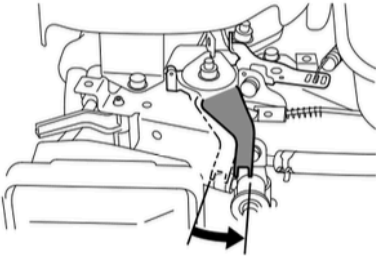
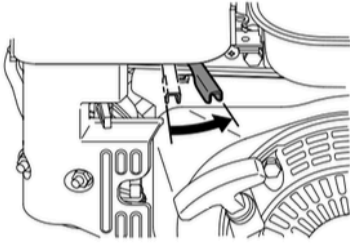
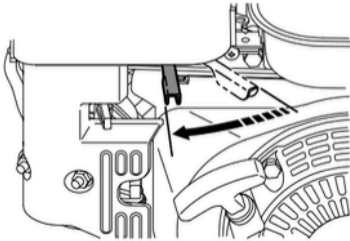


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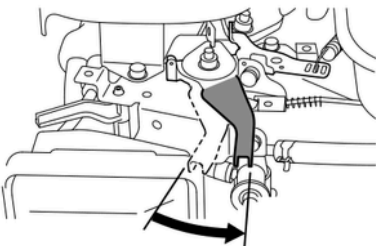
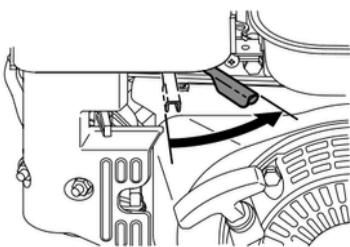


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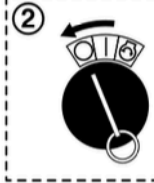
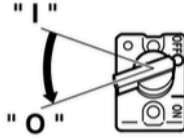


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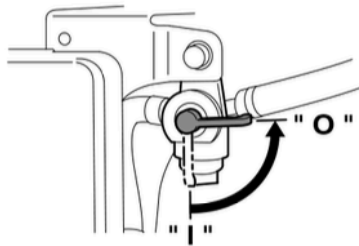
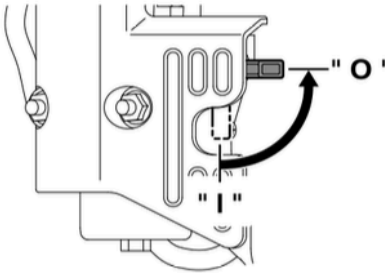
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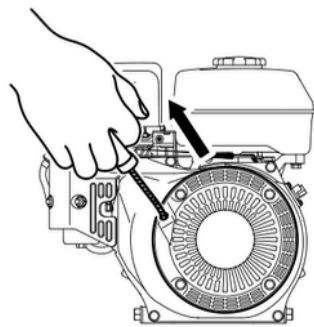
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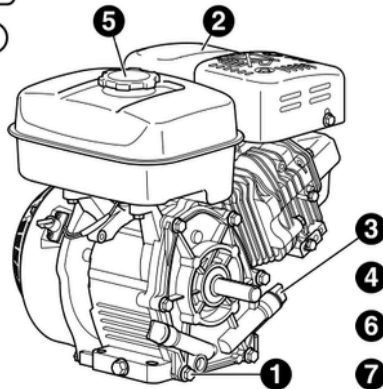


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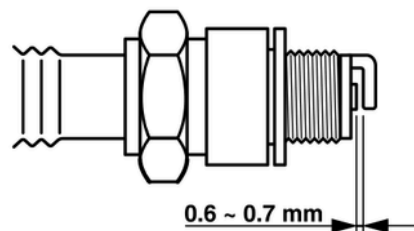


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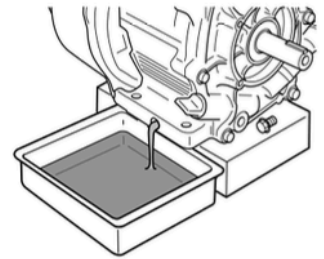


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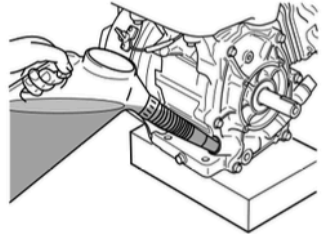


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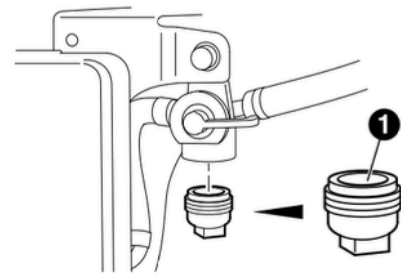
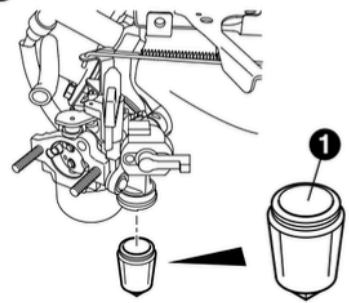
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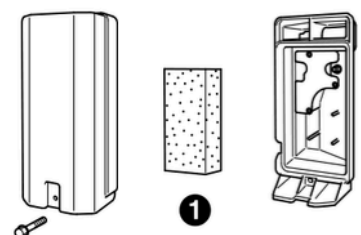
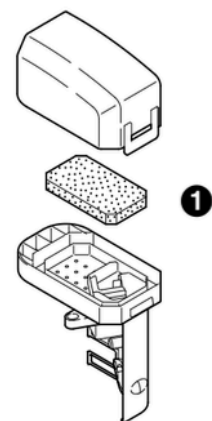
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⑥



# FOREWORD

Thank you very much for purchasing a **EX SERIES ENGINE**.

Your **EX SERIES ENGINE** can supply the power to operate various sorts of machines and equipment.

Please take a moment to familiarize yourself with the proper operation and maintenance procedures in order to maximize the safe and efficient use of this product.

Keep this owner's manual at hand, so that you can refer to it at any time.

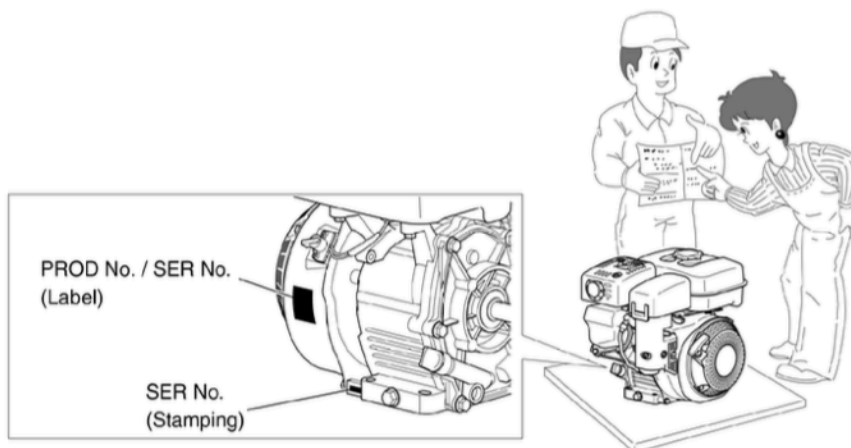
Due to constant efforts to improve our products, certain procedures and specifications are subject to change without notice.

