# 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**

## ⚠ SAFETY FIRST

This symbol, the industry's "Safety Alert Symbol", is used throughout this manual and decals on the machine itself to warn of the possibility of personal injury. Read these instructions carefully.
It is essential that you read the instructions and safety regulations before you attempt to repair or use this unit.

⚠ **DANGER** : Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ **WARNING** : Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ **CAUTION** : Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

■ **IMPORTANT** : Indicates that equipment or property damage could result if instructions are not followed.

■ **NOTE** : Gives helpful information.

## SAFETY SERVICING AND REPAIRING

(1) Before working on the vehicle :
- Park the vehicle on a firm and level ground, and set the parking brake.
- Lower the mower to the ground.
- Stop the engine, and remove the key.
- Disconnect the battery's ground cable.
- Clean the work area and vehicle.

(2) Do not work on the vehicle while under the influence of alcohol, medication, or other substances or while fatigued.
(3) Do not wear a necktie, scarf, necklace, loose or bulky clothing when you work near machine tools or moving parts.
(4) Use tools appropriate to the work. Makeshift tools, parts, and procedures will not make good repairs.
(5) When servicing is performed together by two or more persons, take care to perform all work safely.
(6) Do not work under the vehicle that is supported solely by a jack. Always support the vehicle by safety stands.

(7) If the engine must be running to do some work, make sure the area is well ventilated. Never run the engine in a closed area. The exhaust gas contains poisonous carbon monozide.
(8) Do not touch the rotating or hot parts and high tension cord while the engine is running.
(9) Fuel is extremely flammable and explosive under certain conditions. Do not smoke or allow flames or sparks in your working area.
(10) To avoid sparks from an accidental short circuit, always disconnect the battery's ground cable first and connect it last.
(11) Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, clothing and cause blindness if splashed into eyes. Keep electrolyte away from eyes, hands and clothing. If you spill electrolyte on yourself, flush with water, and get medical attention immediately.
(12) Battery gas can explode. Keep sparks and open flame away from the top of battery, especially when charging the battery.
(13) Do not start the engine by shorting across starter terminals.
(14) Unauthorized modifications to the vehicle may impair the function and / or safety and affect vehicle life.
(15) Do not alter or remove any part of vehicle safety system.
(16) Keep a first aid kit and fire extinguisher handy at all times.

# SAFETY OPERATION

## [BEFORE OPERATION]

(1) Read the "OPERATOR'S MANUAL" carefully. Be thoroughly familiar with the controls and the proper use of the equipment.
(2) Do not wear loose, bulky clothing when operating the vehicle. Do wear safety shoes and eye protection.
(3) Do not operate the vehicle while under the influence of alcohol, medication, or other substances or while fatigued.
(4) Never allow children or inadequately trained persons to operate the vehicle. Keep everyone, especially children and pets, away from the area of operation.
(5) Thoroughly inspect the area where the vehicle is to be used. Remove all sticks, stones, bottles, cans, wires, etc.
(6) Remove all debris (string, wire or cords) which might wrap around blade shafts.
(7) Keep all shields and safety devices in place. If a shield, safety device or decal is missing, defective or damaged, repair or replace it before operating.
(8) Use only implements, attachments and accessories approved by KUBOTA.
(9) Fuel is very flammable. Handle fuel carefully.

- Properly use an approved safety container.
- Refuel the vehicle outdoors.
- Shut off engine and allow it to cool before refueling.
- Do not refuel the vehicle while smoking or when near open flame or sparks.
- Do not overflow fuel while filling fuel tank.
- Install the fuel tank cap securely, and clean up any spilled fuel before starting the engine.

## [OPERATION]

(1) Operate the vehicle only in daylight or in good artificial light.
(2) Do not run the engine in a closed area without adequate ventilation.
(3) Before starting the engine, make sure that all shift levers are in neutral positions or in disengaged positions.
(4) Never start the engine while standing on ground. Start the engine only from operator's seat.
(5) Be alert when operating. To prevent loss of control :
- Watch for holes in the terrain or other hidden hazards.
- Do not drive close to ditches, creeks, or other hazardous areas.
- Reduce speed when making sharp turns.
- Avoid sudden stops and starts.
- Before backing up, look to the rear to make sure no people or obstacles are behind you or the vehicle.

(6) Keep side discharge chute, mulching plate or grass catcher (option) in place.
(7) Do not discharge clippings toward people or objects.
(8) Do not put hands or feet near or under mower deck.
(9) Shut the engine off and wait for all movement to stop before removing grass catcher or unclogging discharge chute.
(10) Adjust cutting height only when engine is stopped and mower blades have stopped turning.
(11) Mow across the face of slopes — never up and down. Exercise extreme caution when changing direction on slopes. Do not mow excessively steep slopes.
(12) To reduce fire hazards, keep the engine exhaust area free of grass or leaves.
(13) Disengage power to the mower blades before crossing gravel drives, walks, or roads.
(14) If the vehicle should start to vibrate abnormally, stop the engine and check immediately for the cause. Vibration is generally a warning of trouble.
(15) After striking a foreign object, stop the engine immediately and thoroughly inspect the vehicle for any damage. Repair damage before restarting and operating the vehicle.
(16) Before leaving the operator's position :
- All shift levers are in neutral positions or in disengaged positions.
- Shut off engine, and remove the key.

## [TRANSPORTING]

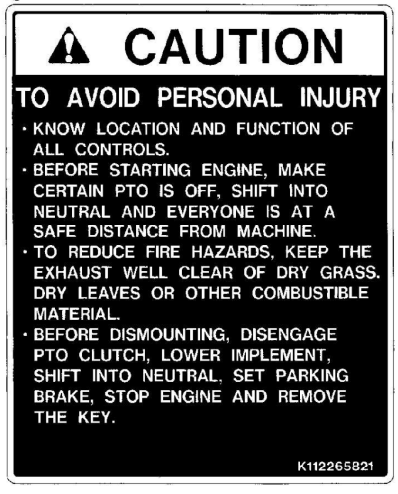
(1) Disengage power to the mower blades, implements and attachments before transporting the vehicle.
(2) Do not tow this vehicle.
(3) Do not use this vehicle on public roads. If you must transport it, use a pick-up truck, trailer, or other suitable vehicle and ramp.
(4) Tie the vehicle down securely before transporting on public roads.

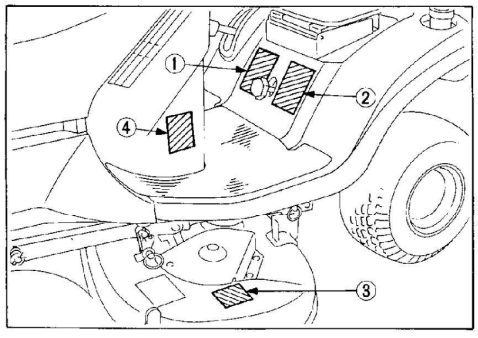
# SAFETY DECALS

- The following safety decals are installed on the vehicle and mower.
  If a decal becomes damaged, illegible or is not on the vehicle and mower, replace it. The decal part number is listed in the parts list.

