TO THE READER

This Workshop Manual has been prepared to provide servicing personnel with information on the mechanism, service and maintenance of T1460 · T1560. It is divided into two parts, "Mechanism" and "Servicing" for each section.

■ **Mechanism**

Information on the construction and function are included. This part should be understood before proceeding with troubleshooting, disassembling and servicing.

■ **Servicing**

Under the heading "General" section comes general precautions, check and maintenance and special tools. Other section, there are troubleshooting, servicing specification lists, checking and adjusting, disassembling and assembling, and servicing which cover procedures, precautions, factory specifications and allowable limits.

All information, illustrations and specifications contained in this manual are based on the latest production information available at the time of publication.

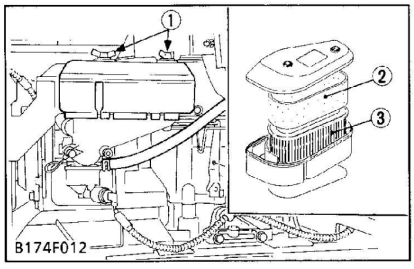
The right is reserved to make changes in all information at any time without notice.

December '94

[3] LUBRICANTS AND FUEL

Place	Capacity		Lubricants and fuel
	T1460	T1560	
Fuel tank	11.0 ℓ 2.9 U.S.gals. 2.4 Imp. gals.		Automobile unleaded gasoline **[Use of alcohol mixed gasoline (Gasohol)]** Use **"Gasohol"** only when the ethanol additive is less than 10 % of the fuel. The use of methanol additive is not recommended. Warranty does not apply to mechanical or performance problems arising from the use of **"Gasohol"**. For best results use unleaded fuel with a minimum of 87 octane.
Engine crankcase	1.3 ℓ 1.4 U.S.qts. 1.1 Imp.qts.		Engine oil : API service classification SE or SF Below 0 °C (32 °F) ····· SAE5W-20 Above 0 °C (32 °F) ····· SAE30
Hydrostatic transaxle	2.3 ℓ 2.4 U.S.qts. 2.0 Imp.qts.		Engine oil : API service classification CD or SG SAE 20W–50
Greasing			
Kingpin	Moderate amount		SAE multi-purpose type grease
Lubricating points			
PTO clutch wire	Moderate amount		Engine oil
Mower brake wire			
Speed change pedal shaft			
Mower links			
Center pin			
Throttle cable			
ATA PTO cable (T1560 only)			
ATA speed cable (T1560 only)			

(7) Check Points of Every 300 Hours

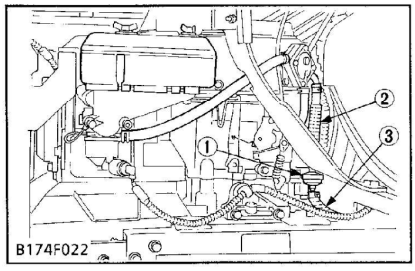


(1) Wing Screw
(2) Foam Element
(3) Paper Element

Changing Air Cleaner Element

1. Open the upper bonnet.
2. Remove the wing screws (1) and lift off complete air cleaner assembly.
3. Change the foam element (2) and paper element (3) every 300 hours or 3 years, whichever occurs first.

■ **NOTE**
- **Do not run the engine with air cleaner element removed.**



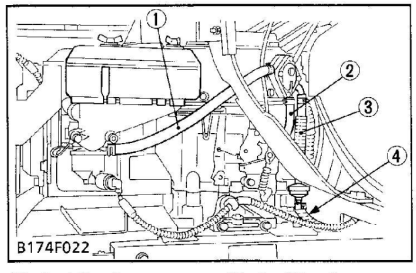
(1) Fuel Filter
(2) Fuel Pipe 2
(3) Fuel Pipe 1

Changing Fuel Filter

⚠ **CAUTION**
- **Be sure to stop the engine before changing fuel filter.**
- **Gasoline is extremely flammable. Do not smoke or allow flames or sparks in your working area. Clean up any spilled gasoline immediately.**

1. Change the fuel filter every 300 hours or 3 years, whichever occurs first.

■ **IMPORTANT**
- **When the fuel line is disconnected for maintenance or repair, close both ends of the fuel line with a piece of clean cloth or pin to prevent dust and dirt from entering.**



(1) Fuel Pipe 3
(2) Fuel Pipe 4
(3) Fuel Pipe 2
(4) Fuel Pipe 1

Changing All Fuel Lines

⚠ **CAUTION**
- **The fuel line is subject to wear and aging, fuel may leak out onto the running engine, causing a fire.**
- **Be sure to stop the engine before changing fuel lines.**
- **Gasoline is extremely flammable. Do not smoke or allow flames or sparks in your working area. Clean up any spilled gasoline immediately.**

