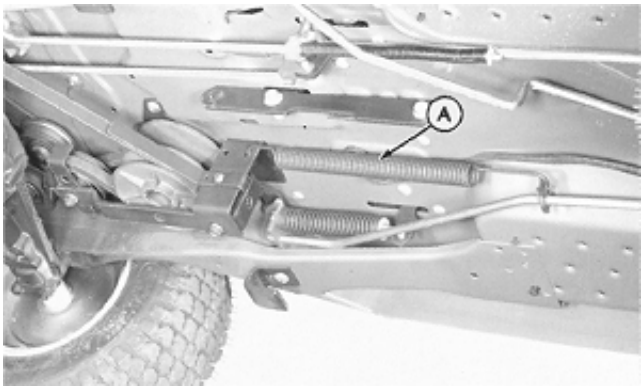
REMOVE CLUTCH ROD ASSEMBLY

1. Remove mower deck. See Section 80.
2. Remove battery.
3. Attach hoist to front of frame and raise machine.



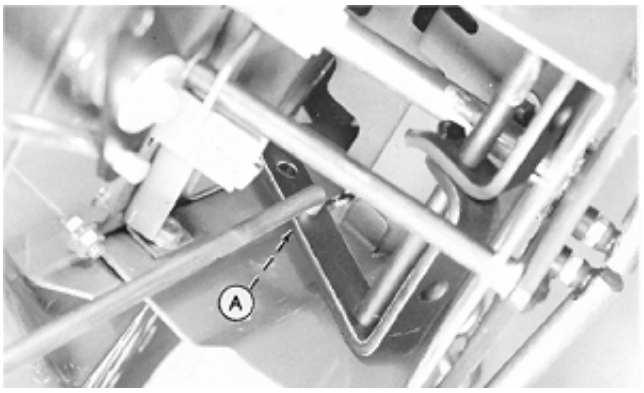
M22,5005G,23 -19-01DEC86

4. Remove clutch return spring (A).



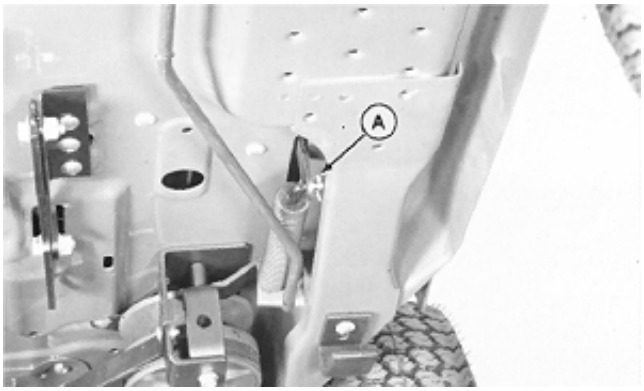
M22,5005G,24 -19-01DEC86

5. Remove cotter pin (A).
6. Remove clutch rod from clutch pedal arm.



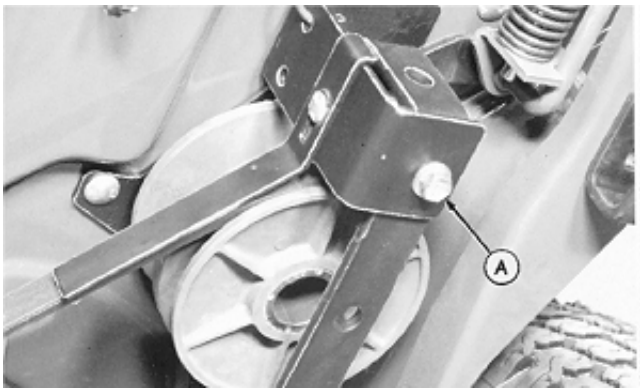
M22,5005G,25 -19-01DEC86

7. Remove cotter pin (A).



M22,5005G,26 -19-01DEC86

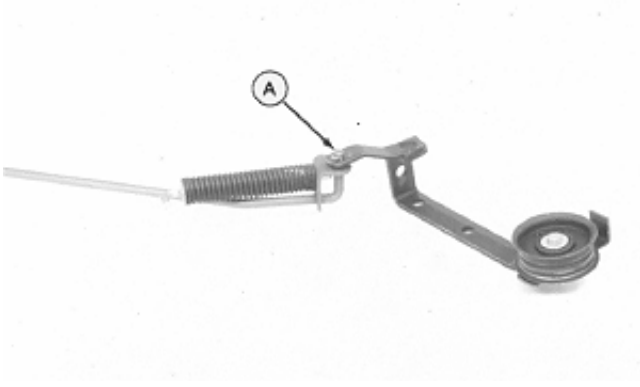
8. Remove bolt (A).



M22,5005G,27 -19-01DEC86

9. Remove primary idler arm and clutch rod assembly.

10. Remove cotter pin (A).



M22,5005G,28 -19-01DEC86

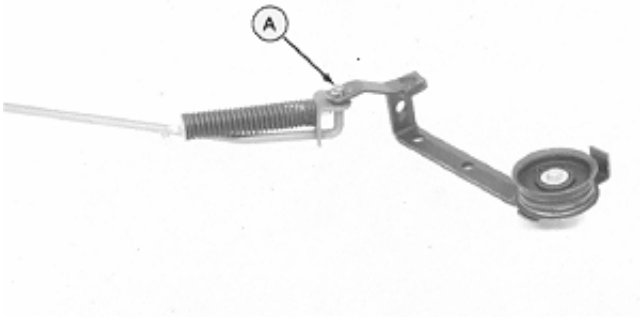
CAUTION: DO NOT attempt to remove compressed spring on clutch rod. Replace entire assembly if service is necessary.

11. Remove clutch rod assembly from primary idler arm.

M22,5005G,29 -19-01DEC86

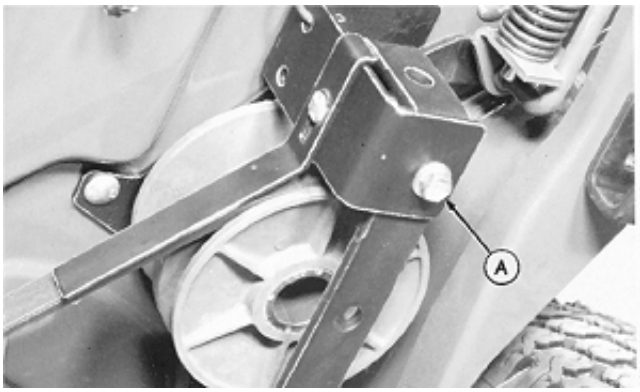
INSTALL CLUTCH ROD ASSEMBLY

1. Install cotter pin (A).



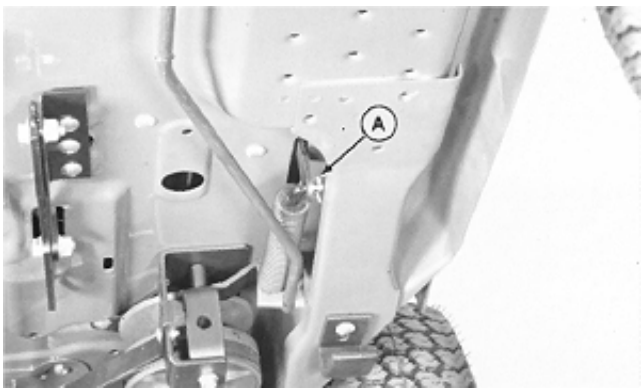
M22,5005G,30 -19-01DEC86

2. Install primary idler arm, clutch rod assembly, and bolt (A).



M22,5005G,31 -19-01DEC86

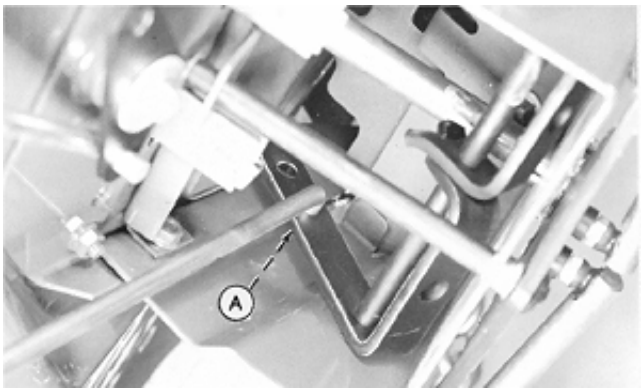
3. Install cotter pin (A).



M22,5005G,32 -19-01DEC86

4. Install clutch rod in clutch pedal arm.

5. Install cotter pin (A).



M22,5005G,33 -19-01DEC86

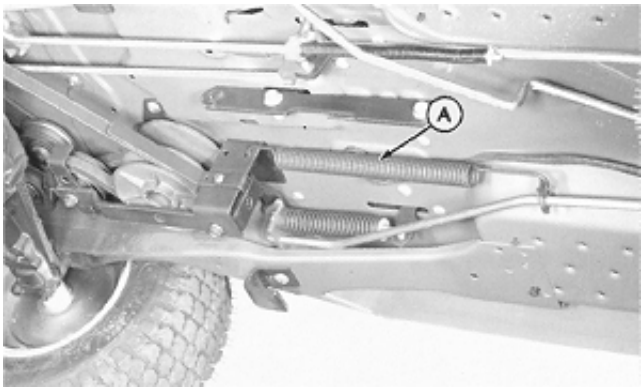
6. Install clutch return spring (A).

NOTE: There are two holes in variator bracket. These holes adjust your clutch pedal tension. Install spring in proper hole. See Section 250.

7. Lower machine and remove hoist.

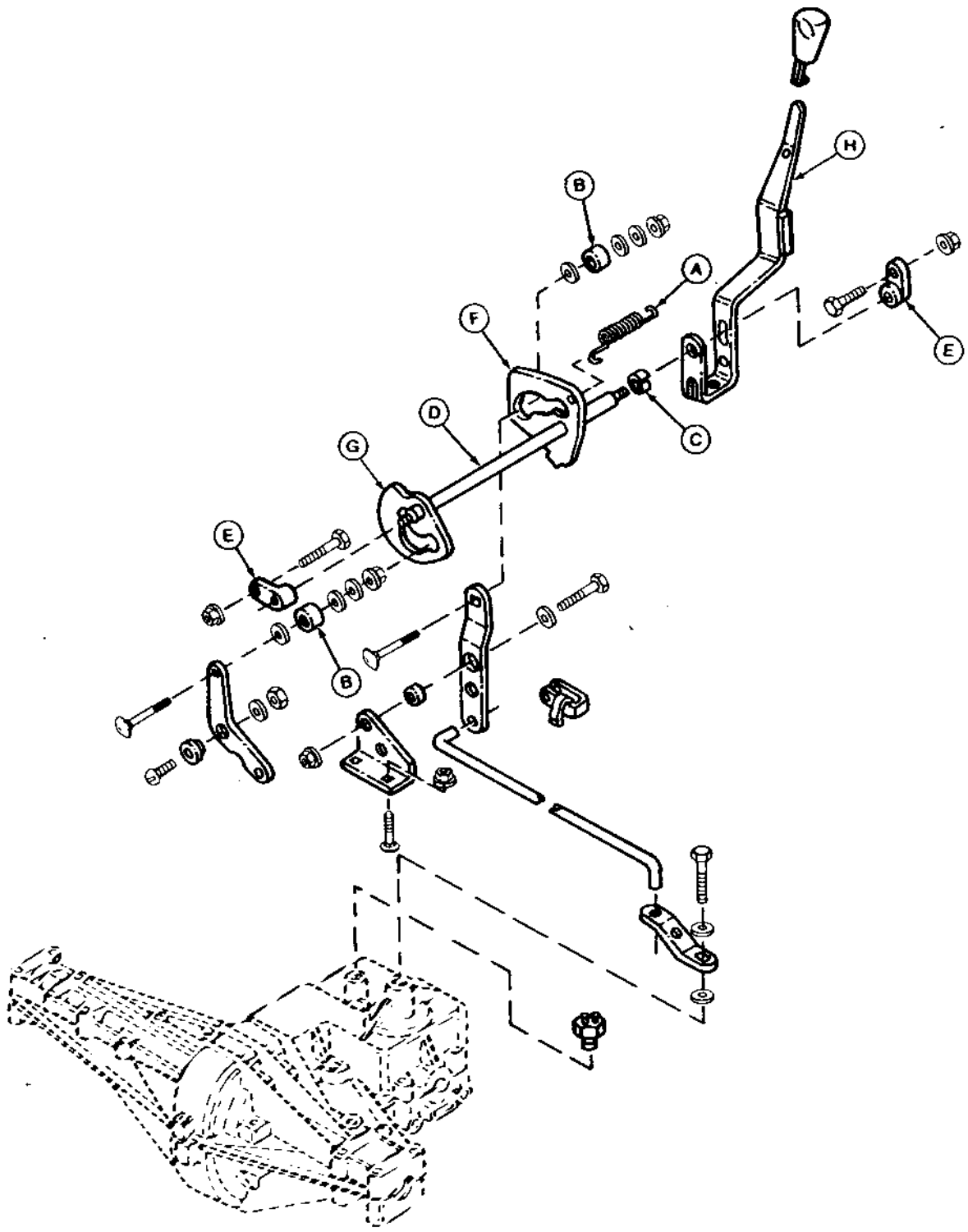
8. Install battery.

9. Attach mower deck. See Section 80.



M22,5005G,34 -19-01DEC86

SPEED AND SHIFT CONTROL LINKAGE ASSEMBLY



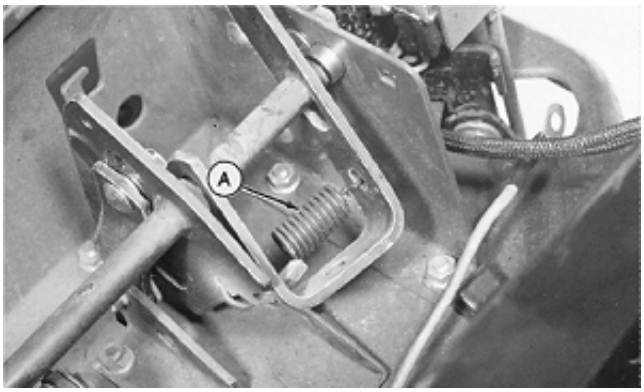
M48151 -UN-31AUG88

A—Shift Lever Return Spring
B—Roller Bearing
C—Bushing
D—Cam Assembly
E—Pivot Bearing
F—Transaxle Shift Cam
G—Variator Speed Cam
H—Shift Lever

M22,5010G,A -19-14JUN88

REMOVE SPEED AND SHIFT CONTROL LINKAGE

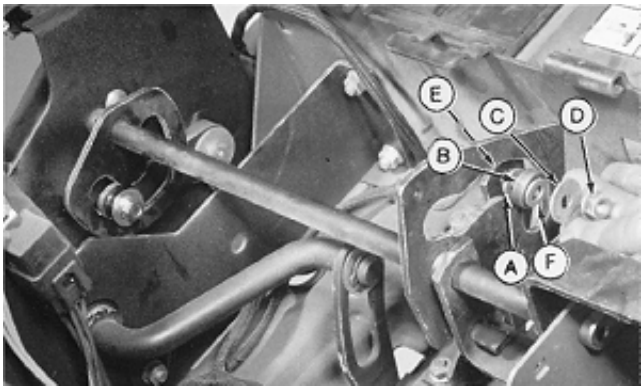
1. Remove spring (A).



M22,5010G,D -19-14JUN88

2. Remove nut (D), large washer (C), outer washer (F), bearing (B), and inner washer (A) from bolt (E) for shift control linkage.

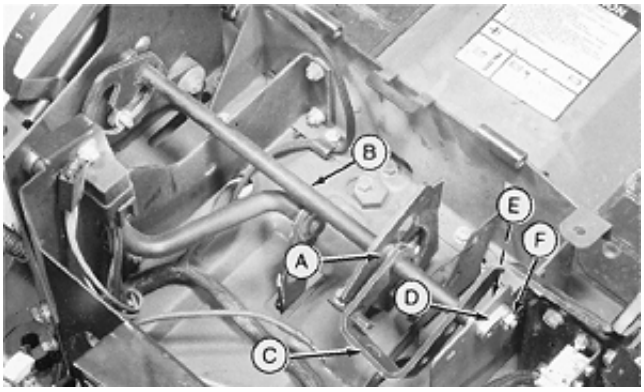
A—Cam Profile Washers
B—Cam Profile Bearing
C—Cam Profile Large Washer
D—Cam Profile Nut
E—Cam Profile Bolt



M22,5010G,E -19-01JUL88

4. Remove pivot bearing nut (F) and pivot bearing (D) from pedestal support.

5. Remove speed control shaft (B), bushing (A), bolt (E) and speed control lever (C) from pedestal support.

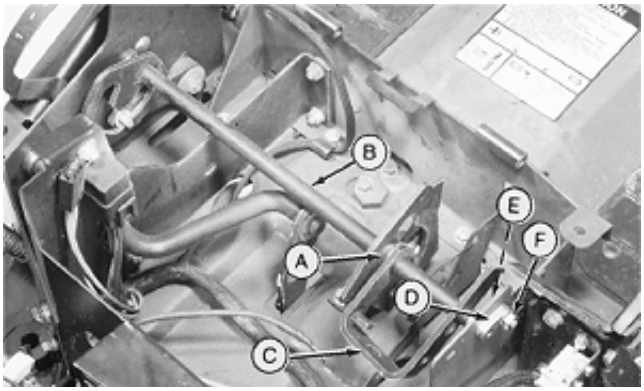


M22,5010G,F -19-01JUL88

INSTALL SPEED AND SHIFT CONTROL LINKAGE

1. Install bushing (A), speed control shaft (B), speed control lever (C), pivot bearing (D), bolt (E), and nut (F).

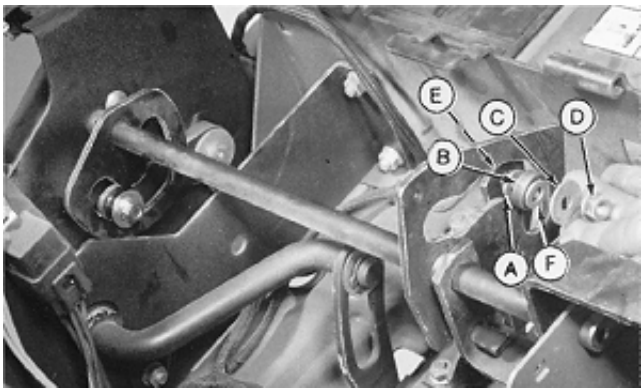
A—Bushing
B—Speed Control Shaft
C—Speed Control Lever
D—Pivot Bearing
E—Pivot Bearing Bolt
F—Pivot Bearing Nut



M22,5010G,B -19-14JUN88

2. Install inner washer (A), bearing (B), outer washer (F), large washer (C), and nut (D) on bolt (E) for shift control linkage.

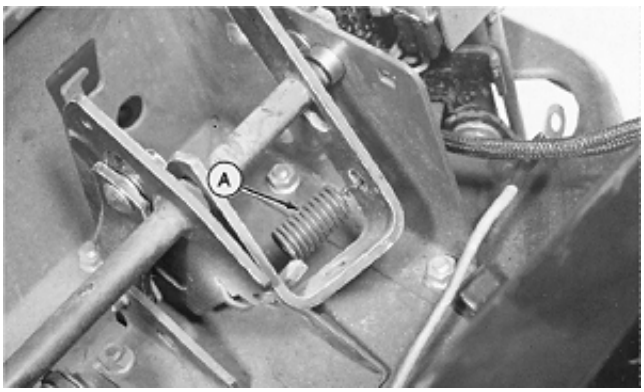
A—Cam Profile Washers
B—Cam Profile Bearing
C—Cam Profile Large Washer
D—Cam Profile Nut
E—Cam Profile Bolt



M22,5010G,C -19-01JUL88

4. Install spring (A).

5. Adjust speed control linkage. See Section 250.



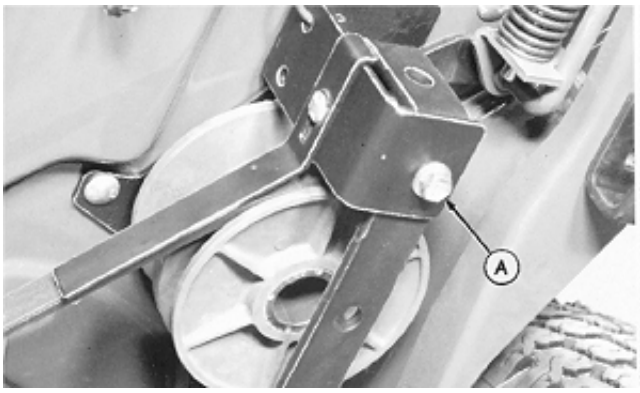
M22,5010G,4 -19-02DEC86

REMOVE AND DISASSEMBLE VARIATOR

1. Put shift lever in neutral.

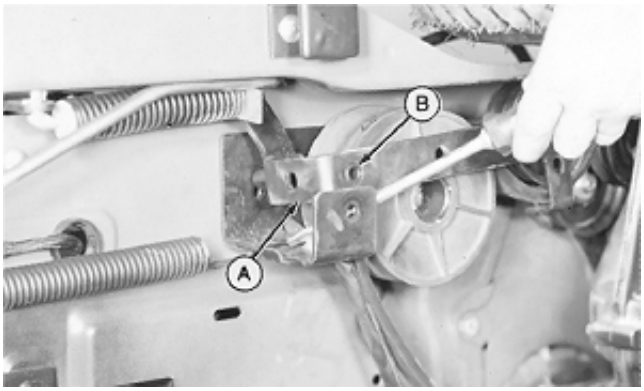
2. Engage park brake.

3. Remove bolt (A).



M22,5010G,5 -19-02DEC86

4. Remove primary idler arm (A) and pivot tube (B) from variator mounting bracket.



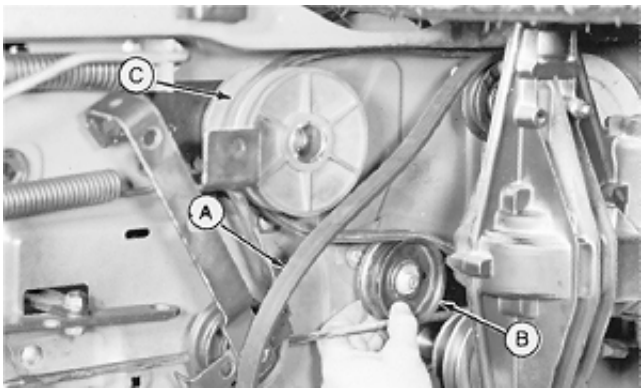
M22,5010G,6 -19-02DEC86

5. Remove primary belt (A) from variator.

CAUTION: Secondary idler arm is spring loaded.

6. Grasp firmly and pull secondary idler arm (B) to release tension on secondary belt.

7. Remove secondary belt (C) from variator and slowly release secondary idler arm.



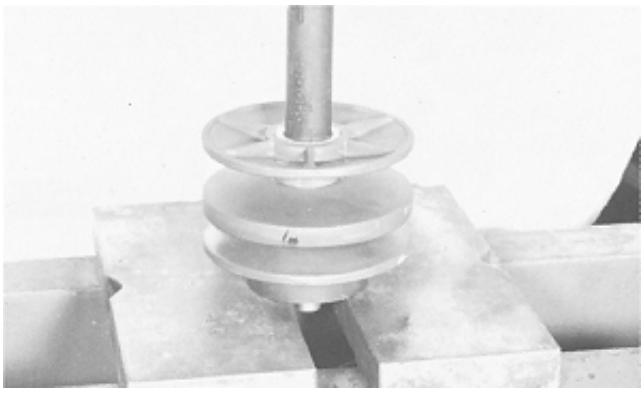
M22,5010G,7 -19-02DEC86

8. Remove pin (A) and variator.

M22,5010G,8 -19-02DEC86

9. Press bearing out the top of variator (same end that shaft protrudes) using a 27 mm (1-1/16 in.) OD pipe.

NOTE: The bearing is the only serviceable part on the variator.

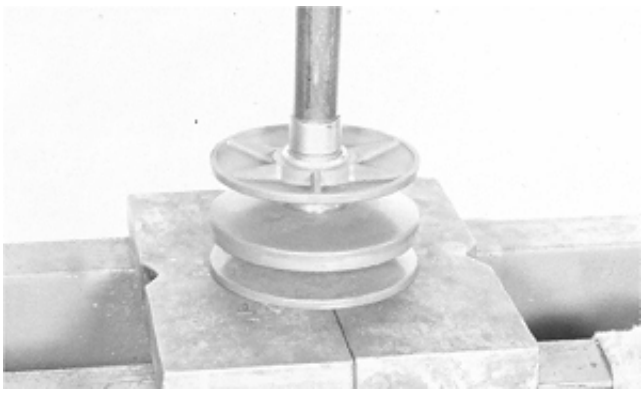


M22,5010G,G -19-01JUL88

ASSEMBLE AND INSTALL VARIATOR

1. Press bearing into larger ID end of hub variator using a 27 mm (1-1/16 in.) OD pipe until bearing contacts step.

NOTE: Install so short end of bearing shaft is toward step.



M22,5010G,H -19-14JUN88

2. Install variator in bracket.

3. Install pin (A).

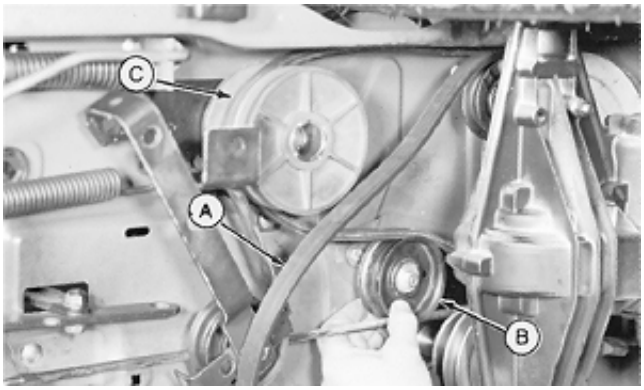
M22,5010G,11 -19-02DEC86

4. Install secondary belt (C) on variator.

CAUTION: Secondary idler arm is spring loaded.

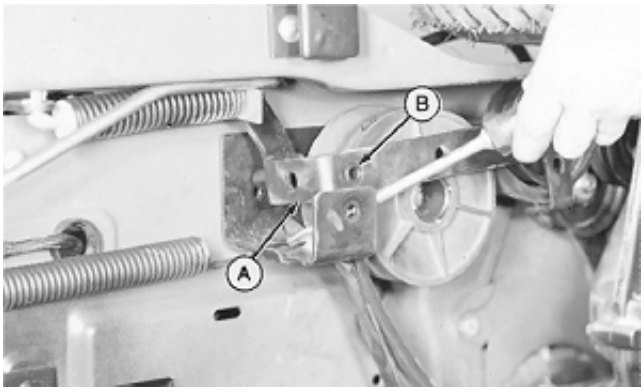
5. Grasp firmly and pull secondary idler arm (B) to align secondary belt. Slowly release secondary idler arm.

6. Install primary belt (A) on variator.



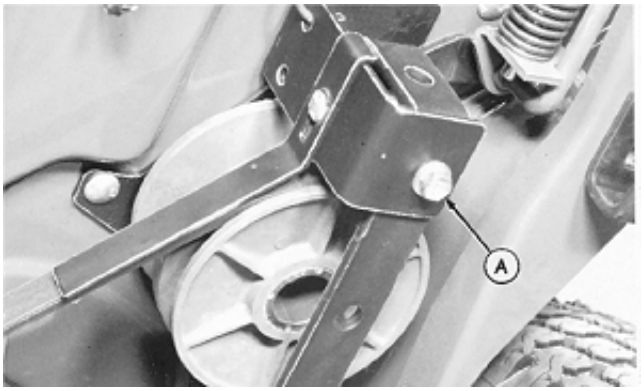
M22,5010G,12 -19-22DEC86

7. Install primary idler arm (A) and pivot tube (B) on variator mounting bracket and align primary belt.



M22,5010G,13 -19-22DEC86

8. Install bolt (A).



M22,5010G,14 -19-02DEC86

SERVICE EQUIPMENT AND 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.

Name	Use
Bushing, Bearing and Seal Driver Set	To service bearings.