When ordering spare parts, always give us the MODEL, PRODUCTION NUMBER and SERIAL NUMBER of your engine.

Please fill in the following blanks after checking the production number on your engine. (Location of label is different depending on the engine specification.)

| PROD NO. |  |  |  |  |  |  |  |  |  |
|----------|--|--|--|--|--|--|--|--|--|
|          |  |  |  |  |  |  |  |  |  |

| SER NO. |  |  |  |  |  |  |  |  |  |
|---------|--|--|--|--|--|--|--|--|--|
|         |  |  |  |  |  |  |  |  |  |



## NOTICE

The engine which is complied with the emission regulation of USA, Europe, and China has the emission control label placed on the engine according to each country's regulation.

Exporting any engine to these countries/regions which does not have the emission control label is a violation and subject to penalty.

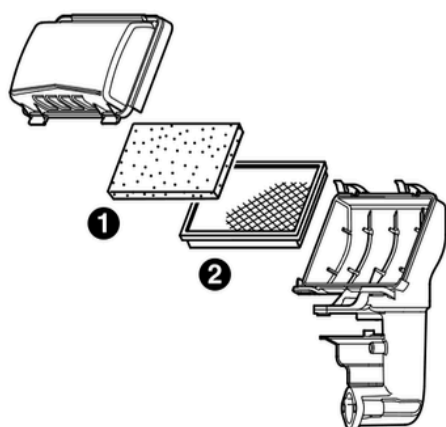
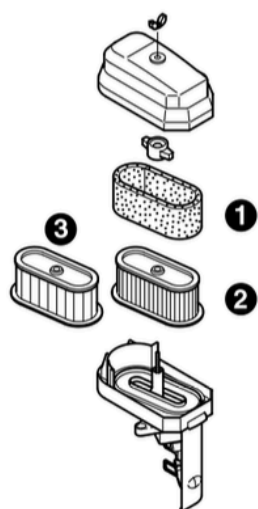
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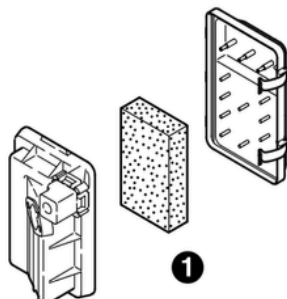
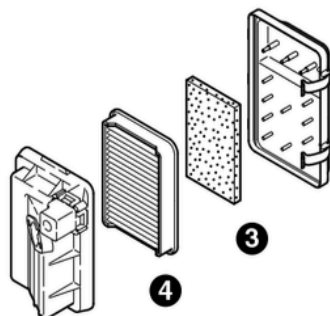
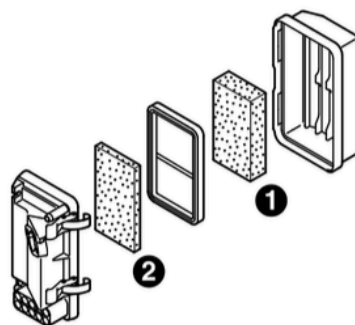
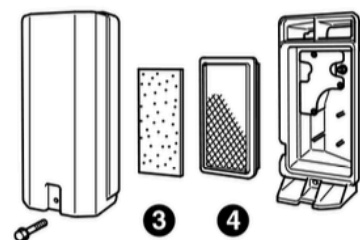
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**NOTE** Please refer to the illustrations on the back page of the front cover or back cover for Fig. **1** to **8** indicated in the sentence.

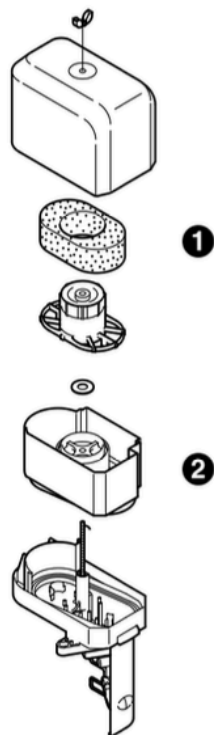
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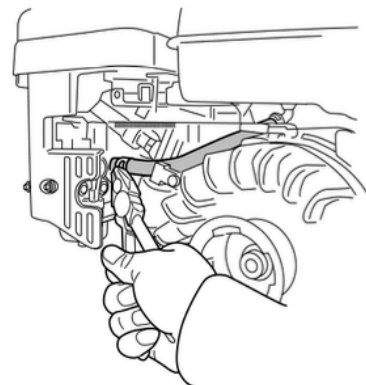
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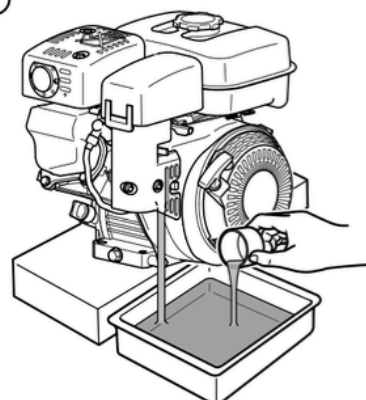


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# 1. SAFETY PRECAUTIONS

Please make sure you review each precaution carefully.

Pay special attention to statement preceded by the following words.

**⚠ WARNING** “WARNING” indicates a strong possibility of severe personal injury or loss of life if instructions are not followed.

**⚠ CAUTION** “CAUTION” indicates a possibility of personal injury or equipment damage if instructions are not followed.

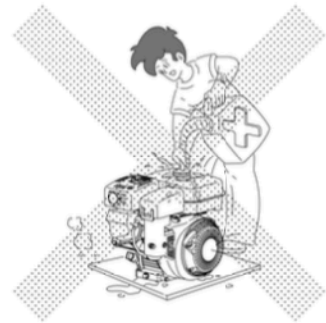
## ⚠ WARNING : EXHAUST PRECAUTIONS

- Never inhale exhaust gasses.  
They contain carbon monoxide, a colorless, odorless and extremely dangerous gas which can cause unconsciousness or death.
- Never operate the engine indoors or in a poorly ventilated area, such as tunnel, cave, etc.
- Exercise extreme care when operating the engine near people or animals.
- Keep the exhaust pipe free of foreign objects.



## ⚠ WARNING : REFUELING PRECAUTIONS

- Gasoline is extremely flammable and its vapors can explode if ignited.
- Do not refuel indoors or in a poorly ventilated area.
- Be sure to stop the engine prior to refueling.
- Do not remove fuel tank cap nor fill fuel tank while engine is hot or running.  
Allow engine to cool at least 2 minutes before refueling.
- Do not overfill the fuel tank.
- If fuel is spilt, wipe it away carefully and wait until the fuel has dried before starting the engine.
- After refueling, make sure that the fuel cap is secured to prevent spillage.