1. Change the fuel pipes together with pipe clamps every 300 hours or 3 years, whichever occurs first.

■ **IMPORTANT**
- **When the fuel line is disconnected for maintenance or repair, close both ends of the fuel line with a piece of clean cloth or pin to prevent dust and dirt from entering.**

Checking and Adjusting Valve Clearance

1. See page 1-14.

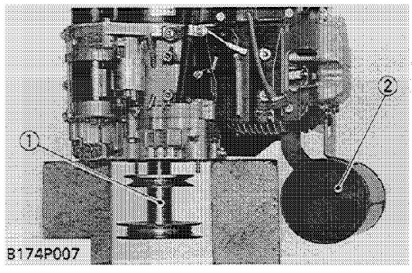
[Erratical Run]

Symptom	Probable Cause	Solution	Reference Page
Problem in fuel system. (lack of fuel)	• Entry of dust or water into fuel pipe or fuel filter.	Clean or replace	G-11, 12
	• Air or vapor lock in fuel line.	Remove	–
	• Plugged air vent of fuel tank cap.	Clean	–
	• Plugged air / fuel passages in carburetor.	Clean	1-44
	• Too little opening of carburetor pilot screw.	Correct	–
Problem in governor system.	• Incorrect governor linkage adjustment.	Correct	1-43
	• Faulty governor spring.	Replace	–
	• Governor gear assembly malfunction.	Replace	–
Engine knocks.	• Stale fuel.	Change	G-2
	• Excessive carbon deposit in engine.	Clean	–
	• Excessive engine load.	Adjust	–
	• Engine overheating.	See "Low Power"	1-6

[Excessive Fuel Consumption]

Is compression sufficient? **YES**	• Carburetor not properly adjusted.	Adjust	1-41, 42
	• Clogged air cleaner.	Clean	G-7, 9
	• High idling speed.	Adjust	1-41
	• Incomplete opening of choke valve.	Open	–
NO	• Worn piston / piston rings.	Replace	1-31, 32
	• Stuck piston rings.	Clean or replace	1-31, 32
	• Worn cylinder bore.	Bore or replace	1-30
	• Insufficient cylinder head tightening.	Retighten	1-20
	• Faulty contact of valve seat.	Lap	1-29
	• Plunged-up valve.	Adjust	1-28, 29
	• Warped cylinder head.	Repair or replace	–
	• Broken valve spring.	Replace	1-21, 27
	• Stuck valve.	Clean or grind	1-21
	• Burned cylinder head gasket.	Replace	1-20

(2) External Components



(1) Engine Pulley (2) Muffler

Engine Pulley and Muffler

1. Unscrew the engine pulley mounting screw, and remove the engine pulley (1).
2. Unscrew the muffler mounting nuts, and remove the muffler (2).

(When reassembling)

- Replace the muffler gasket with a new one.

Tightening torque	Engine pulley mounting screw	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 35.5 to 41.2 ft-lbs
	Muffler mounting nut	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 ft-lbs

Cylinder Cowling and Fan Cover

⚠ CAUTION

- **Gasoline is extremely flammable. Do not smoke or allow flames or sparks in your working area. Clean up any spilled gasoline immediately.**

1. Remove the fan guard (3), and remove the dust screen (1) and shim (10).
2. Remove the fuel pump (7), fuel pipe 3 (9) and fuel pipe 4 (8).
3. Remove the cylinder cowling 1 (5), fan cover (4), cylinder cowling 2 (2) and cylinder cowling 3 (6).
4. Remove the fan (12).

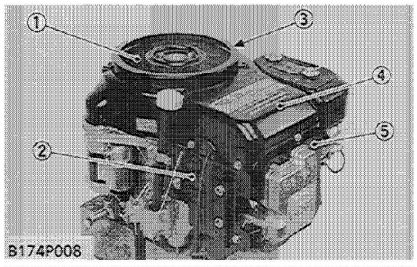
(When reassembling)

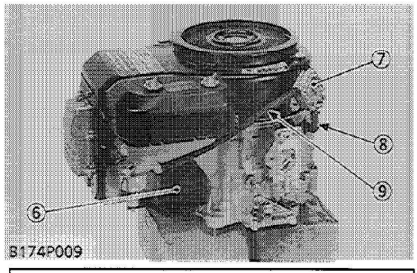
- Be sure to install the three collars (11) in the fan.
- Be sure to install the shim (10) on the fan (12).