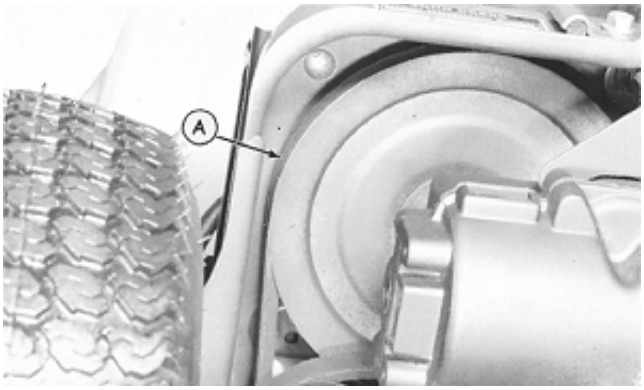
M22,5015G,4 -19-02DEC86

REMOVE TRANSAXLE

1. Attach hoist and raise machine just high enough to remove rear wheels.

2. Remove rear wheels.

3. Remove belt (A). See Remove Secondary Belt in this section.

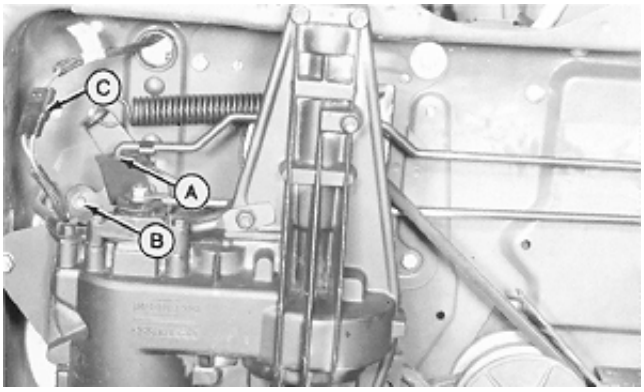


M22,5015G,1 -19-02DEC86

4. Disconnect brake linkage (A).

5. Disconnect direction control linkage (B).

6. Disconnect neutral start switch lead (C).



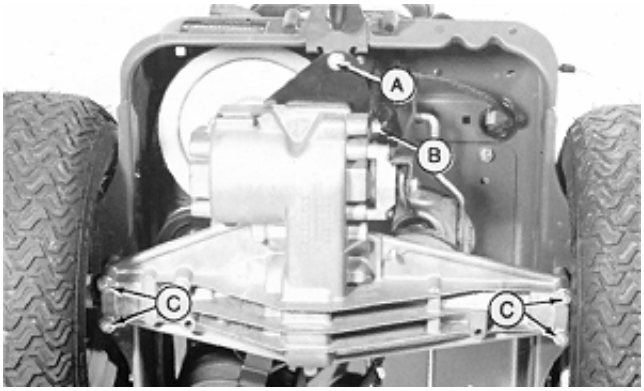
M22,5015G,2 -19-02DEC86

7. Remove nut (A).

8. Remove cap screw (B).

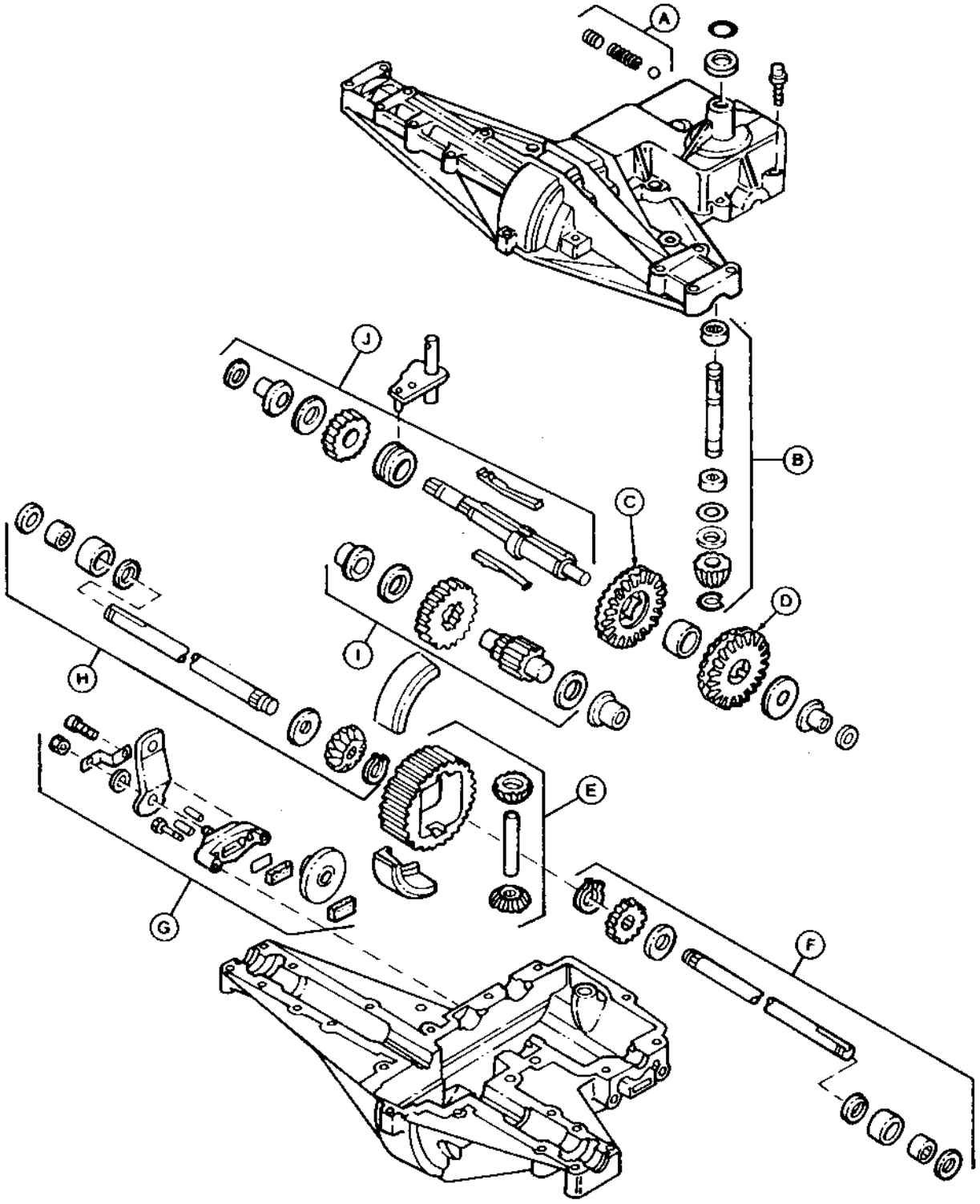
9. Remove four cap screws (C) and remove transaxle.

10. Remove sheave from input shaft of transaxle.



M22,5015G,3 -19-02DEC86

TRANSAXLE ASSEMBLY



A—Shift Detent (early units only)
B—Input Shaft Assembly
C—Reverse Gear
D—Forward Gear
E—Differential Assembly
F—Right Axle Assembly
G—Brake Assembly
H—Left Axle Assembly
I—Output Pinion Shaft Assembly
J—Shifter Shaft Assembly

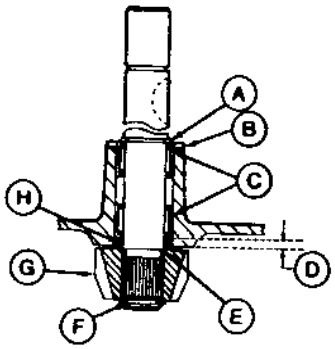
M22,5015G,A -19-14JUN88

ASSEMBLE TRANSAXLE

1. Lubricate the transaxle with approximately 532 ml (18 oz) of a SAE EP90 Lithium Grease, such as John Deere Moly High-Temperature EP Grease.

2. Assemble input shaft.

Install needle bearings into case top half using a 3/4 in. driver disk. Install the bearing on the inboard side to a depth (D) of 3.4—3.8 mm (0.135—0.150 in.) below flush. Apply grease between bearings.



M48154 -UN-31AUG88

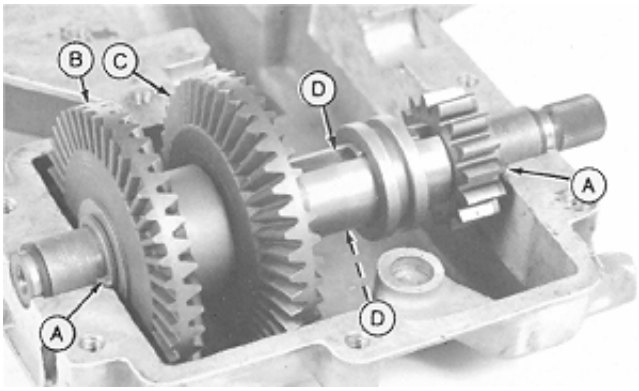
A—Snap Ring
B—Washer
C—Needle Bearing (2)
D—Installation Dimension
E—Washer
F—Snap Ring
G—Pinion Gear
H—Washer

M22,5015G,B -19-14JUN88

50 15 3

3. Assemble and install shifter/brake shaft.

Fill both shaft keyways (D) with grease. Position beveled side of gears (B and C) toward each other. Put boss in bushings (A) in notch in case.



M46003 -UN-08JAN90

A—Bushings
B—Forward Gear
C—Reverse Gear
D—Shaft Keyways

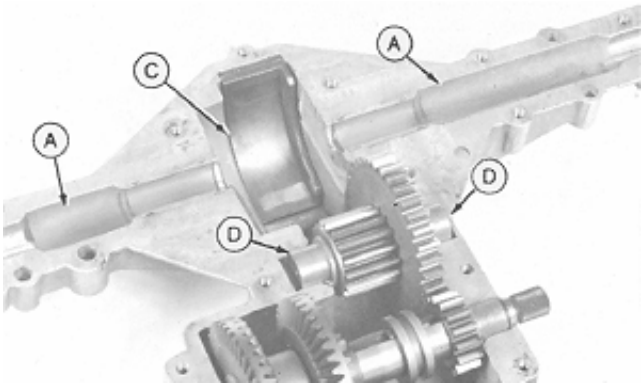
M22,5015G,7A -19-01JUL88

4. Assemble and install output pinion shaft.

Put in bushings (D) in notch in case.

5. Install lower bearing block (C). Do not put grease between case and bearing block.

6. Put grease in area (A).



M48155 -UN-08JAN90

M22,5015G,C -19-14JUN88

7. Assemble and install differential and axles.

Check that axles and ring gear are fully seated into case.

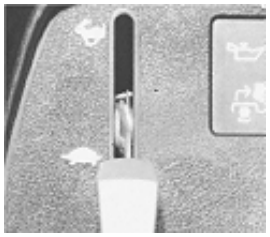
Fill the unit with grease. Install bearing block (A) with flange opposite the lower bearing block flange.

8. Install shifting fan (B).

9. Install cover and tighten cap screws to 10 N·m (95 lb-in.).

10. Early units only: install detent ball, spring and set screw. Tighten set screw until it is flush with cover.

M49005 -UN-08JAN90


M49006 -UN-08JAN90

M22,5015G,D -19-14JUN88

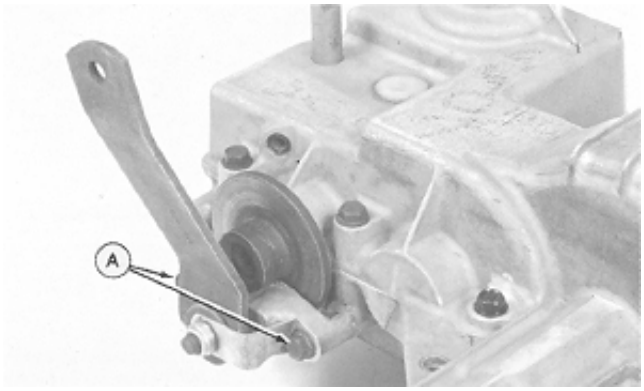
50
15
4

11. Assemble and install brake.

IMPORTANT: Brake pads and brake disc must be free of grease and oil.

Apply a light film of LUBRIPLATE to the inside of the lever portion which contacts pins to the outside of the lever which contacts flat washer, and between the shaft OD and bore of brake disc.

Tighten cap screws (A) to 10 N·m (95 lb-in.).



M48156 -UN-08JAN90

M22,5015G,E -19-14JUN88

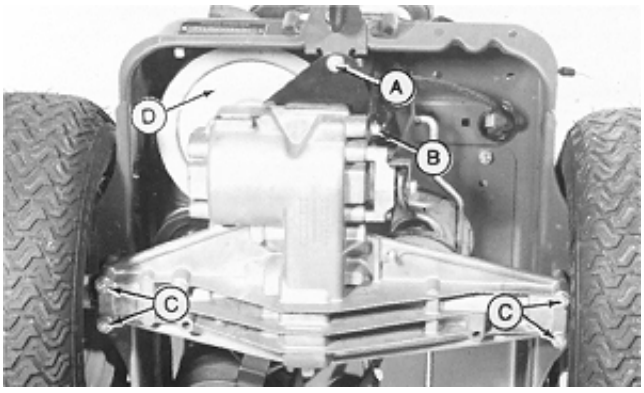
INSTALL TRANSAXLE

1. Install sheave (D) on input shaft of transaxle.

2. Install four cap screws (C).

3. Install cap screw (B).

4. Install nut (A).



M48157 -UN-08JAN90

M22,5015G,F -19-14JUN88

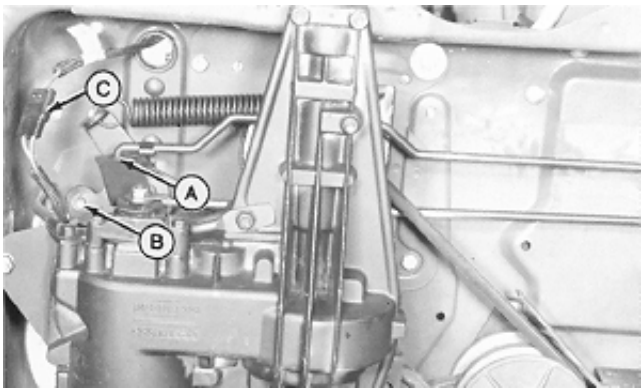
5. Connect neutral start switch connector (C).

6. Connect direction control linkage (B).

7. Connect brake linkage (A).

8. Install rear wheels.

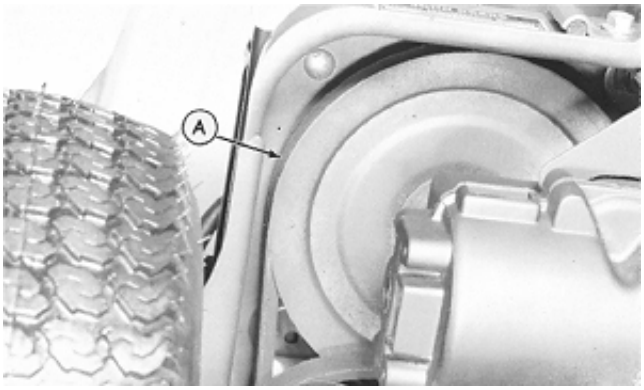
9. Lower machine.



M22,5015G,12 -19-02DEC86

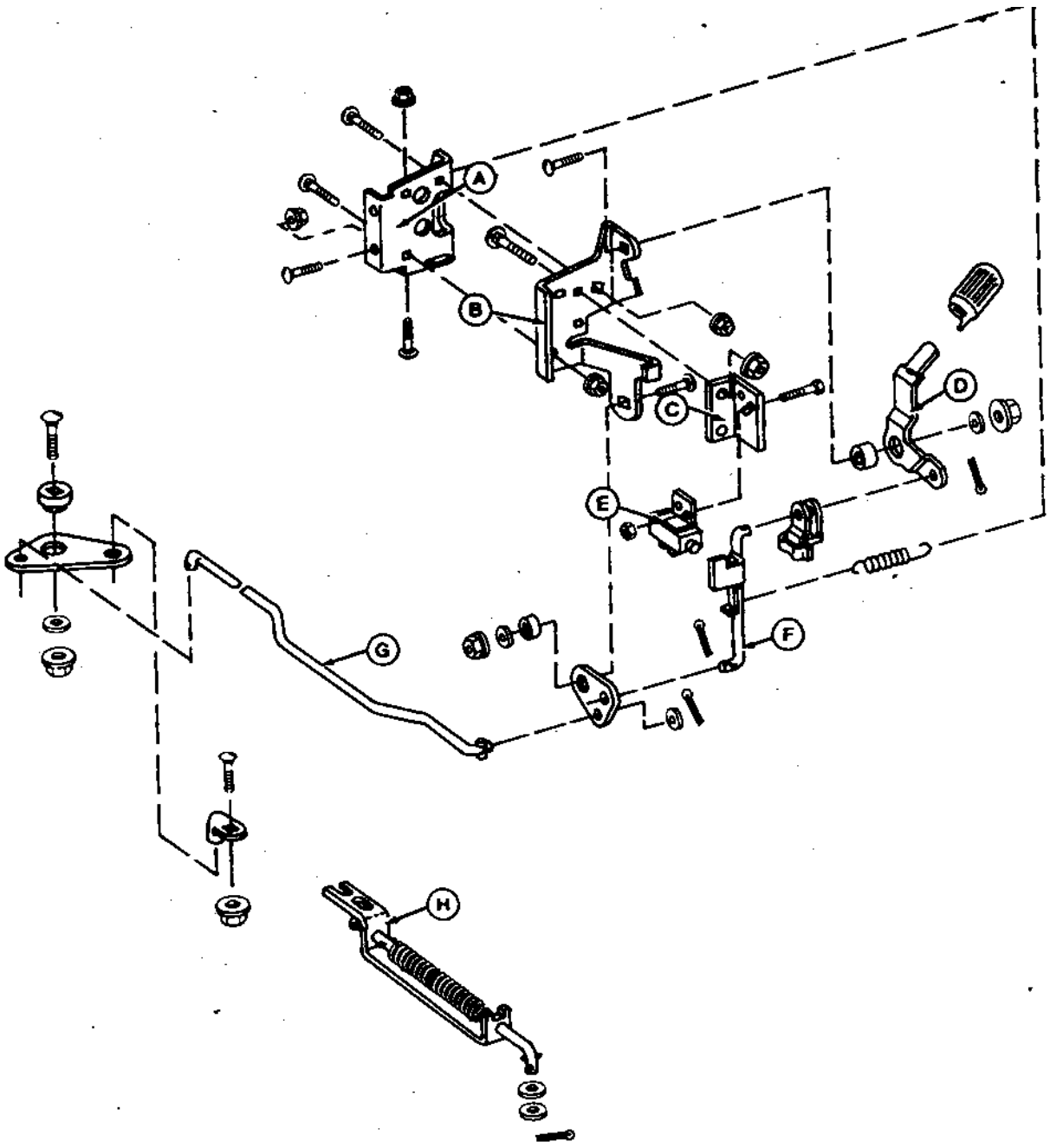
10. Install belt (A). See Install Secondary Belt in this section.

11. Adjust brake. See Section 60.



M22,5015G,G -19-14JUN88

PTO LINKAGE



A—PTO Support Bracket
B—PTO Bracket
C—PTO Safety Switch Bracket
D—PTO Lever
E—PTO Safety Switch
F—Upper PTO Rod
G—Lower PTO Rod
H—PTO Spring Assembly

M22,5020G,1 -19-02DEC86

ADJUST PTO LINKAGE—26 AND 30 INCH MOWER DECK

1. Move PTO lever fully forward. Lift mower to number 4 setting.

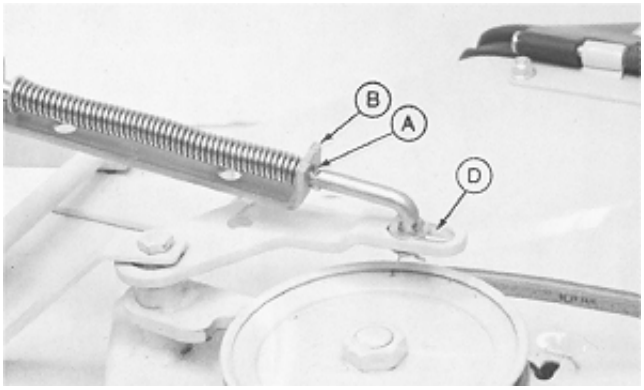
2. LOOK: Nipples (A) on rod should pull away from PTO bracket (B).

3. Move PTO lever fully rearward. Lower mower to Setting 1.

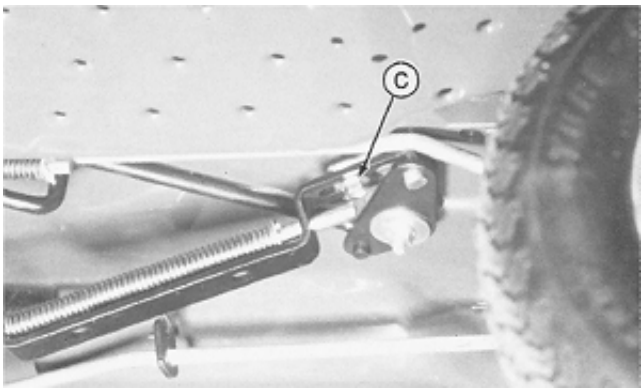
4. LOOK: Nipples should touch PTO bracket.

5. To adjust PTO engagement rod.

a. Move PTO lever fully rearward.
b. Lower mower to Setting 1.
c. Loosen nut (C).
d. Pull PTO engagement rod forward until it is at front of slot (D).
e. Tighten nut.



M48175 -UN-08JAN90



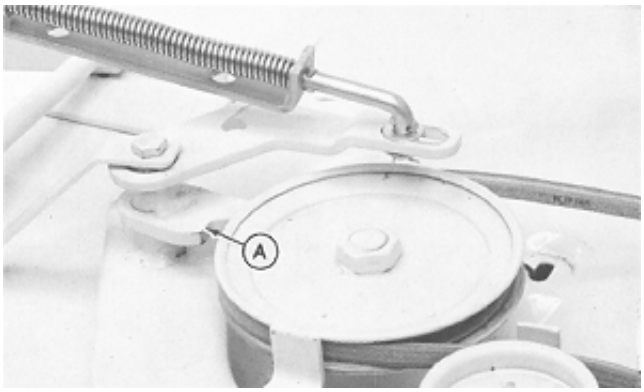
M48177 -UN-08JAN90

M22,5020G,A -19-01JUL88

6. Repeat steps 1-4. PTO engagement rod is in proper adjustment when:

a. Nipples pull away from bracket when PTO lever is fully forward and mower is at highest Setting 4.

b. Brake arm (A) touches belt when PTO lever is fully rearward and mower is at lowest Setting 1.



M48176 -UN-08JAN90

M22,5020G,B -19-01JUL88

ADJUST PTO LINKAGE—38 INCH MOWER DECK

1. Move PTO lever fully forward. Lift mower to number 4 setting.

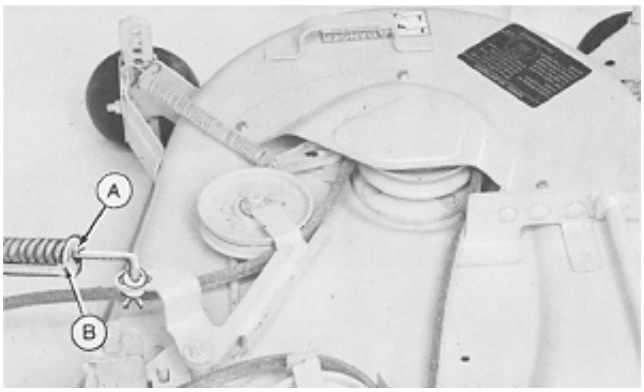
2. LOOK: Nipples (A) on rod should pull away from PTO bracket (B).

3. Move PTO lever fully rearward. Lower mower to Setting 1.

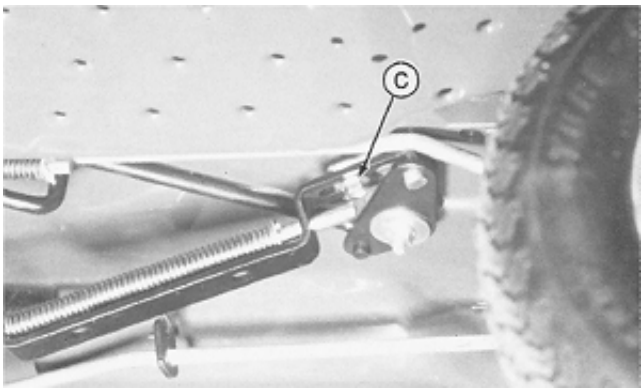
4. LOOK: Nipples should touch PTO bracket.

5. To adjust PTO engagement rod.

a. Move PTO lever fully rearward.
b. Lower mower to Setting 1.
c. Loosen nut (C).
d. Pull PTO engagement rod forward until it is at front of slot (D).
e. Tighten nut.



-UN-08JAN90
M48174



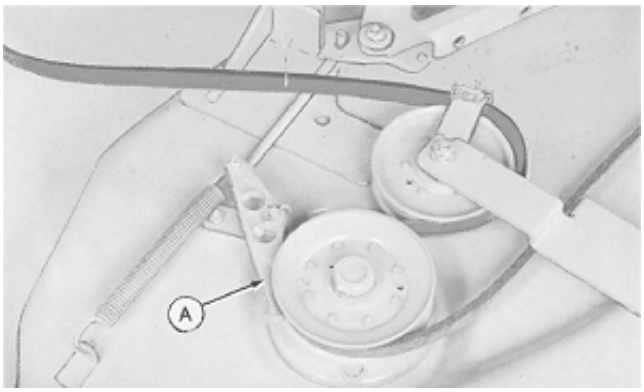
-UN-08JAN90
M48177

M22,5020G,C -19-01JUL88

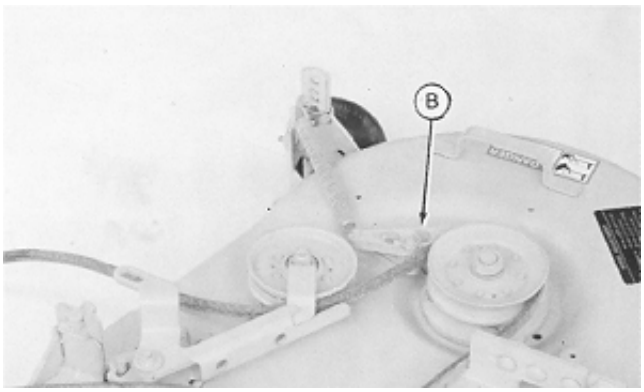
6. Repeat steps 1-4. PTO engagement rod is in proper adjustment when:

a. Nipples pull away from bracket when PTO lever is fully forward and mower is at highest Setting 4.

b. Brake arms (A and B) touch belt when PTO lever is fully rearward and mower is at lowest Setting 1.



-UN-08JAN90
M48159



-UN-08JAN90
M48158

M22,5020G,D -19-14JUN88

Section 60
STEERING AND BRAKE REPAIR

Contents

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Remove 60-05-5
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Adjust 60-10-3
Brake Linkage
Remove and Disassemble 60-10-3
Assemble and Install 60-10-4

REPAIR FRONT WHEELS AND BEARINGS

CAUTION: If machine is raised more than 4 in., remove battery to prevent spillage of electrolyte solution.

1. Raise front of machine just enough so that front wheels can be removed. Remove hub cap.

2. Remove snap ring (A). Pull wheel from spindle.

M22,6005G,19 -19-28OCT86

3. Remove each bearing by tapping on its backside with hammer and punch.

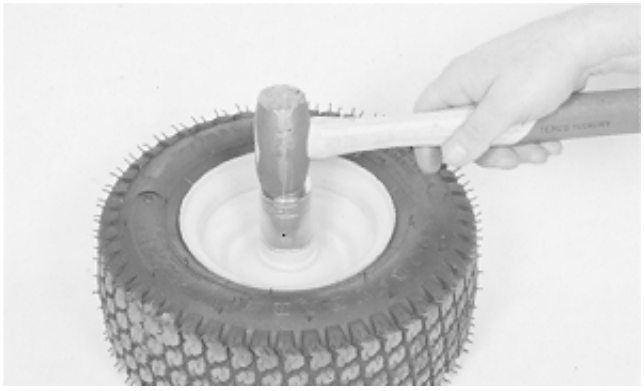
4. Remove old grease and repack wheel hub with multipurpose grease.

5. If bearings are not being replaced, wash them with solvent and repack with multipurpose grease.

M22,6005G,20 -19-22DEC86

IMPORTANT: Never drive bearings by tapping on the inside race.

6. Drive bearings into each wheel hub until they are flush with outside of hub. Use a 1-1/16 in. socket or press plate.



M22,6005G,21 -19-28OCT86

7. Install wheel on spindle.

8. Install snap ring (A) into groove on spindle.

9. Lower machine.

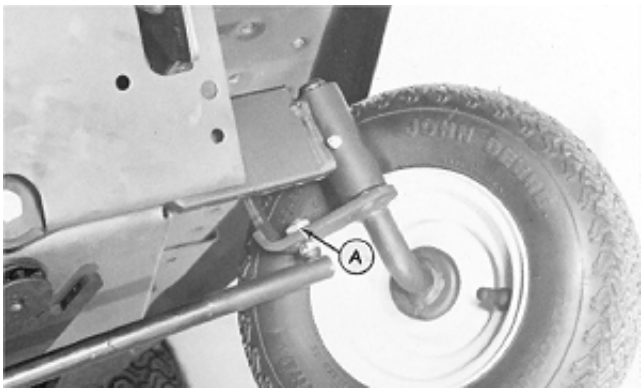
M22,6005G,A -19-14JUN88

REPLACE FRONT SPINDLE

CAUTION: If machine is raised more than 4 inches, remove battery to prevent spillage of electrolyte solution.

1. Remove nut (A) and disconnect tie rod from spindle arm.

2. Remove front wheel. See Remove Front Wheels and Service Bearings in this section.

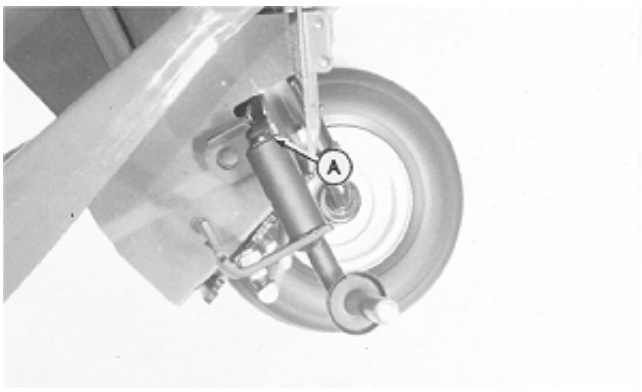


M22,6005G,23 -19-02DEC86

3. Remove retaining ring (A).

4. Remove spindle from axle.

5. Replace spindle if damaged.



M22,6005G,24 -19-28OCT86

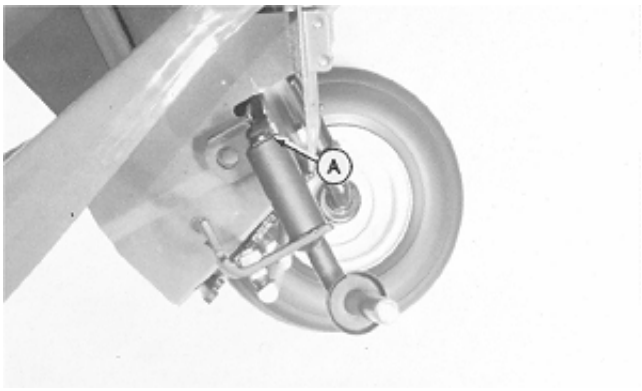
6. Check to see that grease fitting in axle bearing is not plugged or damaged. Replace if necessary.