① Part No. K1122-6581-1


② Part No. K1122-6582-1

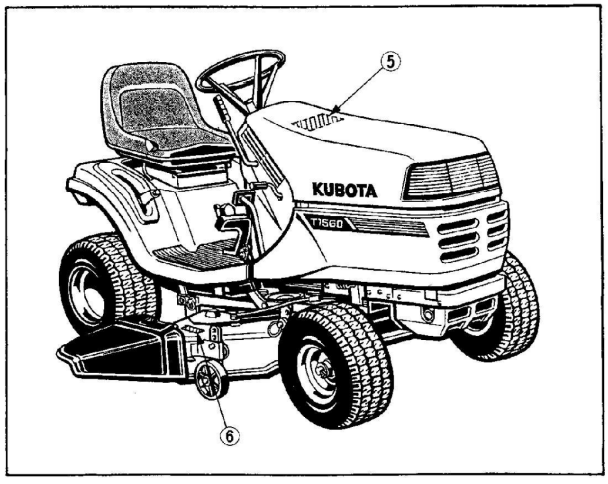



③ Part No. K5112-7312-1

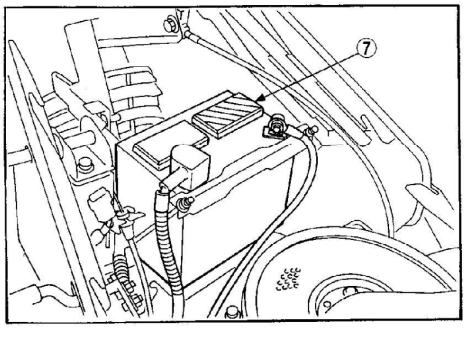

④ Part No. K1122-6584-1


B174F001

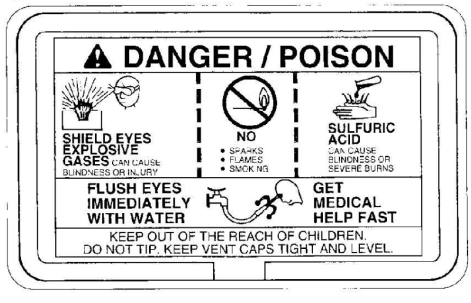



⑤ Part No. K1122-6583-1


⑥ Part No. K5112-7311-1


⑦ Part No. K1122-6115-1

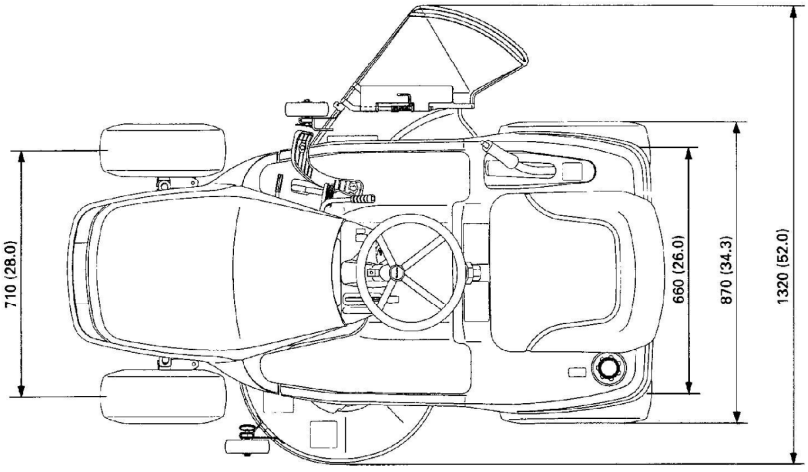


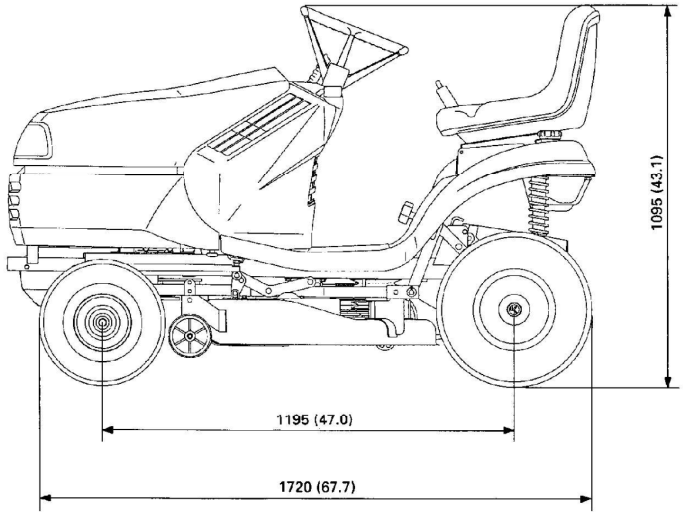

B174F002

# SPECIFICATIONS

| Model | | | T1460 | T1560 |
|---|---|---|---|---|
| Engine | Model | | GH410V | GH420V |
| | Type | | Forced air-cooled, Vertical shaft OHV, 4-stroke gasoline engine | |
| | Number of cylinders | | 1 | |
| | Bore and stroke | | 89 mm × 68 mm (3.50 in. × 2.68 in.) | |
| | Total displacement | | 423 cm³ (25.8 cu.in.) | |
| | Maximum horsepower | | 9.3 kW / 3600 min⁻¹ (12.5 HP / 3600 rpm) | 10.4 kW / 3600 min⁻¹ (14.0 HP / 3600 rpm) |
| | Maximum torque | | 29.2 N·m / 2300 min⁻¹ (2.98 kgf·m / 2300 rpm, 21.6 ft-lbs / 2300 rpm) | 30.6 N·m / 2300 min⁻¹ (3.12 kgf·m / 2300 rpm, 22.6 ft-lbs / 2300 rpm) |
| | Maximum bare speed | | 3350 ± 50 min⁻¹ (3350 ± 50 rpm) | |
| | Minimum bare idling speed | | 1550 ± 75 min⁻¹ (1550 ± 75 rpm) | |
| | Direction of rotation | | Counterclockwise facing the PTO shaft | |
| | Compression ratio | | 8.4 : 1 | |
| | Ignition system | | Flywheel magneto transistor type | |
| | Spark plug | | Champion RN11YC | |
| | Carburetor | | Float type with fixed main jet | |
| | Air cleaner | | Semi-cyclone type with dual element | |
| | Governor | | Mechanical flyweight type | |
| | Lubricating system | | Forced lubrication by oil pump | |
| | Cooling system | | Forced air cooling | |
| | Starting system | | Electric starter (12 V, 0.6 kW) | |
| | Charging system | | Charging coil (12 V, 3 A) | |
| | Battery | | U1L-9 (12 V, 300 CCA) | |
| | Throttle system | | Manual | ATA (Auto Throttle Advance) |
| | Engine stop system | | Key stop | |
| Capacities | Fuel tank | | 11.0 ℓ (2.9 U.S.gals., 2.4 Imp. gals.) | |
| | Engine crankcase | | 1.3 ℓ (1.4 U.S.qts., 1.1 Imp.qts.) | |
| | Hydrostatic transmission | | 2.3 ℓ (2.4 U.S.qts., 2.0 Imp.qts.) | |
| Dimensions | Overall length | | 1720 mm (67.7 in.) | |
| | Overall width | | 1320 mm (52.0 in.) | |
| | Overall height | | 1095 mm (43.1 in.) | |
| | Wheel base | | 1195 mm (47.0 in.) | |
| | Tread | Front | 710 mm (28.0 in.) | |
| | | Rear | 660 mm (26.0 in.) | |
| Weight (with mower) | | | 240 kg (529.1 lbs) | |
| Tire size | Front | | 15 × 6.00 - 6 | |
| | Rear | | 18 × 8.50 - 8 | |
| Steering system | | | Sector gear type | |
| Transmission | | | Hydrostatic transmission | |
| Brake | | | Internal disk type | |
| Traveling speed | Forward | | 0 to 9.0 km / h (0 to 5.6 mph) | |
| | Reverse | | 0 to 4.0 km / h (0 to 2.5 mph) | |
| PTO clutch | | | Belt tension | |
| Mower | Model | | RCK40LT | |
| | Overall length | | 835 mm (32.9 in.) | |
| | Overall width | | 1320 mm (52.0 in.) | |
| | Overall height | | 260 mm (10.2 in.) | |
| | Mounting method | | Parallel linkage | |
| | Adjustment of cutting height | | Dial gauge | |
| | Cutting width | | 1016 mm (40 in.) | |
| | Cutting height | | 25 to 102 mm (1.0 to 4.0 in.) | |
| | Number of blades | | 2 | |
| | Weight (Approx.) | | 43 kg (94.8 lbs) | |
| | Discharge | | Right side | |

# DIMENSIONS




B174F003

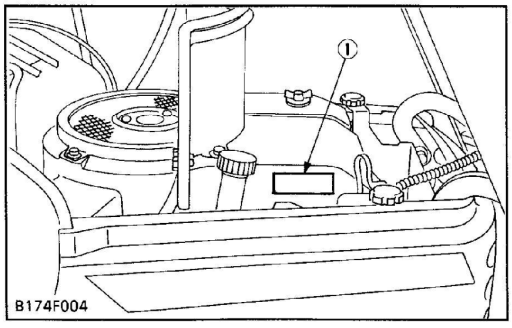
Unit : mm (in.)

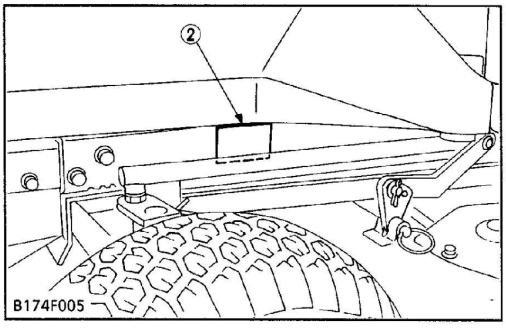
# G GENERAL

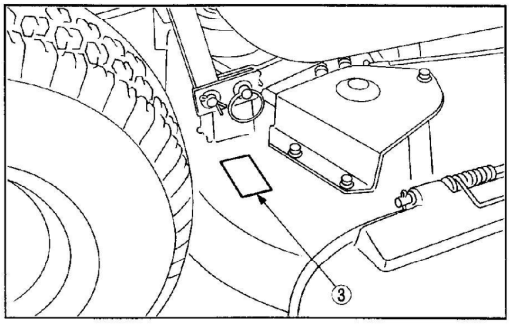
## CONTENTS

## [1] UNIT IDENTIFICATION

When contacting your local KUBOTA distributor, always specify engine serial number, vehicle serial number and mower serial number.