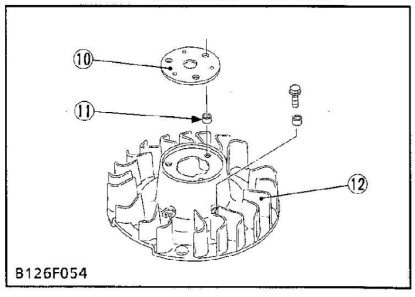
■ IMPORTANT

- **Check the clearance (ℓ) between the counter blade (13) and fan cover (4). If the measurement is out of the factory specification, adjust it by changing number of shim (10).**

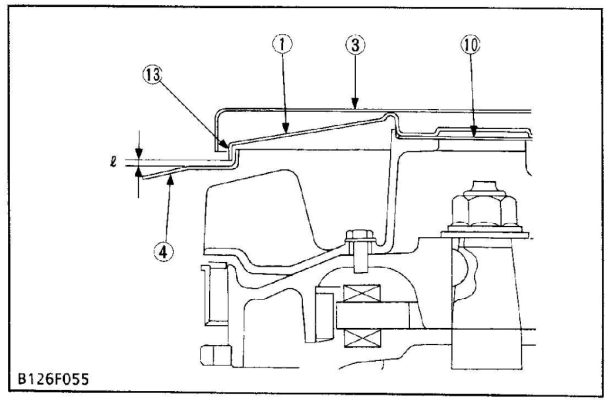
Clearance (ℓ) between the counter blade and fan cover	Factory spec.	Approx. 1.5 mm 0.059 in.

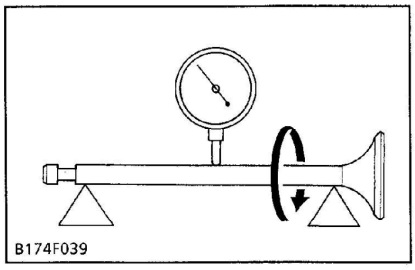






(1) Dust Screen
(2) Cylinder Cowling 2
(3) Fan Guard
(4) Fan Cover
(5) Cylinder Cowling 1
(6) Cylinder Cowling 3
(7) Fuel Pump
(8) Fuel Pipe 4
(9) Fuel Pipe 3
(10) Shim
(11) Collar
(12) Fan
(13) Counter Blade

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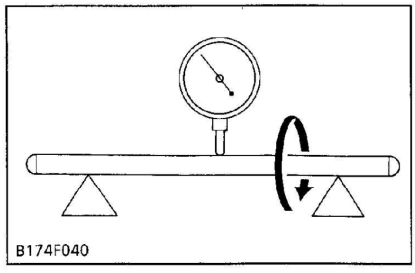
Valve Stem Runout

1. Place the valve on V blocks.
2. Measure the valve stem runout.
3. If the measurement exceeds the allowable limit, replace the valve.

Valve stem runout	Allowable limit	0.03 mm 0.0012 in.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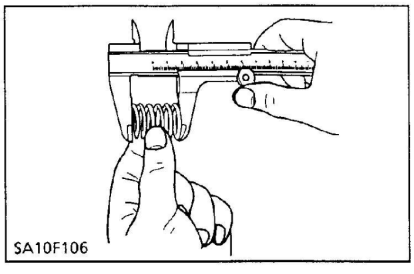
Push Rod Runout

1. Place the push rod on V blocks.
2. Measure the push rod runout.
3. If the measurement exceeds the allowable limit, replace the push rod.

Push rod runout	Allowable limit	0.30 mm 0.0118 in.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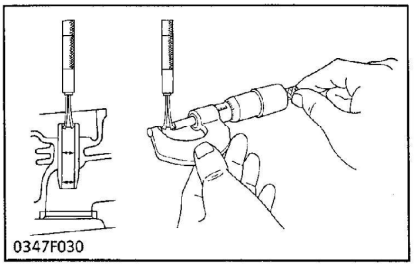
Valve Spring Free Length

1. Measure the valve spring free length with vernier calipers.
2. If the measurement is less than the allowable limit, replace it.

Intake and exhaust valve spring free length	Allowable limit	37.50 mm 1.4764 in.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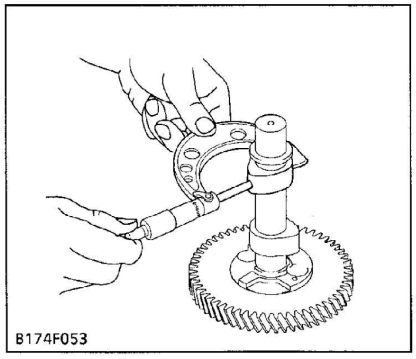
Valve Guide I. D.