7. Apply multipurpose grease to spindle and inside axle bearing.

8. Install spindle and retaining ring (A).

9. Attach tie rod with nut. Tighten nut to 25-30 N·m (18.5-22 lb-ft).

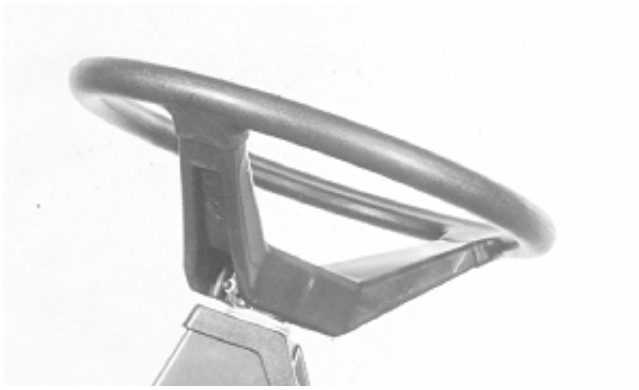
10. Install wheel and retaining ring. Lower machine.



M22,6005G,25 -19-28OCT86

REMOVE STEERING SHAFT AND TIE ROD ASSEMBLY

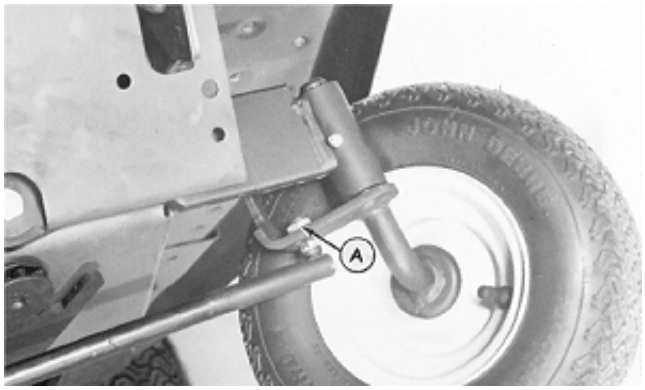
1. Remove steering wheel.
2. Install pin through hole in shaft.
3. Turn fuel valve OFF.
4. Remove battery.
5. Raise machine.



M49058 -UN-20DEC89

M22,6005G,B -19-14JUN88

6. Remove nut (A) and remove tie rod from hole in spindle arm on both sides of machine.
7. Hold end of steering shaft in position.
8. Remove pin from top of steering shaft.
9. Lower steering shaft and tie rod assembly from machine.
10. Remove plastic cover from steering column.



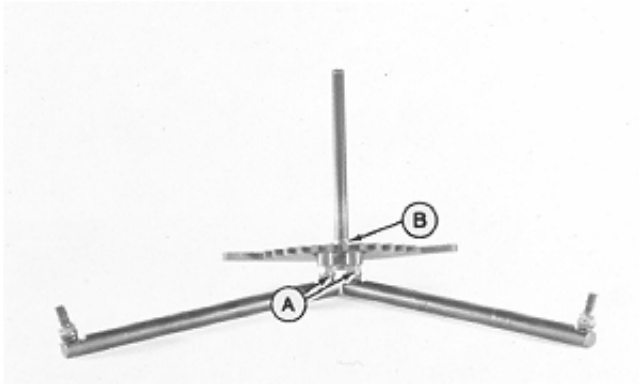
M49059 -UN-20DEC89

M22,6005G,C -19-14JUN88

60 05 3

DISASSEMBLE TIE ROD AND SECTOR GEAR ASSEMBLY

1. Remove two nuts (A) and tie rods from sector gear.
2. Inspect ball joints for wear. Replace as needed.
3. Inspect tie rods for straightness. Replace as needed.
4. Inspect sector gear for worn or broken teeth.
5. Inspect bushing (B) for damage. Replace as needed.



M49060 -UN-20DEC89

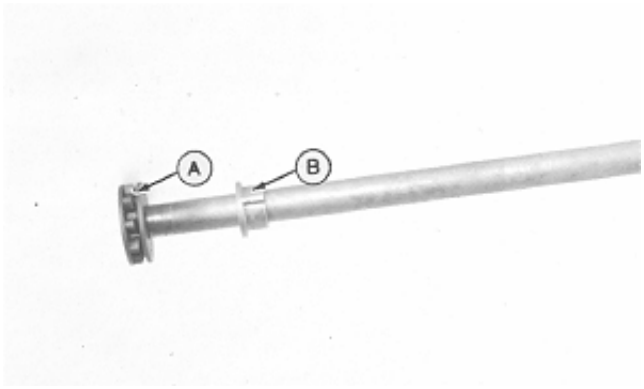
M22,6005G,4 -19-22DEC86

INSPECT STEERING SHAFT

1. Inspect steering shaft for straightness. Replace shaft as needed.

2. Inspect pinion gear (A) for worn or broken teeth. Replace shaft as needed.

3. Inspect bushing (B) for damage. Replace bushing as needed.



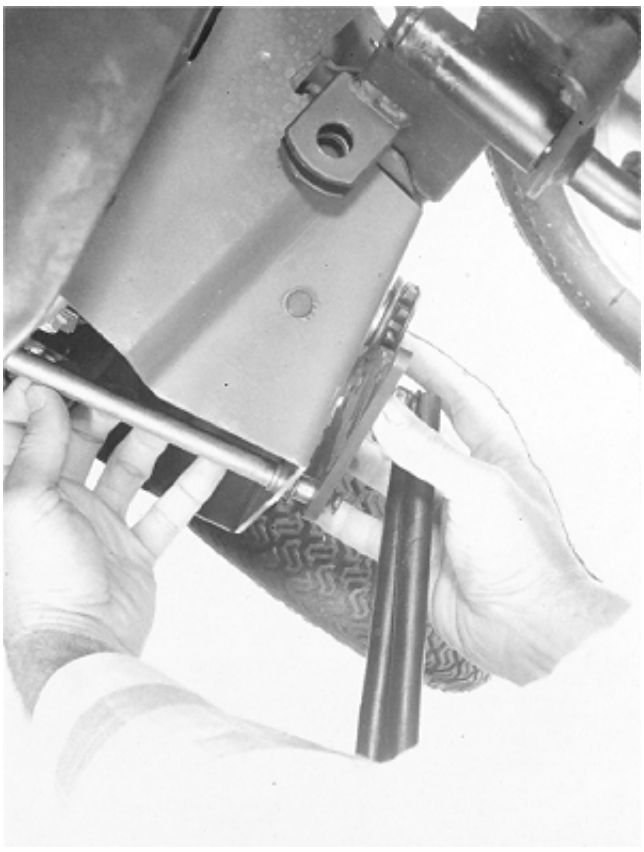
M22,6005G,D -19-14JUN88

INSTALL STEERING SHAFT AND TIE ROD ASSEMBLY

1. Align pinion gear and sector gear for correct steering wheel installation.

2. Install steering shaft and tie rod assembly together.

3. Attach locking pliers to shaft to hold assembly in place.

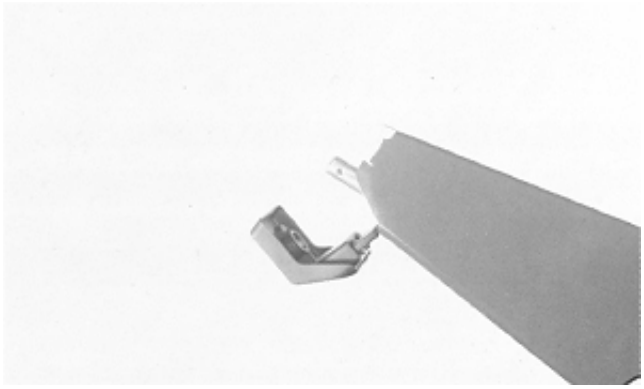


M22,6005G,6 -19-23DEC86

4. Install plastic plate on top of steering column.

5. Install steering wheel.

6. Remove locking pliers from shaft.



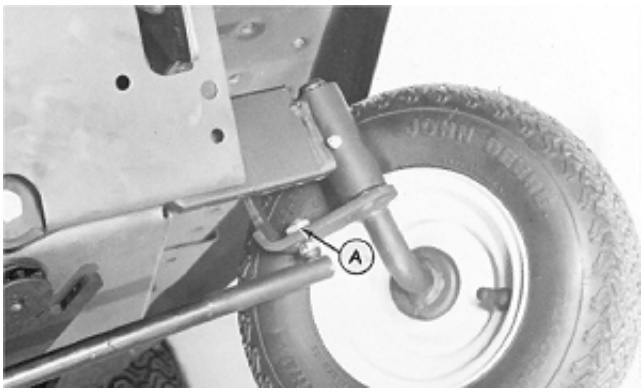
M22,6005G,E -19-14JUN88

7. Connect tie rods to spindle brackets. Tighten nut (A) to 25—30 N·m (18.5—22 lb-ft).

8. Lower machine.

9. Install battery.

10. Turn fuel ON.



M22,6005G,F -19-01JUL88

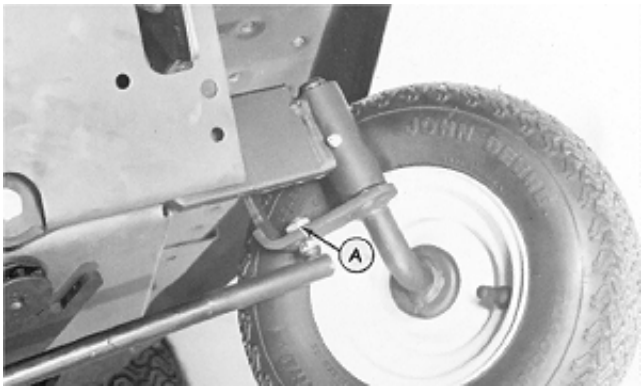
REMOVE FRONT AXLE

1. Remove battery.

2. Remove mower deck. See Section 80.

3. Attach hoist and raise machine.

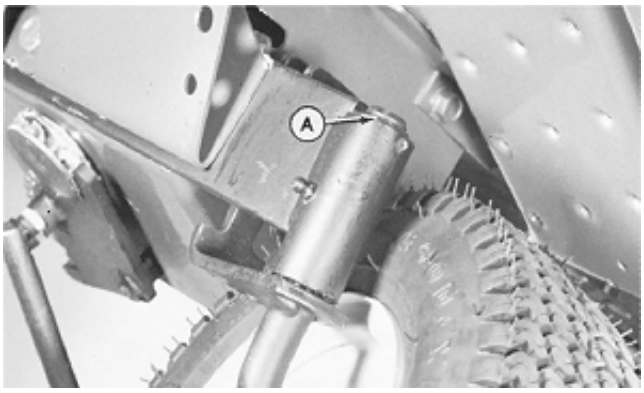
4. Remove nut (A) and remove the tie rods from both wheel spindles.



M22,6005G,10 -19-22DEC86

5. Remove snap ring (A).

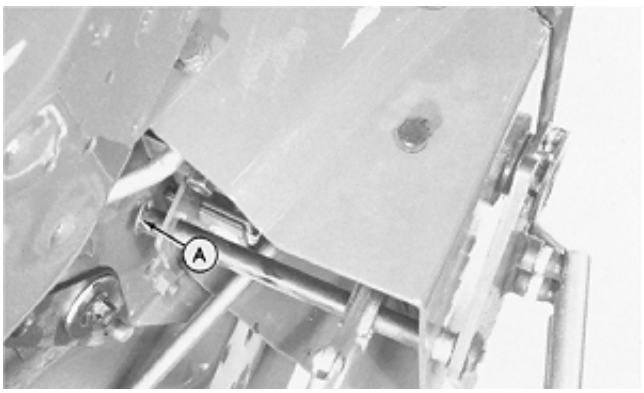
6. Remove wheel and spindle on each side of machine.



M22,6005G,11 -19-29OCT86

7. Attach locking pliers or similar device to tie rod and sector gear assembly.

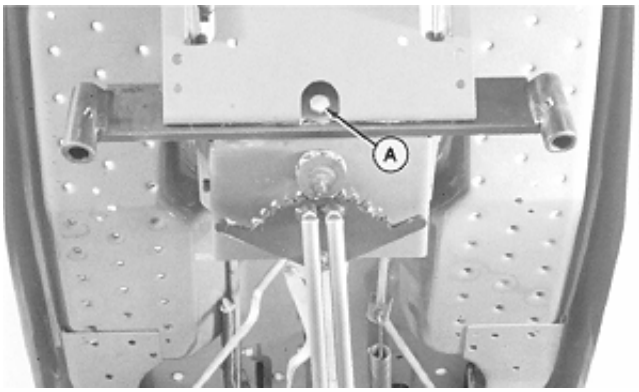
8. Remove steering wheel and lower steering system to gain clearance for removal of axle.



M22,6005G,G -19-14JUN88

9. Remove cap screw (A).

10. Remove axle from machine.

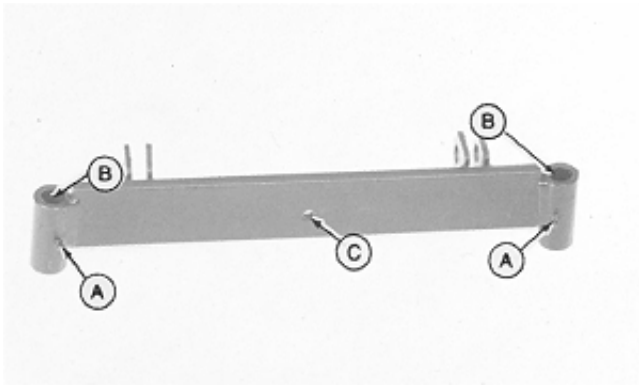


M22,6005G,H -19-14JUN88

11. Inspect axle for cracks, bending or excessive wear. Repair or replace as required.

12. Inspect grease fittings (A) for damage. Replace if necessary.

13. Inspect axle bearings (B) and pivot bolt hole (C) for out-of-round condition. Replace axle if necessary.



M22,6005G,I -19-14JUN88

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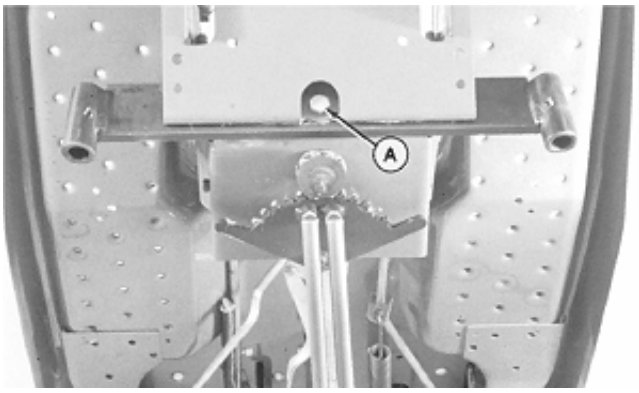
05
6

INSTALL FRONT AXLE

1. Coat axle and axle slot in frame with multipurpose grease.

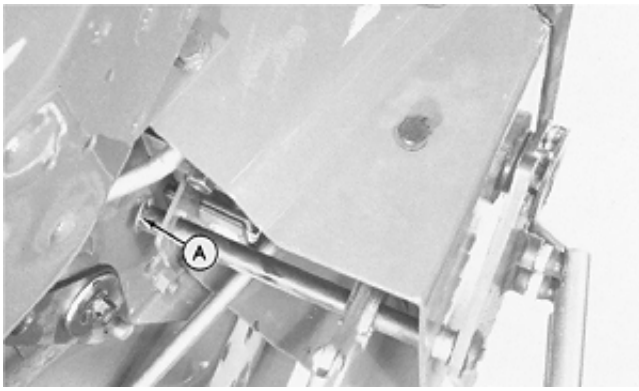
2. Install axle into slot and secure with cap screw (A).



M22,6005G,15 -19-29OCT86

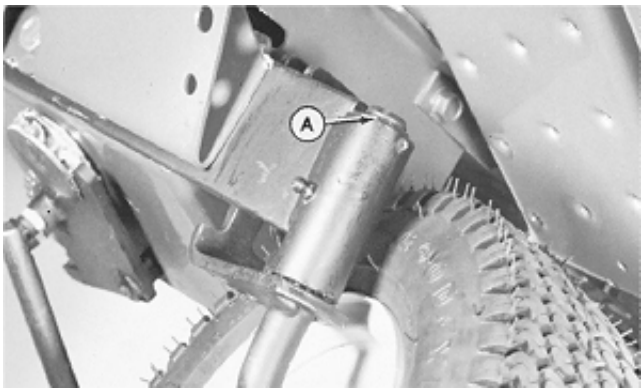
3. Move steering system back into place. Check for proper orientation of pin hole in steering shaft. It should be perpendicular to steering column.

4. Install steering wheel.



M22,6005G,J -19-14JUN88

5. Install wheel and spindle on each side of machine. Secure each with a snap ring (A).



M22,6005G,K -19-14JUN88

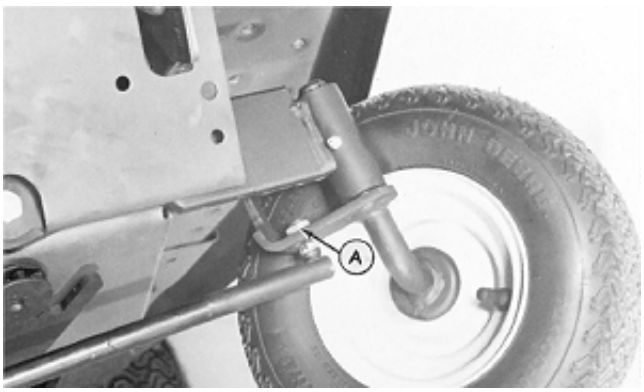
6. Attach tie rods to wheel spindles with nut (A).

7. Tighten nut 25—30 N·m (18.5—22 lb-ft).

8. Lower machine.

9. Install battery.

10. Install mower deck. See Section 80.



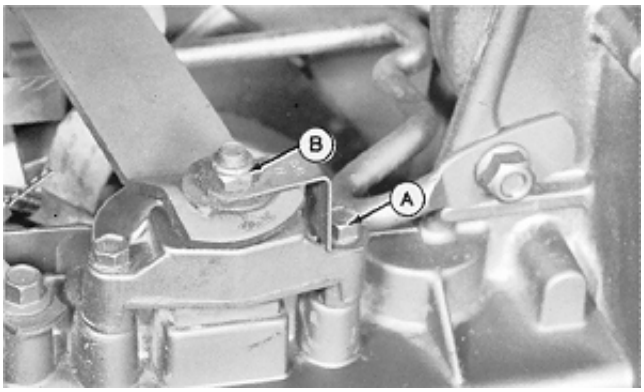
M22,6005G,L -19-01JUL88

REPAIR BRAKE

1. Remove cap screw (A).

2. Remove nut (B).

3. Remove brace, lever arm, and washer.

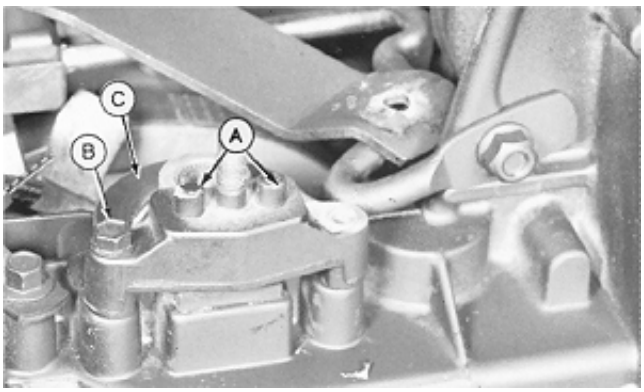


M22,6010G,1 -19-29OCT88

4. Remove dowel pins (A).

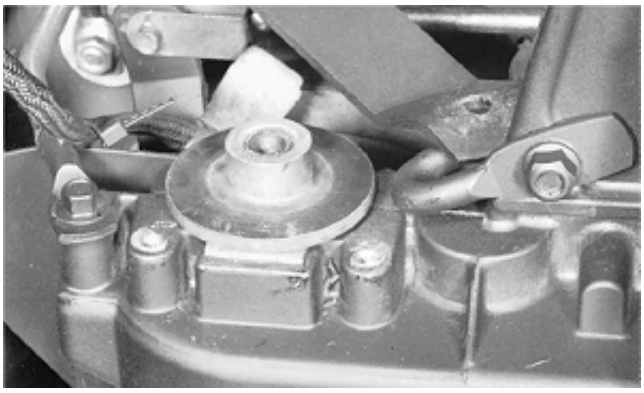
5. Remove cap screw (B).

6. Remove lock nut bracket (C) brake pad plate and brake pad.



M22,6010G,A -19-14JUN88

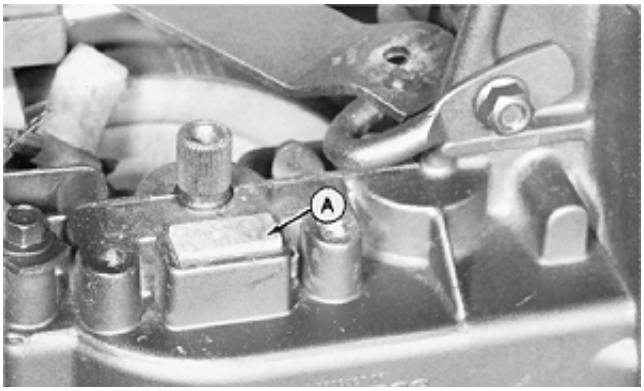
7. Remove brake disc.



M22,6010G,B -19-14JUN88

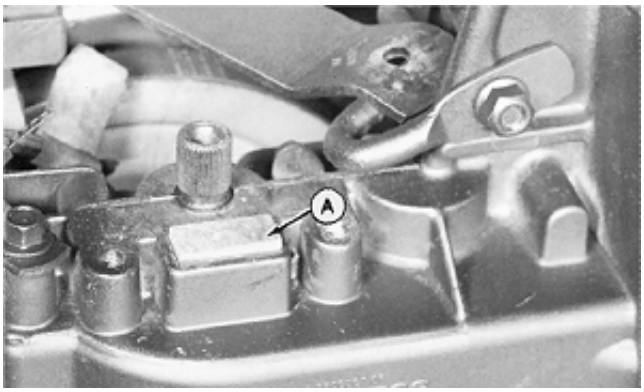
8. Remove brake pad (A).

9. Replace brake pads if they are thinner than 6 mm (1/4 in.).



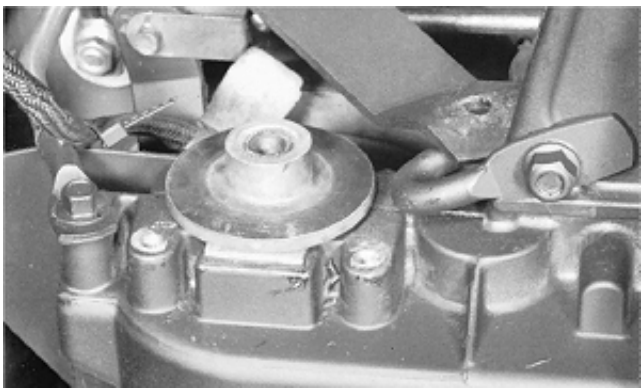
M22,6010G,C -19-14JUN88

10. Install new brake pad (A).



M22,6010G,5 -19-29OCT86

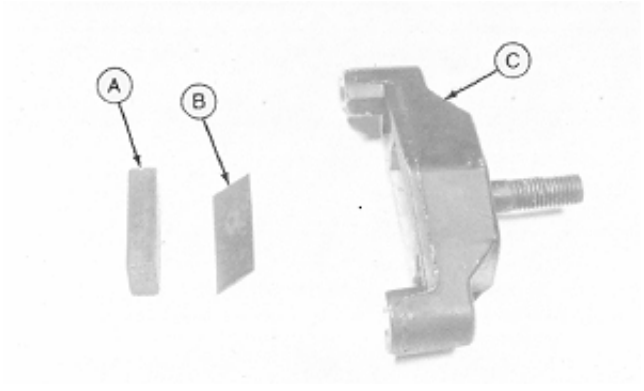
11. Coat shaft with LUBRIPLATE lubricant and install brake disc.



M22,6010G,6 -19-22DEC86

12. Install brake pad (A) and brake pad plate (B) into lock nut bracket (C).

13. Install on transaxle.

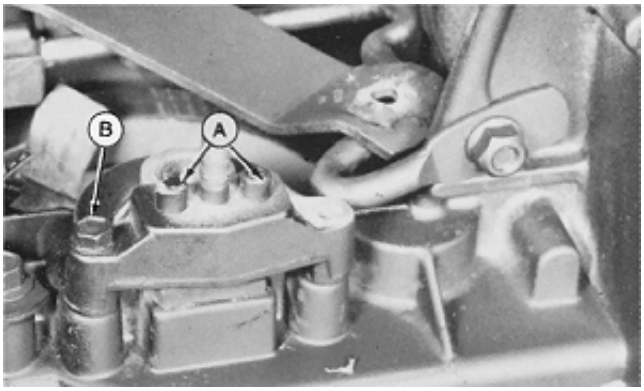


M22,6010G,D -19-14JUN88

14. Install cap screw (B).

15. Install dowel pins (A).

16. Coat dowel pin ends with LUBRIPLATE lubricant.



M22,6010G,E -19-14JUN88

17. Install lever arm.

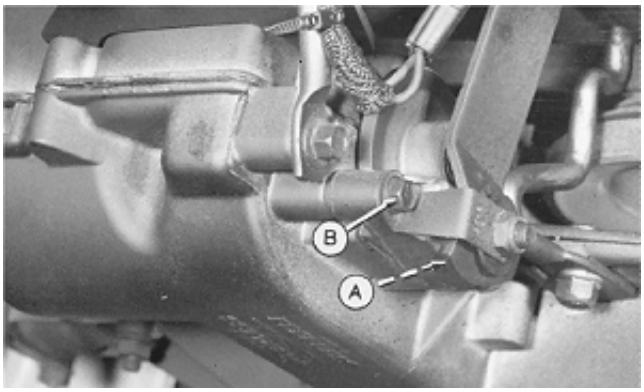
18. Coat area where washer contacts lever arm with LUBRIPLATE lubricant.

19. Install washer and brace.

20. Install cap screw (A).

21. Tighten cap screws (A) and (B) to 10 N·m (95 lb-in.).

22. Install nut over lever arm.

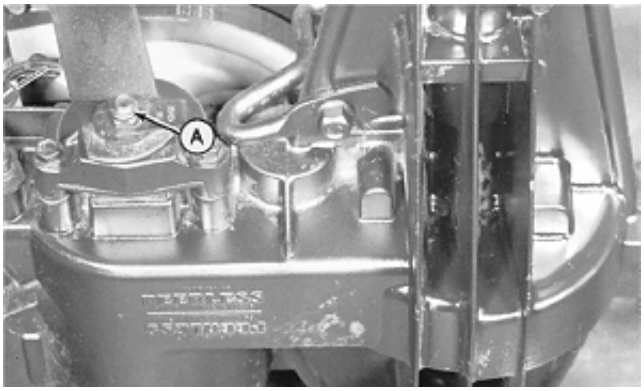


-UN-08JAN90
M48162

M22,6010G,F -19-14JUN88

ADJUST BRAKE

Turn brake lock nut (A) until there is 19 mm (3/4 in.) of free travel measured at the pad on the brake pedal.



-UN-20DEC89
M49112

M22,6010G,G -19-14JUN88

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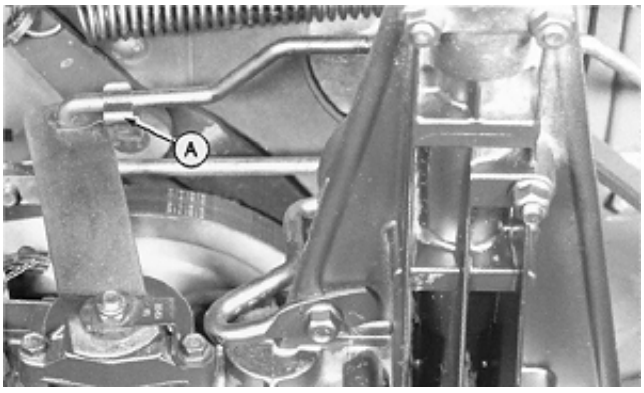
10
3

REMOVE AND DISASSEMBLE BRAKE LINKAGE

1. Remove clip (A) and separate linkage from brake.

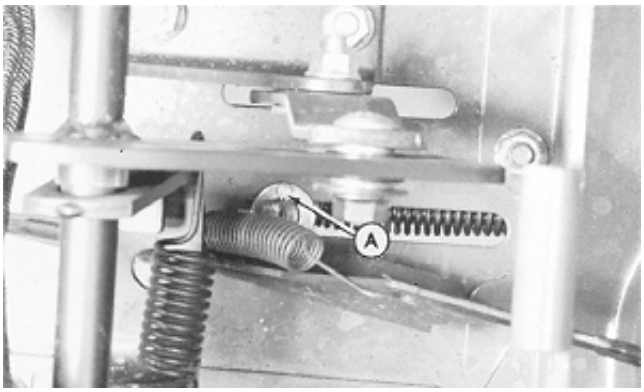


-UN-20DEC89
M49088

M22,6010G,H -19-14JUN88

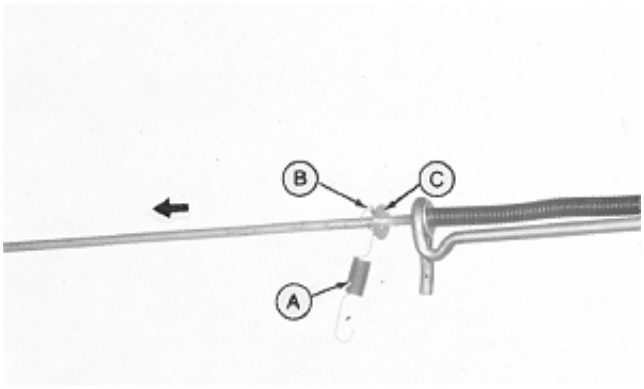
2. Remove cotter pin (A) and lower linkage through slot in frame.