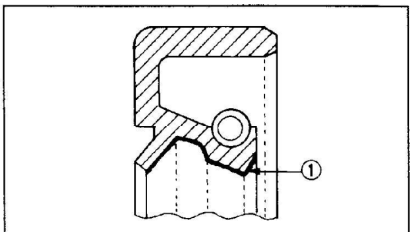


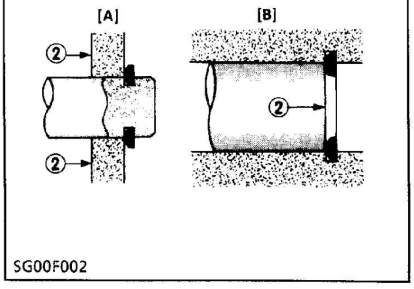




(1) Engine Serial Number
(2) Vehicle Serial Number
(3) Mower Serial Number

## [2] GENERAL PRECAUTIONS




- During disassembly, carefully arrange removed parts in a clean area to prevent confusion later. Screws, bolts and nuts should be installed in their original position to prevent reassembly errors.
- When special tools are required, use KUBOTA genuine special tools. Special tools which are not frequently used should be made according to the drawings provided.
- Before disassembling or servicing electrical wires, always disconnect the ground cable from the battery first.
- Remove oil and dirt from parts before measuring.
- Use only KUBOTA genuine parts for parts replacement to maintain machine performance and to assure safety.
- Gaskets and O-rings must be replaced during reassembly.
- Apply grease to new O-rings or oil seals before assembling. See the figure left side.
- When reassembling external snap rings or internal snap rings, they must be positioned so that sharp edge faces against the direction from which a force is applied. See the figure left side.

(1) Grease
(2) Force

**[A] External Snap Ring**
**[B] Internal Snap Ring**

## [3] LUBRICANTS AND FUEL

| Place | Capacity | | Lubricants and fuel |
|---|---|---|---|
| | T1460 | T1560 | |
| Fuel tank | 11.0 ℓ<br>2.9 U.S.gals.<br>2.4 Imp. gals. | | Automobile unleaded gasoline<br>**[Use of alcohol mixed gasoline (Gasohol)]**<br>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"**.<br>For best results use unleaded fuel with a minimum of 87 octane. |
| Engine crankcase | 1.3 ℓ<br>1.4 U.S.qts.<br>1.1 Imp.qts. | | Engine oil : API service classification SE or SF<br>Below 0 °C (32 °F) ····· SAE5W-20<br>Above 0 °C (32 °F) ····· SAE30 |
| Hydrostatic transaxle | 2.3 ℓ<br>2.4 U.S.qts.<br>2.0 Imp.qts. | | Engine oil : API service classification CD or SG<br>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) | | | |

## [4] TIGHTENING TORQUES (GENERAL USE SCREWS, BOLTS AND NUTS)

Screws, bolts and nuts whose tightening torques are not specified in this Workshop Manual should be tightened according to the table below.

### (1) Metric Screws, Bolts and Nuts

| Grade / Unit / Nominal Diameter | GR. 8.8 * (8.8) | | | GR. 10.9 * (10.9) | | |
|---|---|---|---|---|---|---|
| | N·m | kgf·m | ft-lbs | N·m | kgf·m | ft-lbs |
| M 8 | 23.6 to 27.4 | 2.4 to 2.8 | 17.4 to 20.2 | 29.4 to 34.3 | 3.0 to 3.5 | 21.7 to 25.3 |
| M10 | 48.1 to 55.8 | 4.9 to 5.7 | 35.5 to 41.2 | 60.8 to 70.5 | 6.2 to 7.2 | 44.9 to 52.1 |
| M12 | 77.5 to 90.1 | 7.9 to 9.2 | 57.2 to 66.5 | 103 to 117 | 10.5 to 12.0 | 76.0 to 86.8 |
| M14 | 124 to 147 | 12.6 to 15.0 | 91.2 to 108 | 167 to 196 | 17.0 to 20.0 | 123 to 144 |
| M16 | 196 to 225 | 20.0 to 23.0 | 145 to 166 | 260 to 303 | 26.5 to 31.0 | 192 to 224 |

* The figures on the table above are indicated the top of screw or bolt.

### (2) American Standard Screws, Bolts and Nuts with UNC or UNF Threads

| Grade / Unit / Nominal Diameter | GR. 5 * ( ) | | | GR. 8 * ( ) | | |
|---|---|---|---|---|---|---|
| | N·m | kgf·m | ft-lbs | N·m | kgf·m | ft-lbs |
| 5/16 | 23.1 to 27.8 | 2.35 to 2.84 | 17.0 to 20.5 | 32.5 to 39.3 | 3.31 to 4.01 | 24 to 29 |
| 3/8 | 47.5 to 57.0 | 4.84 to 5.82 | 35 to 42 | 61.0 to 73.2 | 6.22 to 7.47 | 45 to 54 |
| 1/2 | 108.5 to 130.2 | 11.07 to 13.29 | 80 to 96 | 149.2 to 179.0 | 15.22 to 18.27 | 110 to 132 |
| 9/16 | 149.2 to 179.0 | 15.22 to 18.27 | 110 to 132 | 217.0 to 260.4 | 22.14 to 26.57 | 160 to 192 |
| 5/8 | 203.4 to 244.1 | 20.75 to 24.91 | 150 to 180 | 298.3 to 358.0 | 30.44 to 36.53 | 220 to 264 |

* The figures on the table above are indicated the top of screw or bolt.

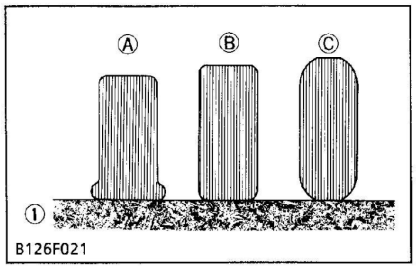
## [5] MAINTENANCE CHECK LIST

To keep the machine working in good condition as well as to avoid any accident and trouble, carry out periodic inspection and maintenance. Check the following points before use.

| Service Interval | Check Points | Reference Page |
|---|---|---|
| Daily (Each use) | | |
| [Walking around the machine] | • Check the tire pressure, wear and damage | G-5 |
| | • Check the oil leaks | — |
| | • Check the engine oil level | G-5 |
| | • Check the fuel level | — |
| | • Check the damage of machine body, tightness of all screws, bolts and nuts | — |
| | • Check the dust screen | G-5 |
| | • Check the brake play | 3-2 |
| | • Check the battery electrolyte level | G-6 |
| [While sitting in the operator's seat] | • Check the speed change pedal and brake pedal | 2-5, 3-2 |
| | • Check the parking brake | 3-2 |
| | • Check the steering wheel | 5-2 |
| [Turning the key switch on] | • Check the head lights | — |
| [Starting the engine] | • Check the color of the exhaust fumes | — |
| | • Check the safety start switch and seat safety control | G-6 |
| | • Check for abnormal noise and vibration | — |
| [Mower] | • Make sure blade screws are tight | 9-7 |
| | • Check the blades for wear or damage | 9-3 |
| | • Check all hardware | — |
| | • Make sure all pins are in place | — |
| [Others] | • Check the areas where previous trouble was experienced | — |
| Initial 25 Hours | • Grease all grease nipples | G-7 |
| | • Check all belts | G-7 |
| | • Check the PTO belt tension | 7-2 |
| | • Check and adjust the brake play | 3-2 |
| Every 25 Hours | • Clean the air cleaner foam element | G-7 |
| | • Oiling | G-8 |
| Initial 50 Hours | • Change the engine oil | G-9 |
| Every 50 Hours | • Clean the air cleaner paper element | G-9 |
| | • Check the battery electrolyte gravity | 8-6 |
| | • Check all belts | G-7 |
| | • Check the PTO belt tension | 7-2 |
| | • Check and adjust the brake play | 3-2 |
| | • Grease all grease nipples | G-7 |
| Every 100 Hours | • Change the engine oil | G-9 |
| | • Clean the engine's cooling fins | G-10 |
| | • Check the spark plug | G-10 |
| | • Check the fuel filter | G-11 |
| | • Clean the fuel tank | G-11 |
| | • Check and adjust the throttle cable | 1-43 |
| | • Check and adjust the ATA PTO cable | 1-48 |
| | • Check and adjust the ATA speed cable | 1-49 |
| Every 300 Hours | • Change the air cleaner element (paper element and foam element) | G-12 |
| | • Change the fuel filter | G-12 |
| | • Change all fuel lines | G-12 |
| | • Check and adjust the valve clearance | 1-14 |

# [6] CHECK AND MAINTENANCE

## (1) Check Points of Daily or Each Use

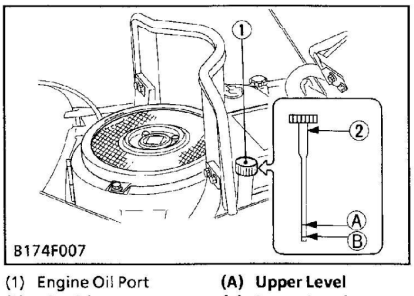



(1) Ground
(A) Insufficient
(B) Normal
(C) Excessive

### Checking Tire Pressure

1. Check the wear and damage of tires.
2. Check the tire pressure.
3. If insufficient, add air.

| | | |
|---|---|---|
| Tire pressure | Front | 100 kPa<br>1.0 kgf/cm²<br>14 psi |
| | Rear | 70 kPa<br>0.7 kgf/cm²<br>10 psi |




(1) Engine Oil Port
(2) Dipstick
(A) Upper Level
(B) Lower Level

### Checking Engine Oil Level

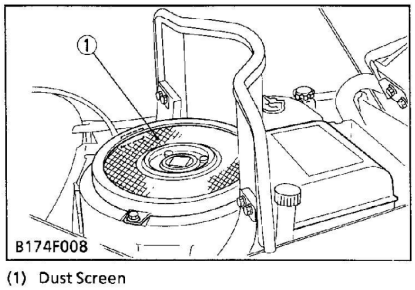
**⚠ CAUTION**

- **Be sure to stop the engine before checking the engine oil level.**

1. Park the vehicle on a level ground.
2. Check engine oil level before starting the engine or wait at least 5 minutes after the engine has stopped.
3. To check the oil level, remove the dipstick (2), wipe it clean, replace it WITHOUT SCREWING IT IN, and draw it out again. Check to see that the oil level is between the two marks.
4. Add new oil to the prescribed level at the oil port if necessary.