1. Remove carbon from the valve guide section.
2. Measure the valve guide I.D. at three positions (see figure) with a small hold gauge.
3. If the measurement exceeds the allowable limit, replace the valve guide.

Intake and exhaust valve guide I.D.	Allowable limit	7.065 mm 0.27815 in.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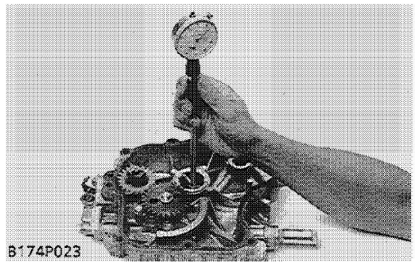
Cam Height

1. Measure the height of the cam at its highest point with an outside micrometer.
2. If the measurement is less than the allowable limit, replace the camshaft.

Cam heights of intake and exhaust	Allowable limit	36.750 mm 1.44685 in.

(5) Crankcase Cover and Crankcase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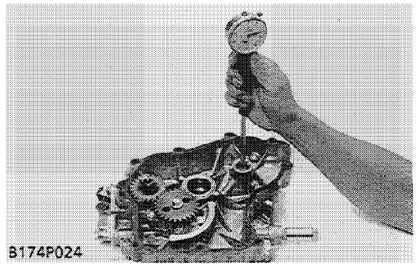
PTO Bearing I. D.

1. Measure the PTO (crankshaft) bearing I.D. with a cylinder gauge.
2. If the measurement exceeds the allowable limit, replace the crankcase cover.

PTO bearing I.D.	Allowable limit	35.069mm 1.38067 in.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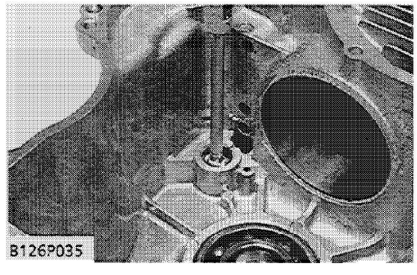
Camshaft Bearing I. D. (Crankcase Cover Side)

1. Measure the camshaft bearing I.D. with a cylinder gauge.
2. If the measurement exceeds the allowable limit, replace the crankcase cover.

Camshaft bearing I.D.	Allowable limit	21.076 mm 0.82976 in.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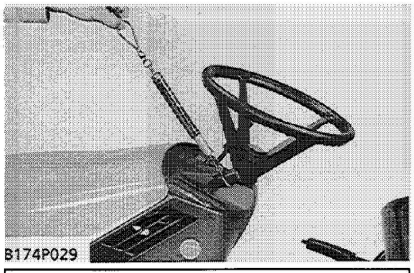
Camshaft Bearing I. D. (Crankcase Side)

1. Measure the camshaft bearing I.D. with a cylinder gauge.
2. If the measurement exceeds the allowable limit, replace the crankcase.

Camshaft bearing I.D.	Allowable limit	20.076 mm 0.79039 in.

[5] AUTO THROTTLE ADVANCE SYSTEM

CHECKING AND ADJUSTING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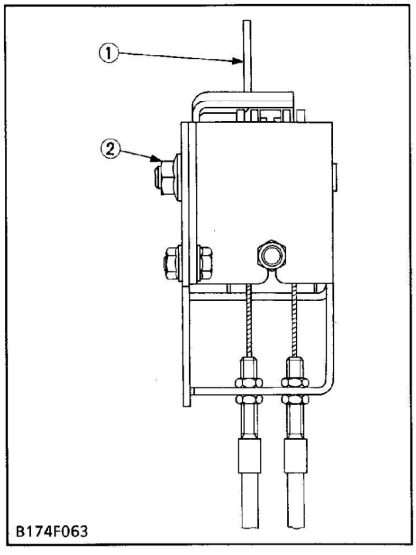

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Throttle Lever Operating Force

1. Set a spring balance at 20 mm (0.79 in.) below the tip of the throttle lever, and measure the operating force.
2. If the operating force is not within the factory specifications, turn the flange nut (2) to adjust.