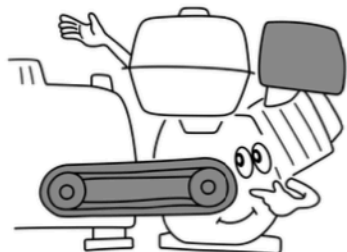
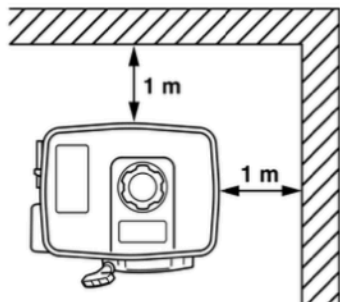
## ⚠ WARNING : FIRE PREVENTION

- Do not operate the engine while smoking or near an open flame.
- Do not use around dry brush, twigs, cloth rags, or other flammable materials.
- Keep cooling air intake (recoil starter area) and muffler side of the engine at least 1 meter (3 feet) away from buildings, obstructions and other burnable objects.
- Keep the engine away from flammables and other hazardous materials (trash, rags, lubricants, explosives).



## ⚠ WARNING : OTHER SAFETY PRECAUTIONS

- Place the protective covers over the rotating parts.  
If rotating parts such as the drive shaft, pulley, belt, etc. are left exposed, they are potentially hazardous. To prevent injury, equip them with protective covers or shrouds.
- Be careful of hot parts.  
The muffler and other engine parts become very hot while the engine is running or just after it has stopped. Operate the engine in a safe area and keep children away from the running engine.





- Do not touch the spark plug and ignition cable when starting and operating the engine.
- Never make adjustments on the machinery while it is connected to the engine, without first removing the ignition cable from the spark plug. Turning the crankshaft by hand during adjusting or cleaning might start the engine, and cause serious injury to the operator.
- Operate the engine on a stable, level surface.  
If the engine is tilted, fuel spillage may result.

**NOTE**

Operating the engine at a steep incline may cause seizure due to improper lubrication even with a maximum oil level.



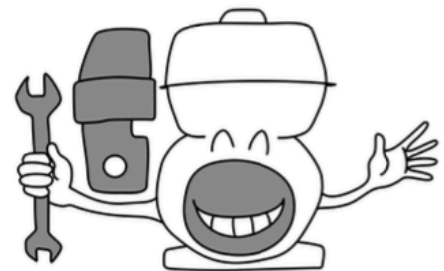
- Do not transport the engine with fuel in tank or with fuel strainer valve open.
- Do not move the engine while in operation when it has been removed from the equipment.
- Keep the unit dry (do not operate it in rainy conditions).

**⚠ WARNING : WHEN CHARGING THE BATTERY**

- Battery electrolyte contains sulphuric acid. Protect your eyes, skin and clothing. In case of contact, flush thoroughly with water and get prompt medical attention, especially if your eyes are affected.
- Batteries generate hydrogen gas, which can be highly explosive. Do not smoke or allow flames or sparks near a battery, especially during charging.
- Charge the battery in a fully ventilated location.
- Be sure to confirm Battery polarity.

**⚠ CAUTION : PRE-OPERATION CHECKS**

- Carefully check fuel hoses and joints for looseness and fuel leakage. Leaked fuel creates a potentially dangerous situation.
- Check bolts and nuts for looseness. A loose bolt or nut may cause serious engine trouble.
- Check the engine oil and refill if necessary.
- Check the fuel level and refill if necessary. Take care not to overfill the tank.
- Keep cylinder fins and recoil starter free of dirt, grass and other debris.
- Wear snug fitting working clothes when operating the engine.  
Loose aprons, towels, belt, etc., may be caught in the engine or drive train, causing a dangerous situation.



## SYMBOLS

|  |   |  |   |
|--|---|--|---|
|  | <i>Read manual.</i>   |  | <i>Shut off fuel valve when the engine is not in use.</i> |
|  | <i>Stay clear of the hot surface.</i>   |  | <i>Check for leakage from hose and fittings.</i>          |
|  | <i>Exhaust gas is poisonous.<br/>Do not operate in an unventilated room or enclosed area.</i> |  | <i>Fire, open flame and smoking prohibited.</i>           |
|  | <i>Stop the engine before refueling.</i>  |  | <i>HOT, avoid touching the hot area.</i>                  |

|  |            |  |   |  |                                   |           |                    |
|--|------------|--|---|--|-----------------------------------|-----------|--------------------|
|  | On (Run)   |  | Engine start<br>(Electric start)                  |  | Fuel (gasoline)                   |           | Primer             |
|  | Off (Stop) |  | Engine stop                                       |  | Fuel (diesel)                     |           | Push primer        |
|  | Engine oil |  | Cold engine                                       |  | Fuel shut-off                     |           | Do not push primer |
|  | Add oil    |  | Warm engine                                       |  | Fuel system failure / malfunction | <b>2X</b> | Two times          |
|  | Battery    |  | Electrical preheat<br>(Low temperature start aid) |  | Choke                             |           |                    |
|  | Fast       |  | Run position                                      |  | Plus ;<br>positive polarity       |           |                    |
|  | Slow       |  | Stop position                                     |  | Minus ;<br>negative polarity      |           |                    |

## 2. COMPONENTS

(See Fig. 1)

**NOTE** Please refer to the illustrations on the back page of the front cover or back cover for Fig. 1 to 8 indicated in the sentence.

- ① SPARK PLUG
- ② EXHAUST OUTLET
- ③ MUFFLER COVER
- ④ AIR CLEANER
- ⑤ FUEL TANK
- ⑥ FUEL TANK CAP (FUEL FILLER)
- ⑦ SPEED CONTROL LEVER
- ⑧ RECOIL STARTER
- ⑨ STARTER HANDLE
- ⑩ CHOKE LEVER

- ⑪ FUEL VALVE
- ⑫ FUEL CUP
- ⑬ CARBURETOR
- ⑭ P.T.O. SHAFT
- ⑮ OIL GAUGE (OIL FILLER)
- ⑯ OIL DRAIN PLUG
- ⑰ ENGINE SERIAL NO. (STAMPING)
- ⑱ ENGINE NAME LABEL (SPEC. No.)
- ⑲ STOP SWITCH
- ⑳ OIL SENSOR UNIT

# 3. PRE-OPERATION CHECKS

## NOTE

Engine shipped from our factory is without oil.  
Before starting engine, fill with oil. Do not over-fill.

## 1. CHECK ENGINE OIL (See Fig. [2])

Before checking or refilling engine oil, be sure the engine is located on stable, level surface and stopped.

- Do not screw the oil gauge into the oil filler neck to check oil level. If the oil level is low, refill to the upper level with the following recommended oil.
- Use 4-stroke automotive detergent oil of API service class SE or higher grade.
- Select the viscosity based on the air temperature at the time of operation as shown in the table. (See Fig.[2]-①)

| Oil capacity (Upper level) : |       | (L) |
|------------------------------|-------|-----|
| EX16/17/21, SP17/21          | ..... | 0.6 |
| EX27/30                      | ..... | 1.0 |
| EX35/40                      | ..... | 1.2 |

## Explanation of Fig. [2]-②

① Oil Gauge      ② Upper Level      ③ Lower Level

- For the engine with Oil Bath type air cleaner, fill the engine oil upto the specified level of the oil bath (oil pan).  
(See Fig. [2]-③-①)

| Oil capacity in the Oil Bath (oil pan) : |                   |
|--|-------------------|
| EX16/17/21, SP17/21                      | ..... About 55 mL |

## 2. CHECK FUEL (See Fig. [3])

### ⚠ WARNING

- Do not refuel while smoking, near an open flame or other such potential fire hazards. Otherwise fire accident may occur.
- Remove the static electricity from your body before refilling the gasoline. Sparking from electrostatic discharge may cause the ignition to the vaporized fuel (gasoline) resulting burns. Static electricity can be discharged from the body by touching by hand the metal parts of the unit and the fuel dispensing pump.