**■ IMPORTANT**

- **Use the specified engine oil.**
  **Refer to "LUBRICANTS AND FUEL". (See page G-2.)**
- **When using new oil of a different maker or viscosity from the previous one, drain all used oil.**
  **Never mix two different types of oil.**




(1) Dust Screen

### Checking Dust Screen

**⚠ CAUTION**

- **Be sure to stop the engine before checking or cleaning dust screen.**

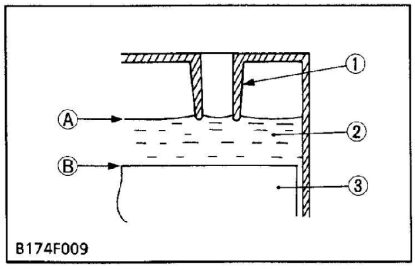
**■ IMPORTANT**

- **Dust screen must be clear of debris to prevent engine from overheating.**

1. Lift the bonnet and check that the dust screen is clear of grass clippings and debris.
2. If screen is dirty, clean the screen with a brush or cloth.
3. If dust or chaff is accumulated inside the panel, clean the inside of the panel completely.

### Checking Brake Play

1. See page 3-2.




(1) Vent Well
(2) Electrolyte
(3) Separator
(A) Upper Level
(B) Lower Level

## Checking Battery Electrolyte Level

**⚠ CAUTION**

- **Never remove the battery cap while the engine is running. Keep electrolyte away from eyes, hands and clothes. If you are spattered with it, wash it away completely with water immediately.**
- **Keep open sparks and flames away from the battery at all times. Hydrogen gas mixed with oxygen becomes very explosive.**

1. Make sure each electrolyte level is to the bottom of vent wells (1).
2. If insufficient, add distilled water.

## Checking Speed Change Pedal and Brake Pedal

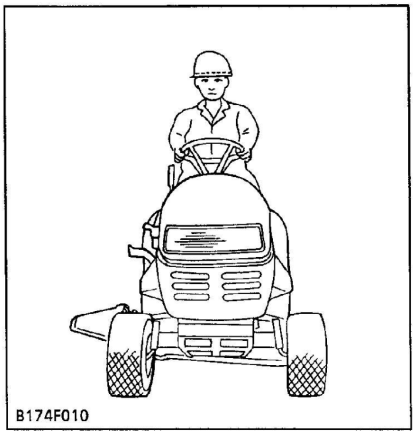
1. See page 2-5, 3-2.

## Checking Parking Brake

1. See page 3-2.

## Checking Steering Wheel

1. See page 5-2.




## Checking Safety Start Switch and Seat Safety Control

1. Check the safety devices using the table below.
2. If the machine does not pass one of the checking items, explore a trouble and repair it.

| | PTO clutch lever | | Brake pedal | | Seat | | Engine | | |
|---|---|---|---|---|---|---|---|---|---|
| | Disengage | Engage | Depress | Free | Vacant | Occupied | Stop | Run | Start |
| 1 | | ● | | ● | | ● | | ● | |
| 2 | | ● | | ● | ● | | ● | | |
| 3 | | ● | ● | | | ● | | ● | |
| 4 | | ● | ● | | ● | | ● | | |
| 5 | ● | | | ● | | ● | | ● | |
| 6 | ● | | | ● | ● | | ● | | |
| 7 | ● | | ● | | | ● | | ● | ● |
| 8 | ● | | ● | | ● | | | ● | ● |

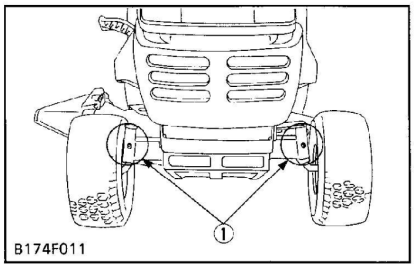
## Checking Blade Screw Tightening Torque

1. See page 9-7.

## Checking Blade for Wear or Damage

1. See page 9-3.

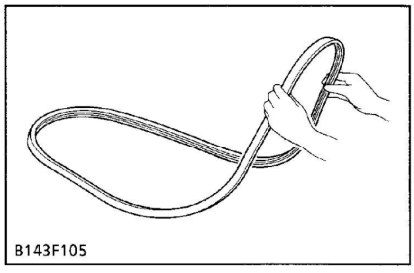
## (2) Check Points of Initial 25 Hours




### Greasing All Grease Nipples

1. Apply grease to the following point.

(1) Kingpin




### Checking All Belts

1. Check the HST belt, PTO belt and mower belt.
2. Replace the belt with a new one, if surface split is found at more than 3 positions.

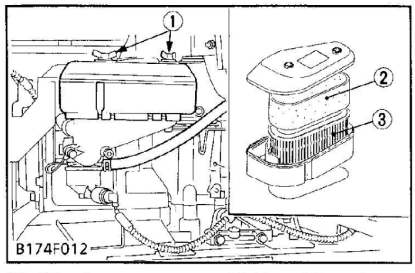
### Checking PTO Belt Tension

1. See page 7-2.

### Checking and Adjusting Brake Play

1. See page 3-2.

## (3) Check Points of Every 25 Hours




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

### Cleaning Air Cleaner Foam Element

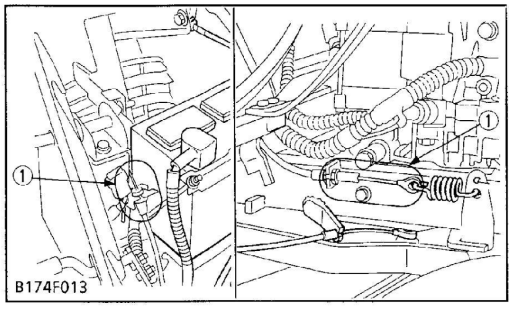
1. Open the upper bonnet.
2. Remove the wing screws (1), and lift off complete air cleaner assembly.
3. Remove the foam element (2).
4. Wash in detergent and water, and dry thoroughly.
5. Soak in new engine oil and squeeze to remove excess oil.
6. Install the air cleaner assembly.

■ **NOTE**

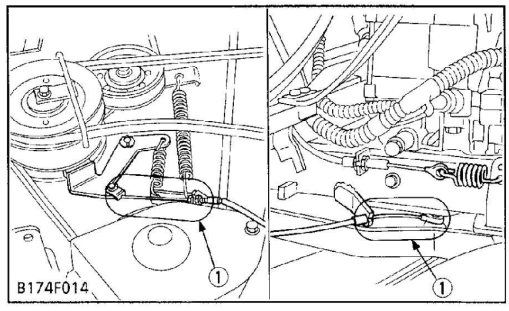
- **Do not run the engine with air cleaner element removed.**
- **Operating in dusty conditions may require more frequent maintenance than recommended.**

## Oiling

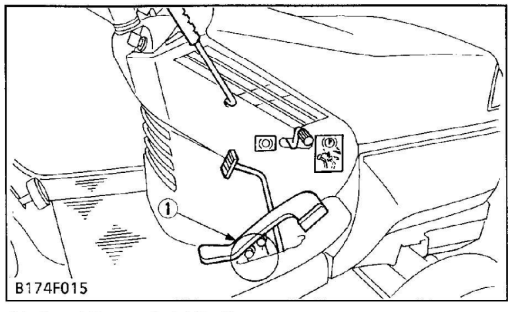
1. Apply oil to the following points.