Throttle lever operating force	Factory spec.	20 to 44 N 2.0 to 4.5 kgf 4.5 to 9.9 lbs

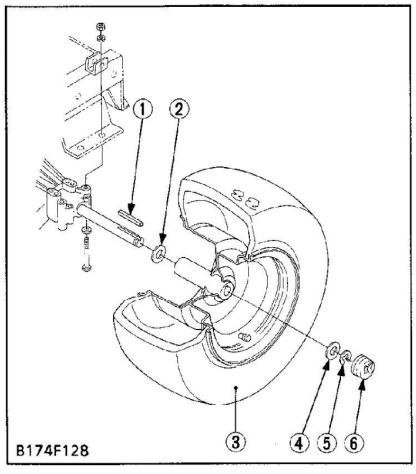
(1) Throttle Lever (2) Flange Nut

DISASSEMBLING AND ASSEMBLING

(1) Separating Hydrostatic Transaxle

Dismounting Mower

1. See page 9-5.



Rear Wheel

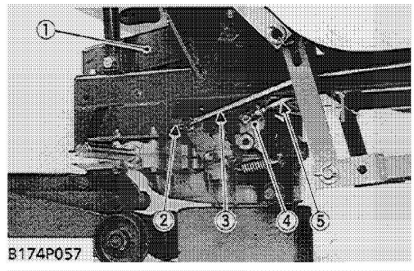
1. Support the frame and hydrostatic transaxle.
2. Remove the rear wheel cap (6).
3. Remove the retaining ring (5), and then remove the plain washer 2 (4), rear wheel (3), plain washer 1 (2) and key (1).

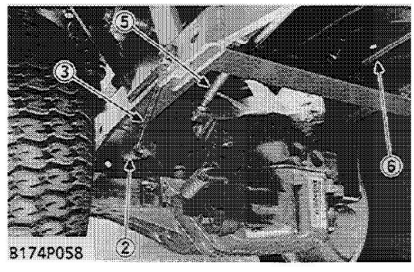
(When reassembling)

■ IMPORTANT

- **Apply grease to the rear axle.**
- **Replace the retaining ring (5) with a new one.**
- **After assembling the rear wheel, be sure to check the clearance between the plain washer 2 and retaining ring. (See page 2-16.)**

(1) Key
(2) Plain Washer 1
(3) Rear Wheel
(4) Plain Washer 2
(5) Retaining Ring
(6) Rear Wheel Cap





HST Belt, Speed Change Rod and Brake Rod

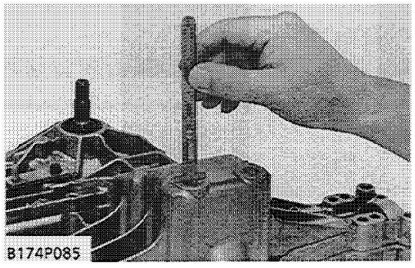
1. Remove the rear cover (1).
2. Remove the HST tension spring, and remove the HST belt (6) from the HST pulley.
3. Remove the brake return spring (2).
4. Pull out the cotter pin, and remove the brake rod (3).
5. Pull out the cotter pin, and remove the the speed change rod (5) from the speed change arm (4).

(When reassembling)

■ IMPORTANT

- **After assembling the brake rod, be sure to adjust the brake pedal play. (See page 3-2.)**
- **After assembling the speed change rod, be sure to adjust the length of rod. (See page 2-5.)**

(1) Rear Cover
(2) Brake Return Spring
(3) Brake Rod
(4) Speed Change Arm
(5) Speed Change Rod
(6) HST Belt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Start-Up Procedures

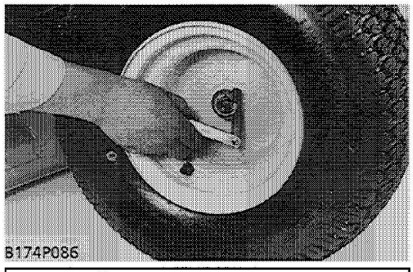
It is recommended that the unit be purged prior to installing into the vehicle frame. The following is the suggested purging procedures for repaired transaxles.

1. Fill the hydrostatic transaxle with a 20W-50 engine oil. The correct volume for fill should be 2.3 ℓ (2.4 U.S.qts., 2.0 Imp.qts.).
2. Spin the input shaft in a clockwise direction at 1000 to 1500 min^{-1} (1000 to 1500 rpm). This may be performed in a drill press (or equivalent).
3. Engage (actuate) the bypass.
4. Stroke the control lever (trunnion arm) forward for five seconds and then reverse for five seconds. Do this three times in each direction.
5. Return the control lever (trunnion arm) to neutral.
6. Disengage the bypass.
7. Stroke the control lever (trunnion arm) forward for five seconds and then reverse for five seconds. Do this three times in each direction.
8. Check the oil level after fully purging the unit of air. It should be between 32 mm and 42 mm (1.25 in. and 1.62 in.) from the top of the housing.