3. Disconnect linkage from brake pedal. Remove linkage from machine.



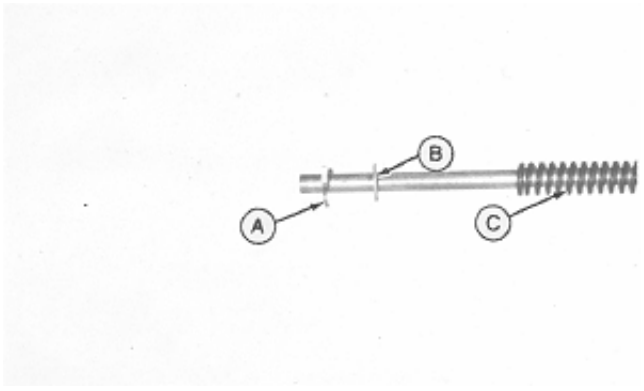
M22,6010G,11 -19-29OCT86

4. Pull rear brake rod in direction indicated and remove spring (A) cotter pin (B) and washer (C).



M22,6010G,I -19-14JUN88

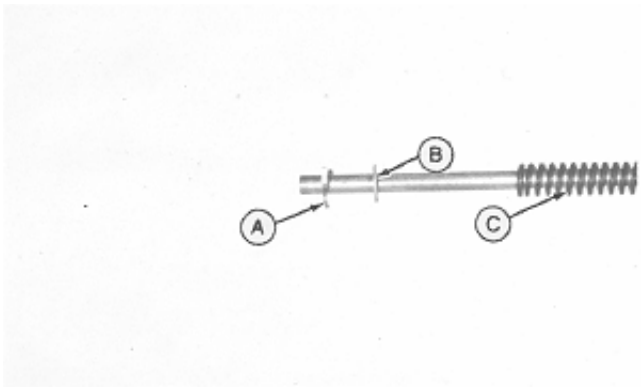
5. Remove cotter pin (A), washer (B) and brake spring (C).



M22,6010G,J -19-14JUN88

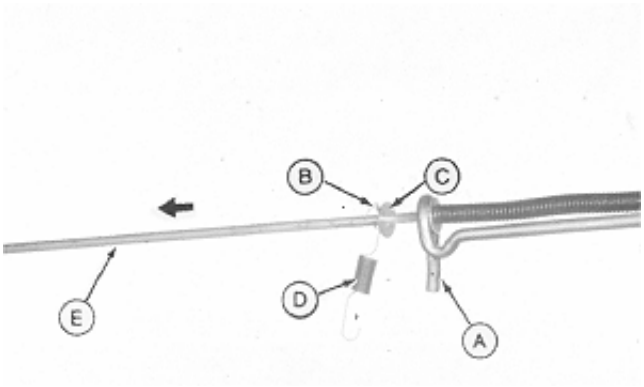
ASSEMBLE AND INSTALL BRAKE LINKAGE

1. Install brake spring (C), washer (B), and cotter pin (A) on rear brake rod.



M22,6010G,K -19-14JUN88

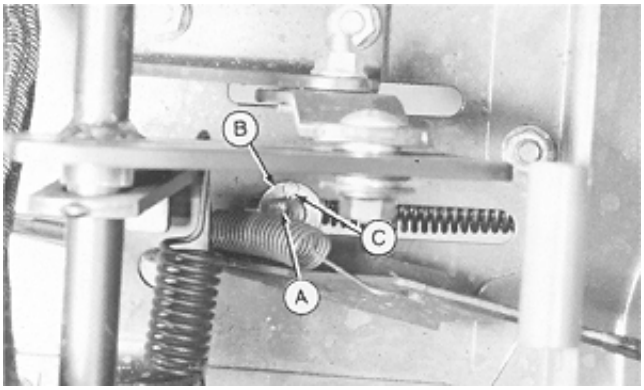
2. Install front brake rod (A), washer (C), and cotter pin (B) on rear brake rod (E). Hook spring (D) through cotter pin.



M22,6010G,L -19-14JUN88

3. Install front brake rod in brake pedal.

4. Slip front brake rod (A) through slot in frame. Install washer (B) and cotter pin (C).

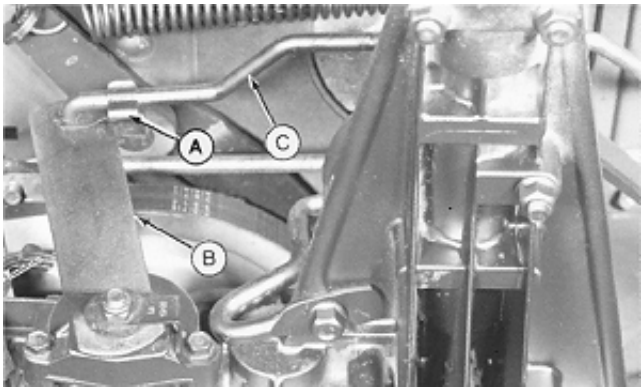


M22,6010G,M -19-14JUN88

5. Install clip (A) on brake lever (B).

6. Install rear brake rod (C) through brake lever and clip.

7. Adjust brake. See this section.



M22,6010G,N -19-14JUN88

Section 80
MISCELLANEOUS REPAIR

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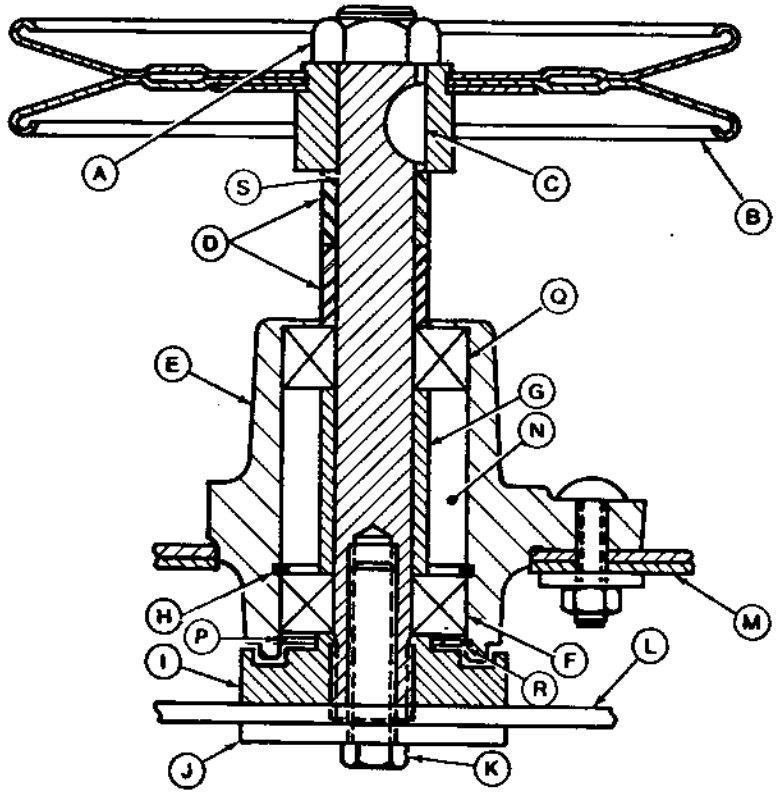
SERVICE EQUIPMENT AND TOOLS

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.

Name	Use
13-Ton Puller Set	To service bearings
Bushing, Bearing, and Seal Driver Set	To service bearings and seal

M45,8010A,1 -19-19OCT85

SERVICE SPINDLE—26 AND 30 INCH MOWER



M48166 -UN-31AUG88

80 05 2

A—Nut
B—Sheave
C—Key
D—Spacer (2 used)
E—Housing
F—Ball Bearing (Lower)
G—Spacer
H—Snap Ring (Upper)
I—Blade Hub
J—Washer
K—Cap Screw
L—Blade
M—Plate
N—Grease Area
P—Snap Ring
Q—Ball Bearing (Upper)
R—Grease Area
S—Spindle Shaft

M22,8005G,A -19-14JUN88

DISASSEMBLE SPINDLE

1. Remove cap screw (K), washer (J), and blade (L) from spindle shaft (S).

2. Remove nut (A), sheave (B), key (C), and spacers (D) from spindle shaft (S).

3. Press spindle shaft (S) down through housing (E).

4. Remove snap ring (P). Press on inner and outer races of bearing (Q) to remove bearing (F) and spacer (G).

5. Turn housing over and press out bearing (Q). Press on outer race to prevent bearing damage.

6. Remove blade hub (I) from spindle shaft (S).

7. Inspect all parts for damage or wear, replace as needed.

M22,8005G,B -19-14JUN88

ASSEMBLE SPINDLE

1. Position bearing (F) in housing (E). Make sure land riding seal of bearing is away from housing. Press bearing against snap ring (H). Press on outer race to prevent bearing damage.

2. Put spacer (G) into position. Fill area (N) around spacer 50 to 60 percent full of John Deere multipurpose grease or equivalent.

3. Support bearing (F) at inner race and place bearing (Q) into position on housing (E). Make sure land riding seal of bearing is away from housing. Press bearing (Q) against spacer (G).

4. Install snap ring (P). Fill area (R) around snap ring 50 to 60 percent full of John Deere multipurpose grease or equivalent.

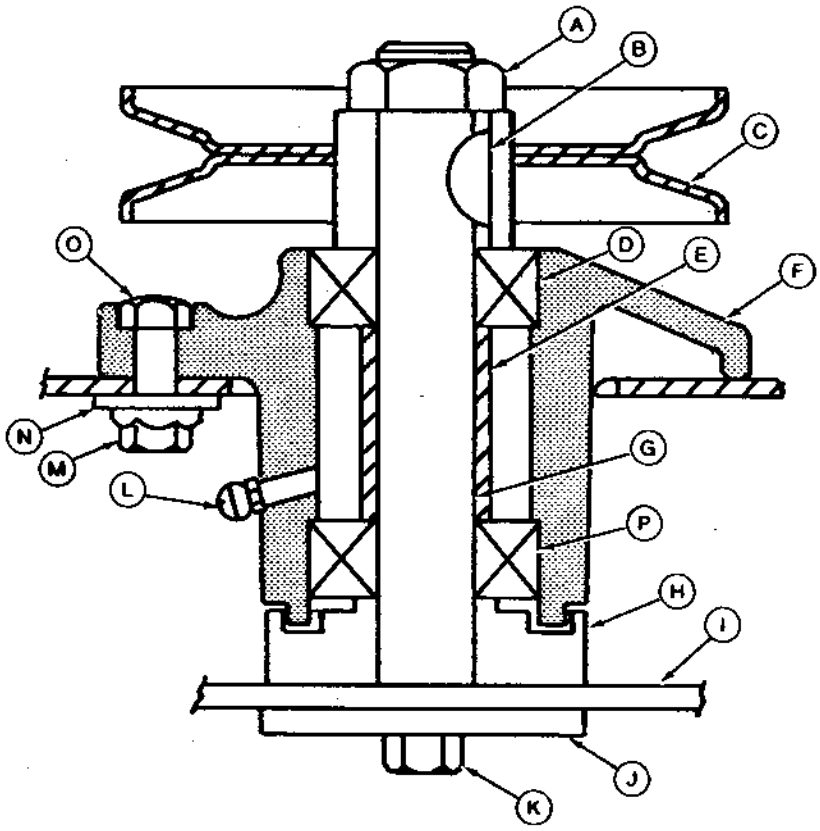
5. Clean threads on spindle shaft (S) and hub (I) using clean and cure primer. Apply thread lock and sealer (medium strength) on threads. Install hub on shaft. Tighten to 140 N·m (103 lb-ft).

6. Support inner race of bearing (Q) press spindle shaft (S) into hub (E).

7. Install spacers (D), key (C), sheave (B), and nut (A) on spindle shaft (S). Tighten to 140 N·m (103 lb-ft).

M22,8005G,C -19-01JUL88

SERVICE SPINDLE—38-INCH MOWER



M48167 -UN-31AUG88

A—Lock Nut
B—Key
C—Sheave
D—Bearing (Upper)
E—Spacer
F—Housing
G—Spindle Shaft
H—Hub
I—Blade
J—Washer
K—Cap Screw
L—Grease Fitting
M—Nut (4 used)
N—Washer (4 used)
O—Cap Screw (4 used)
P—Bearing (Lower)

M22,8005G,D -19-01JUL88

DISASSEMBLE SPINDLE

1. Remove cap screw (K), washer (J), and blade (I) from spindle shaft (G).

2. Remove lock nut (A), sheave (C), and key (B) from spindle shaft (G).

3. Press spindle shaft (G) down out of housing (F).

4. Tap bearing (P) out of housing (F) with a hammer and punch.

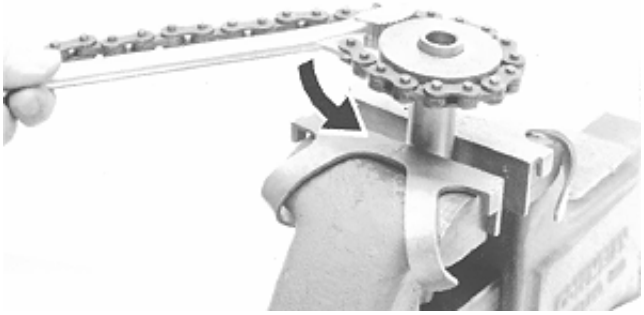
5. Remove spacer (E), turn housing (F) over and press bearing (D) out. Press on the outer race to prevent bearing damage.

6. Remove hub (H) from spindle shaft (G).

M22,8005G,E -19-14JUN88

ASSEMBLE SPINDLE—38-INCH MOWER

1. Clean threads on shaft and hub using clean and cure primer. Apply thread lock and sealer (medium strength) on threads. Install hub on shaft. Tighten hub to 140 N·m (103 lb-ft).



M37339 -UN-08JUL91

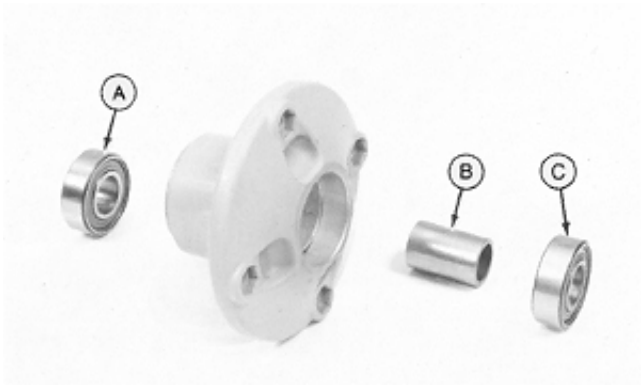
M22,8005G,F -19-01JUL88

IMPORTANT: To prevent bearing damage, press on outer race only (Steps 2 and 4).

2. Install bearing (C) to bottom of bore in top of housing.

3. Install spacer (B).

4. Install bearing (A) to bottom of bore in top of housing.



M46009 -UN-08JAN90

M22,8005G,G -19-14JUN88

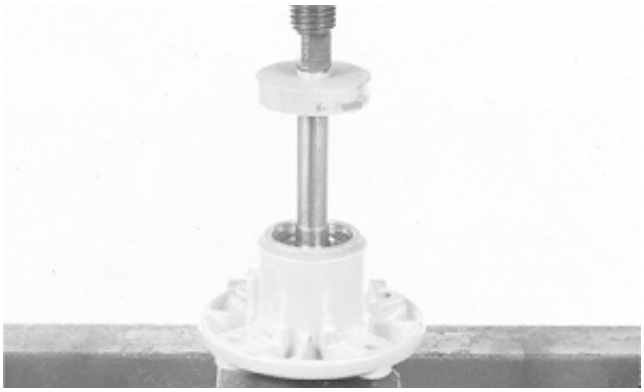
5. Align internal spacer with shaft. Press in shaft until it bottoms. Support inner race of lower bearing.

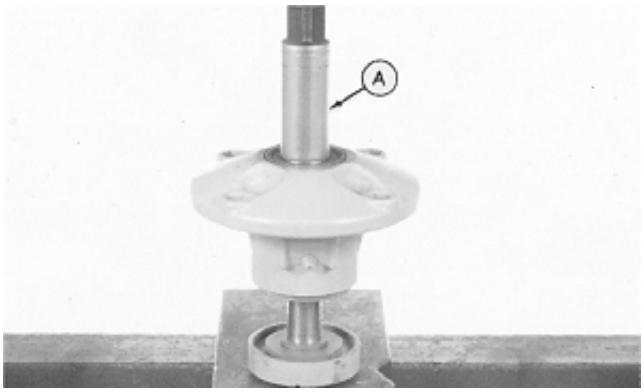
IMPORTANT: To prevent bearing damage, press only on inner race (Step 6).

6. Press housing onto shaft using a deep-well socket (A) or piece of pipe until shaft assembly bottoms on lower bearing.

7. Install key, sheave, and lock nut. Tighten lock nut to 140 N·m (103 lb-ft).

8. Fill spindle housing completely with John Deere multipurpose grease or equivalent.





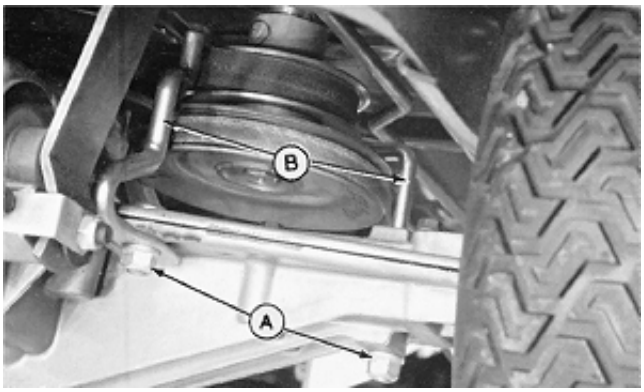
M22,8005G,H -19-01JUL88

80
05
6

REMOVE MOWER DECK

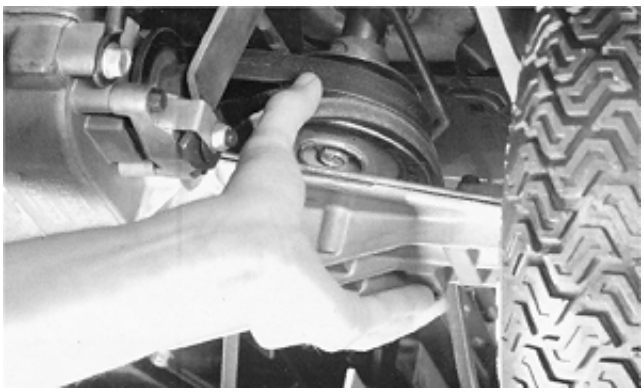
1. Disengage PTO.

2. Loosen nuts (A) and move belt guides (B) away from engine sheave.



M22,8010G,1 -19-05NOV86

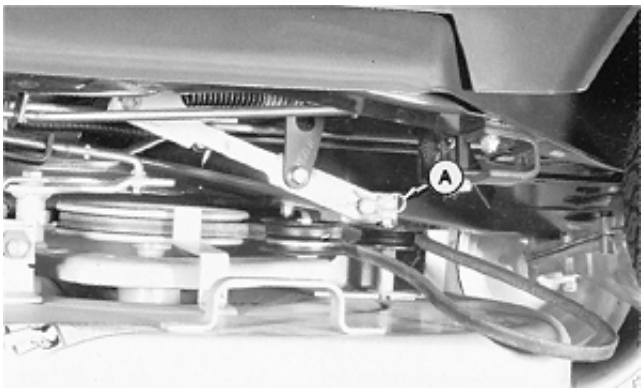
3. Remove mower belt from lower slot of engine sheave.



M22,8010G,2 -19-05NOV86

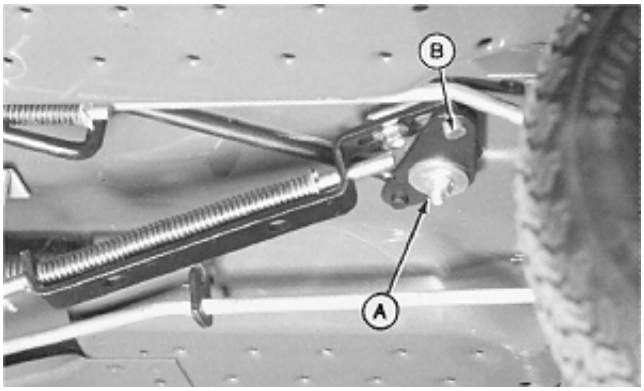
4. Loosen idler sheave nut. (26 and 30 in mowers.)

5. Remove spring locking pin (A) from rear draft link. Remove rear draft link from mower.



M22,8010G,A -19-01JUL88

6. Loosen nut (A) and remove PTO engagement rod (B).

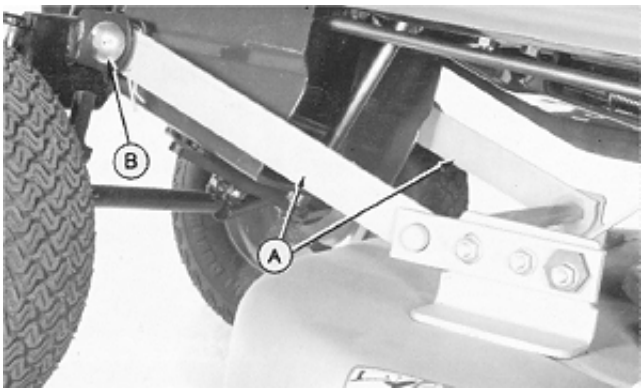


M22,8010G,4 -19-05NOV86

7. Remove front draft links (A) from frame by removing spring locking pins and drilled pins (B).

8. Turn wheels fully to the right.

9. Remove mower deck from under machine.



-UN-30AUG88
M40402

M22,8010G,5 -19-05NOV86

INSTALL MOWER DECK

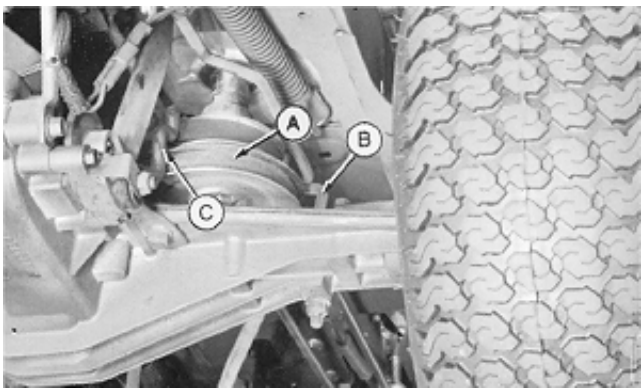
1. Slide mower deck under machine.

2. Install mower belt (A).

3. Set speed control lever in 7th to tension variator belt.

4. Install belt guide (B). Leave 1 mm (0.04 in.) clearance between guide and variator belt.

5. Install belt guide (C). Leave 2.0—4.0 mm (0.08—0.16 in.) clearance between guide and variator belt.



-UN-08JAN90
M48168

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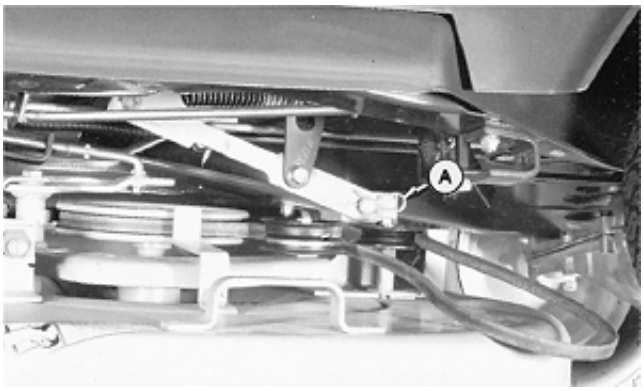
10
2

M22,8010G,B -19-14JUN88

4. Install rear draft link. Secure with spring locking pin (A).

5. Tighten idler nut.

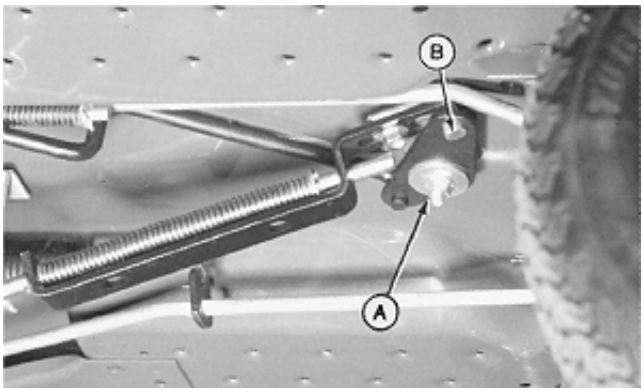


-UN-18JAN90
M40380

M22,8010G,C -19-14JUN88

6. Install PTO engagement rod (B).

7. Tighten nut (A).



M22,8010G,8 -19-05NOV86

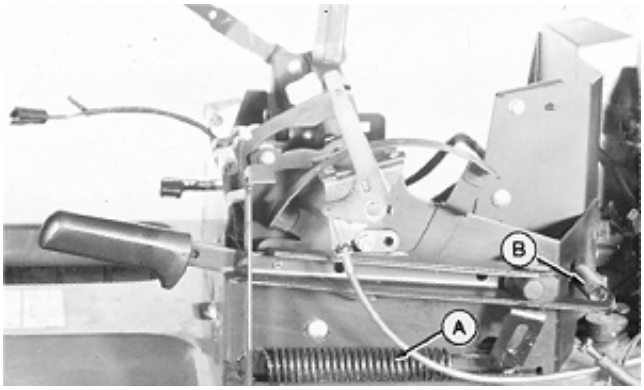
REMOVE MOWER LIFT LINKAGE

1. Remove mower deck.

2. Remove engine shroud. See Remove Engine Shroud this section.

3. Remove throttle lever. Remove battery on electric start models.

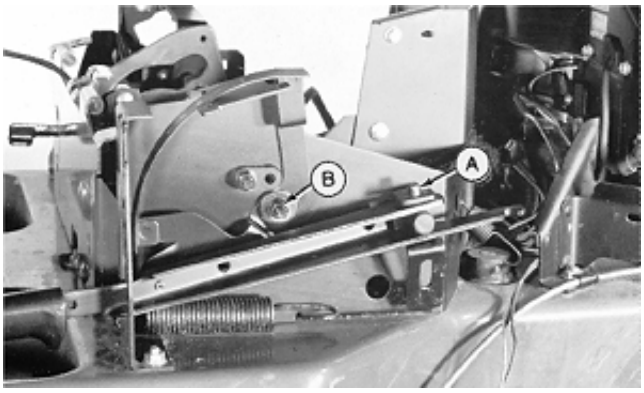
4. Remove springs (A) and (B).



M22,8010G,9 -19-02DEC86

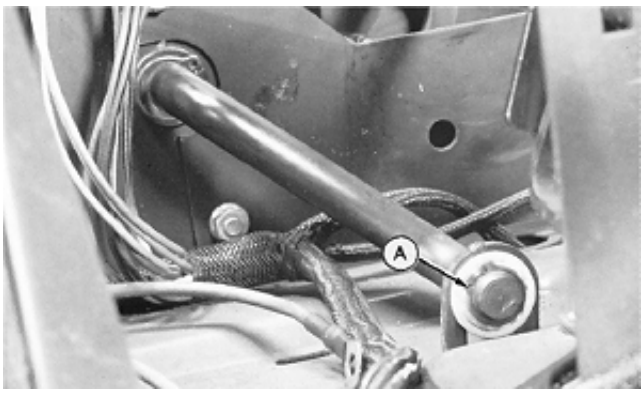
5. Drive out pin (A) and remove lever arm.