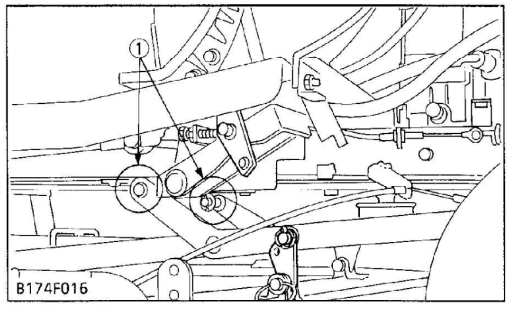

(1) PTO Clutch Wire



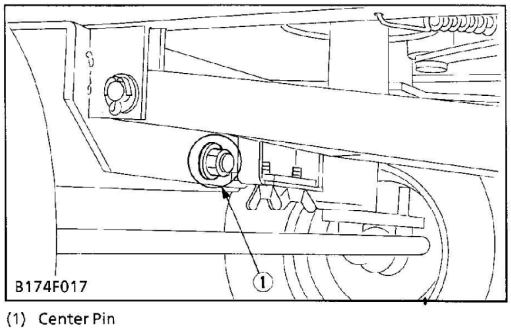

(1) Mower Brake Wire



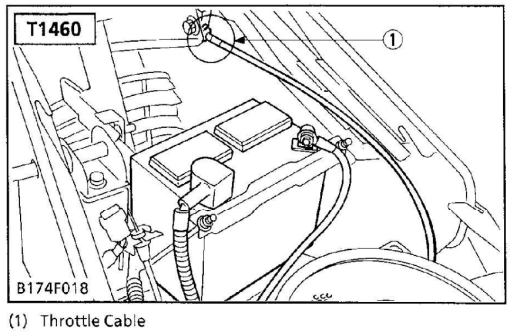

(1) Speed Change Pedal Shaft



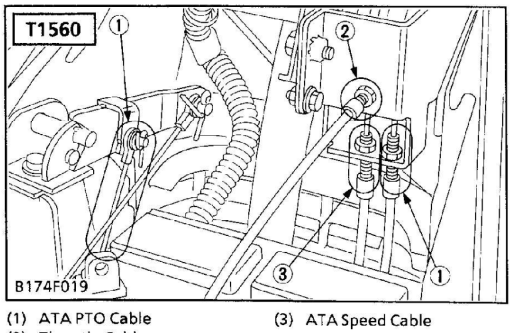

(1) Mower Links




(1) Center Pin

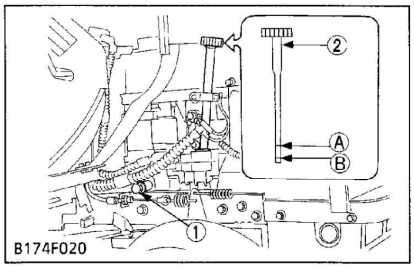



(1) Throttle Cable




(1) ATA PTO Cable
(2) Throttle Cable
(3) ATA Speed Cable

## (4) Check Points of Initial 50 Hours




(1) Drain Plug
(2) Dipstick
**(A) Upper Level**
**(B) Lower Level**

### Changing Engine Oil

**⚠ CAUTION**

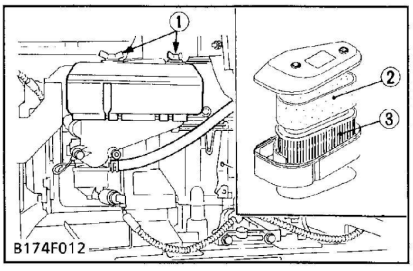
- **Be sure to stop the engine before changing the engine oil.**

1. Park the vehicle on a level ground.
2. Remove the lower bonnet, and place an oil pan underneath the drain plug.
3. Unscrew the drain plug (1), and drain the used oil completely.
   All used oil can be drained out easily while the engine is still warm.
4. After draining the oil, reinstall the drain plug.
5. Fill with new oil up to the upper level (A) on the dipstick (2).

**■ IMPORTANT**

- **Use the specified engine oil.**
  **Refer to "LUBRICANTS AND FUEL". (See page G-2.)**

## (5) Check Points of Every 50 Hours




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

### Cleaning Air Cleaner Paper Element

1. Open the upper bonnet.
2. Remove the wing screws (1), and lift off complete air cleaner assembly.
3. Clean by tapping gently to remove dust.
   If very dirty, wash in detergent and water, and dry thoroughly.
4. Install the air cleaner assembly.

**■ IMPORTANT**

- **Do not use petroleum solvent to clean paper element.**
  **Do not oil paper element.**
  **Do not use pressurized air to clean or dry paper element.**

**■ NOTE**

- **Do not run the engine with air cleaner element removed.**
- **Operating in dusty conditions may require more frequent maintenance than recommended.**

### Checking Battery Electrolyte Gravity

1. See page 8-6.

### Checking All Belts

1. See page G-7.

### Checking PTO Belt Tension

1. See page 7-2.

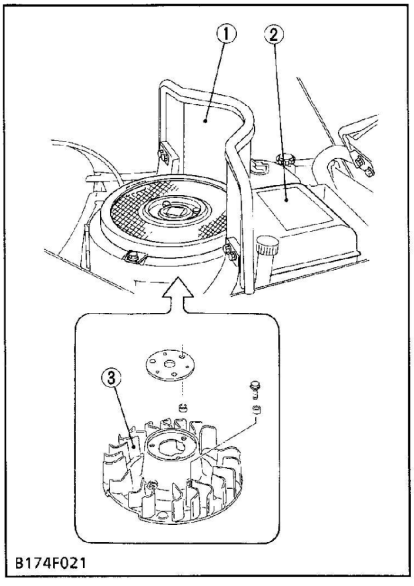
### Checking and Adjusting Brake Play

1. See page 3-2.

### Greasing All Grease Nipples

1. See page G-7.

## (6) Check Points of Every 100 Hours



B174F021

### Changing Engine Oil

1. See page G-9.

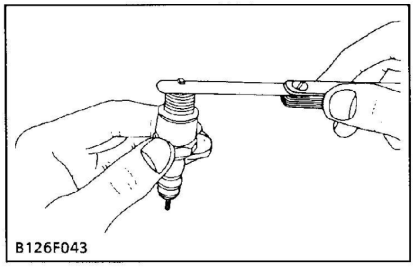
### Cleaning Engine's Cooling Fins

**⚠ CAUTION**

- **Make sure engine is cool to the touch before removing fan cover.**

1. Open the bonnet, and remove the shutter plate 1 (1).
2. Remove the fan cover assembly (2).
3. Check to see if the engine's cooling fins (3) are blocked with dust and dirt.
   Clean them up with compressed air if required.

(1) Shutter Plate 1
(2) Fan Cover Assembly
(3) Cooling Fin


B126F043

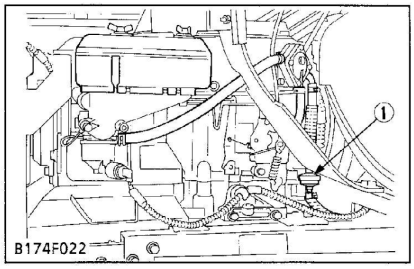
### Checking Spark Plug

1. Remove the lower bonnet.
2. Remove the spark plug, and clean carbon from the electrode with a wire brush.
3. Measure the spark plug gap with a feeler gauge.
4. If the measurement is not within the factory specifications, repair or replace it.
5. If the electrode or insulator is deformed or cracked, replace the plug.
6. If the spark plug cap is defective, replace the cap.

| | | |
|---|---|---|
| Spark plug gap | Factory spec. | 0.7 to 0.8 mm<br>0.028 to 0.031 in. |

**■ NOTE**

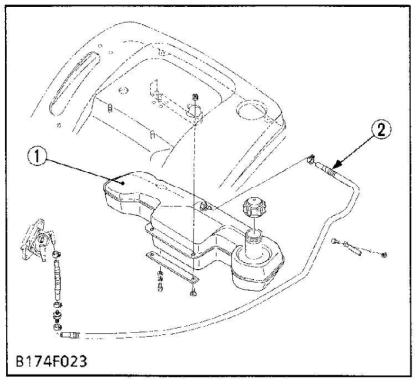
- **When replacing the spark plug, be sure to use a resister-type spark plug.**




## Checking Fuel Filter

1. Check the fuel filter (1) for impurities and water.
2. If impurities and water have collected in the fuel filter, replace the fuel filter.

(1) Fuel Filter




## Cleaning Fuel Tank

**CAUTION**

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

1. Unscrew the fuel tank mounting nuts and screws, and remove the fuel tank (1) from the fender.
2. Pinch the fuel pipe 1 (2), and then remove it from the fuel tank and insert the pin into fuel pipe 1 to avoid leaking fuel.
3. Drain the fuel and clean the fuel tank.