■ **NOTE**

- **It may be necessary to repeat these steps in the vehicle to fully purge the hydrostatic transaxle.**

SERVICING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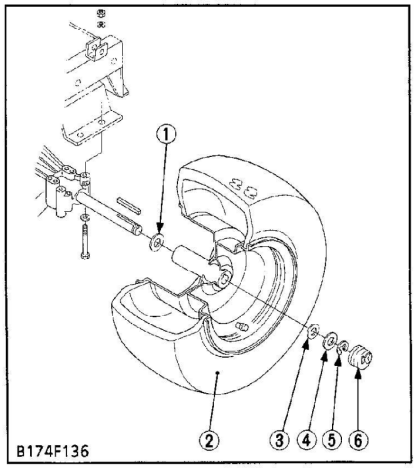
Clearance between Plain Washer 2 and Retaining Ring

1. Lift up the rear of vehicle with a jack.
2. Remove the rear wheel cap (6).
3. Measure the clearance between plain washer 2 (4) and retaining ring (5).
4. If the measurement exceeds the allowable limit, adjust the clearance with plain washers 2, 3, 4.

Clearance between plain washer 2 and retaining ring	Allowable limit	0.76 mm 0.030 in.

(Reference)

- Thickness of plain washer 2 : 3.25 mm (0.128 in.)
- Thickness of plain washer 3 : 0.76 mm (0.030 in.)
- Thickness of plain washer 4 : 2.26 mm (0.089 in.)



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(1) Plain Washer 1
(2) Rear Wheel
(3) Plain Washer 3 or Plain Washer 4
(4) Plain Washer 2
(5) Retaining Ring
(6) Rear Wheel Cap

TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Cannot steer	• Broken steering shaft and sector gear.	Replace	5-4
	• Broken steering linkage.	Replace	–
Hard steering.	• Stuck steering shaft and sector gear.	Replace	5-4
	• Stuck bearing.	Replace	–
	• Improper front alignment.	Adjust	4-2
	• Insufficient tire pressure.	Inflate	G-5

SERVICING SPECIFICATIONS

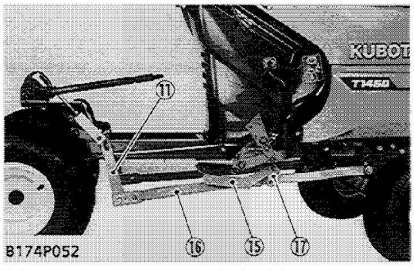
Item		Factory Specification	Allowable Limit
Steering Wheel	Play	20 to 30 mm 0.79 to 1.18 in.	50 mm 1.97 in.

TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-3)

Item	N·m	kgf·m	ft-lbs
PTO clutch lever mounting screw	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Parking lock pedal mounting screw	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Panel mounting screw	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Steering support mounting screw	48.1 to 55.9	4.9 to 5.7	35.5 to 41.2
Drag link mounting nut	74.8 to 81.3	7.64 to 8.30	55.2 to 60.0
Shaft retainer mounting screw	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Sector gear mounting screw	48.1 to 55.9	4.9 to 5.7	35.5 to 41.2

(2) Lift Linkage



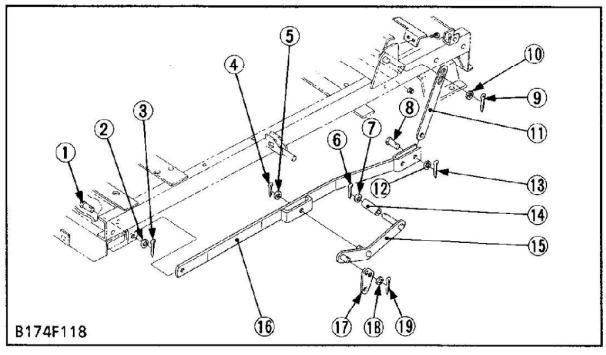
(1) Clevis Pin
(2) Plain Washer
(3) Cotter Pin
(4) Cotter Pin
(5) Plain Washer
(6) Cotter Pin
(7) Plain Washer
(8) Clevis Pin
(9) Cotter Pin
(10) Plain Washer
(11) Link 2
(12) Plain Washer
(13) Cotter Pin
(14) Collar
(15) Link 3
(16) Link 1
(17) Link 4
(18) Plain Washer
(19) Cotter Pin