- Stop the engine and open the cap.
- Use unleaded automotive gasoline only.
  - Unleaded regular/premium or reformulated gasoline containing no more than 10% Ethanol (E10), or 15% MTBE may also be used.
  - Never use gasoline containing ethanol exceeding 10%, or MTBE exceeding 15% because engine or fuel system damage could result.
  - Never use stale or contaminated gasoline.
  - Use of these non-recommended fuels may result in reduced performance and/or denial of warranty.

| Fuel tank capacity : |       | (L) |
|----------------------|-------|-----|
| EX16/17/21, SP17/21  | ..... | 3.2 |
| EX27                 | ..... | 5.6 |
| EX35/40              | ..... | 6.8 |

- Close the fuel valve before filling the fuel tank.

## Explanation of Fig.[3]-①

### ① Maximum Fuel level

- Do not fill above the top of the fuel filter screen (marked ①), or the fuel may overflow when it heats up later and expands.
- When filling the fuel tank, always use the fuel filter screen.
- Reattach the fuel cap by turning clockwise until reaching the physical stop (about one quarter turn). Do not attempt to turn past the physical stop or the fuel cap may be damaged.
- Wipe off any spilled fuel before starting the engine.

# 4. ELECTRIC STARTER MODELS

For electric starter operation, proper electric wiring arrangements are needed before normal engine operation.

## 1. BATTERY

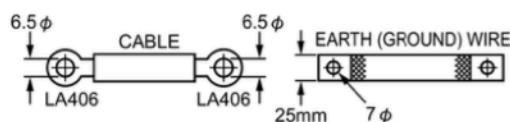
- Use a battery rated 12V-24AH or larger.

### ⚠ WARNING

- Charge the battery in a fully ventilated location.
- Batteries generate hydrogen gas, which can be highly explosive. Do not smoke or allow flames or sparks near a battery, especially during charging.
- Be sure to confirm Battery polarity. Connect positive (+) terminal first when mounting battery, and disconnect negative (-) terminal first when dismounting.
- Battery electrolyte contains sulphuric acid. Protect your eyes, skin and clothing. In case of contact, flush thoroughly with water and get prompt medical attention, especially if your eyes are affected.

## 2. BATTERY CABLE

- Use a proper cable and ground wire to connect battery.
- For GROUND WIRE, use a flat braided wire of 20 sq. mm. or larger sectional area.



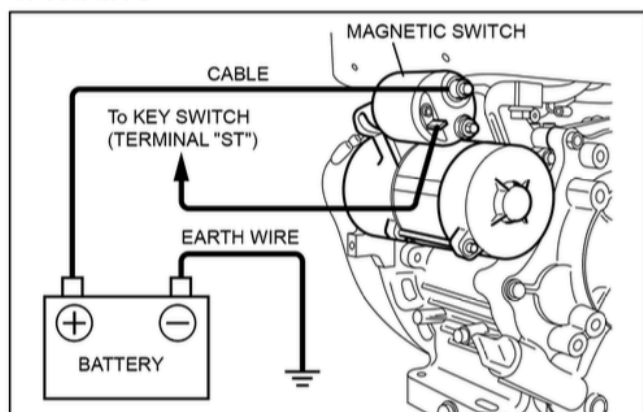
| Cable length   | Cable dia. | Wire gauge   |     |      |
|----------------|------------|--------------|-----|------|
|                |            | AWG (BS) BWG | SAE | JIS  |
| Less than 1.5m | 7.3 mm     | 1            | 6   | AV15 |
| 1.5 m to 2.5 m | 8.4 mm     | 0            | 4   | AV20 |
| 2.5 m to 4 m   | 10.8 mm    | 3/0          | 2   | AV30 |

### 3. KEY SWITCH CABLE

If a remote key switch is used, select wires of proper gauge to connect it and magnetic switch of the engine.

| Cable length   | Cable dia. | Wire gauge |     |        |
|----------------|------------|------------|-----|--------|
|                |            | AWG (BS)   | BWG | JIS    |
| Less than 1.5m | 1.5 mm     | 14         | 16  | AV1.25 |
| 1.5 m to 3 m   | 1.9 mm     | 12         | 14  | AV2    |
| 3 m to 5 m     | 2.4 mm     | 10         | 13  | AV3    |

### 4. WIRING



- (1) Connect positive (+) terminal of the magnetic switch and positive (+) terminal of the battery with battery cable.

#### ⚠ CAUTION

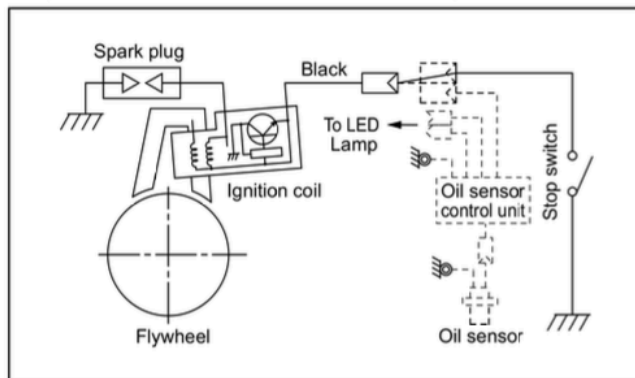
**Make sure the polarity of battery terminals. Never connect the battery cable with the battery negative (-) terminal.**  
**When connecting the battery cable with the battery negative (-) terminal, diode rectifier chips will be burned out or damaged in a moment.**

- (2) Ground negative terminal of the battery to the engine body or machine with ground wire.
- (3) When installing the key switch on the machine, install with its drain hole at the bottom.

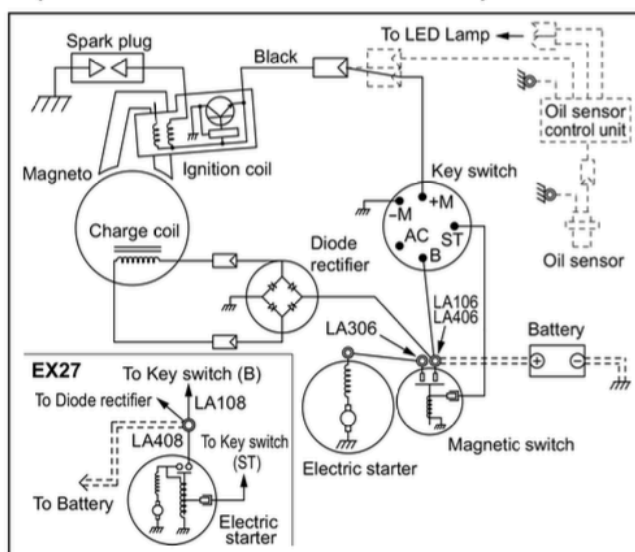
#### NOTE

Tighten bolts and nuts on terminals securely so that they will not be loosened by vibration.