6. Remove nut (B) and remove cutting height indicator.



M22,8010G,10 -19-05NOV86

7. Remove snap ring (A) and remove shaft.

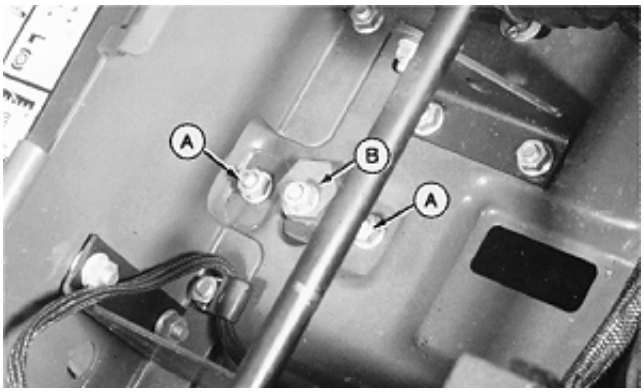


M22,8010G,D -19-14JUN88

8. Remove two nuts (A).

9. Remove eccentric nut adjuster (B) and remove mower deck lift arm.

10. Repair or replace parts as necessary.



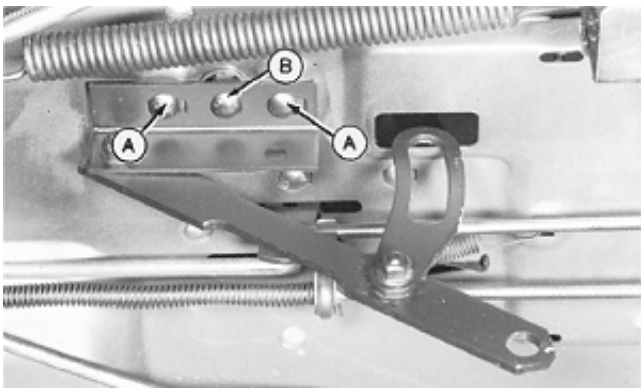
M49107 -UN-20DEC89

M22,8010G,12 -19-06NOV86

INSTALL MOWER LIFT LINKAGE

1. Install mower deck lift arm and secure with nuts on carriage bolts (A).

2. Install eccentric nut adjuster on center carriage bolt (B).



M49108 -UN-20DEC89

M22,8010G,13 -19-06NOV86

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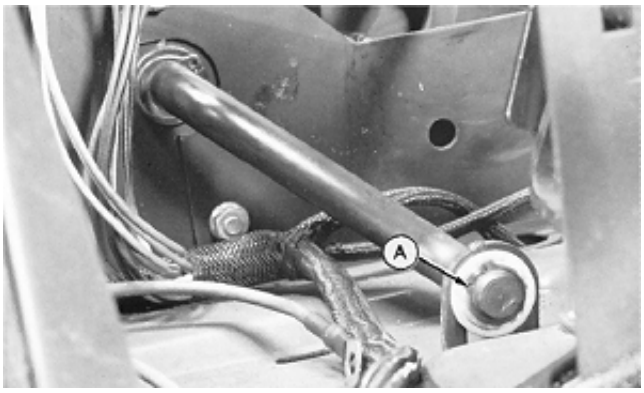
4

3. Install shaft through mower lift arm and secure with washer and snap ring (A).



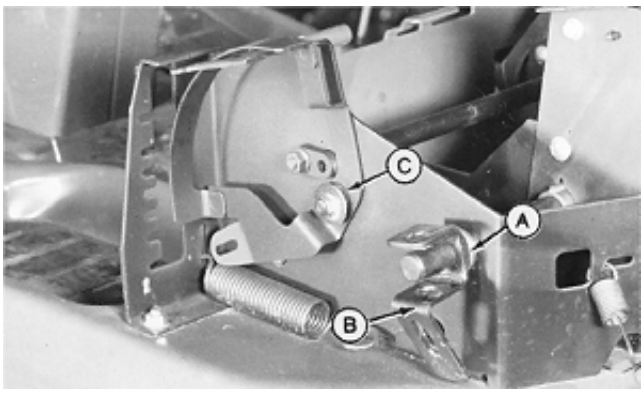
M49106 -UN-20DEC89

M22,8010G,E -19-14JUN88

4. Install bushing (A) and bracket (B).

5. Install bushing and wavy washer (C).

6. Install cutting height indicator.



M49109 -UN-20DEC89

M22,8010G,15 -19-06NOV86

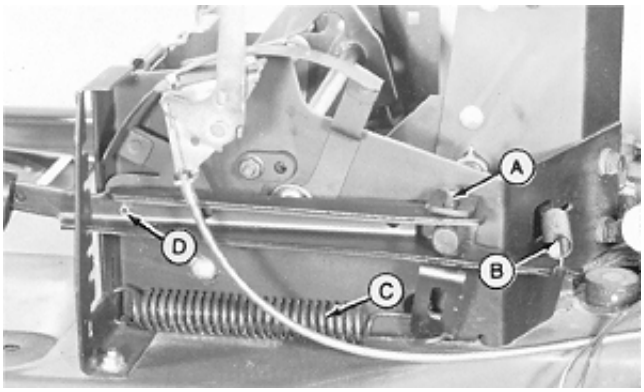
7. Install lever arm with pin (A).

8. Connect springs (B) and (C).

9. Check roll pin (D) for binding at all lever arm positions. If binding is present, tap lever arm inward to gain more clearance for roll pin.

10. Install throttle lever.

A—Pin
B—Spring
C—Spring
D—Roll Pin



-UN-20DEC89
M49110

M22,8010G,16 -19-06NOV86

11. Install battery.

12. Install engine shroud. See Install Engine Shroud this section.

13. Install and level mower deck.

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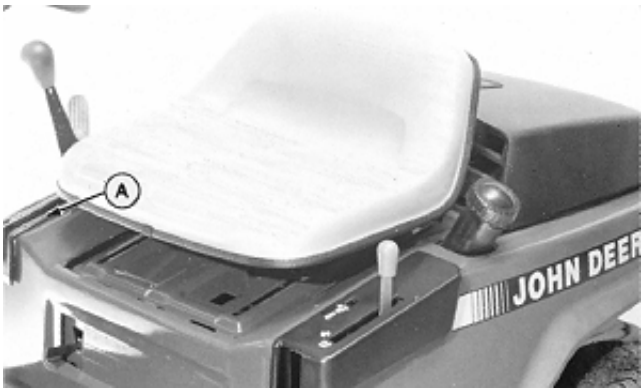
M22,8010G,17 -19-22DEC86

REMOVE ENGINE SHROUD

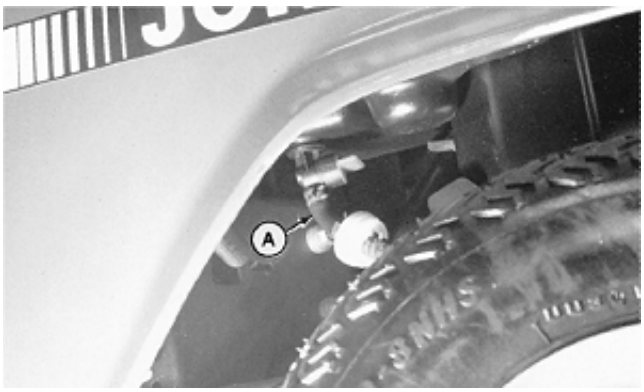
1. Remove engine cowl. (SX Series Riders)
2. Remove throttle, gearshift, and PTO lever knobs.
3. Remove quadrant (A).
4. Remove key switch nut.
5. Disconnect seat switch connector.



-UN-08JAN90
M49040

M22,8015G,A -19-14JUN88

6. Turn fuel shutoff valve OFF.
7. Disconnect line (A) from valve.



-UN-08JAN90
M49041

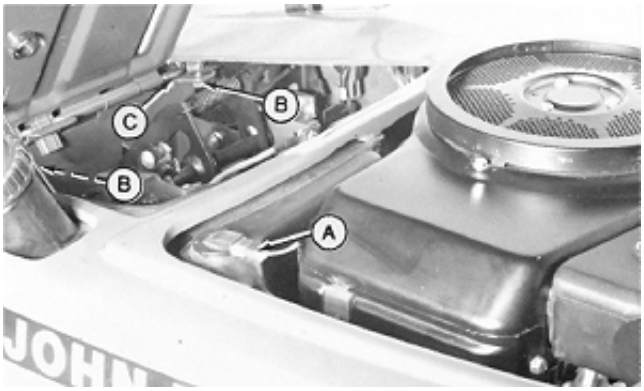
M22,8015G,2 -19-06NOV86

8. Remove two nuts (A) under rear of engine shroud.

-UN-20DEC89
M49065

M22,8015G,3 -19-06NOV86

9. If equipped, remove fuel sensor lead (A).
10. Remove nuts (B) from engine shroud.
11. Lift engine shroud until pin (C) can be removed. Remove pin, seat base and seat.
12. Remove engine shroud.



-UN-08JAN90
M49042

M22,8015G,4 -19-06NOV86

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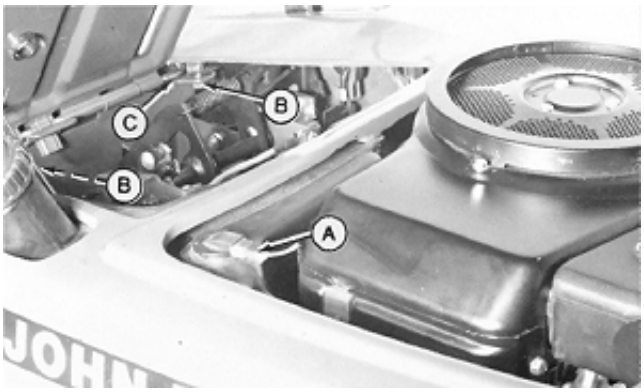
15
1

INSTALL ENGINE SHROUD

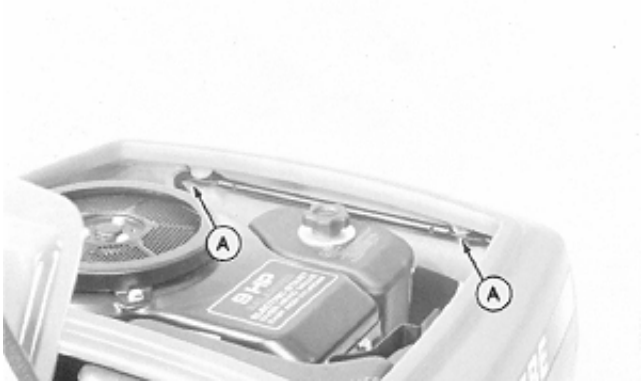
1. Guide engine shroud over gearshift and PTO levers.
2. Install seat base and seat with pin (C).
3. Install two nuts (B) at front of engine shroud.
4. Connect fuel sensor lead (A).



M49042 -UN-08JAN90

M22,8015G,5 -19-23DEC86

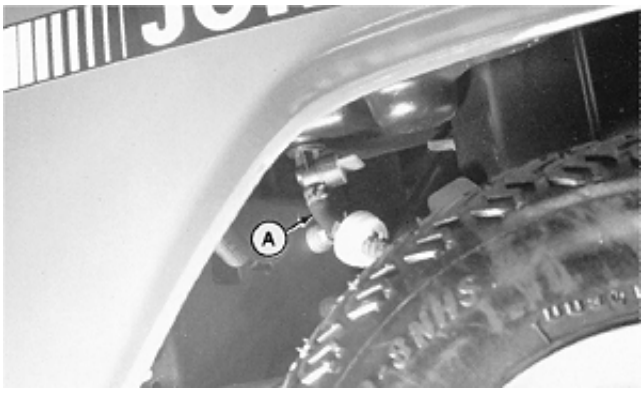
5. Install two nuts (A) at rear of engine shroud.



M49065 -UN-20DEC89

M22,8015G,6 -19-06NOV86

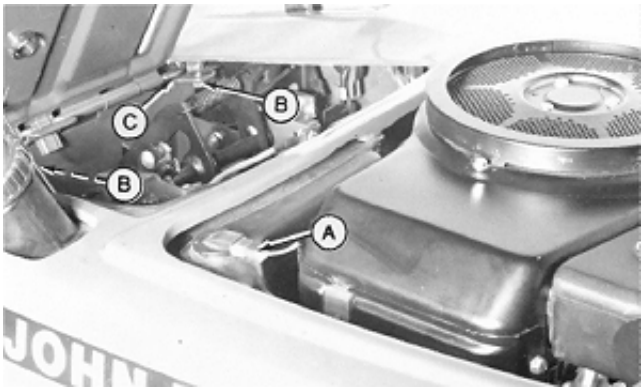
6. Connect fuel line (A) to valve.



M49041 -UN-08JAN90

M22,8015G,7 -19-22DEC86

7. Connect seat switch connector.
8. Fasten key switch with nut.
9. Install plate (A).
10. Install throttle, gearshift and PTO lever knobs.
11. Install engine cowl. (SX Series Riders)



M49042 -UN-08JAN90

M22,8015G,8 -19-02DEC86

SERVICE INFORMATION BULLETINS FOR RX/SX RIDERS

SIB-M88-30-1 Variator Performance, Riding Mowers
RX73 (-480550) RX95 (-477858)
RX75 (-485068) SX95 (-477244)
SX75 (-475998)

SIB-M88-30-2 Engine Backfire On Shutdown
SX95 Riding Mower (S/N -477570)
RX95 Riding Mower (S/N -478248)

SIB-M88-30-3 15 Amp Fuse Fails Repeatedly
RX75, RX95, SX75, RX95 Riding Mowers

SIB-M87-30-1 Loose Shifter Pivot Arm Hardware
RX73 (MORX73X420001-420121)
RX75 (MORX75X420001-424047)

SIB-M87-30-2 (Corrected)
RX/SX RM - Variator Belt Noise

SIB-M87-30-3 Variator Backshifting Under Load
All RX/SX Riding Mowers

SIB-M87-30-4 Bagger Chute Pulls Out Of Hopper Top
RX73, RX75, RX95 and SX75 Riding Mowers

SIB-M87-30-5 Kawasaki Engine Surge Riding Mowers
RX73 (MORX73X420001-)
RX75 (MORX75X420001-)
RX95 (MORX95X420001-)
SX75 (MOSX75X420001-)
SX95 (MOSX95X420001-)

SIB-M87-30-6 Low Fuel Light Stays On
SX75 and SX95 Riding Mowers

SIB-M87-30-7 Mower Drive Belt Jumps Or Fails
RX73, RX75, RX95, SX75 and SX95 Riding Mowers

SIB-M87-30-8 Engine Stops When Hot
RX75 (MORX75X441681-477878) SX75 (MOSX75X475569-475690)

SIB-M87-30-10 BM16570 Grass Bagger Chute Does Not Fit
RX63 Riding Mower

SIB-M87-80-1 Grass Bagger Mounting Bracket For RX/SX Series Riders

BLANK1 -19-02DEC86

Section 210
SPECIFICATIONS AND OPERATIONAL CHECKOUT

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Manual Steering Check 210-05-5

ENGINES

Full throttle (no-load)	3350 ± 100 rpm
Idle speed (no-load)	1400 ± 100 rpm
Crankcase vacuum	
6 hp model	200 mm (7.8 in.)
9 hp model	70 mm (2.8 in.)
12.5 hp model	250 mm (9.8 in.)
Cylinder compression	
6 hp model	415 kPa (60 psi)
9 hp models	490 kPa (71 psi)
12.5 hp models	380 kPa (55 psi)
Fuel pump pressure (12.5 hp models only)	6 kPa (0.9 psi)
Fuel pump flow (12.5 hp models only)	80 mL/15 sec. at 3000 rpm
Oil pressure (12.5 hp models only)	240 kPa (55 psi)

ELECTRICAL

Starter current draw (maximum)	150 amps
Starter no-load current draw (maximum)	
9 hp models	60 amps
12.5 hp models	50 amps
Charging system unregulated AC voltage (minimum) (at 3350 rpm)	24 VAC
Charging system current output (minimum) (at 3350 rpm)	3 amps
Ignition coil air gap	0.3 mm (0.12 in.)

BLANK2 -19-02DEC86

BEFORE YOU START

This operational checkout procedure is designed for you to perform a quick check of the machine in a step-by-step method.

We recommend you perform these checks of the entire machine. These checks refer you to a specific system on the machine for a more detailed step-by-step method of resolving machine problems. These procedures also provide you a method to evaluate trade-in equipment and perform an annual checkout.

A large majority of typical machine problems can be resolved using operational diagnostics with your sense of look, listen, and feel.

Perform these checks on a level surface. No special tools or equipment are required.

Begin with step one and read from left to right. Read the step completely before performing the check.

Do the entire procedure before continuing on to another section or correcting the indicated problem. Once the machine checkout is complete, turn to the appropriate sections in this manual.

M21,21006Q,1 -19-23DEC86

❶ **INDICATOR LIGHT CHECK FOR SX75 AND SX95 ONLY**	Move shift lever to neutral position. Move PTO lever to disengaged position. Turn key to RUN position.	 M49029 -UN-08JAN90	*LOOK: "READY START" light must come ON.* *NOTE: "READY START" lamp must go OFF when PTO is engaged or machine is shifted out of neutral.*	**OK:** GO TO ❷ **NOT OK:** GO TO SECTION 240.

M22,21005G,1 -19-30OCT86

❷ **TRANSMISSION NEUTRAL START CHECK** PTO disengaged. Electric start models: Operator on seat. Recoil start models: Operator off seat.	⚠ **CAUTION: Be aware that if neutral start circuit is defective, tractor will start and move forward.**	 M49038 -UN-08JAN90	Put shift lever in slow forward position. ELECTRIC START: Turn key to start position. *LISTEN: Engine must not crank.* RECOIL START: Turn key to run position and pull starter rope. *LISTEN: Engine must not start.*	**OK:** GO TO ❸ **NOT OK:** GO TO SECTION 240.

M22,21005G,2 -19-23DEC86

❸ PTO NEUTRAL START CHECK

Electric start models: Operator on seat.

Recoil start models: Operator off seat.

M49030 -UN-08JAN90

⚠ CAUTION: Be aware that if PTO neutral start circuit is defective, tractor will start and PTO will engage.

Put shift lever in neutral position.

Move PTO lever to ENGAGED position.

ELECTRIC START: Turn key to start position.

LISTEN: Engine must NOT crank.

RECOIL START: Turn key to run position and pull starter rope.

LISTEN: Engine must NOT start.

OK: GO TO ❹

NOT OK:
GO TO SECTION 240.

M22,21005G,3 -19-23DEC86

❹ STARTING CIRCUIT CHECK

Operator on seat.

Move shift lever to neutral position.

Move PTO lever to disengaged position.

M49031 -UN-08JAN90

ELECTRIC START: Turn key to start position.

LISTEN: Starter must crank engine. Engine must start and run (use choke as needed).

RECOIL START: Turn key to run position and pull starter rope.

LISTEN: Engine must start and run (use choke as needed).

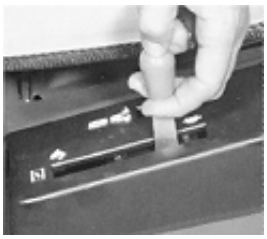
OK: GO TO ❺

NOT OK:
GO TO SECTION 240.

M22,21005G,4 -19-30OCT86

❻ THROTTLE AND CHOKE LEVER CHECK

Accelerate engine from slow to fast idle.



M49033 -UN-08JAN90

LOOK: Lever must contact stop at slow and fast positions.

LISTEN: Engine must accelerate smoothly without hesitation.

Run engine at half throttle.

Quickly move throttle lever to choke position, then back to half throttle.

LISTEN: Engine must falter, then resume speed.

OK: GO TO ❼

NO OK:
GO TO SECTION 220.

M22,21005G,5 -19-30OCT86

210
05
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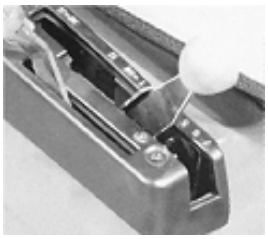
7 **PTO CHECK** Operator on seat.	Shift lever in neutral position. Run engine at half throttle.	 M49030 -UN-08JAN90	Engage PTO. *LISTEN: Mower blade(s) and engine running.* Disengage PTO. *LISTEN: Mower blade(s) must STOP: Engine must stay running.*	**OK:** GO TO **8** **NOT OK:** GO TO SECTION 250. M22,21005G,6 -19-30OCT86
8 **SEAT SWITCH CHECK FOR PTO CIRCUIT** Operator on seat. Move shift lever to neutral position. Run engine at half throttle.		 M49030 -UN-08JAN90	Move PTO lever to engaged position. Raise off seat 2-3 seconds. *LISTEN: Engine must STOP.*	
Restart engine and run at half throttle. Move PTO lever to engaged position. Quickly rise off seat and sit back down. *LISTEN: PTO must stay engaged. Engine may falter but must stay running.*				**OK:** GO TO **9** NO OK: GO TO SECTION 240. M22,21005G,7 -19-30OCT86
9 **SEAT SWITCH CHECK FOR IGNITION CIRCUIT** Operator on seat. PTO disengaged. Run engine at slow idle.		 M49038 -UN-08JAN90	Move shift lever to a slow forward position. Raise off seat 2-3 seconds. *LISTEN: Engine must STOP.*	
Restart engine. Move shift lever to slow forward position. Quickly rise off seat and sit back down. *LISTEN: Engine may falter but must stay running.*				**OK:** GO TO **10** **NOT OK:** GO TO SECTION 240. M22,21005G,8 -19-23DEC86

10 **PTO BRAKE CHECK** Operator on seat.	Shift lever in neutral. Run engine at half throttle. Move PTO lever to engaged position.	 M49034 -UN-08JAN90	After PTO is fully engaged, pull PTO lever back to disengaged position. *LISTEN: Mower blade(s) must stop within 7 seconds.*	**OK:** GO TO **11** **NOT OK:** GO TO SECTION 250. M22,21005G,9 -19-23DEC86
11 **TRANSMISSION FORWARD-REVERSE CHECK** Operator on seat.	Run engine at half throttle.	 M49035 -UN-08JAN90	Move shift lever to maximum forward speed, then back to neutral and into reverse. *FEEL: Machine must accelerate and decelerate smoothly from forward to reverse.*	**NOT OK:** **12** GO TO SECTION 250. M22,21005G,10 -19-30OCT86
12 **BRAKE PEDAL LOCK CHECK** Operator on seat. Run engine at half throttle.	 M49036 -UN-08JAN90		Depress brake pedal and engage pedal lock. Move shift lever full forward and reverse. *FEEL: Machine may creep somewhat but speed must not increase.*	**OK:** GO TO **13** **NOT OK:** See Adjust Brake, Section 60. M22,21005G,11 -19-23DEC86

13 **MANUAL STEERING CHECK**	Turn engine OFF.	M49037 -UN-08JAN90	Turn steering wheel full left and full right. *LOOK: Steering wheels must move freely from lock to lock.* *NOTE: Steering arms may not contact stops unless rider is moving.*	**OK:** PROCEDURE COMPLETE **NOT OK:** See Steering System Repair, Section 60. M22,21005G,12 -19-23DEC86

Section 220
ENGINE/FUEL SYSTEM OPERATION AND TESTS

Contents

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BEFORE YOU START

Always begin with this group to identify a failure in the engine system. The step-by-step procedures will provide you with a quick check of the system. No tools are required to perform these checks. If a failure is indicated, you will be referred to a more detailed check, adjustment, or test.

Always start with the first step and follow the sequence from left to right. Read each step completely before performing the check.

This procedure is designed as a quick check of the system. While performing the check, concentrate only on the check you are performing and disregard signals from unrelated components.

M22,22005G,1 -19-22DEC86

❶ ENGINE OIL LEAK CHECK

M48025 -UN-08JAN90

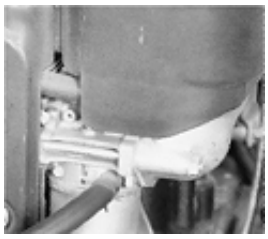
Inspect for external engine oil leakage from engine base gasket, dipstick tube, or drain plug.

OK: GO TO ❷

NOT OK:
Repair or replace, then...
GO TO ❷

M22,22005G,2 -19-23OCT86

❷ FUEL LEAK CHECK



M48026 -UN-08JAN90

Inspect for external fuel leakage from fuel tank, fuel pump, fuel filter, carburetor, fuel lines, and fittings.

OK: GO TO ❸

NOT OK:
Repair or replace, then...
GO TO ❸

M22,22005G,3 -19-23OCT86

❸ AIR CLEANER AND AIR INTAKE SCREEN CHECK

M43657 -UN-31AUG88

M43658 -UN-31AUG88

Inspect precleaner, filter element, and air intake screen for debris or plugged condition.

OK: GO TO ❹

NOT OK:
Clean or replace, then...
GO TO ❹

M22,22005G,4 -19-23OCT86

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1

4 THROTTLE LEVER CHECK	M48027 -UN-08JAN90	Move throttle lever from low idle position to high idler position. *LOOK: Throttle lever must contact stops in the dash at low and high idle positions.*	*FEEL: Throttle lever must move smoothly from low to high idle position with slight friction.*	**OK:** GO TO 5 **NOT OK:** GO TO 1 GROUP 10. M22,22005G,5 -19-23OCT86
5 ENGINE START CHECK Put transmission lever in neutral position.	Put PTO lever in OFF position. Move throttle lever to choke position. Depress brake pedal.	M48028 -UN-08JAN90	Turn key switch to START position. Starter must crank engine. Engine must start.	**OK:** GO TO 6 **NOT OK:** GO TO Engine/Fuel System Operating Tests GROUP 10. M22,22005G,6 -19-23OCT86
6 CHOKE LINKAGE CHECK	M48029 -UN-08JAN90	Run engine at half throttle. Quickly move throttle lever to choke position, then to run position.	*LISTEN: Engine must falter, then resume speed.*	**OK:** GO TO 7 **NOT OK:** GO TO 1 GROUP 10. M22,22005G,7 -19-23OCT86
7 ENGINE PERFORMANCE CHECK	M48027 -UN-08JAN90	Move throttle lever from slow idle to fast idle position. *LISTEN: Engine must accelerate smoothly, without hesitation.*	*LISTEN: Governor must hold engine at a constant rpm and not surge.* *LOOK: Exhaust gas must be clear.*	**OK:** GO TO 8 **NOT OK:** GO TO Engine/Fuel System Operating Tests GROUP 10. M22,22005G,8 -19-22DEC86
8 ENGINE LOAD PERFORMANCE CHECK	M48030 -UN-08JAN90	Engage PTO lever and run at fast idle. Mow tall grass, if possible, to load engine. *LISTEN: Governor must hold constant engine rpm under varying load conditions.*	*LOOK: Exhaust gas must be clear.* *LISTEN: Engine must not make any abnormal sounds or backfire. Engine must not hesitate or stumble.*	**OK:** System normal. **NOT OK:** GO TO Engine/Fuel System Operating Tests GROUP 10. M22,22005G,9 -19-02DEC86
9 OPERATOR COMPLAINT NOT IDENTIFIED	If you completed the checkout procedure and did not isolate a malfunction, the problem may be intermittent. Try to duplicate the conditions of the malfunction identified by the operator.		REPEAT THE ENGINE SYSTEM CHECKOUT PROCEDURE IN THIS GROUP. IF MALFUNCTION IS NOT IDENTIFIED AFTER REPEATING THE CHECKOUT PROCEDURE: FACTORY ASSISTANCE IS AVAILABLE THROUGH THE DEALER TECHNICAL ASSISTANCE CENTER (DTAC). M22,22005G,10 -19-23OCT86	

220 05 2

BEFORE YOU START

Always perform the system checkout procedure in Group 05 BEFORE making any tests or adjustments in this group. The step-by-step procedures in this group provide you with the detailed diagnostic information you will need to isolate a malfunction. Basic diagnostic equipment is used.

It is assumed that you are familiar with the machine and its engine and fuel system components.

Engine rpm and temperature are critical in most engine tests. Be sure to follow test specifications carefully.

Fuel can have a great effect on engine performance. Make sure the correct fuel is used. And that it is fresh, clean, and, if possible, without alcohol.

Always start with the first step and follow the sequence from left to right. Read each step completely before performing the tests.

Upon completing a test or adjustment, check to see whether the problem is corrected by performing the checkout procedure in Group 05.

BLANK3 -19-23OCT86

ENGINE/FUEL SYSTEM OPERATING TESTS	If engine/fuel system do not operate properly, select the appropriate symptom. If engine will not crank, see Section 240.	Engine will not start: GO TO Ⓐ Engine will not stay running: GO TO Ⓑ Engine surges only at low idle: GO TO Ⓒ Engine surges only at high idle: GO TO Ⓓ Engine surges under load or all conditions: GO TO Ⓔ Engine low idle rpm incorrect: GO TO Ⓕ Engine high idle rpm incorrect: GO TO Ⓖ	Engine low on power: GO TO Ⓗ Engine has black smoke coming from muffler, misfires in turns or over bumps, or fouls spark plugs rapidly: GO TO Ⓙ Engine backfires at shut-down or start-up: GO TO Ⓚ Engine starts hard when cold: GO TO Ⓛ Engine starts hard when hot: GO TO Ⓜ

BLANK4 -19-23OCT86

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A **Engine Will Not Start**	Check for spark-GO TO Section 240. Check for fuel in tank. Check fuel supply: GO TO 9 Check fuel shut-off valve. Check for plugged fuel filter. Check for pinched or collapsed fuel line. Check throttle cable and choke adjustment: GO TO 1 Check fuel pump (RX95/SX95 only): GO TO 7 Check carburetor: GO TO CTM-5. Check cylinder compression: GO TO 5

BLANK5 -19-23OCT86

B **Engine Will Not Stay Running**	Check vent in fuel tank cap. Check fuel shut-off valve. Check for restricted fuel filter. Check for restricted fuel line. Check fuel pump (RX95/SX95 only):	GO TO 7 Check low idle speed and mixture adjustments: GO TO 4 Check carburetor: GO TO CTM-5.

BLANK6 -19-23OCT86

C **Engine Surges Only At Low Idle**	Check low idle speed and mixture adjustments: GO TO 4 Check for air leak in manifold between carburetor and engine: GO TO CTM-5. Check carburetor: GO TO CTM-5.

BLANK7 -19-23OCT86

D **Engine Surges Only At High Idle**	Check low idle speed and mixture adjustments: GO TO 4 Check air filter and precleaner: GO TO CTM-5. Check cylinder and head under fan shroud for blockage: GO TO SIB-M87-30-5. Check carburetor: GO TO CTM-5.

BLANK8 -19-23OCT86

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2

E **Engine Surges Under Load Or Under All Conditions**	Check vent in fuel tank cap. Check for restricted fuel line. Check for restricted fuel filter. Check fuel pump (RX95/SX95 only): GO TO 7	Check low idle speed and mixture adjustments: GO TO 4 Check carburetor: GO TO CTM-5.