Link Assembly

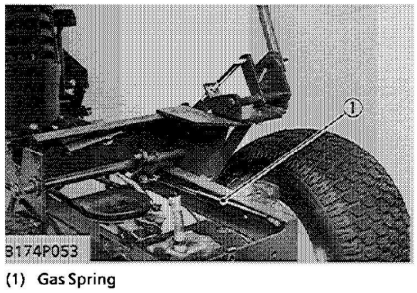
1. Pull out the cotter pins (3), (13).
2. Remove the plain washers (2), (12) and clevis pins (1), (8), and then remove the link assembly (link 1, link 3 and link 4).
3. Pull out the cotter pin (4), and remove the plain washer (5) and link 3 (15) from the link 1 (16).
4. Pull out the cotter pin (19), and remove the plain washer (18) and link 4 (17) from the link 3 (15).
5. Pull out the cotter pin (9), and remove the plain washer (10) and link 2 (11).

(When reassembling)

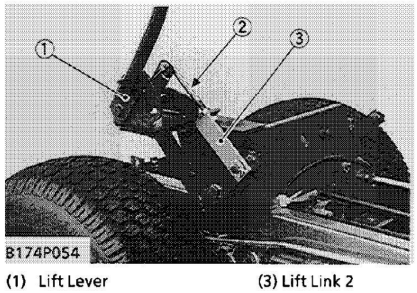
- Apply grease to the collar (14).
- Be sure to pay attention to how to assemble the link 4.
- Be sure to pay attention to how to assemble the link 1.



(3) Lift Lever



(1) Gas Spring



(1) Lift Lever
(2) Lift Link 1
(3) Lift Link 2

Gas Spring

1. Set the lift lever to **"LIFT"** position.
2. Unscrew the gas spring mounting nuts, and remove the gas spring (1).

(When reassembling)

- Before installing the gas spring, set the lift lever to **"LIFT"** position.

Tightening torque	Gas spring mounting nut	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 ft-lbs

Lift Link and Lift Lever

1. Pull out the cotter pins and remove the lift link assembly (lift link 1 and lift link 2).
2. Unscrew the lift lever mounting screws, and remove the lift lever (1).

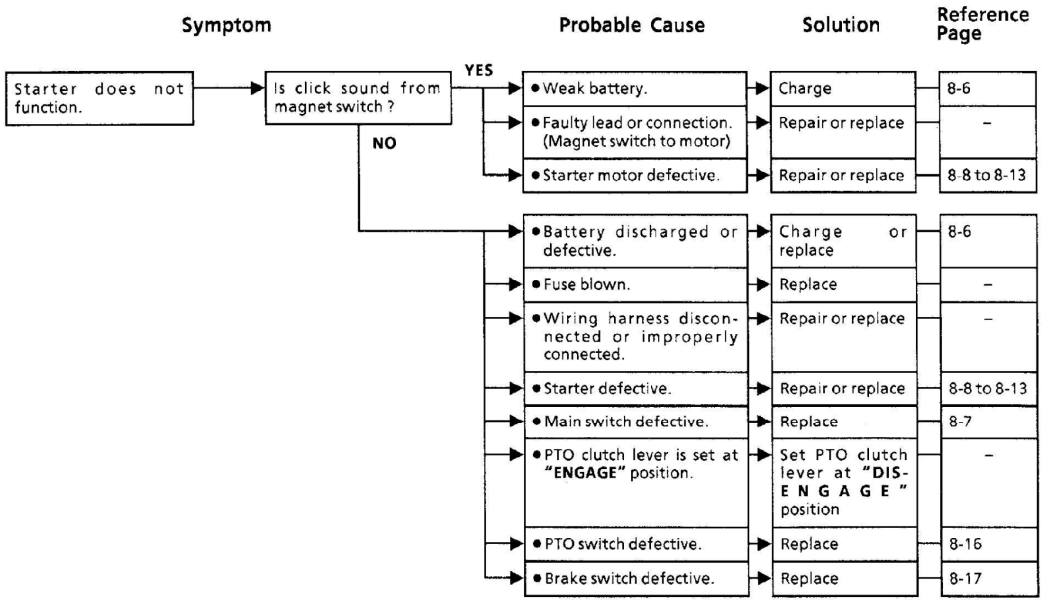
(When reassembling)