### 5. WIRING DIAGRAM (RECOIL STARTER MODELS)



### WIRING DIAGRAM (ELECTRIC STARTER MODELS)

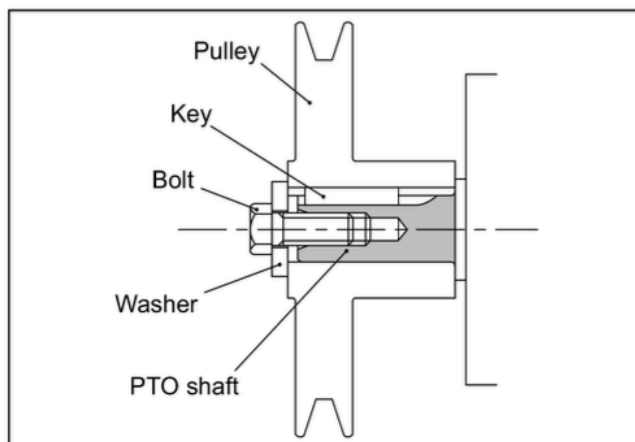


Optional hardware shown by dotted lines.

### 5. BELT PULLEY INSTALLATION ONTO KEYWAY-TYPE CRANKSHAFT

When installing the belt pulley and/or clutch onto keyway-type crankshaft (PTO shaft), proper and correct arrangements are needed.

The following illustration shows the correct installation of the applicable component parts.



## ■ Metric keyway-type crankshaft

Washer; Use the washer (material; SS41P) with the thickness described below;

|                        | EX16/17/21,<br>SP17/21 | EX27/30              | EX35/40              |
|------------------------|------------------------|----------------------|----------------------|
| Washer Thickness<br>mm | 4.5 or over            |                      | 6.0 or over          |
| ROBIN genuine part     | 020-00801-40, Washer   | 020-00800-20, Washer | 020-01002-20, Washer |
| Thickness; mm          | 4.5                    | 4.5                  | 6.0                  |
| OD; mm                 | 28                     | 35                   | 40                   |
| ID; mm                 | 8.5                    | 8.5                  | 10.5                 |
| Material;              | SS41P                  | SS41P                | SS41P                |

Bolt; Select the proper bolt and tighten it to the specified tightening torque, as mentioned below;

|   | EX16/17/21,<br>SP17/21       | EX27/30  | EX35/40                             |
|---|------------------------------|----------|-------------------------------------|
| Effective thread length<br>mm             | 16 to 22                     | 18 to 27 | 18 to 27                            |
| Strength                                  | "8T" or higher               |          |                                     |
| Tightening Torque<br>N•m(kgf•cm)          | 20 - 22<br>(204 - 224)       |          | 40 - 50<br>(408 - 510)              |
| ROBIN genuine parts<br>(Screw length; mm) | 011-00802-50, Flange Bolt 25 |          | 001-13102-00, BOLT AND WASHER AY 20 |

## ■ SAE (inch) keyway-type crankshaft

Washer; Use the washer (material; SS41P) with the thickness described below;

|                              | EX16/17/21,<br>SP17/21 | EX27/30                | EX35/40                |
|------------------------------|------------------------|------------------------|------------------------|
| Washer Thickness<br>in. (mm) | 0.177 (4.5)<br>or over | 0.248 (6.3)<br>or over | 0.236 (6.0)<br>or over |
| ROBIN genuine part           | 020-00801-40, Washer   | (NA)                   | (NA)                   |
| Thickness; mm                | 4.5                    |                        |                        |
| OD; mm                       | 28                     |                        |                        |
| ID; mm                       | 8.5                    |                        |                        |
| Material;                    | SS41P                  |                        |                        |

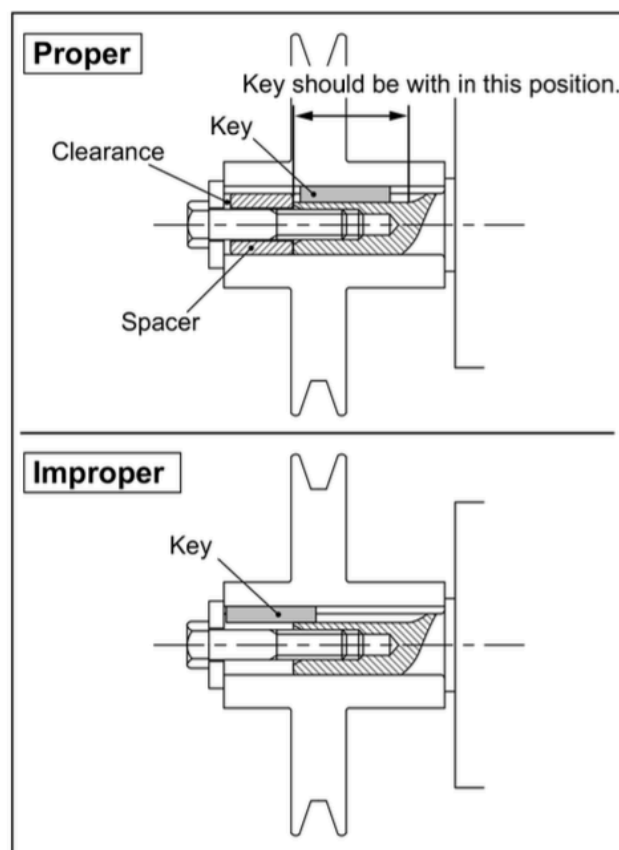
Bolt; Select the proper bolt and tighten it to the specified tightening torque, as mentioned below;

|  | EX16/17/21,<br>SP17/21                  | EX27/30                                 | EX35/40                                 |
|--|---|---|---|
| Thread dimensions                        | 5/16 - 24UNF2B                          | 7/16 - 20UNF2B                          | 3/8 - 24UNF2B                           |
| Effective thread length<br>in. (mm)      | 0.63 to 0.87<br>(16 to 22)              | 0.71 to 1.06<br>(18 to 27)              | 0.71 to 1.06<br>(18 to 27)              |
| Strength                                 | "8T" or higher                          |   | "10T" or higher                         |
| Tightening Torque<br>N•m(kgf•cm)(ft•lb.) | 20 - 22<br>(204 - 224)<br>(14.8 - 16.2) | 50 - 60<br>(510 - 612)<br>(36.9 - 44.3) | 45 - 55<br>(457 - 561)<br>(33.2 - 40.6) |

(No ROBIN genuine part is available.)