(1) Fuel Tank (3) Fuel Pipe 1

## Checking and Adjusting Throttle Cable

1. See page 1-43.

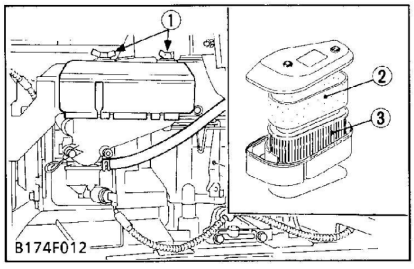
## Checking and Adjusting ATA PTO Cable

1. See page 1-48.

## Checking and Adjusting ATA Speed Cable

1. See page 1-49.

## (7) Check Points of Every 300 Hours

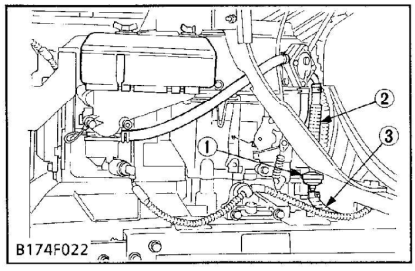



(1) Wing Screw
(2) Foam Element
(3) Paper Element

### 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.**



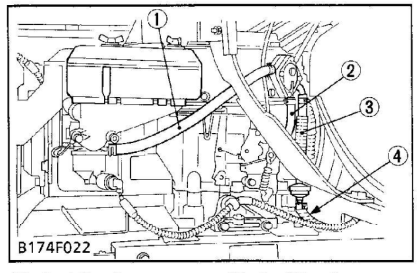

(1) Fuel Filter
(2) Fuel Pipe 2
(3) Fuel Pipe 1

### 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.**

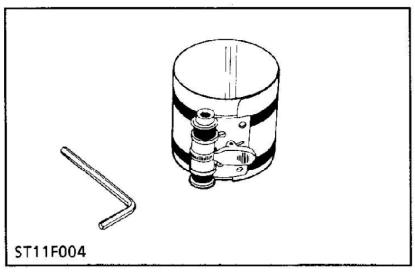
1. Change the fuel pipes together with pipe clamps every 300 hours or 3 years, whichever occurs first.

■ **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

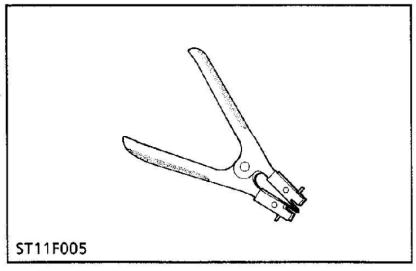
1. See page 1-14.

## [7] SPECIAL TOOLS


ST11F004

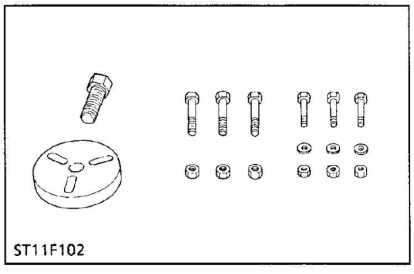
**Piston Ring Compressor**

Code No : 07909-32111
Application : Use exclusively to push in the piston with piston rings into the cylinder.


ST11F005

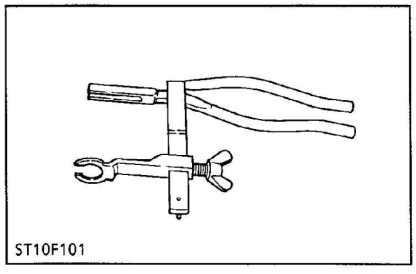
**Piston Ring Tool**

Code No : 07909-32121
Application : Use exclusively to remove or install the piston ring with ease.


ST11F102

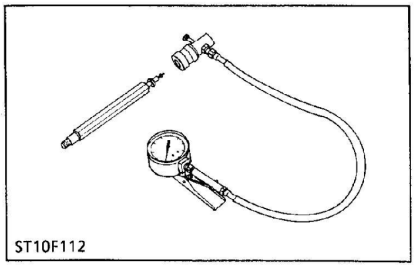
**Flywheel Puller**

Code No : 07916-30160
Application : Use to remove the flywheel (Rotor).


ST10F101

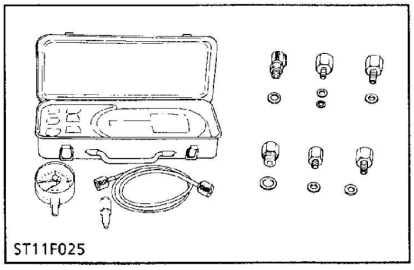
**Valve Lifter**

Code No : 07916-32001
Application : Use exclusively for removing or installing the valve spring collet with ease.


ST10F112

**Air Cooled Compression Tester**

Code No : 07909-30251
Application : Use to measure air cooled engine compression and diagnosis of need for major overhaul.


ST11F025

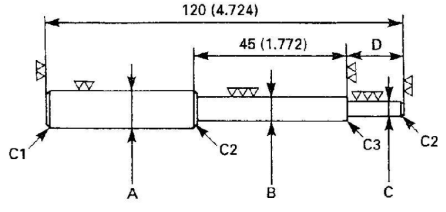
**Oil Pressure Tester**

Code No : 07916-32032
Application : Use for measuring lubricating oil pressure.

■ **NOTE**

- **The following special tools are not provided, so make them referring to the figures.**

Unit : mm (in.)




| * Chamfer | mm | in. |
|---|---|---|
| C1 | 2.0 | 0.079 |
| C2 | 1.0 | 0.039 |
| C3 | 0.3 | 0.012 |

ST11F004

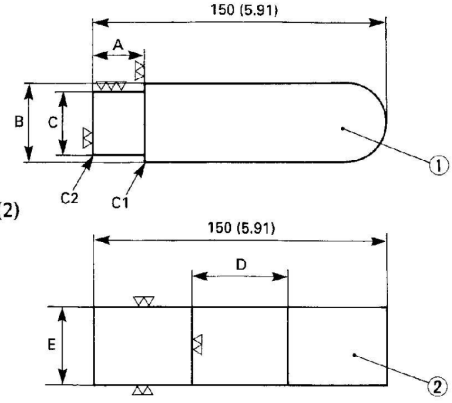
**Valve Guide Replacing Tool**

Application : Use to press out and to press fit the valve guide.

**[Intake and Exhaust Valve Guide]**

| | |
|---|---|
| A | 18 mm Dia.<br>0.709 in. Dia. |
| B | 11.00 to 11.10 mm Dia.<br>0.4331 to 0.4370 in. Dia. |
| C | 6.70 to 6.75 mm Dia.<br>0.2638 to 0.2657 in. Dia. |
| D | 25 mm Dia.<br>0.984 in. Dia. |

(1) Unit : mm (in.)




| * Chamfer | mm | in. |
|---|---|---|
| C1 | 0.3 | 0.012 |
| C2 | 1.0 | 0.039 |

B174F024

**Balancer Weight Bushing Replacing Tool**

Application : Use to press out and to press fit the balancer weight bushing.

| | |
|---|---|
| A | 19.5 to 20.0 mm<br>0.768 to 0.787 in. |
| B | 28.9 to 29.1 mm Dia.<br>1.138 to 1.146 in. Dia. |
| C | 25.7 to 25.8 mm Dia.<br>1.012 to 1.016 in. Dia. |
| D | 40 mm Dia.<br>1.575 in. Dia. |
| E | 30 mm<br>1.181 in. |

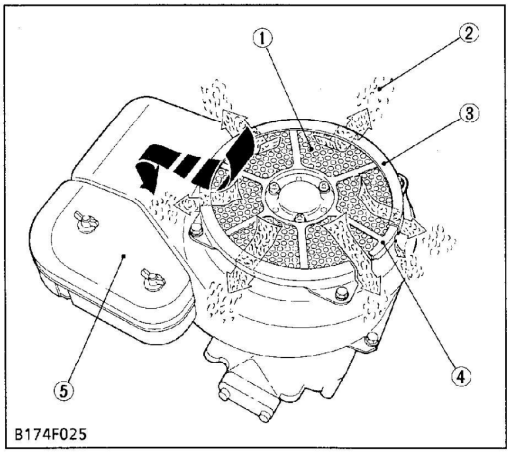
(1) Balancer Weight Bushing Replacing Tool **A**
(2) Balancer Weight Bushing Replacing Tool **B**

# 1 ENGINE

## CONTENTS

# MECHANISM

## [1] INTAKE AIR SYSTEM AND COOLING AIR SYSTEM



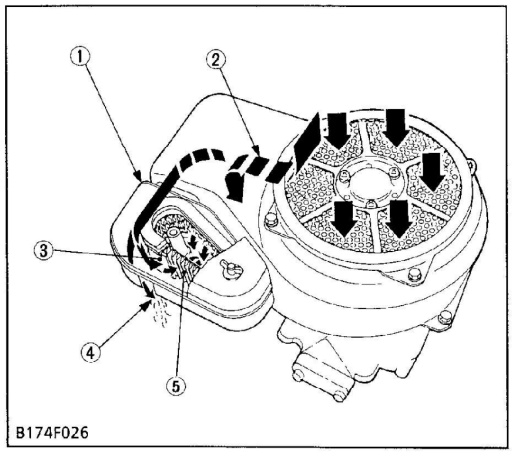
B174F025

The system utilitizes a special screen and peripheral blades (4) that remove grass and debris. A careful study was made to determine the most efficient size and shape for the rotating screen (1) as it must be capable of removing grass clippings and yet allow adequate cooling air to enter the fan.

A peripheral blade (4) is incorporated to cut and remove long, thin grass drawing through the screen perimeter and the fan housing.

A safety guard (3) is on the outside of blade for user protection.