BLANK9 -19-23OCT86

F **Engine Low Idle Incorrect**	Check low idle speed and mixture adjustments: GO TO 4 Check throttle cable and choke adjustment: GO TO 1 Check carburetor: GO TO CTM-5. BLANK10 -19-23OCT86

G **Engine High Idle Incorrect**	Check throttle cable and choke adjustment: GO TO 1 Check governor linkage adjustment: GO TO 2 Check fast idle speed adjustment: GO TO 3 Check internal governor components: GO TO CTM-5. BLANK11 -19-23OCT86

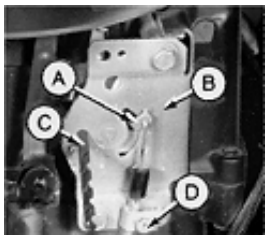
H **Engine Low On Power**	Check throttle cable and choke adjustment: GO TO 1 Check fast idle speed adjustment: GO TO 3 Check low idle speed and mixture adjustments: GO TO 4 Check carburetor: GO TO CTM-5. Check for binding in traction and PTO drives: GO TO Section 50. Check cylinder compression: GO TO 5 Check crankcase vacuum: GO TO 6 Check ignition system: GO TO	Section 240. Check internal components of engine: GO TO CTM-5. BLANK12 -19-23OCT86

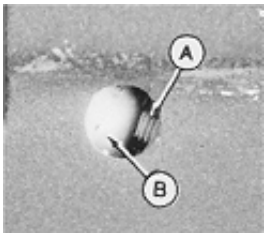
J **Engine Has Black Smoke Coming From Muffler, Misfires In Turns Or Over Bump, Or Fouls Spark Plugs Rapidly**	Check throttle cable and choke adjustment: GO TO 1 Check low idle speed and mixture adjustments: GO TO 4 Check for restricted air cleaner housing inlet. Check carburetor: GO TO CTM-5. BLANK13 -19-23OCT86

K **Engine Backfires At Shut-down Or Start-up**	Check low idle speed and mixture adjustments: GO TO 4 Check fuel supply: GO TO 9 Check throttle cable and choke adjustment: GO TO 1 Check for air leaks between carburetor and engine: GO TO CTM-5. Check carburetor: GO TO CTM-5. Check for air leaks between engine and muffler. (RX95 SN -478247/SX95 SN -477499) install anti-backfire solenoid kit: GO TO MPC 2106. BLANK14 -19-23OCT86

L **Engine Starts Hard When Cold**	Check throttle cable and choke adjustment: GO TO 1 Check fuel pump (RX95/SX95 only): GO TO 7 Check carburetor: GO TO CTM-5. Check cylinder compression: GO TO 5 BLANK15 -19-23OCT86

M **Engine Starts Hard When Hot**	Check fuel supply: GO TO 9 Check fuel line routing: GO TO SIB-M87-30-8. Check low idle speed and mixture adjustments: GO TO 4 Check fuel pump (RX95/SX95 only):	GO TO 7 Check carburetor: GO TO CTM-5. Check cylinder compression: GO TO 5 BLANK16 -19-23OCT86

1 **THROTTLE CABLE AND CHOKE ADJUSTMENT** *NOTE: Adjust throttle cable before adjusting choke linkage.* Move throttle lever on dash to fast idle position.	 M48035 -UN-08JAN90	Loosen clamp (D). Align hole in throttle control lever (A) with hole in control plate (B). Install a 15/64 in. drill bit (C) through holes to keep throttle control lever from moving. Pull throttle cable tight. Tighten clamp (D). Check choke plate and linkage for free movement.	Leave drill bit in control lever and plate. Adjust choke. BLANK17 -19-23OCT86



M49262 -UN-20DEC89

Turn screw (A) counterclockwise until screw does not contact choke control lever (B).

Turn screw (A) clockwise until it just contacts choke control lever (B).

Remove drill from control lever and plate.

Move throttle lever on dash to choke position, choke plate should be closed completely.

Move throttle lever on dash to fast idle position, choke plate should be open completely.

Readjust if necessary.

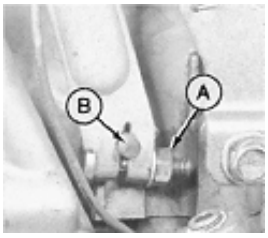
RETURN TO: Engine/Fuel System Operating Tests.

BLANK18 -19-23OCT86

❷ GOVERNOR LINKAGE ADJUSTMENT

NOTE: Adjust throttle cable and choke before adjusting governor linkage.

Move throttle lever on dash to fast idle position.



M43662 -UN-12JAN90

Loosen nut (A). Turn governor shaft (B) clockwise until governor shaft stops. Tighten nut.

Move throttle lever to be sure linkage is not binding.

RETURN TO: Engine/Fuel System Operating Tests.

M22,22010G,3 -19-02DEC86

❸ FAST IDLE SPEED ADJUSTMENT

NOTE: Adjust governor linkage before adjusting fast idle speed.

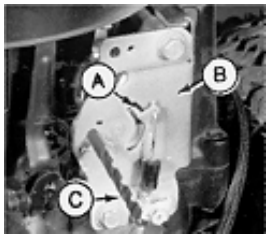
Move transmission shift lever to neutral position.

Depress brake pedal.

M48027 -UN-08JAN90

Start and run engine for 10 minutes.

Move throttle lever on dash to fast idle position.

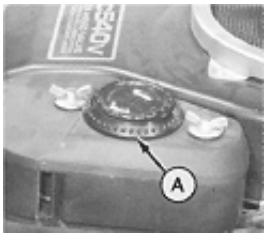


M48031 -UN-08JAN90

⚠ CAUTION: Engine will be HOT. Be careful not to burn hands.

Align hole in throttle control lever (A) with hole in control plate (B). Install a 15/64 in. drill bit (C) through holes.

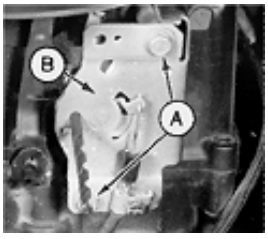
M22,22010G,4 -19-22DEC86



M43663 -UN-12JAN90

Check engine speed using JDM-71 Vibration Tachometer.

Put tachometer (A) on air cleaner. Set tachometer to read 3350 rpm.



M48041 -UN-08JAN90

Loosen cap screws (A).

Move control plate (B) left or right to adjust fast idle speed to 3350 ± 100 rpm.

GO TO ❶

Throttle cable and choke adjustment.

M22,22010G,5 -19-02DEC86

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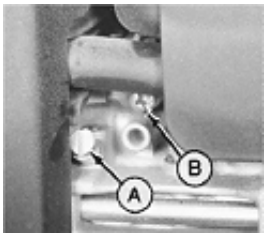
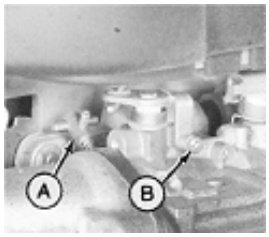
4 SLOW IDLE SPEED AND MIXTURE ADJUSTMENTS

IMPORTANT: Forcing the idle mixture screw tight will damage the needle and seat.



M43665 -UN-12JAN90

6 and 9 HP Models



M43666 -UN-12JAN90

12.5 HP Models

M22,22010G,6 -19-02DEC86

Turn idle mixture screw (A) clockwise until lightly seated, then counterclockwise 1-1/8 turns.

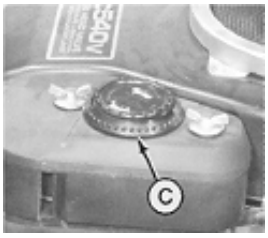
Move transmission shift lever to neutral position.

Depress brake pedal.

Start and run engine for 10 minutes.

Move throttle lever on dash to slow idle position.

⚠ CAUTION: Engine will be HOT. Be careful not to burn hands.



M43668 -UN-12JAN90

M22,22010G,7 -19-23OCT86

Check engine speed using JDM-71 Vibration Tachometer.

Put tachometer (C) on air cleaner. Set tachometer to read 1400 rpm on 9 and 12.5 HP. 1500 rpm on GHP.

Turn slow idle stop screw (B) until slow idle speed is 1350 to 1450 rpm on 9 and 12.5 HP or 1450 to 1550 on 6 HP.

Turn idle mixture screw clockwise until engine speed drops, then counterclockwise until engine speed increases and begins to drop again.

Adjust idle mixture screw for highest engine speed between drops, then turn screw out an additional 1/4 turn.

Turn slow idle stop screw to adjust slow idle to 1400 ± 100 rpm on 9 and 12.5 HP, 1500 rpm on GHP.

RETURN TO: Engine/Fuel System Operating Tests.

BLANK19 -19-23OCT86

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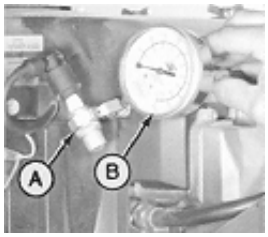
5 CYLINDER COMPRESSION TEST

Remove spark plug.

Connect spark plug wire to JDM-74A-5 Ignition Test Plug (A). (Electric start models only).

Install JDM-59 Compression Gauge.



M43669 -UN-31AUG88

Move throttle lever to fast idle position. Depress brake pedal.

On electric start models, turn key-switch to START position.

On manual start models, leave key switch off, pull recoil starter rope 3 or 4 times.

LOOK: Minimum compression for 9 hp models should be 490 kPa (71 psi). Minimum compression for 12.5 hp models should be 380 kPa (55 psi). Minimum compression for 6 hp model should be 415 kPa (60 psi).

OK: RETURN TO: Engine/Fuel System Operating Tests.

NOT OK: Continue.

BLANK20 -19-23OCT86

5A Compression Leakage Test

Remove compression gauge.

M43670 -UN-12JAN90

Put clean engine oil on piston rings through spark plug hole.

Repeat Step 5

COMPRESSION PRESSURE INCREASES: GO TO CTM-5. Check rings, piston and cylinder bore for broken rings, scoring, wear or damage. Replace as necessary.

COMPRESSION PRESSURE STILL LOW: GO TO CTM-5. Check for leaking intake or exhaust valves or cylinder head gasket. Replace as necessary.

M22,22010G,10 -19-02DEC86

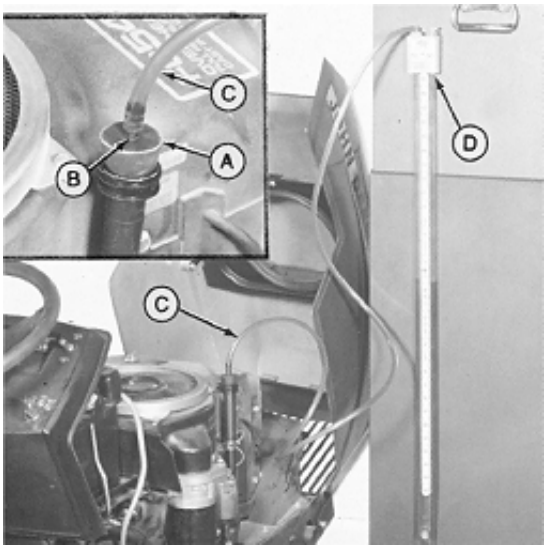
6 CRANKCASE VACUUM TEST

Remove dipstick.

Put plug (A) only in dipstick hole.

IMPORTANT: Do not hook up rest of test kit until engine is running or fluid in manometer will be sucked into crankcase.

Continued on next page



M43671 -UN-12JAN90

A—8741-F66 Plug
B—JT05703 Barb Fitting
C—JT05699 Line
D—JT05698 U-Tube Manometer

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ecord crankcas

MINIMUM VACUUM

6 hp . . . . . 200 mm (7.8 in.)
9 hp . . . . . 70 mm (2.8 in.)
12.5 hp . . . . . 250 mm (9.8 in.)

Remove Manometer line from plug before shutting off engine.

OK: Return to Engine/Fuel System Operating Tests.

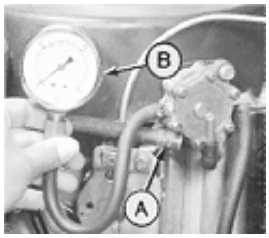
NOT OK: Vacuum Low: GO TO CTM-5 and inspect for: Damaged breather, excessive breather air gap, leaking fuel pump vacuum line, damaged dip stick seals, or leaking piston rings.

BLANK21 -19-23OCT86

7 FUEL PUMP PRESSURE AND FLOW TESTS

Start and run engine at slow idle for 5 minutes to fill carburetor with fuel.

Stop the engine.



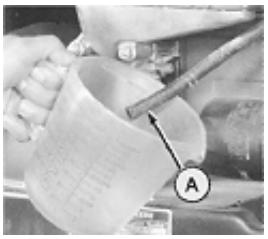
M43674 -UN-12JAN90

Disconnect and plug fuel pump outlet hose (A).

Connect JDG356 0-103 kPa (0-15 psi) Pressure Gauge (B) to fuel pump outlet.

Start and run engine at fast idle for 15 seconds. Record pressure reading and stop engine. Minimum pressure is 3.6 kPa (.5 psi).

BLANK22 -19-23OCT86



M43675 -UN-12JAN90

Disconnect fuel pump outlet hose (A) and place in a graduated container.

Start and run engine at fast idle for 15 seconds and then stop engine.

Minimum flow for 12.5 hp models is 90 mL/15 seconds (3 oz/15 seconds).

OK: RETURN TO: Engine/Fuel System Operating Tests.

NOT OK: GO TO Section 30, GROUP 05.

BLANK23 -19-23OCT86

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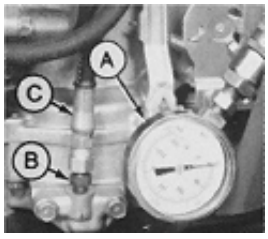
8 OIL PRESSURE TEST FOR 12.5 HP MODELS



M48042 -UN-08JAN90

A—JTO03344 Gauge/2000 kPa (35 psi)
B—JTO3349 Connector
C—JTO3017 Hose

Make test connections from JTO1765 Fitting Kit.

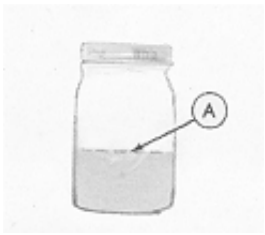
Run engine at fast idle.

LOOK: Minimum oil pressure should be 240 kPa (35 psi).

LOW OIL PRESSURE: GO TO CTM-5. Check for:
Damaged or worn oil pressure relief valve.
Plugged oil pump suction screen.
Damaged or worn oil pump.

M22,22010G,14 -19-02DEC86

9 FUEL SUPPLY TEST



M48143 -UN-08JAN90

Fill a clear container about one/third full of water. Mark water level (A) on side of container.

Fill rest of container with questionable fuel.

Shake mixture for about one minute.

Let mixture stand for 10 to 15 minutes.

BLANK24 -19-23OCT86

M48172 -UN-08JAN90

LOOK: Compare level of water to mark on container. If level of water is even with water level mark, fuel has no alcohol. If level of water (A) is above mark, fuel has alcohol.

NO ALCOHOL: Return to Engine/Fuel System Operating Tests.

ALCOHOL PRESENT: Replace fuel with fresh, no-lead alcohol free fuel. Then...Return to Engine/Fuel System Operating Tests.

BLANK25 -19-23OCT86

Section 240
ELECTRICAL OPERATION AND TESTS

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BEFORE YOU START

Always begin with this group to identify a failure in the electrical system. The step-by-step procedures in this group provide you a quick check of the system. No tools are required to perform these checks. If a failure is indicated, you will be referred to a more detailed check, adjustment, or test.

Always start with the first step and follow the sequence from left to right. Read each step completely before performing the check.

This procedure is designed as a quick check of the system. While performing the check, concentrate only on the check you are performing and disregard signals from unrelated components. If you are unfamiliar with the operation or location of system components, refer to Group 15 in this section.

M22,24005G,1 -19-03DEC86

❶ **INDICATOR LAMP CIRCUIT CHECK (SX MODELS ONLY)**	Move shift lever to neutral position. Move PTO lever to disengaged position. Turn key to RUN position.	 M49029 -UN-08JAN90	*LOOK: Ready-start lamp must come on.* Low fuel lamp will come on only if fuel is low.	**OK:** GO TO ❷ **NOT OK:** GO TO Electrical System Operating Tests GROUP 10.

M22,24005G,2 -19-22DEC86

❷ **STARTING CIRCUIT CHECK** Electric Start Models: Operator on seat. Recoil Start Models: Operator off seat.	Transmission in neutral. PTO disengaged.	 M49031 -UN-08JAN90	Electric start: Turn key to START. *LISTEN: Engine must start.* Recoil start: Turn key ON, pull starter rope. *LISTEN: Engine must start.*	**OK:** GO TO ❸ **NOT OK:** GO TO Electrical System Operating Tests GROUP 10.

M22,24005G,3 -19-22DEC86

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❸ TRANSMISSION NEUTRAL START CHECK Electric Start Models: Operator on seat. Recoil Start Models: Operator off seat.	PTO disengaged. **⚠ CAUTION: If neutral start circuit is defective machine will start and move forward.** Engage park brake.	 M49038 -UN-08JAN90	Shift lever in slow forward. Electric start: Turn key to START position. *LISTEN: Engine must NOT crank.* Recoil start: Key switch ON, pull start rope. *LISTEN: Engine must not start.*	**OK:** GO TO ❹ **NOT OK:** GO TO Electrical System Operating Tests GROUP 10. M22,24005G,4 -19-03DEC86
❹ PTO NEUTRAL START CHECK Electric Start Models: Operator on seat. Recoil Start Models: Operator off seat.	Transmission in neutral. **⚠ CAUTION: If PTO neutral start circuit is defective, engine will start and mower deck will run.**	 M49030 -UN-08JAN90	Engage PTO lever. Electric start. Turn key to START position. *LOOK: Engine must NOT crank.* Recoil start: Turn key to RUN, pull starter rope. *LISTEN: Engine must not start.*	**OK:** GO TO ❺ **NOT OK:** GO TO Electrical System Operating Tests GROUP 10. M22,24005G,5 -19-03DEC86
❺ SEAT SWITCH CHECK FOR PTO SAFETY CIRCUIT Operator on seat. Transmission in neutral. Run engine at half throttle.	 M49030 -UN-08JAN90	Engage PTO. Raise off seat 2-3 seconds. *LISTEN: Engine must stop.*	Restart engine. Engage PTO. Quickly raise off seat and sit back down. *LISTEN: Engine must falter, then resume speed.*	**OK:** GO TO ❻ **NOT OK:** GO TO Electrical System Operating Tests GROUP 10. M22,24005G,6 -19-03DEC86

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6 SEAT SWITCH CHECK FOR IGNITION CIRCUIT Operator on seat. PTO disengaged. Run engine at slow idle.	 M49038 -UN-08JAN90	Move shift lever to slow forward position. Raise off seat for 2-3 seconds. *LISTEN: Engine must stop.*	

Restart engine. Move shift lever to slow forward position. Quickly raise off seat and sit back down. *LISTEN: Engine must falter but must stay running.*	**OK:** GO TO 7 **NOT OK:** GO TO Electrical System Operating Tests GROUP 10. M22,24005G,7 -19-03DEC86

7 CHECKOUT PROCEDURE COMPLETE	Completing all checks in this procedure indicates that all components of the electrical system are functioning satisfactorily.	If the operator complaint was not identified, the problem may be intermittent. Try to duplicate the condition of the malfunction as described by the operator.	Verify the system ground connections and test the battery as instructed in Group 10, then repeat the checkout procedure.	IF MALFUNCTION IS NOT IDENTIFIED AFTER REPEATING THE CHECKOUT PROCEDURE, FACTORY ASSISTANCE IS AVAILABLE THROUGH THE DEALER TECHNICAL ASSISTANCE CENTER (DTAC). M22,24005G,8 -19-22DEC86

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BEFORE YOU START

Always perform the System Checkout in Group 05 before making any tests in this group. The step-by-step procedures in this group provide you with the detailed diagnostic information you will need to isolate a malfunction. Basic diagnostic equipment is used. It is assumed that you are familiar with the machine and its electrical components. If you need additional information refer to the component location drawing or wiring diagrams in Group 15.

As with any electrical system, it is very important that all ground connections are clean and tight and that the battery is fully charged.

Before doing any testing, verify the system ground circuits and test the battery.

Always start with the first step and follow the sequence from left to right. Read each step completely before performing the test.

Upon completing a test or adjustment, check to see whether the problem is corrected by performing the checkout procedure for that step in Group 05.

M22,24010G,1 -19-03DEC86

ELECTRICAL SYSTEM OPERATING TESTS	If the electrical system does not operate properly, select the appropriate symptom.	Engine will not crank over (Electric start models): GO TO Ⓐ Engine cranks over slowly (Electric start models): GO TO Ⓑ Engine cranks over but will not start, no spark: GO TO Ⓒ Battery will not charge or over-charges: GO TO Ⓓ Engine stops when off seat, PTO off transmission in neutral or will not stop when off seat, PTO on and/or transmission in gear: GO TO Ⓔ Ready start lamp circuit test: GO TO Ⓕ	Low fuel lamp circuit tests: GO TO Ⓖ Fuse fails repeatedly: SEE SIB-M88-30-3

BLANK26 -19-23OCT86

❶ **BATTERY TESTS** If problem is with starting circuit, perform all battery tests. If problem is with other components, perform battery tests only if starter does not crank engine satisfactorily.	Check electrolyte level in each cell or battery. If low, add the proper amount of clean soft water.	Check specific gravity of each cell with a hydrometer.

Continued on next page

	SPECIFIC GRAVITY All cells less than 1.175: GO TO 1C All cells more than 1.225 with less than 50 points variation: GO TO 1D All cells less than 1.225 with less than 50 points variation: GO TO 1B Variation more than 50 points: REPLACE BATTERY. M21,24010Q,3 -19-30JUL86

1B Test Battery Voltage	Check battery voltage with voltmeter or JTO5685 Battery Tester.	*NOTE: Battery need not be disconnected from tractor.*	12.4 VOLTS OR MORE: GO TO 1F LESS THAN 12.4 VOLTS: GO TO 1C M21,24010Q,4 -19-05JAN87

1C Charge Battery	Connect variable rate charge to battery. Start charger at a slow rate. Increase charge rate one setting at a time. Check ammeter (on charger) after one minute at each setting. Try to maintain a 10-amp charge rate. Use boost setting as necessary. The maximum charging time at	boost setting is 10 minutes. Allow an additional 5 minutes for each 10˚F below 70˚F.	If battery did not need water at step 1 and is accepting 10 amp charge...GO TO 1E

If battery required water at step 1 or if all cells were below 1.175 but battery is accepting a 10 amp charge...GO TO 1D	If battery does not accept a 10 amp charge after 10 minutes at boost setting, replace battery. BLANK27 -19-23OCT89

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1D Increase Charge Rate	Set charger at 15 - 25 amps.	**IMPORTANT: Decrease charge rate if battery gases or bubbles excessively or becomes too warm to hold.**	Check specific gravity after 30 minutes (60 minutes for maintenance free battery).	IF VARIATION BETWEEN CELLS IS MORE THAN 50 POINTS, REPLACE BATTERY. IF VARIATION BETWEEN CELLS IS LESS THAN 50 POINTS, GO TO 1E

M21,24010Q,6 -19-30JUL86

1E Continue Charging Battery **IMPORTANT: Decrease charge rate if battery gases or bubbles too much or if battery gets too warm to hold.**	Continue charging battery until specific gravity is 1.230 - 1.265 points. IF BATTERY WAS DISCHARGED AT A SLOW RATE (OR DISCHARGE RATE IS UNKNOWN): Charge battery at 10 - 15 amps for 6 - 12 hours. (Maintenance free battery may require 12 - 24 hours.) THEN...GO TO 1F			IF BATTERY WAS DISCHARGED AT A FAST RATE: Charge battery at 2 - 25 amps. Battery may require 2 - 4 hours charging time. (Maintenance free battery may need 4 - 8 hours.) THEN...GO TO 1F

M21,24010Q,7 -19-30JUL86

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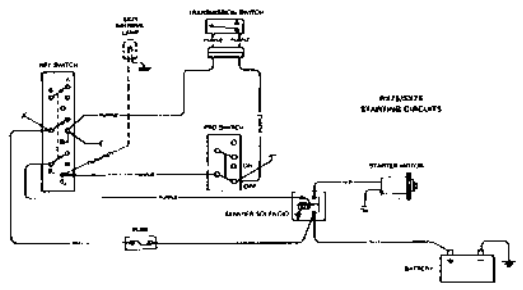
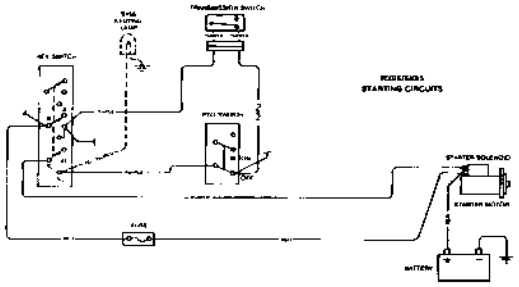
1F Load Test Battery	 M36665 -UN-29AUG88	Connect JTO5685 Tester to battery. Follow instruction on back of meter for testing battery.	**OK:** RETURN TO APPROPRIATE SYMPTOM. **NOT OK:** REPLACE BATTERY AS NEEDED. M21,24010Q,8 -19-22DEC86

A ENGINE WILL NOT CRANK OVER (ELECTRIC START MODELS)	The starting system consists of a primary circuit of battery, starter solenoid, and starter. It carries the heavy amperage for the starter. And a secondary circuit of fuse, key switch, transmission switch, and PTO switch. It engages the starter solenoid when the key switch is turned to start, the transmission is in neutral and the PTO is turned off.		Test battery: GO TO 1 Test the components and circuits starting at A1 9 HP models. A3 12.5 HP models. BLANK28 -19-23OCT86

Starting Circuits Wiring

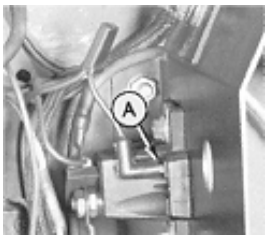
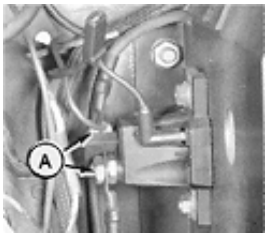


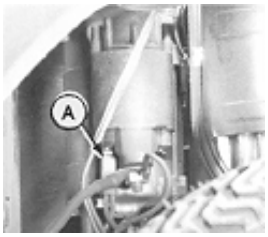
M51877 -19-14MAR89



M51878 -19-14MAR89

BLANK29 -19-23OCT86

A1 Starter Solenoid Test - 9 HP Models	Put transmission in neutral. Engage park brake. Disconnect and ground spark plug lead.	 M47087 -UN-08JAN90	Disconnect purple wire (A) from solenoid. Connect jumper wire and briefly jump across to battery wire. *LISTEN: Start must run.*	STARTER RUNS: Connect wire, then...GO TO A5 STARTER DOES NOT RUN: GO TO A2 M22,24010G,14 -19-22DEC86
A2 Starter Motor Test - 9 HP Models	Transmission in neutral. Brake locked ON. Spark plug lead grounded.	 M47088 -UN-08JAN90	Briefly jump between two large terminals (A) on solenoid. *LISTEN: Starter must run.*	STARTER RUNS: Replace solenoid. STARTER DOES NOT RUN: Check battery cables and connections. Repair or replace starter. See CTM-5. M22,24010G,15 -19-22DEC86

A3 Starter Solenoid Test - 12.5 HP Models	Put transmission in neutral. Engage park brake. Disconnect and ground spark plug lead.	 M47089 -UN-08JAN90	Disconnect purple wire (A) from solenoid. Connect jumper wire to battery, jump across to solenoid terminal. *LISTEN: Starter must run.*	STARTER RUNS: Connect wire, then...GO TO A5 STARTER DOES NOT RUN: GO TO A4 M22,24010G,16 -19-04DEC86

BLK:

ˆA4 Starter Motor Test - 12.5 HP Models

BLK:

Transmission in neutral.

Brake ON.

Spark plug lead grounded.

BLK:

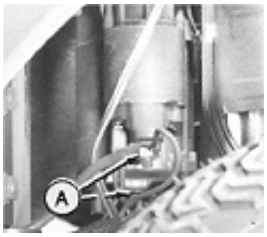
Connect a jumper wire and BRIEFLY jump across the two large terminals (A).

LISTEN: Starter must run.

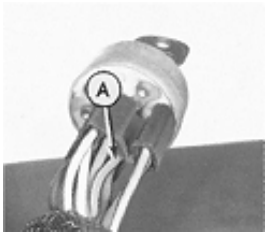
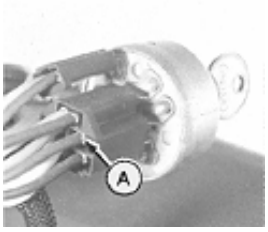
BLK:

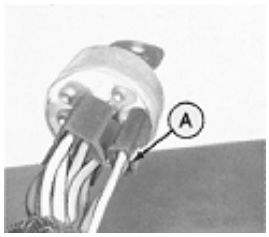
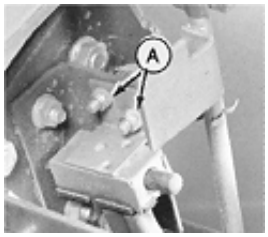
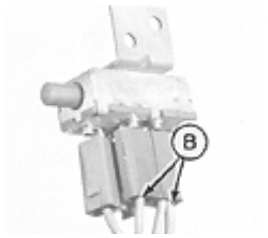
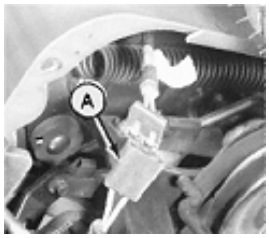
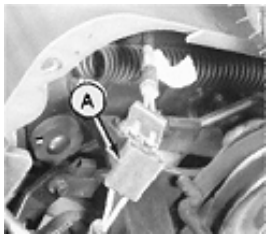
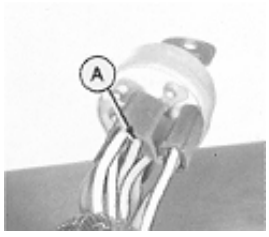
STARTER RUNS: Replace solenoid. See CTM-5.