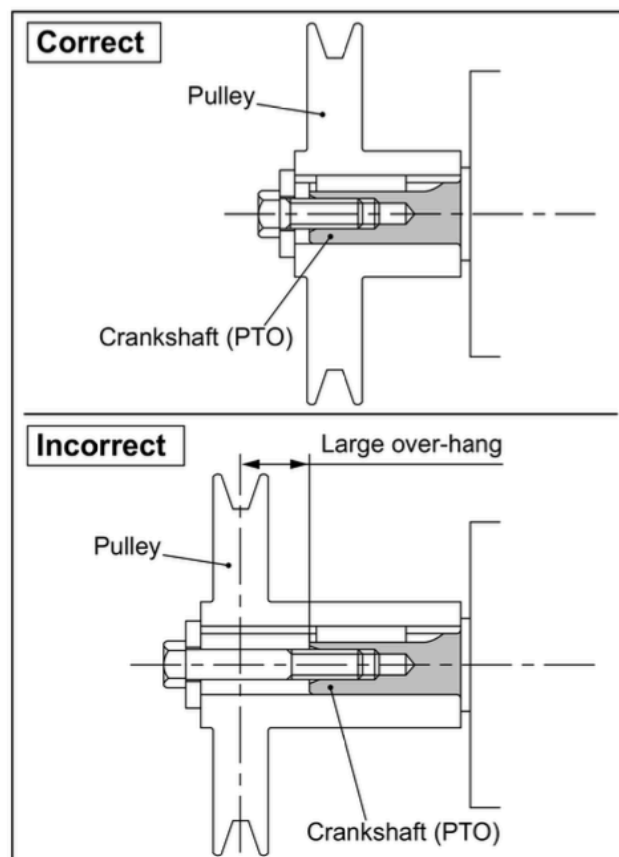
## Key Location

When using the belt pulley with the extended boss on both side as shown in the illustration, put the spacer so that the key stays in the keyway portion of the crankshaft.



## Belt Pulley Installation

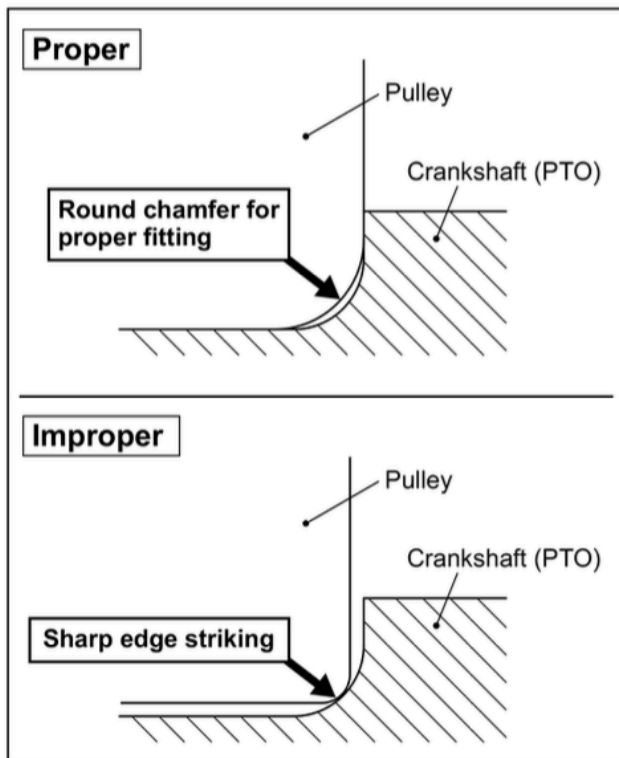
Install the belt pulley in the no over-hang condition as shown in the illustration.



### Pulley fitting onto PTO shoulder

For proper pulley fitting onto PTO shoulder, make round chamfer at pulley corner.

Sharp edge of pulley corner strikes PTO shoulder. In this improper condition, bolt will be loosened, and PTO damaged finally.



## 6. OPERATING YOUR ENGINE

(See Fig. 4)

### 1. STARTING

- (1) Open the fuel valve. (See Fig. 4-1)
- (2) Turn the STOP SWITCH to the position "I" (ON). (See Fig. 4-2)
- (3) Set the speed control lever 1/3 of the way towards the high speed position. (See Fig. 4-3)
- (4) Close the choke lever. (See Fig. 4-4)
  - If the engine is cold or the ambient temperature is low, close the choke lever fully.
  - If the engine is warm or the ambient temperature is high, open the choke lever half-way, or keep it fully open.
- (5) Pull the starter handle slowly until resistance is felt. This is the "compression" point. Return the handle to its original position and pull swiftly. Do not pull out the rope all the way. After starting the engine, allow the starter handle to return to its original position while still holding the handle. (See Fig. 4-5)

### FOR ELECTRIC STARTER MODELS.

Insert the key into the key slot and set it at the "I" (ON) position. Turn it to the right (START position) to start the engine. (See Fig. 4-5)

- Do not operate the electric starter continuously for more than 5 seconds, even if the engine does not start.
- If the engine failed to start, set the key to the "I" (ON) position and wait for about 10 seconds before retrying.
- Never turn the key switch to the START position while engine is running.

- (6) After starting the engine, gradually open choke by turning the choke lever and finally keep it fully opened. Do not fully open the choke lever immediately when the engine is cold or the ambient temperature is low, because the engine may stop. (See Fig. 4-6)

### 2. RUNNING

- (1) After the engine starts, set the speed control lever at the low speed position (L) and warm it up without load for a few minutes. (See Fig. 5-1)
- (2) Gradually move the speed control lever toward the high speed position (H) and set it at the required engine speed. (See Fig. 5-2)
  - Whenever high speed operation is not required, slow the engine down (idle) by moving the speed control lever to save fuel and extend engine life.

### 3. STOPPING

- (1) Set the speed control lever at the low speed position and allow the engine to run at low speed for 1 or 2 minutes before stopping. (See Fig. 6-1)
- (2) Turn the STOP SWITCH (or KEY SWITCH) counterclockwise to the position "O" (OFF). (See Fig. 6-2)
- (3) Close the fuel valve. (See Fig. 6-3)
- (4) Pull the starter handle slowly and return the handle to its original position when resistance is felt. This operation is necessary to prevent outside moist air from intruding into the combustion chamber. (See Fig. 6-4)

### ※STOPPING ENGINE WITH THE FUEL VALVE

Close the fuel valve and wait for a while until the engine stops. Avoid to let the fuel remain in the carburetor over long periods, or the passages of the carburetor may become clogged with impurities, and malfunctions may result.



# 7. MAINTENANCE

(See Fig. 7)

## 1. DAILY INSPECTION (See Fig. 7-①)

Before running the engine, check the following service items.

- ① Loose or broken bolts and nuts
- ② Clean air cleaner element
- ③ Enough clean engine oil
- ④ Leakage of gasoline and engine oil
- ⑤ Enough gasoline
- ⑥ Safe surroundings
- ⑦ Excessive vibration, noise

## 2. PERIODIC INSPECTION

Periodic maintenance is vital to the safe and efficient operation of your engine.

Check the table below for periodic maintenance intervals. Should the engine be operated in extremely dusty condition or in heavier loading condition, the maintenance intervals must be shortened depending on the contamination of oil, clogging of filter elements, wear of parts, and so on.

## 3. INSPECTING THE SPARK PLUG

(See Fig. 7-②)

- (1) Clean off carbon deposits on the spark plug electrode using a plug cleaner or wire brush.

- (2) Check electrode gap. The gap should be 0.6 mm to 0.7mm. Adjust the gap, if necessary, by carefully bending the side electrode.

**Recommended Spark Plug :**  
E6RC (TORCH) or BR-6HS (NGK)

## 4. ENGINE OIL CHANGE (See Fig. 7-③,④)

Initial oil change : After 20 hours of operation  
Thereafter : Every 100 hours of operation

- (1) When changing oil, stop the engine and loosen the drain plug. Drain the used oil while the engine is warm. Warm oil drains quickly and completely.

### ⚠ CAUTION

To prevent injury, pay attention to the hot oil.