■ IMPORTANT

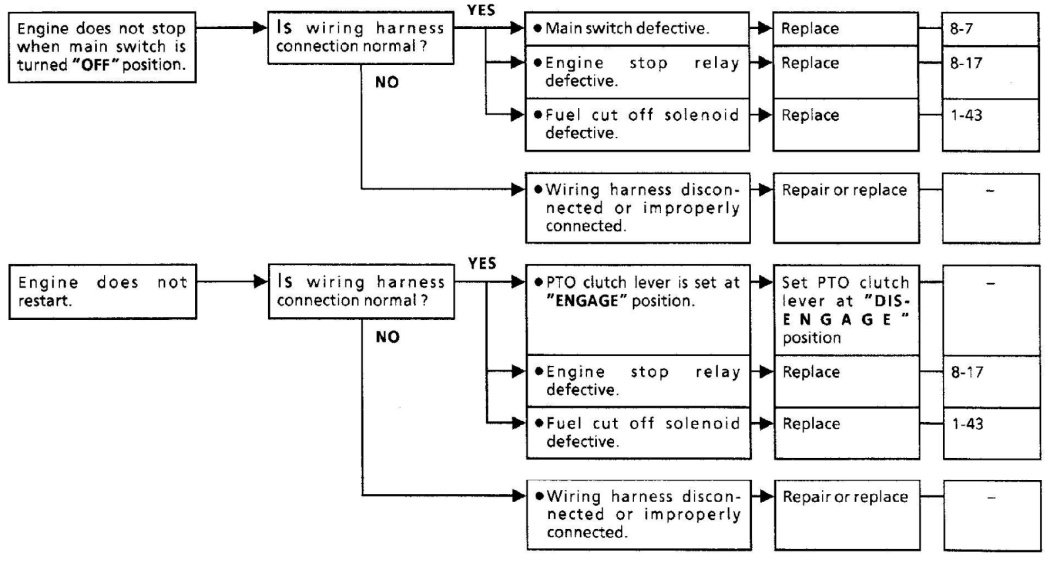
- **After assembling the lift link assembly, be sure to adjust the lift link length. (See page 6-3.)**

Tightening torque	Lift lever mounting screw	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 ft-lbs

[Starting System]

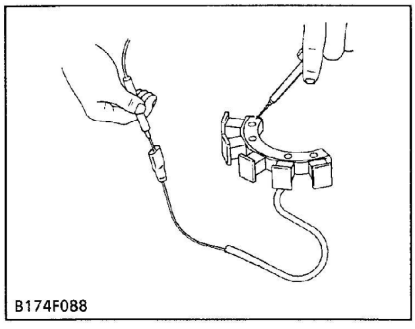


[Engine Key Switch Shut-off System]



[3] CHARGING SYSTEM

CHECKING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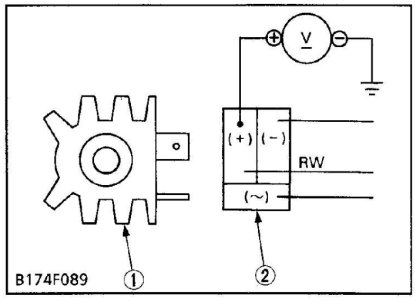
Charging Coil

1. Turn the main switch off.
2. Disconnect the 1P connector between the charging coil and regulator.
3. Measure the resistance with an ohmmeter across the 1P connector (Black) (2) and chassis.
4. If the resistance value specified below is not indicated, the charging coil is faulty.

Resistance	Factory spec.	0.81 to 1.21 Ω

(1) Charging Coil (2) 1P Connector



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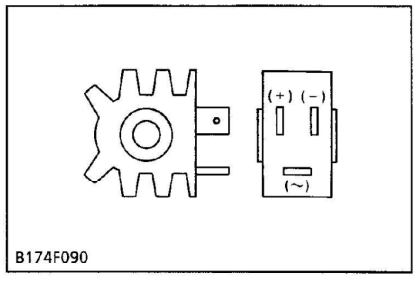
Regulator

1) Connector Voltage

1. Turn the main switch off.
2. Open the bonnet and disconnect the 3P connector (2) from the regulator (1).
3. Measure the voltage with a voltmeter across the + terminal (Red / White) (2) and chassis.
4. If the voltage differs from battery voltage, the wiring harness is faulty.

Voltage (+ terminal – Chassis)	Factory spec.	Battery voltage

(1) Regulator (2) 3P Connector



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2) Terminal Continuity

1. Remove the regulator.
2. Measure the resistance with an ohmmeter across terminals of the regulator.
3. If the resistance values specified below are not indicated, the regulator is faulty.

■ **NOTE**

- **Use a 1.5 volt ohmmeter, and set the selector switch to R × 1 kΩ position.**

Ohmmeter (+) probe / Ohmmeter (−) probe	~ terminal	− terminal	+ terminal
~ terminal		∞	0.5 to 2.0 kΩ
− terminal	∞		∞
+ terminal	∞	∞	