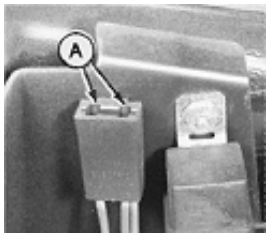
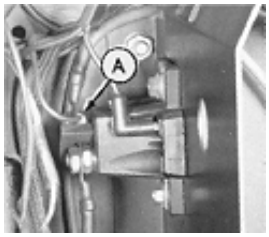
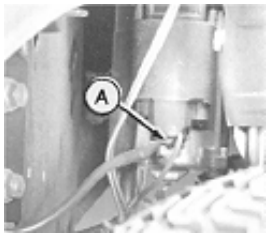
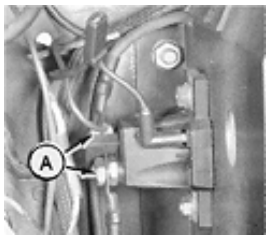
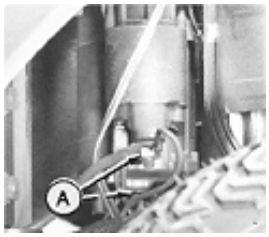
STARTER DOES NOT RUN: Check battery cables and connections. Repair or replace starter. See CTM-5.



M22,24010G,17 -19-04DEC86

A5 Voltage Test at Key Switch (In)	Remove key switch from machine, leave wiring connected. Turn key switch ON.	 M47079 -UN-08JAN90	Check for voltage a terminal with purple and yellow/red wires (A). *NOTE: May be S1 or S2 terminal. See wiring diagram for SN breaks.*	VOLTAGE: GO TO A6 NO VOLTAGE: GO TO A7 M22,24010G,18 -19-22DEC86
A6 Voltage Test at Key Switch (Out)	Transmission in neutral. PTO OFF. Brake ON. Hold key switch in START position.	 M47091 -UN-08JAN90	Check for voltage a terminal (A, purple wire). *NOTE: May be S1 or S2 terminal. See wiring diagram for SN breaks.*	VOLTAGE: Purple wire from key switch to starter solenoid is open. Repair or replace. NO VOLTAGE: Replace key switch. M22,24010G,19 -19-22DEC86

A7 **Voltage Test Key Switch**	Key switch ON.	 M47081 -UN-08JAN90	Check for voltage a terminal with yellow and purple wires (A).	VOLTAGE: GO TO **A8** NO VOLTAGE: GO TO **A11** M22,24010G,20 -19-04DEC86
A8 **Voltage Test at PTO Switch**	 M47092 -UN-08JAN90  M47093 -UN-08JAN90	Remove the two attaching bolts (A), remove switch. Turn key switch ON, depress switch button, check for voltage at both terminals (B) with purple wires.		VOLTAGE BOTH TERMINALS: Purple wire to key switch is open. VOLTAGE ONE TERMINAL: Replace PTO switch. NO VOLTAGE: GO TO **A9** M22,24010G,21 -19-04DEC86
A9 **Voltage Test at Transmission Switch**	Reinstall PTO switch. Turn key switch ON.	 M47094 -UN-08JAN90	Separate switch connector (A) (located under rear of frame). Check for voltage across connector terminals.	VOLTAGE: GO TO **A10** NO VOLTAGE: Purple wire from key switch to transmission switch is open. Repair or replace. M22,24010G,22 -19-04DEC86
A10 **Transmission Neutral Start Switch Tests**	Put transmission in neutral. Key switch OFF. Separate switch connector (A) under rear of machine frame.	 M47094 -UN-08JAN90	Check continuity across switch side of connector. There should be continuity with transmission in neutral and no continuity with transmission in gear.	**NOT OK:** GO TO SECTION 250 to adjust neutral position of transmission lever. Then repeat this test. Replace transmission switch as needed. M22,24010G,37 -19-22DEC86
A11 **Main Voltage Test at Key Switch**	Key switch OFF.	 M47082 -UN-08JAN90	Check for voltage at B terminal (A, red wires) on key switch.	VOLTAGE: Replace key switch. NO VOLTAGE: GO TO **A12** M22,24010G,5 -19-04DEC86

D1 **Voltage Test at Fuse**	Key switch OFF. Remove fuse from holder.	 M47083 -UN-08JAN90	Check for voltage at fuse holder terminals (A). Only one terminal should have voltage.	VOLTAGE: GO TO **2** NO VOLTAGE: Check for open wire between fuse block and starter solenoid then GO TO **D2** M22,24010G,6 -19-04DEC86
A13 **Voltage Test at Solenoid - 9 HP Models**	Key switch OFF.	 M47084 -UN-08JAN90	Check for voltage at terminal (A) with two red wires.	VOLTAGE: Red wire to fuse holder is open. Repair or replace. NO VOLTAGE: Check battery cables and connections. M22,24010G,7 -19-22DEC86
A14 **Voltage Test at Solenoid - 12.5 HP Models**	Key switch OFF.	 M47085 -UN-08JAN90	Check for voltage at terminal (A) on starter with two red wires.	VOLTAGE: Red wire to fuse holder is open. Repair or replace. NO VOLTAGE: Check battery cables and connections. M22,24010G,8 -19-04DEC86
B **ENGINE CRANKS OVER SLOWLY**	The starting system circuits are complete, but the voltage is low or the starter is defective.			Test battery: GO TO **1** Test components and circuits: GO TO **B1** 9 HP Models **B2** 12.5 HP Models BLANK30 -19-23OCT86
B1 **Starter Motor Test - 9 HP Models**	Transmission in neutral. Brake locked ON. Spark plug lead grounded.	 M47088 -UN-08JAN90	Briefly jump between two large terminals (A) on solenoid. *LISTEN: Starter must run.*	STARTER RUNS CORRECT SPEED: Replace solenoid. STARTER RUNS SLOW: GO GO **B3** BLANK31 -19-23OCT88
B2 **Starter Motor Test - 12.5 HP Models**	Transmission in neutral. Brake ON. Spark plug lead grounded.	 M47090 -UN-08JAN90	Connect a jumper wire and BRIEFLY jump across the two large terminals (A). *LISTEN: Starter must run.*	STARTER RUNS CORRECT SPEED: Replace solenoid. See CTM-5. STARTER RUNS SLOW: GO TO **B3** BLANK32 -19-23OCT88

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B3 **Starter Current Draw Test**	Before performing starter current draw test, verify system ground connections.	Disconnect spark plug lead.	M47060 -UN-08JAN90	Use a spark tester (A) to ground lead to engine. M22,24010G,23 -19-04DEC86

M47095 -UN-08JAN90

IMPORTANT: Before making any test connections, turn load knob (A) on meter fully counterclockwise.

Connect JTO5685 Battery Tester to tractor battery: Red lead to positive terminal, black lead to negative terminal.

Crank engine with starter and read voltage on meter while cranking.

Check engine rpm while cranking. Use JTO28201 or JTO1638 Photo Tachometer.

With key OFF, adjust load knob (A) until battery voltage reads the same as when cranking.

Read amperage on meter. Meter should read 150 amps or less.

Turn load knob fully counterclockwise. Remove tester.

150 AMPS OR LESS BUT RPM IS LOW: GO TO **B5**

150 AMPS OR LESS AT ABOUT 300 RPM: Starter OK, check engine oil viscosity and internal components (CTM-5).

150 AMPS OR MORE: GO TO **B4**

M22,24010G,24 -19-12JAN87

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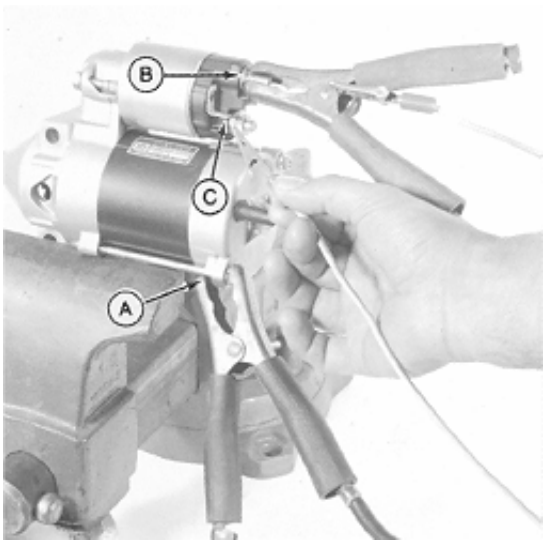
B4 **Starter No-Load RPM Test For 12.5 HP Models**

9 HP Models: GO TO B5



M43697 -UN-12JAN90

Put starter in a vise.

Connect jumper cables to tractor battery or one of similar capacity.

Connect negative cable (A) to starter body.

Connect positive cable (B) to solenoid terminal.

Use a jumper wire to jump from positive cable to solenoid terminal (C).

Measure starter rpm with a photo tachometer.

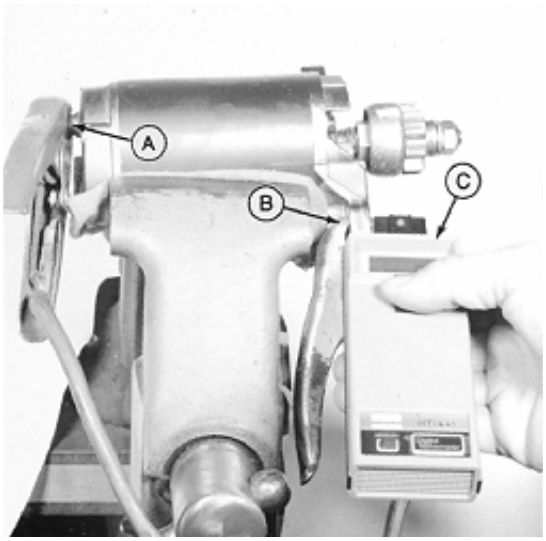
RPM should be at least 6000.

RPM 6000 OR MORE: GO TO B6

RPM LESS THAN 6000: Be sure battery is of proper size and is fully charged. Repeat test as needed with fully charged battery. If rpm is still below spec., disassemble, inspect and repair starter as instructed in CTM-5.

M22,24010G,25 -19-22DEC86

B5 **Starter No-Load RPM Test For 9 HP Models**



M37203 -UN-25JAN90

Put starter in a vise.

Connect jumper cables to tractor battery or one of similar capacity.

Connect positive lead (A) to starter positive terminal.

Connect negative cable (B) to starter body.

Use photo tachometer (C) or mechanical hand tachometer to measure starter rpm.

RPM should be at least 7000.

RPM 7000 OR MORE: GO TO B6

RPM LESS THAN 7000: Be sure battery is of proper size and is fully charged. Repeat test as needed with fully charged battery. If rpm is still below spec., disassemble, inspect and repair starter as instructed in CTM-5.

M22,24010G,26 -19-22DEC86

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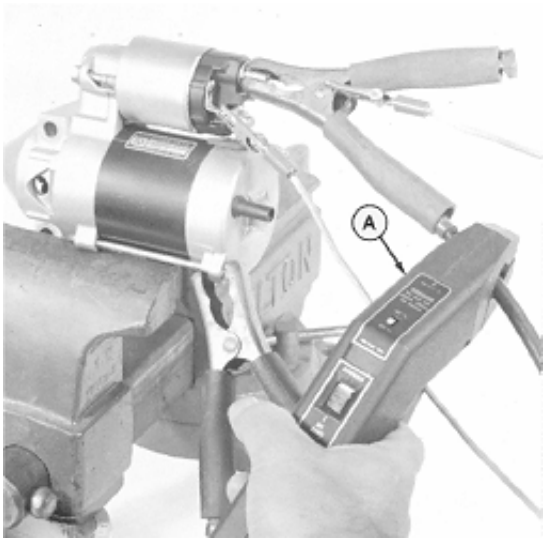
B6 **Starter No-Load Amperage Test**	 M43698 -UN-12JAN90	Put starter in a vise and connect battery cables as instructed in Steps 3K or 3L. With starter running, check amperage with JTO5712 Current Gun (A) or an equivalent. AMPERAGE SPECIFICATION: 9 HP models - 60 amps or less. 12.5 HP Models - 50 amps or less (12.5 HP starter shown)	AMPERAGE IN SPEC: Starter OK. Check oil viscosity or internal engine components. See CTM-5. AMPERAGE OUT OF SPEC: Check for binding or seizing bearings, sticking brushes, dirty or worn commutator. See CTM-5. M22,24010G,27 -19-22DEC86
C **ENGINE CRANKS OVER BUT WILL NOT START (NO SPARK)**	Both manual start and electric start rider ignition systems can be separated into two parts. One part consisting of spark plug, coil ignitor and flywheel. The other part being the key switch, transmission switch, PTO switch, neutral start relay (electric start), seat switch, and wiring harness.		Test components and circuits: GO TO **C1** BLANK33 -19-23OCT88

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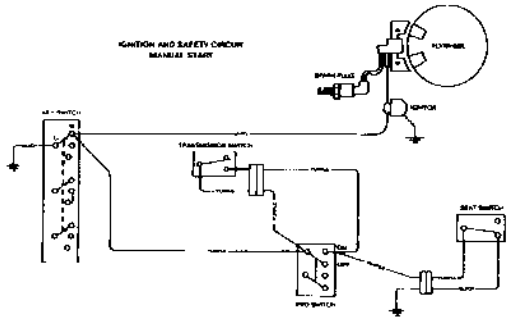
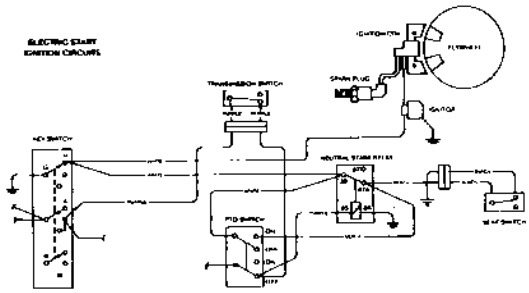
Ignition Circuits Wiring



M51876 -19-14MAR89



M51880 -19-14MAR89

BLANK34 -19-23OCT86

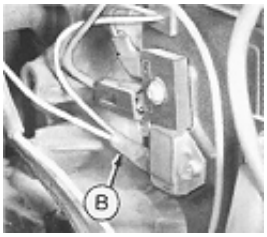
C1 **Ignition Circuit Grounding Test (Manual Start Models)**

Put transmission in neutral, lock brakes ON.

PTO OFF.

Disconnect spark plug lead.

M47060 -UN-08JAN90



M49263 -UN-20DEC89

Install a spark tester (A).

Disconnect double white wires (B) from ignitor.

Crank engine and check for spark.

SPARK: GO TO **C6**

NO SPARK: Replace ignitor if available and retest OR GO TO **C2**

BLANK35 -19-23OCT86

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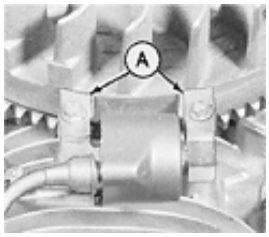
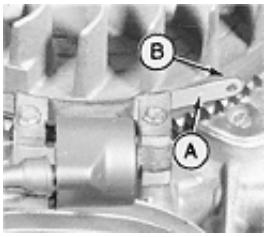
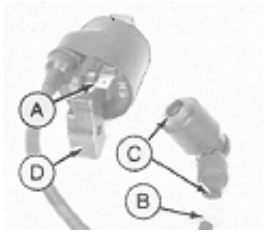
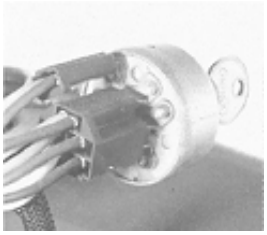
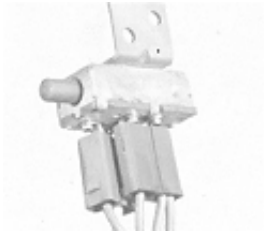
C2 Ignition Coil Air Gap Test	Remove blower housing shroud from engine. Rotate flywheel until magnet area is away from legs of coil.	 M43625 -UN-12JAN90	Use a feeler gauge to check ignition coil air gap under both legs (A) of coil. Gap should be 0.3 mm (0.12 in.).	AIR GAP OK: GO TO C5 AIR GAP NOT OK: GO TO C3 M22,M24010G,32 -19-04DEC86
C4 Ignition Coil Air Gap Adjustment	 M43626 -UN-12JAN90	Loosen the two coil mounting screws. Place a 0.3 mm (0.12 in.) feeler gauge or length of shim stock (A) against flywheel (B).	Allow magnetic force to draw coil against feeler gauge. Tighten coil mounting screens. Rotate flywheel to remove feeler gauge.	AFTER ADJUSTMENT: Repeat C1. If still no spark, GO TO C5 M22,24010G,33 -19-04DEC86
C5 Ignition Coil Test Remove ignition coil from engine.	 M48142 -UN-08JAN90	Measure resistance between primary coil lead (A) and core (D). Remove spark plug boot, from high tension lead, measure secondary resistance between high tension lead (B) and core (D). Measure resistance of spark plug boot (C). Resistance is marked on boot. SPECIFICATIONS Primary coil (A): 0.4-0.8 ohms Secondary coil (B): 10,000-18,000 ohms.		IN SPEC: Replace ignitor. OUT OF SPEC: Replace coil or boot. BLANK36 -19-23OCT86
C6 Continuity Test At Key Switch Double white wires at ignitor disconnected, PTO off, transmission in neutral.	 M49264 -UN-20DEC89	Turn key switch on and off. Manual start: Check for continuity between black wire and white and purple double wire.	Electric start: Check for continuity between black and double white wires. There should be continuity with key switch off, no continuity with key switch on.	**OK:** GO TO C7 **NOT OK:** Replace key switch. BLANK37 -19-23OCT86
C7 Continuity Test At PTO Switch Double white wires at ignitor disconnected, transmission in neutral. Key switch on.	 M49265 -UN-20DEC89	Engage and disengage PTO. Manual start: Check for continuity between double purple wires.	Electric start: Check for continuity between white and black wires. There should be continuity with PTO on and no continuity with PTO switch off.	**OK:** GO TO C8 Manual start. C9 Electric start. **NOT OK:** Adjust PTO switch OR Replace. BLANK38 -19-23OCT86

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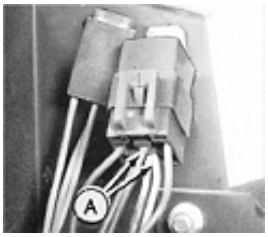
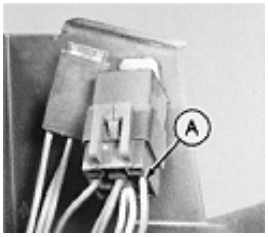
C8 Continuity Test At Transmission Switch (Manual Start Models)	Double white wires at ignitor disconnected, key switch on, PTO off.	Put transmission in forward, neutral and reverse. There should be continuity in forward and reverse, no continuity in neutral.	Continuity in neutral and forward or neutral and reverse, transmission misadjusted. Continuity in all or no positions, switch bad.	**OK:** GO TO C12 **NOT OK:** Adjust transmission: GO TO Section 250-10 5 OR Replace switch. BLANK39 -19-23OCT88
C9 Neutral Start Relay Test	Transmission in neutral. PTO OFF.	 M47097 -UN-08JAN90	Use continuity or tester to check continuity across terminals (A) with double white and black wires. Turn key switch ON and OFF. There should be continuity with key OFF, no continuity with key ON.	RELAY OPERATES: GO TO C RELAY DOES NOT OPERATE: GO TO C10 M22,24010G,30 -19-04DEC86
C10 Relay Power Circuit Test	Transmission in neutral. PTO OFF. Key switch ON.	 M47098 -UN-08JAN90	Check for voltage at relay terminal 85 with purple wire (A).	VOLTAGE: Verify good ground at single black wire, then replace relay as needed. NO VOLTAGE: GO TO C11 M22,24010G,31 -19-04DEC86
C11 Continuity Test At Transmission Switch (Electric Start Models)	Key switch off. Put transmission in forward, neutral, and reverse.	There should be continuity in neutral, no continuity in forward or reverse.	Continuity in forward or reverse, transmission misadjusted. Continuity in all or no positions, switch bad.	**OK:** GO TO C12 **NOT OK:** Adjust transmission: GO TO Section 250-10 5 OR Replace switch. BLANK40 -19-23OCT88

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C12 Continuity Test At Seat Switch Double white wires at ignitor disconnected, key switch on, transmission in neutral.	*NOTE: Two types of seat switches are used. A band type, located in the seat and a plunger type mounted on the pedestal. Both operate the same way, they are open (no continuity) when you sit on the seat and closed (continuity) when you are off the seat.* On the plunger type switch, there will not be any spark if the wiring harness connector is not plugged correctly onto the switch. The connector has a small spring that will short across between the two wires. On the band type switch, that ignition will not cut out if the wiring harness connector is not plugged correctly into the switch. BLANK41 -19-23OCT88

Sit on and get off set.	Check for continuity at the seat switch connector between: Black wires (Electric start models).	Black and purple wires (Manual start models).	Should not have continuity when on seat and should have continuity when off seat.	**OK:** Reassemble and test for spark. **NOT OK:** Check connector and/or replace switch. BLANK42 -19-23OCT88

D BATTERY WILL NOT STAY CHARGED OR OVER-CHARGED	The charging system consists of flywheel magnets and stator to generate current, rectifier to change AC to DC, regulator (SN 595,001-) to limit current, fuse to protect system and battery to store energy.	Test battery: GO TO 1 Test components and circuits: GO TO D1 BLANK43 -19-23OCT88

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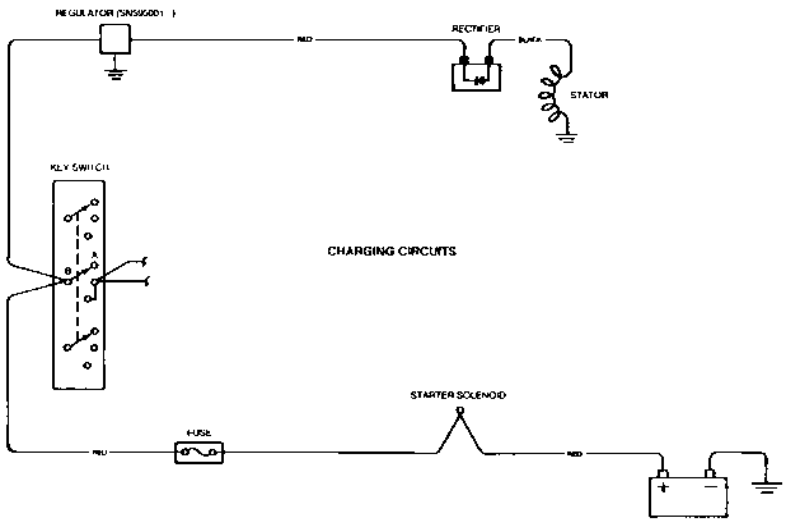
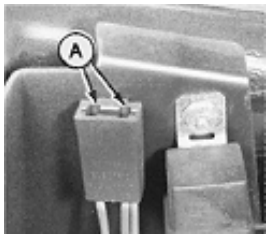
Charging System Wiring Diagram



M51879 -19-14MAR89

BLANK44 -19-23OCT88

D1 **Voltage Test at Fuse**	Key switch OFF. Remove fuse from holder.	 M47083 -UN-08JAN90	Check for voltage at fuse holder terminals (A). Only one terminal should have voltage.	VOLTAGE: GO TO **2** NO VOLTAGE: Check for open wire between fuse block and starter solenoid then GO TO **D2** M22,24010G,6 -19-04DEC86

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D2 **Battery Voltage Test For Charging System**

M47095 -UN-08JAN90

IMPORTANT: Before making any test connections, turn load knob (A) fully out (counterclockwise).

Connect JTO5685 Battery Tester to battery.

Run engine at fast idle.

On riders (SN -595,000) battery voltage should be greater than 12.2.

On riders (SN 595,001-) battery voltage should be greater than 12.2 but less than 14.7.

IN SPEC: GO TO

VOLTAGE GOES ABOVE 14.7: On riders (SN -595,000) normal if battery over-charges, install regulator.

On riders (SN595,001-) replace regulator.

VOLTAGE BELOW 12.2: GO TO **D3**

M22,24010G,42 -19-22DEC86

D3 **Regulated Current Output Test**

Disconnect and ground spark plug lead.

Crank engine for 15 - 20 seconds to discharge battery.

M47095 -UN-08JAN90

Turn load knob (A) fully out (counterclockwise), and connect JTO5685 Battery Tester to battery.

Run engine at full throttle.

Read amperage on tester.

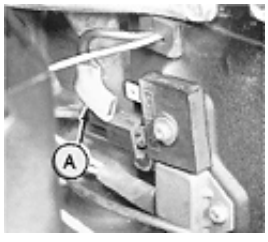
Charging system output should be 3 amps.

IN SPEC: Charging system OK.

OUT OF SPEC: GO TO **D4**

M22,24010G,43 -19-22DEC86

D4 **Unregulated Current Output Voltage Test**



M47100 -UN-08JAN90

Run engine at full throttle.

Disconnect single lead (A) from rectifier.

Set voltmeter to 50 VAC.

Connect meter red lead to connector and black lead to ground.

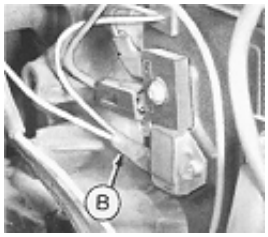
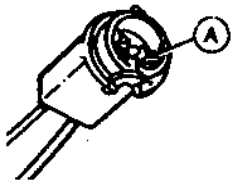
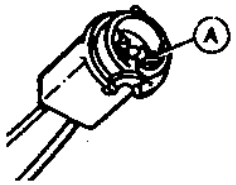
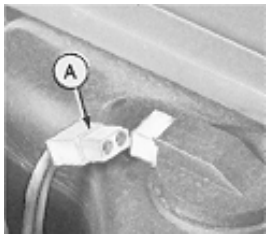
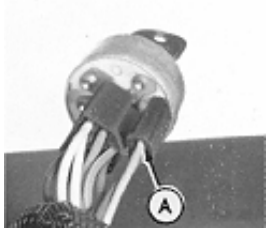
Meter should read about 26 VAC.

26 VOLTS OR MORE: Stator OK, test battery, check wires and ground connections.

LESS THAN 26 VOLTS: Replace stator or flywheel. See CTM-5.