- (2) Re-install the drain plug before refilling oil.

| Oil capacity (Upper level) : | (L) |
|------------------------------|-----|
| EX16/17/21, SP17/21 .....    | 0.6 |
| EX27/30 .....                | 1.0 |
| EX35/40 .....                | 1.2 |

- (3) Refer to page 5 for the recommended oil.
  - Always use the best grade and clean oil. Contaminated oil, poor quality oil and shortage of oil cause damage to engine or shorten the engine life.

Periodic Maintenance Schedule table

| Maintenance Items                          | Every 8 hours (Daily)              | Every 50 hours (Weekly) | Every 200 hours (Monthly) | Every 300 hours | Every 500 hours | Every 1000 hours  |
|--|------------------------------------|-------------------------|---------------------------|-----------------|-----------------|-------------------|
| Clean engine and check bolts and nuts      | ● (Daily)                          |                         |                           |                 |                 |                   |
| Check for leakage from hoses and fitting   | ● (Daily)                          |                         |                           |                 |                 |                   |
| Check and refill engine oil                | ● (Refill daily up to upper level) |                         |                           |                 |                 |                   |
| Change engine oil                          | ● (Initial 20 hours)               | ● (Every 100 hours)     |                           |                 |                 |                   |
| Clean spark plug                           |                                    | ● (Every 100 hours)     |                           |                 |                 |                   |
| Clean air cleaner                          |                                    | ●                       |                           |                 |                 |                   |
| Replace air cleaner element                |                                    |                         | ●                         |                 |                 |                   |
| Clean fuel cup                             |                                    |                         | ●                         |                 |                 |                   |
| Clean and adjust spark plug and electrodes |                                    |                         | ●                         |                 |                 |                   |
| Check and adjust valve clearance           |                                    |                         |                           | ●               |                 |                   |
| Remove carbon from cylinder head           |                                    |                         |                           |                 | ●               |                   |
| Clean and adjust carburetor                |                                    |                         |                           |                 | ●               |                   |
| Replace fuel lines                         |                                    |                         |                           |                 |                 | ● (Every 2 years) |
| Overhaul engine if necessary               |                                    |                         |                           |                 |                 | ●                 |

## 5. CLEANING FUEL CUP (See Fig. 7-5)

**⚠ WARNING** Flame Prohibited

**⚠ WARNING**

Remove the static electricity from your body before refilling the gasoline.  
Sparking from electrostatic discharge may cause the ignition to the vaporized fuel (gasoline) resulting burns.  
Static electricity can be discharged from the body by touching by hand the metal parts of the unit.

- (1) Inspect fuel cup for water and dirt. (See Fig. 7-5-1)
- (2) To remove water and dirt, close the fuel valve and remove the fuel cup.
- (3) After removing dirt and water, wash the fuel cup with kerosene or gasoline. Reinstall securely to prevent leakage.

## 6. CLEANING AIR CLEANER (See Fig. 7-6 thru 9)

A dirty air cleaner element will cause starting difficulty, power loss, engine malfunctions, and shorten engine life extremely.  
Always keep the air cleaner element clean.

**⚠ WARNING** Flame Prohibited

### A. Urethane Foam Element Type (See Fig. 7-6)

Remove the element and wash it in washing oil (kerosene). Then saturate it in engine oil and squeeze it firmly before installing. (See Fig. 7-6-1)

### B. Dual Element Type

(Urethane Foam and Paper elements) (See Fig. 7-7)

- For EX16/17/21, SP17/21 urethane foam, remove it from the paper element and wash it in washing oil (kerosene). Then saturate it in engine oil and squeeze it firmly before installing. (See Fig. 7-7-1)
- For EX27/30/35/40 urethane foam, remove it from the paper element and wash it thoroughly with detergent. Then dry it before installing. (See Fig. 7-7-1)
- For the paper element, clean by blowing on it with compressed air from the inside or tapping on it gently to remove dirt. Change the paper element when doing this fails to remove the dirt. (See Fig. 7-7-2)

### C. Dual Element Type

(Urethane Foam and Nonwoven Cloth elements)  
(See Fig. 7-7)

- For EX16/17/21, SP17/21 urethane foam, remove it from the non-woven cloth element and wash it thoroughly in washing oil (kerosene). Then saturate it in an oil mixture of **4 parts kerosene to 1 part engine oil** and squeeze it firmly before installing. (See Fig. 7-7-1)

- For EX27/30/35/40 urethane foam, remove it from the non-woven cloth element and clean it via the method described in B above. (See Fig. 7-7-1)
- Wash the element in kerosene and drain off the kerosene. Then saturate it in a mixture of **4 parts kerosene and 1 part engine oil**, wring the element to remove the mixture and install. (See Fig. 7-7-3)

### D. For Generator Type (See Fig. 7-8)

#### <Paper Element Specifications> (See Fig. 7-8-3,4)

- Wash the first element (urethane foam) thoroughly with detergent. Then dry it before installing. (See Fig. 7-8-3)
- Clean the second element (paper element) by blowing on it with compressed air from the inside or tapping on it gently to remove dirt. Change the paper element when doing this fails to remove the dirt. (See Fig. 7-8-4)

#### <Urethane Element Specifications>

#### EX16/17/21, SP17/21 (See Fig. 7-8-1,2)

- Clean the first element via the method described in A above. Remove the second element from its casing and wash it thoroughly with detergent. Then dry it before installing.

#### EX27/30/35/40 (See Fig. 7-8-1)

- Clean this via the method described in A above.

### E. Oil Bath Type (See Fig. 7-9)

Clean the urethane foam (Fig. 7-9-1) in the same way as described A Urethane Foam Element Type.  
Drain the dirty oil from the oil pan (Fig. 7-9-2) and wash it in kerosene.  
Then fill the new engine oil upto the specified oil level.

#### Oil capacity in the Oil Bath (oil pan) :

EX16/17/21, SP17/21 . . . . . About 55 mL



**NOTE**

Instead of washing oil (kerosene), it is possible to wash the urethane foam element in a solution of mild detergent and warm water.

Then rinse the element thoroughly in clean water.

Allow the element to dry thoroughly. Soak the element in clean engine oil and squeeze out excess oil.

**NOTE**

Clean and replace air cleaner elements more often when operating in dusty environments. Replace the element in case that dirt or dust can not be removed and/or that the element is deformed or deteriorated.

**7. FUEL HOSE REPLACEMENT**

(See Fig. 7-10)

**⚠ WARNING**

- Take extreme caution when replacing fuel hose ; gasoline is extremely flammable.
- Remove the static electricity from your body before refilling the gasoline.  
Sparking from electrostatic discharge may cause the ignition to the vaporized fuel (gasoline) resulting burns.  
Static electricity can be discharged from the body by touching by hand the metal parts of the unit.

Replace the fuel hose every 2 years. If fuel leaks from fuel hose, replace the fuel hose immediately.

**8. CHECKING BOLTS, NUTS AND SCREWS**

- Retighten loose bolts and nuts.
- Check for fuel and oil leaks.
- Replace damaged parts with new ones.

**9. CHECK BATTERY****⚠ WARNING** Flame Prohibited

If the electrolyte fluid is below level line, refill with distilled water to the upper level line.