(1) Rotating Screen
(2) Flapping Grass
(3) Safety Guard
(4) Peripheral Blade
(5) Air Cleaner

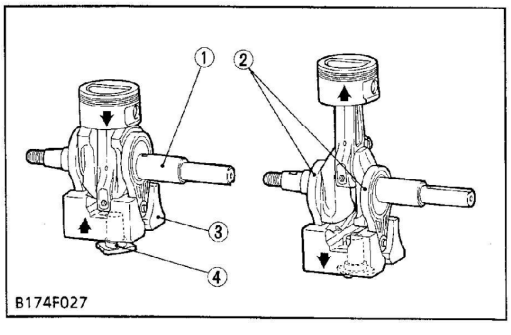


B174F026

As shown left, dirty air is drawn into the cooling air inlet. Centrifugal force caused by the sharp curve in the element housing (1) forces the large particles of dirt to be thrown to the outer wall of the housing and out the air cleaner outlet (4). The smaller particles are removed by the primary pre-cleaner (3) and secondary paper element (5) allowing only thoroughly cleaned air to enter the engine.

(1) Element Housing
(2) Cooling Air
(3) Primary Pre-cleaner
(4) Air Cleaner Outlet
(5) Secondary Paper Element

## [2] RECIPROCATING BALANCE SYSTEM



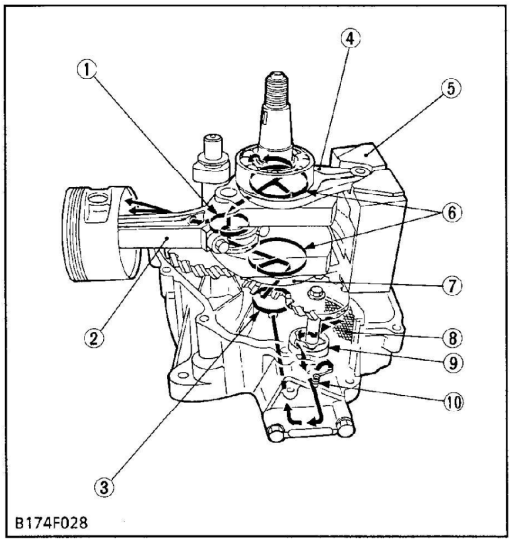
B174F027

The vibrations generated by engines is attributed mainly to the inertia force resulting from the reciprocating motion mass of the piston, piston ring and piston pin.

The GH410V and GH420V have the balancer weight (3) mounted to the crankshaft (1) and reciprocating balance is accomplished in the exact line of the piston motion axis. This method is the most effective means of canceling the inertial force and reducing vibration.

(1) Crankshaft
(2) Balancer Link Rod
(3) Balancer Weight
(4) Balancer Support Shaft

## [3] LUBRICATING SYSTEM




The GH410V and GH420V are equipped with a crank gear driven trochoid pump (9) to pressurize lubricating oil. Oil is drawn into the pump chamber through the oil screen (8) and pressurized by the trochoid pump. Oil pressure is controlled by the relief valve (10) to 294 kPa (3 kgf)cm$^2$, 43 psi).

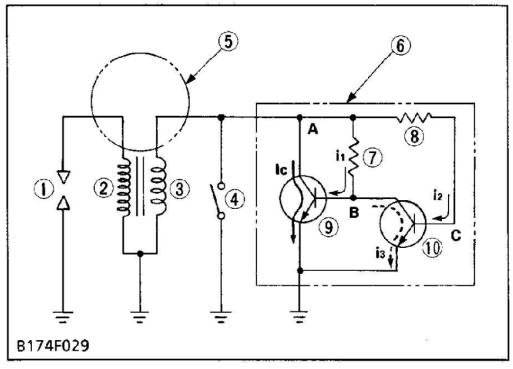
Then oil flows to the PTO side main journal (3), and crankshaft lubricating lower balancer link rod (7), crankpin journal (1), and upper balancer link rod (4).

A portion of oil at the crankpin passes through the orifice in connecting rod (2) and spreads on piston and cylinder.

Another portion of oil at upper balancer link rod (4) spreads on magneto side ball bearing.

(1) Crankpin Journal
(2) Connecting Rod
(3) PTO Side Main Journal
(4) Upper Balancer Link Rod
(5) Balancer Weight
(6) Balancer Link Rod Journal
(7) Lower Balancer Link Rod
(8) Oil Screen
(9) Trochoid Pump
(10) Relief Valve

## [4] IGNITION SYSTEM




(1) Spark Plug
(2) Secondary Coil $L_2$
(3) Primary Coil $L_1$
(4) Stop Switch
(5) Rotor
(6) Ignition Controller
(7) Resistor $R_1$
(8) Resistor $R_2$
(9) Transistor $TR_1$
(10) Transistor $TR_2$

As the rotor magnet rotates past the armature, AC power is generated in the primary coil $L_1$ (3).

When the voltage at **A** position is positive (+), base current ($i_1$) flows intro transistor $TR_1$ (9). Transistor $TR_1$ (9) is then turned on to allow a large amplified current ($I_c$) to flow. Transistor $TR_2$ (10) is not turned on because of low voltage at **C** position. Resistor $R_2$ (8) controls this flow to **C** position.

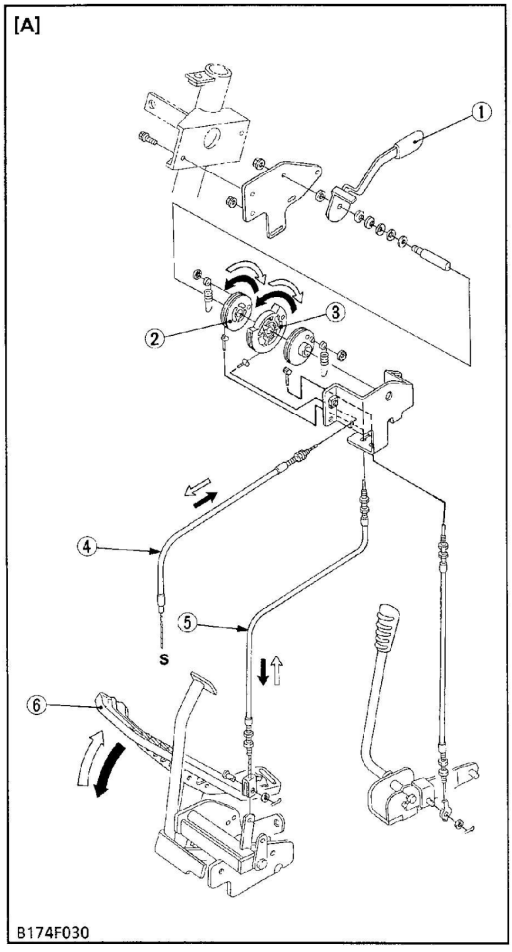
The engine piston now approaches the top of the cylinder and proper spark timing must take place before the piston reaches the top of the cylinder.

As the rotor continues to rotate, AC current continues to build in the primary coil $L_1$ (3). When current Is high enough at **C** position, indicating high voltage induced within the primary coil $L_1$ (3), transistor $TR_2$ (10) is turned on.

When transistor $TR_2$ (10) is turned on, base current ($i_1$), through resistor $R_1$ (7) to transistor $TR_1$ (9), begins to flow ($i_3$) to transistor $TR_2$ (10). This turns off transistor $TR_1$ (9) because of the voltage drop at **B** position.

Sudden current ($I_c$) cut-off creates an induced high voltage within secondary coil $L_2$ (2) which fires spark plug (1).

## [5] AUTO THROTTLE ADVANCE SYSTEM



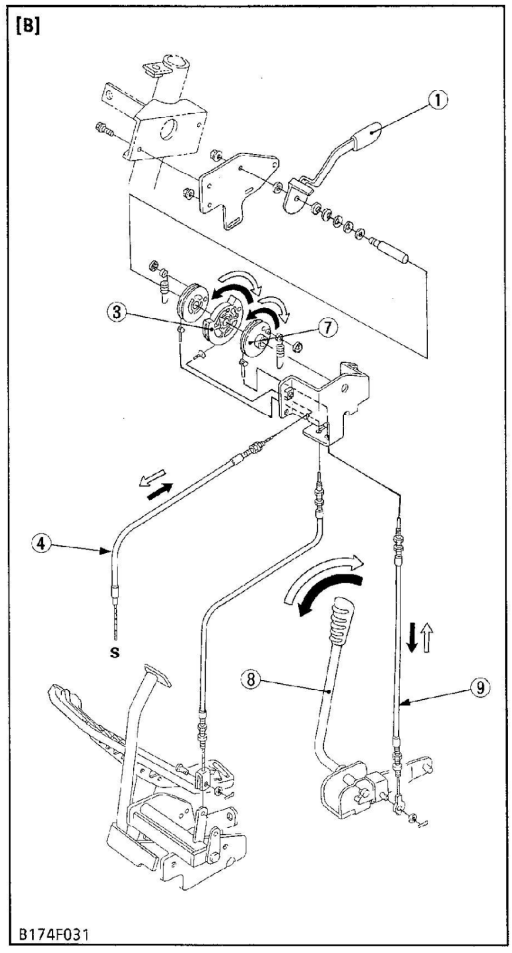

(1) Throttle Lever
(2) Side Pulley 1
(3) Center Pulley
(4) Throttle Cable
(5) ATA Speed Cable
(6) Speed Change Pedal

The Auto Throttle Advance System delivers synchronized acceleration.