M22,24010G,44 -19-22DEC86

240 10 17

E **ENGINE STOPS WHEN OFF SEAT, PTO OFF, TRANSMISSION IN NEUTRAL OR ENGINE WILL NOT STOP OFF SEAT, PTO ON AND/OR TRANSMISSION IN GEAR**			The operator presence system consists of seat switch, PTO switch, transmission switch, neutral start relay, and the wiring harness.	Check the components and circuits: GO TO **E1** BLANK45 -19-23OCT86
E1 **Continuity At Ignitor** Key switch off.	 M49263 -UN-20DEC89		Disconnect double white wires (B) from ignitor. Check for continuity between white wires and ground.	CONTINUITY: GO TO **C6** and follow tests to end of section. NO CONTINUITY: Check for open white wire between ignitor and key switch. BLANK46 -19-23OCT88
F **READY-START LAMP CIRCUIT TESTS (SX MODELS ONLY)**	*NOTE: Do this test only if unit starts and runs normally. If unit will not start: GO TO* **A**	 M36635 -UN-24APR89	Remove and check bulb. Turn key switch ON, check for voltage at socket terminal (A) with yellow wire.	VOLTAGE: Repair black ground lead at socket. NO VOLTAGE: Yellow/red wire to bulb socket is open. Repair or replace. M22,24010G,2 -19-04DEC86
G **LOW FUEL LAMP CIRCUIT TESTS** If low fuel lamp stays on at all times but fuel level is not low, GO TO **C3**	Check 10-amp fuse.	 M36635 -UN-24APR89	Remove and check bulb. Turn key switch ON, check for voltage at socket terminal (A) with yellow wire.	VOLTAGE: GO TO **G1** NO VOLTAGE: GO TO **G2** M22,24010G,9 -19-04DEC86
G1 **Low Fuel Lamp Circuit Tests**	Disconnect wiring from low fuel sensor. Turn key switch ON.	 M47080 -UN-08JAN90	Jump across terminals of connector (A). *LOOK: Lamp should come on.*	LAMP ON: Replace low fuel sensor. LAMP NOT ON: Black/white wire to bulb socket is open. Repair or replace. M22,24010G,10 -19-04DEC86
G2 **Low Fuel Lamp Circuit Tests** *NOTE: Do this test only if unit starts and runs normally, if unit will not start: GO TO* **A**	Remove key switch. Do not disconnect wires. Turn key switch ON.	 M47086 -UN-08JAN90	Check for voltage at terminal with yellow and purple wires (A).	VOLTAGE: Yellow wire from key switch to bulb socket is open. M22,24010G,11 -19-04DEC86

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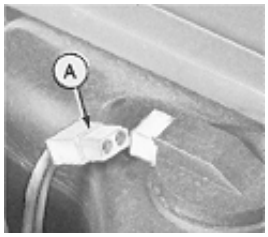
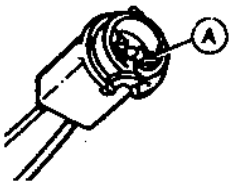
G3 Low Fuel Lamp Short Circuit Tests	 M47080 -UN-08JAN90  M36635 -UN-24APR89	Disconnect wiring from low fuel sensor (A). Check for continuity between black/white wire at bulb socket (A) and ground.	CONTINUITY: Black/white wire is shorted to ground, repair or replace. NO CONTINUITY: Replace low fuel sensor. M22,24010G,12 -19-23DEC86

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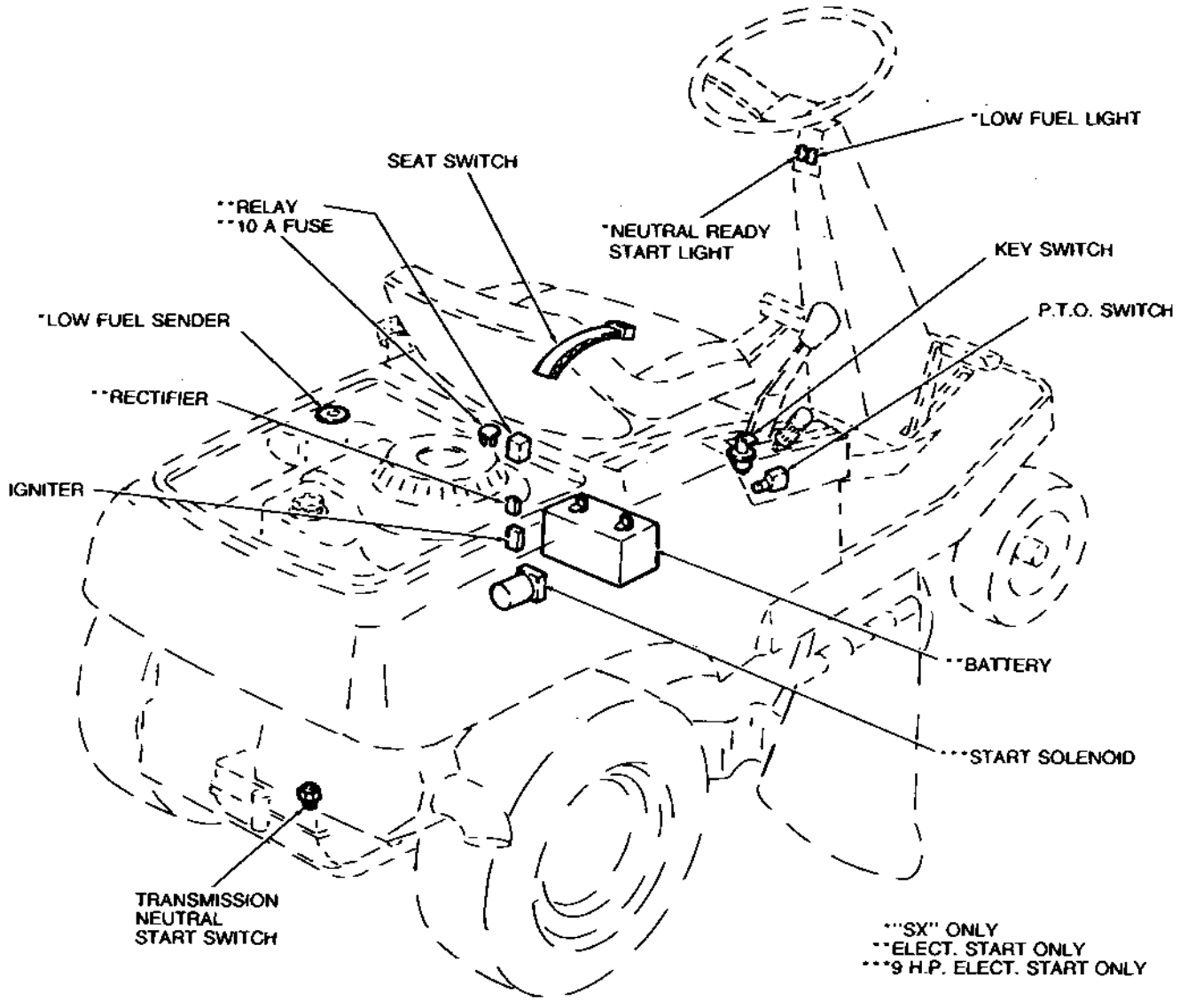
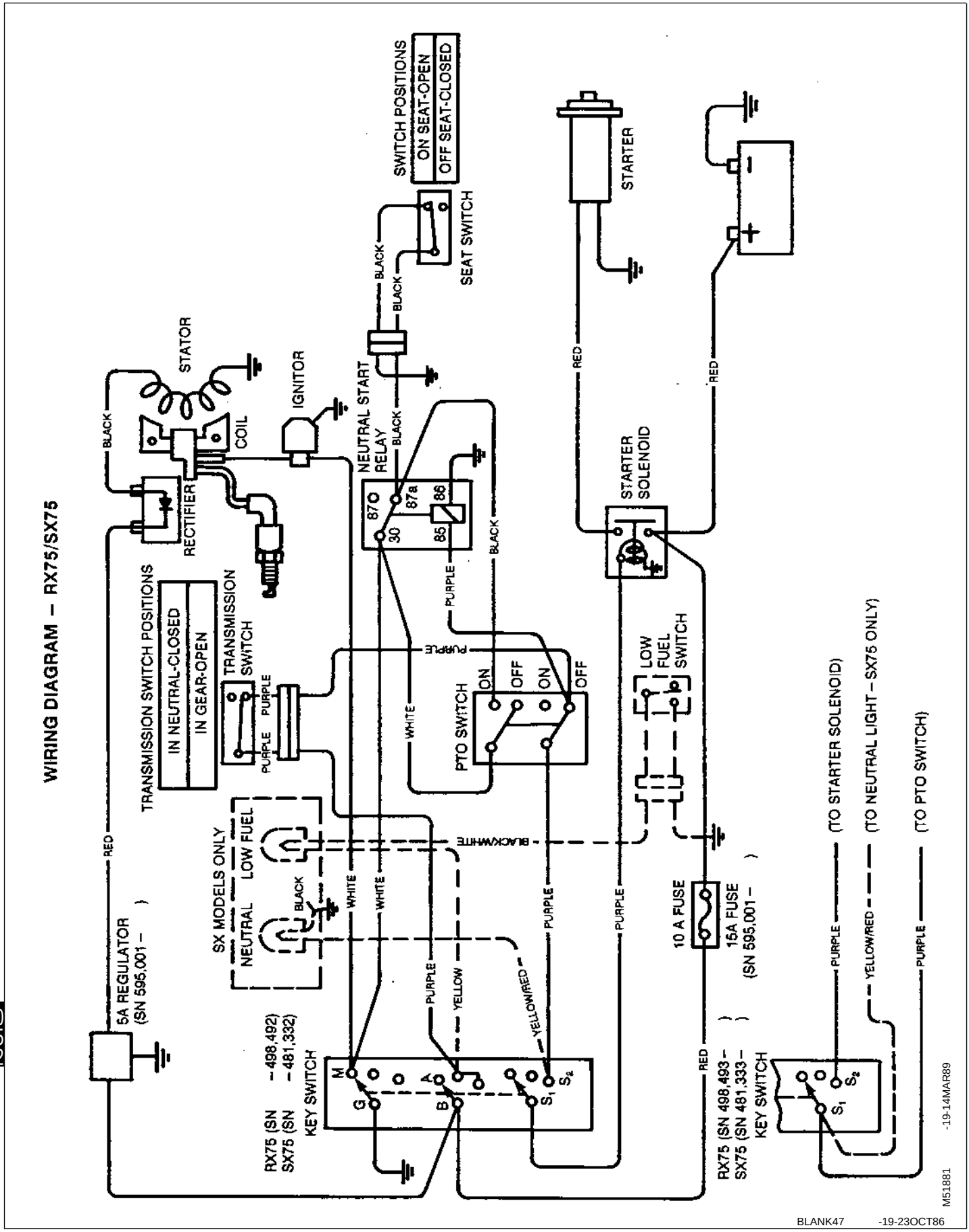
ABOUT THIS GROUP

The group contains a drawing illustrating the location of electrical components and wiring diagrams for both electric and recoil start riding mowers. The wiring diagram for machines with electric start combines both RX and SX models. Differences between these models are noted on the diagram.

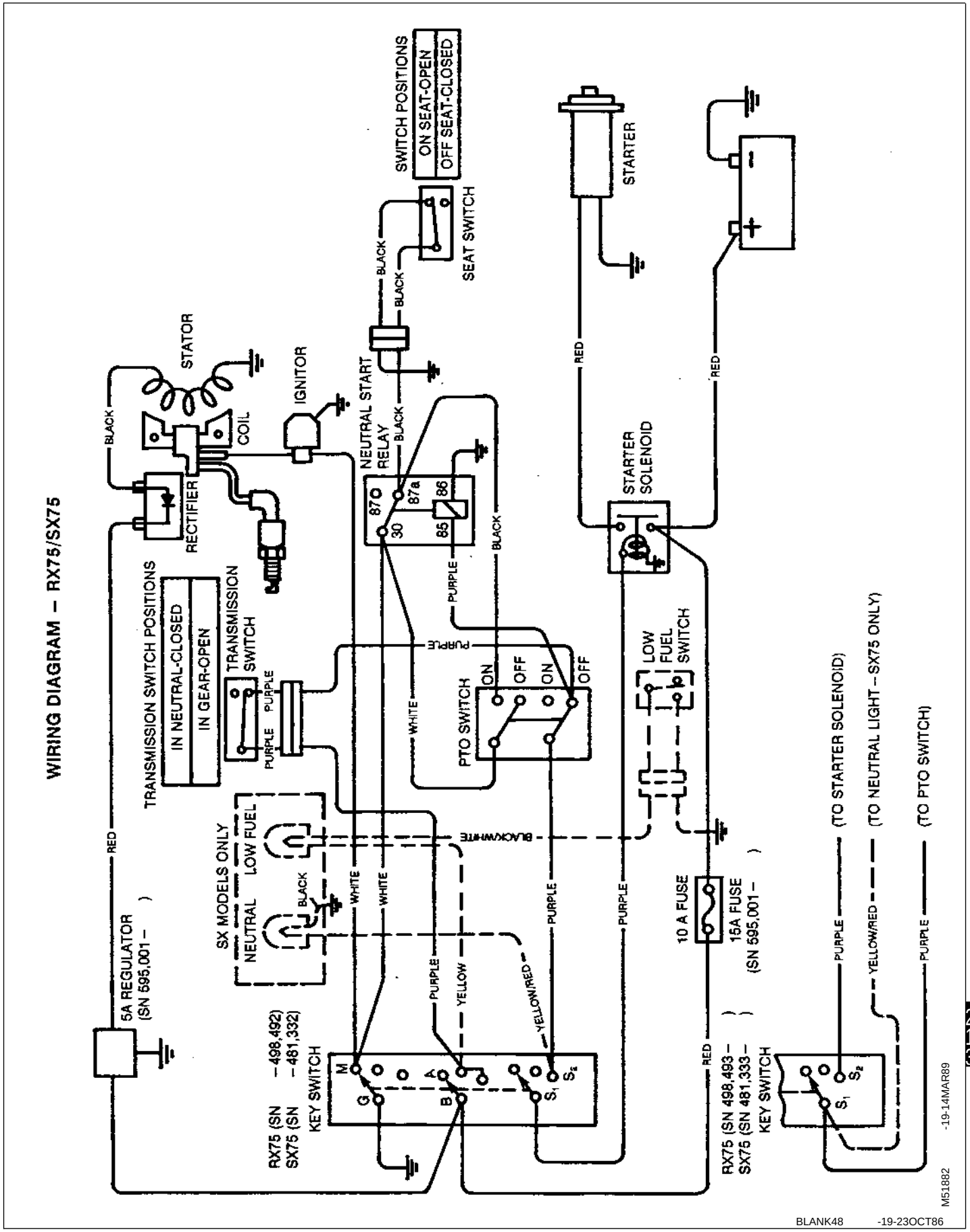
M22,24015G,1 -19-04DEC86



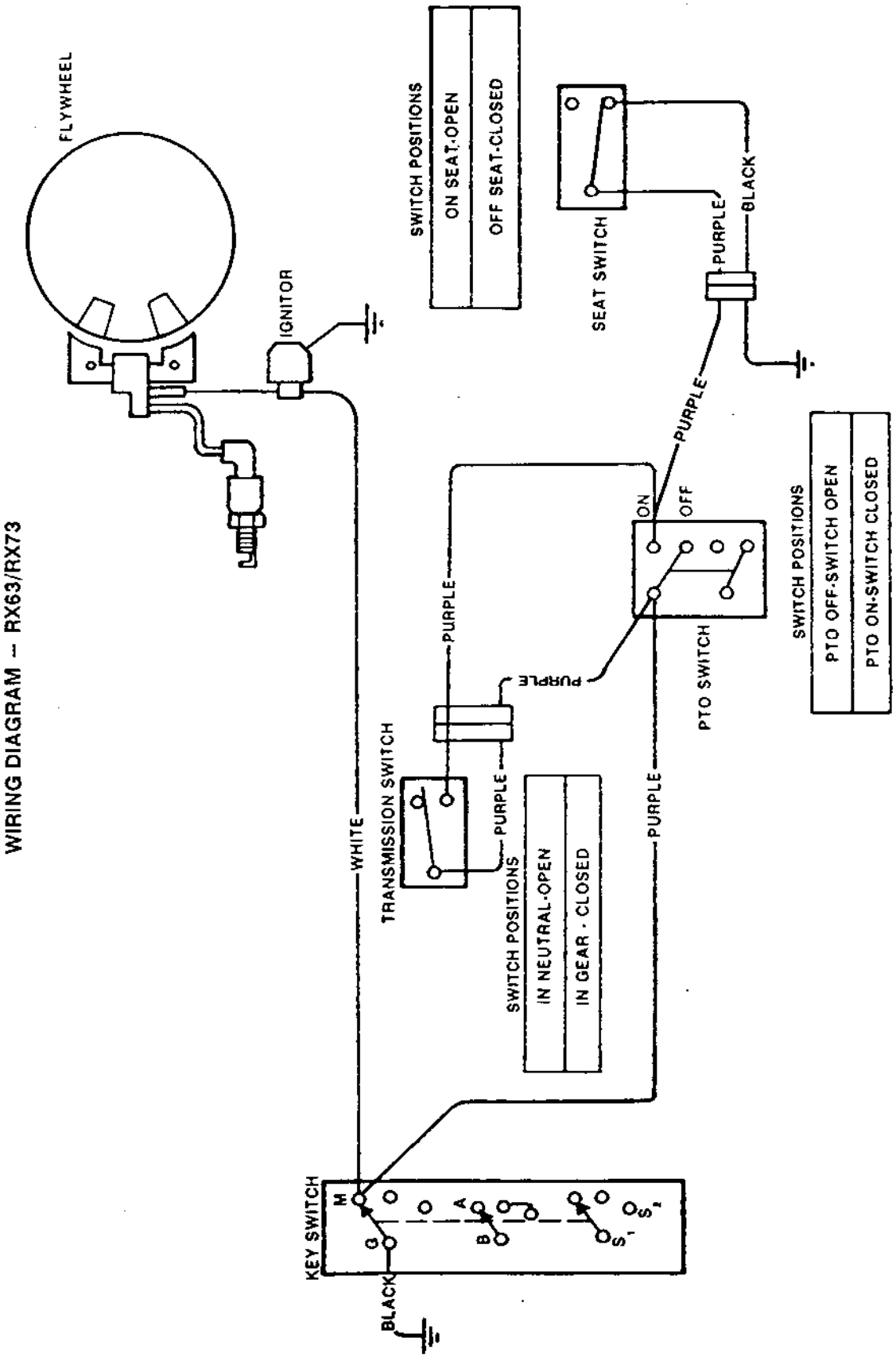
M22,2401562 -19-22DEC86



BLANK47 -19-23OCT86



BLANK48 -19-23OCT86



BLANK49 -19-23OCT86

Section 250
POWER TRAIN OPERATION AND TESTS

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BEFORE YOU START

Always begin with this group to identify a failure in the power train. The step-by-step procedures will provide you with a quick check of the system. No tools are required to perform these checks. If a failure is indicated, you will be referred to a more detailed check, adjustment, or test.

Always start with the first step and follow the sequence from left to right. Read each step completely before performing the check. This procedure is designed as a quick check of the system. While performing the check, concentrate only on the check you are performing and disregard signals from unrelated components.

M22,25005G,1 -19-23DEC86

❶ **BRAKE/CLUTCH LINKAGE CHECK** Engine OFF. Operator on seat.	 M49117 -UN-20DEC89	Push brake pedal all the way down. *LOOK: Clutch pedal must also go down.*		**OK:** GO TO ❷ **NOT OK:** GO TO Power Train Operating Test Group 10. M22,25005G,5 -19-10DEC86
❷ **TRANSAXLE NEUTRAL CHECK** Electric start models: Operator on seat. Recoil start models: Operator off seat.	 M49128 -UN-20DEC89	Unit on level surface. Transaxle in neutral. PTO disengaged. Start engine. Brake and clutch disengaged.	*LOOK/FEEL: Machine must not move.*	**OK:** GO TO ❸ **NOT OK:** GO TO Power Train Operating Test Group 10. M22,25005G,7 -19-09DEC86

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1

❸ **CLUTCH/SPEED CHECK** Operator on seat. Run engine at full throttle. Depress clutch pedal and shift to 7th position.	 M49116 -UN-20DEC89	SLOWLY release clutch pedal. *LOOK: Ground speed must increase as pedal is released.* SLOWLY depress clutch pedal.	*LOOK: Ground speed must decrease as pedal is depressed.*	QUICKLY release clutch pedal. *LOOK: Ground speed should increase until maximum speed is reached.* M22,25005G,9 -19-23DEC86
QUICKLY depress clutch pedal. *LOOK: Ground speed should decrease. Machine should stop.*	 M49124 -UN-20DEC89	QUICKLY press clutch pedal halfway down. *LOOK: Ground speed should be half as fast.*		QUICKLY release clutch pedal. *LOOK: Ground speed should gradually increase back to full speed.* BLANK50 -19-23OCT86
Speed control linkage must be readjusted whenever a primary belt is changed. A new belt may create a slightly fast low speed and little difference between 6th and 7th speed. However, as the new belt stretches and wears, speeds will slow down and there will be a greater difference between 6th and 7th. Also, normal belt stretch may require a speed control adjustment. There are two adjustments that can be made to the speed control linkage. One will adjust the linkage to factory specifications, the other adjustment will result in slower reverse and forward speeds. Before making any adjustments, drive machine for a few minutes to allow belts to conform to operating characteristics.				**OK:** GO TO ❹ **NOT OK:** GO TO Power Train Operating Test Group 10. BLANK51 -19-23OCT86

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4 **FORWARD/REVERSE DRIVE CHECK**

Operator on seat.

Run engine at full throttle.

Depress clutch pedal.

M49114 -UN-20DEC89

Move shift lever to 1st speed.

Release clutch pedal. Move shift lever gradually from 1st to 7th position then back to 1st.

LOOK: Machine must move and change speed gradually as shift lever is moved from slow to fast then back to slow.

FEEL: Speed increase and decrease must be smooth.

M22,25005G,11 -19-09DEC86

M49115 -UN-20DEC89

Run engine at half throttle.

Depress clutch pedal. Put shift lever in reverse, then release clutch pedal.

FEEL: Machine must move in reverse at a constant speed.

OK: GO TO **5**

NOT OK: GO TO Power Train Operating Tests Group 10.

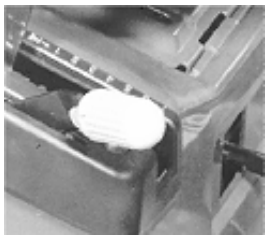
M22,25005G,12 -19-23DEC86

5 **PTO CHECK**

Operator on seat.

Transmission in neutral.

Run engine at half throttle.



M49129 -UN-20DEC89

Engine PTO.

FEEL: PTO lever should engage with little effort and stay engaged.

LISTEN: Mower blade(s) must stop within 7 seconds.

OK: GO TO **6**

GO TO: Power Train Operating Tests Group 10.

M22,25005G,8 -19-23DEC86

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❻ **OPERATOR COMPLAINT NOT FOUND**	If you completed the checkout procedure and did not isolate a malfunction, the problem may be intermittent. Try to duplicate the condition of the malfunction identified by the operator.	Repeat system checkout in this group.	IF MALFUNCTION IS NOT IDENTIFIED AFTER REPEATING SYSTEM CHECKOUT PROCEDURE; FACTORY ASSISTANCE IS AVAILABLE THROUGH THE DEALER TECHNICAL ASSISTANCE CENTER (DTAC). M22,25005G,13 -19-09DEC86

BEFORE YOU START

Always perform the system checkout procedure in Group 05 BEFORE making any tests or adjustments in this group. The step-by-step procedures in this group provide you with the detailed diagnostic information you will need to isolate a malfunction. Basic diagnostic equipment is used.

It is assumed that you are familiar with the machine and its power train components.

Always start with the first step and follow the sequence from left to right. Read each step completely before performing the test.

Upon completing a test or adjustment, check to see whether the problem is corrected by performing the checkout procedure in Group 05.

M22,25010G,1 -19-09DEC86

POWER TRAIN OPERATING TESTS	If the power train system does not operate properly, select the appropriate symptom.	—Rider will not move forward or reverse: GO TO Ⓐ —Noise in power train when rider moving: GO TO Ⓑ —Noise in power train unit stationary: GO TO Ⓒ —Rider has only one speed: GO TO Ⓓ —Rider slows down under heavier loading: GO TO Ⓔ —Rider power train is jerky: GO TO Ⓕ —Transaxle jumps out of gear: GO TO Ⓖ	—Rider speeds are too slow or fast for operator: GO TO Ⓗ —Mower drive belt slips or will not stop: GO TO Ⓙ —Mower drive belt jumps off sheaves: GO TO Ⓚ

BLANK52 -19-23OCT86

Ⓐ **Rider Will Not Move Forward Or Reverse**	—Check brake linkage and adjustments: GO TO Section 60. —Check variator belts, sheaves, and idlers: GO TO Section 50. —Check speed and shift control linkage: GO TO ❹ —Check speed control linkage adjustment: GO TO ❺ —Check variator adjustment: GO TO ❶ —Check for installation of drive axle to wheel hub keys. —Check transaxle internal components: GO TO Section 50.

BLANK53 -19-23OCT86

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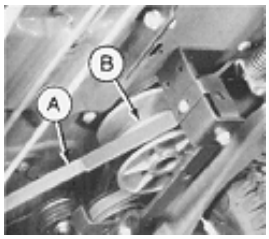
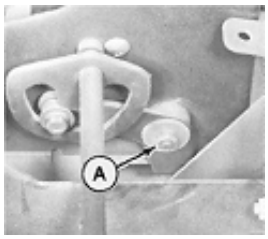
B **Noise In Power Train When Rider Moving**	—Check variator primary belt guides adjustments: GO TO 6 —Check variator belts, sheaves, and idlers: GO TO Section 50. —Check transaxle internal components: GO TO Section 50. BLANK54 -19-23OCT86
C **Noise In Power Train Unit Stationary**	—Check variator primary belt guides adjustments: GO TO 6 —Check variator belts, sheaves, and idlers: GO TO Section 50. BLANK55 -19-23OCT86
D **Rider Has Only One Speed**	—Check variator belts, sheaves, and idlers: GO TO Section 50. —Check speed and shift control linkage: GO TO 4 —Check variator adjustment: GO TO 1 BLANK56 -19-23OCT86
E **Rider Slows Down Under Heavier Loading**	—Check variator adjustment: GO TO 1 —Check clutch pedal spring adjustment: GO TO 3 —Check SIB-M87-30-3 BLANK57 -19-23OCT86
F **Rider Power Train Jerky**	—Check variator belts, sheaves, and idlers: GO TO Section 50. —Check speed and shift control linkage: GO TO 4 —Check shift control linkage adjustment: GO TO 5 —Check variator adjustment: GO TO 1 —Check transaxle internal components: GO TO Section 50. BLANK58 -19-23OCT86
G **Transaxle Jumps Out Of Gear**	—Check shift control linkage adjustment: GO TO 5 —Check speed and shift control linkage: GO TO 4 —Check transaxle internal components: GO TO Section 50. BLANK59 -19-23OCT86

H **Rider Speeds Too Slow or Fast For Operator**	—Check variator adjustment: GO TO **1** —Make variator speed reduction adjustment: GO TO **2** BLANK60 -19-23OCT86

J **Mower Drive Belt Slips Or Will Not Stop**	—Check PTO linkage adjustment: GO TO Section 50. —Check mower belt, sheaves and idlers for wear or damage. —Check mower belt guide: GO TO SIB-M87-30-7. BLANK61 -19-23OCT86

K **Mower Drive Belt Jumps Off Sheaves**	—Check mower belt guide: GO TO SIB-M87-30-7. —Check mower gauge wheel adjustment: GO TO Operators Manual. —Check mower belt, sheaves and idlers for wear or damage. BLANK62 -19-23OCT86

1 **VARIATOR ADJUSTMENT (STANDARD)** Before adjusting, operate rider to warm belts.	Drive machine with control lever in 7th speed. Push clutch pedal down and allow rider to come to complete stop. Turn engine off.	Release clutch pedal after engine has stopped. Put control lever in 1st speed.	 M48136 -UN-08JAN90 Check position of variator primary belt (A) in variator (B). *LOOK: If belt is more than 3 mm (1/8 in.) from top of sheaves, start over.* BLANK63 -19-23OCT86

Raise seat.	 M49135 -UN-20DEC89	Loosen pivot nut (A). *LOOK: Pivot and arm assembly should move from tension of speed control spring.* Tighten pivot nut (A).	RETURN TO: Power Train Operating Tests. BLANK64 -19-23OCT86

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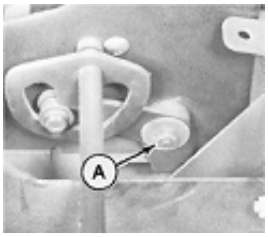
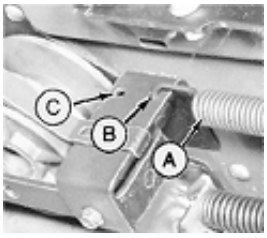
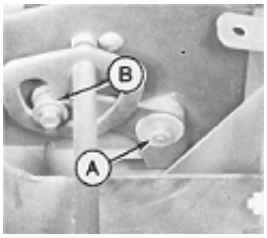
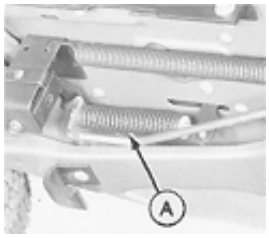
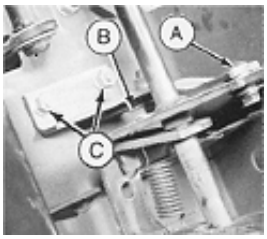
2 VARIATOR ADJUSTMENT (REDUCED SPEED) Before adjusting, operate rider to warm belts. Drive machine with control lever in 7th speed.	Push clutch pedal down and allow rider to come to complete stop. Turn engine off. Release clutch pedal after engine has stopped.	 M49135 -UN-20DEC89	Raise seat. Put control lever in 2nd speed. Loosen pivot nut (A) and allow pivot to move. Tighten pivot nut (A).	RETURN TO: Power Train Operating Tests. BLANK65 -19-23OCT86
3 CLUTCH PEDAL SPRING TENSION ADJUSTMENT Engine OFF.	 M49136 -UN-20DEC89	Push down clutch pedal and note amount of resistance.	Put spring (A) into hole (B) for less clutch pedal tension, hole (C) for more. Hole (C) will also cause less speed variation on hills or heavier loads.	RETURN TO: Power Train Operating Tests. M22,25010G,8 -19-23DEC86
4 SPEED AND SHIFT CONTROL LINKAGE CHECKS Engine OFF. Raise seat.	 M48132 -UN-08JAN90	Check speed control pivot (A). Check speed control cam roller bearing (B).	 M48133 -UN-08JAN90	Check speed control spring (A). BLANK66 -19-23OCT86
 M48134 -UN-08JAN90	Check shift control pivot (A). Check shift control cam bearing (B). Check shift control support cap screws (C).	ART NOT FOUND M48147 M48147 -UN-	Check shift arm capscrew (A).	**OK:** RETURN TO Power Train Operating Tests. **NOT OK:** Repair or replace as needed. RETURN TO: Power Train Operating Tests. BLANK67 -19-23OCT86

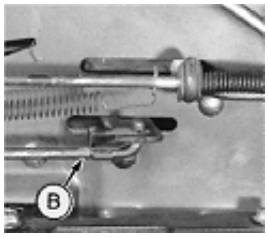
5 SHIFT CONTROL LINKAGE ADJUSTMENT

Engine OFF.

Shift lever in any forward speed.

Raise seat.

M49142 -UN-20DEC89



M49134 -UN-20DEC89

Loosen nuts (A).

Push shift rod (B) forward as far as it will go.

Tighten nuts (A).

RETURN TO: Power Train Operating Tests.

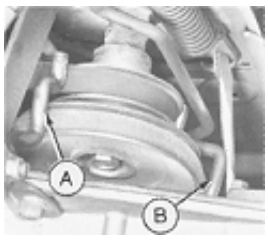
M22,25010G,4 -19-09DEC86

6 VARIATOR PRIMARY BELT GUIDES ADJUSTMENTS

Engine OFF.

Support rear of rider on stands.

Put control lever in 7th speed.



M48135 -UN-08JAN90

Adjust belt guide (A) for 2.0 to 4.0 mm (0.08 to 0.160 in.) clearance.

Adjust belt guide (B) for 1.0 mm (0.04 in.) maximum clearance, but not touching.

If belt guide (A) is positioned too close to belt and belt guide (B) positioned too far from belt, a chattering may be heard when drive in neutral or during clutch engagement or disengagement.

If belt guide (B) is positioned too close or touching belt, a ticking may be heard during forward or reverse operation.

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M48131 -UN-08JAN90

Adjust and/or bend belt guide (A) parallel to and 1.0 to 2.0 mm (.04 to .08 in.) clearance from belt.

RETURN TO: Power Train Operating Tests.

BLANK69 -19-23OCT86

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