All you need to do is to move the PTO clutch lever (8) and the speed change pedal (6); there is absolutely no need for you to always operate with throttle lever (1).

[A] **PTO** clutch lever is in **"DISENGAGE"** position.

While operating with the PTO clutch lever (8) in **"DISENGAGE"** position, the engine speed increase or decrease is in response to your movement of the speed change pedal (6) as shown in the figure.



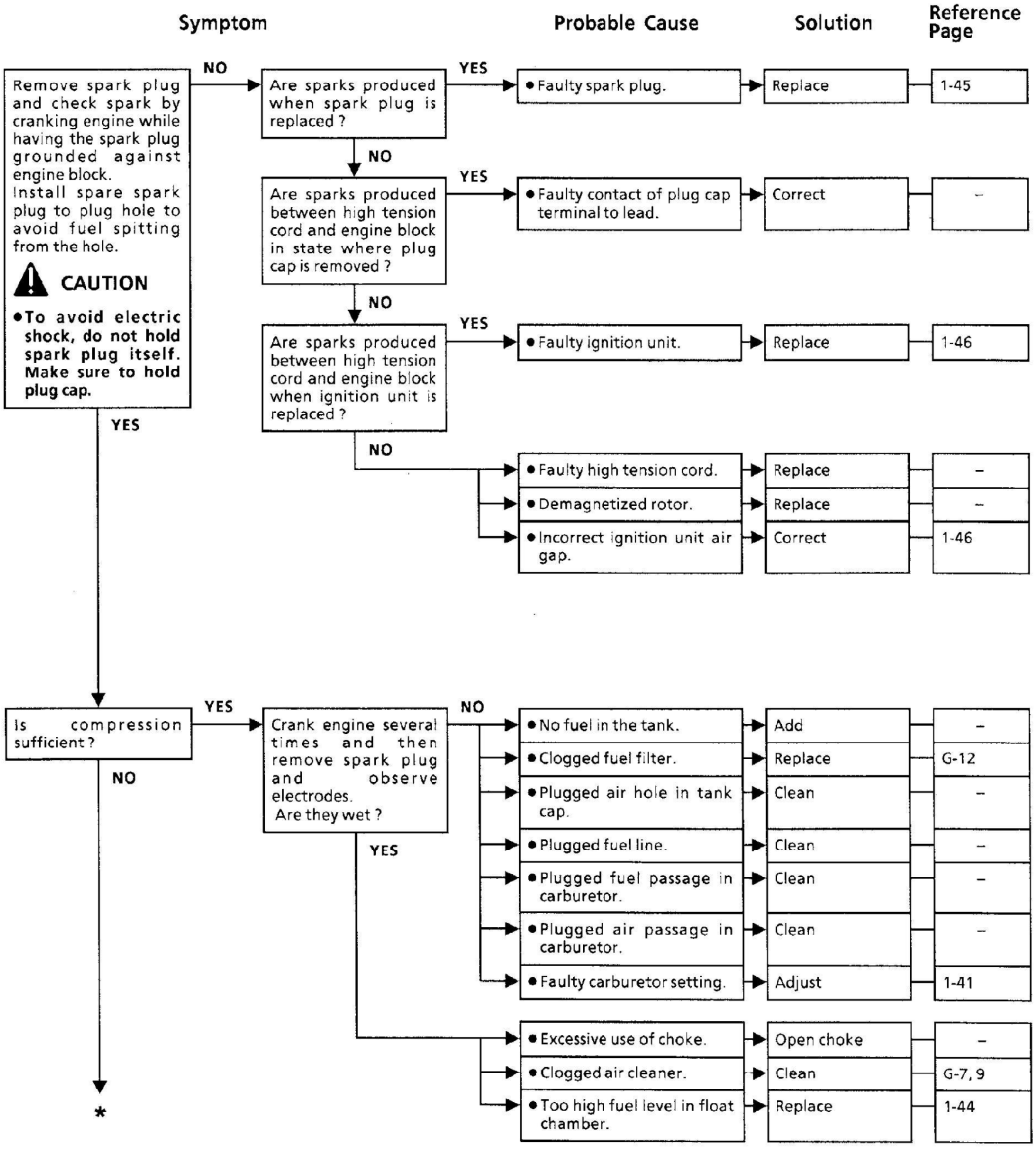

(7) Side Pulley 2
(8) PTO Clutch Lever
(9) ATA PTO Cable
S : To speed control lever
⟵ : Engine speed increase
⇦ : Engine speed decrease

**[B] PTO clutch lever is in "ENGAGE" position.**

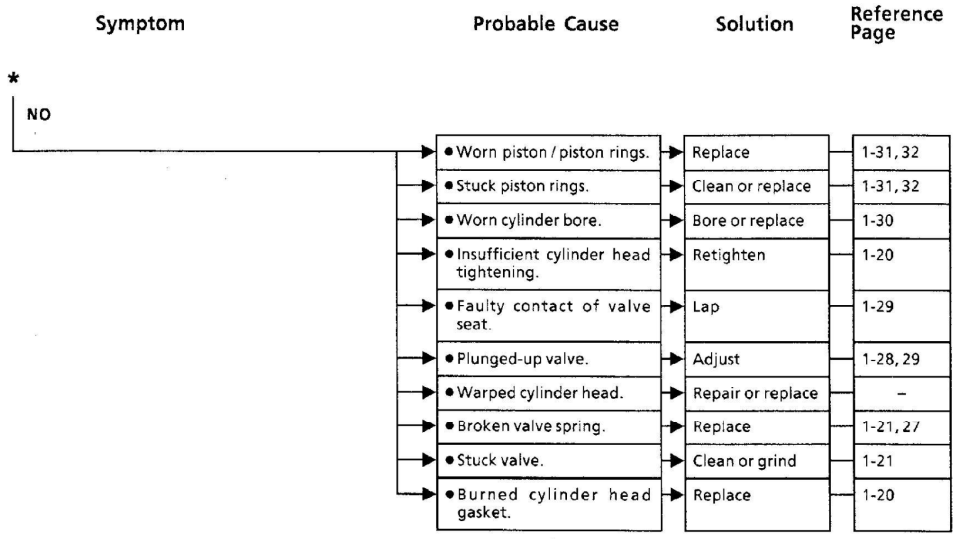
When the PTO clutch lever (8) is set to **"ENGAGE"** position, the engine speed automatically increase to ensure the optimum working speed as shown in the figure.

# TROUBLESHOOTING

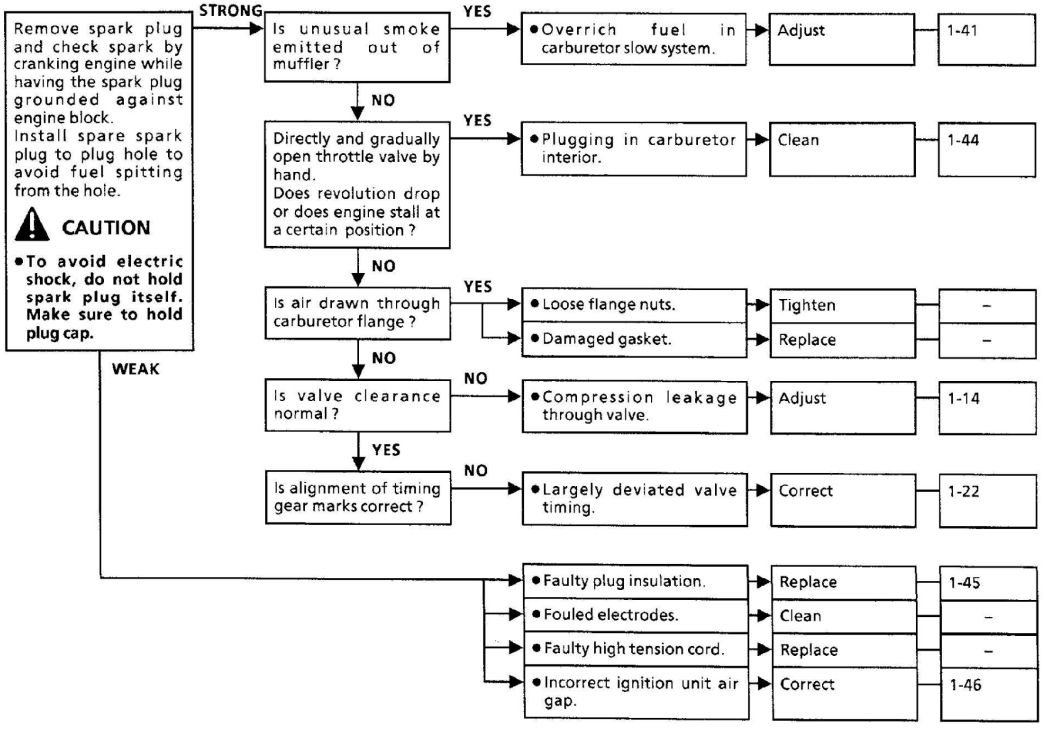
## [ Hard Starting ]



## [ Hard Starting (Continued) ]




## [ Malfunctions at Low Speed ]



## [ Low Power ]