**8. PREPARATIONS FOR STORAGE****1. DISCHARGE FUEL (See Fig. 8-1)****⚠ WARNING** Flame Prohibited

If you do not use the engine more than 1 month, discharge fuel to prevent gum in the fuel system and carburetor parts.

**⚠ WARNING**

- Remove the static electricity from your body before refilling the gasoline.  
Sparking from electrostatic discharge may cause the ignition to the vaporized fuel (gasoline) resulting burns.  
Static electricity can be discharged from the body by touching by hand the metal parts of the unit.
- Always store/carry the fuel (gasoline) with metallic portable tank to prevent fire.

- Remove the fuel cup, place it over a container and open the fuel valve to discharge fuel from the fuel tank.
- Remove the drain screw of the carburetor float chamber and discharge fuel.

**2. ENGINE OIL**

- Change the engine oil with fresh oil.
- Remove the spark plug, pour about 5 cc of engine oil into the cylinder, slowly pull the starter handle of the recoil starter 2 or 3 times, and reinstall the spark plug.

**3. CLEAN AND STORE**

- Slowly pull the recoil starter handle until resistance is felt and leave it in that position.
- Clean the engine thoroughly with an oiled cloth, put the cover on, and store the engine indoors in a well ventilated, low humidity area.

**4. BATTERY CHARGING****⚠ WARNING** Flame Prohibited

- The battery discharges itself even when not connected, therefore it is necessary to recharge it once a month.

# 11. SPECIFICATIONS

| MODEL                  |                    | EX16D   | EX17D                             | EX21D                  | EX27D                  |
|------------------------|--------------------|---|-----------------------------------|------------------------|------------------------|
| Type                   |                    | Air-cooled, 4-cycle single cylinder, overhead camshaft, gasoline engine |                                   |                        |                        |
| Displacement           | mL (cc)            | 169   |                                   | 211                    | 265                    |
| Continuous Output      | kW/rpm<br>(HP/rpm) | 2.2/3600<br>(3.0/3600)  | 2.9/3600<br>(4.0/3600)            | 3.7/3600<br>(5.0/3600) | 5.1/3600<br>(7.0/3600) |
| Maximum Output         | kW/rpm<br>(HP/rpm) | 3.2/4000<br>(4.3/4000)  | 4.2/4000<br>(5.7/4000)            | 5.1/4000<br>(7.0/4000) | 6.6/4000<br>(9.0/4000) |
| Direction of Rotation  |                    | Counterclockwise, as Viewed from P.T.O. Shaft side                      |                                   |                        |                        |
| Lubricant              |                    | Automotive detergent oil (API/ SE or higher grade, SAE/ 10W-30 etc.)    |                                   |                        |                        |
| Oil Capacity           | Liter              | 0.6   |                                   |                        | 1.0                    |
| Fuel                   |                    | Automotive Gasoline (Unleaded)  |                                   |                        |                        |
| Fuel Tank Capacity     | Liter              | 3.2   |                                   |                        | 5.6                    |
| Spark Plug             |                    | TORCH E6RC or NGK BR-6HS  |                                   |                        |                        |
| Starting System        |                    | Recoil starter  | Recoil starter / Electric starter |                        |                        |
| Dry Weight             | kg                 | 15  |                                   | 16                     | 21                     |
| Dimensions (L x W x H) | mm                 | 312 × 359 × 335   |                                   | 320 × 370 × 335        | 381 × 420 × 410        |

| MODEL                  |                    | EX30D   | EX35D                   |                         | EX40D                   |                          |
|------------------------|--------------------|---|-------------------------|-------------------------|-------------------------|--------------------------|
| Type                   |                    | Air-cooled, 4-cycle single cylinder, overhead camshaft, gasoline engine |                         |                         |                         |                          |
| Displacement           | mL (cc)            | 287   | 404                     |                         |                         |                          |
| Continuous Output      | kW/rpm<br>(HP/rpm) | 5.5/3600<br>(7.5/3600)  | 6.3/3600<br>(8.5/3600)  |                         | 7.0/3600<br>(9.5/3600)  |                          |
| Maximum Output         | kW/rpm<br>(HP/rpm) | 6.6/3600<br>(9.0/3600)  | Net                     | Gross                   | Net                     | Gross                    |
|                        |                    |   | 7.4/3600<br>(10.0/3600) | 8.8/3600<br>(12.0/3600) | 8.8/3600<br>(12.0/3600) | 10.3/3600<br>(14.0/3600) |
| Direction of Rotation  |                    | Counterclockwise, as Viewed from P.T.O. Shaft side                      |                         |                         |                         |                          |
| Lubricant              |                    | Automotive detergent oil (API/ SE or higher grade, SAE/ 10W-30 etc.)    |                         |                         |                         |                          |
| Oil Capacity           | Liter              | 1.0   | 1.2                     |                         |                         |                          |
| Fuel                   |                    | Automotive Gasoline (Unleaded)  |                         |                         |                         |                          |
| Fuel Tank Capacity     | Liter              | —   | 6.8                     |                         |                         |                          |
| Spark Plug             |                    | TORCH E6RC or NGK BR-6HS  |                         |                         |                         |                          |
| Starting System        |                    | Recoil starter / Electric starter                                       |                         |                         |                         |                          |
| Dry Weight             | kg                 | 21  | 33                      |                         |                         |                          |
| Dimensions (L x W x H) | mm                 | 415 × 424 × 319   | 415 × 450 × 447         |                         |                         |                          |

• Specifications are subject to change without notice

| MODEL                  |                    | SP17  | SP21                   |
|------------------------|--------------------|---|------------------------|
| Type                   |                    | Air-cooled, 4-cycle single cylinder, overhead camshaft, gasoline engine |                        |
| Displacement           | mL (cc)            | 169   | 211                    |
| Continuous Output      | kW/rpm<br>(HP/rpm) | 2.9/3600<br>(4.0/3600)  | 3.7/3600<br>(5.0/3600) |
| Maximum Output         | kW/rpm<br>(HP/rpm) | 4.2/4000<br>(5.7/4000)  | 5.1/4000<br>(7.0/4000) |
| Direction of Rotation  |                    | Counterclockwise, as Viewed from P.T.O. Shaft side                      |                        |
| Lubricant              |                    | Automotive detergent oil (API/ SE or higher grade, SAE/ 10W-30 etc.)    |                        |
| Oil Capacity           | Liter              | 0.6   |                        |
| Fuel                   |                    | Automotive Gasoline (Unleaded)  |                        |
| Fuel Tank Capacity     | Liter              | 3.2   |                        |
| Spark Plug             |                    | TORCH E6RC or NGK BR-6HS  |                        |
| Starting System        |                    | Recoil starter  |                        |
| Dry Weight             | kg                 | 15  | 16                     |
| Dimensions (L x W x H) | mm                 | 312 × 357 × 335   | 320 × 366 × 335        |

- Specifications are subject to change without notice

(California Proposition 65)



## **WARNING:**



The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

(California only)

## **AIR INDEX**

To show compliance with California emission regulations, a hangtag has been provided displaying the Air Index level and durability period of this engine.

The Air Index level defines how clean an engine's exhaust is over a period of time. A bar graph scaled from "0" (most clean) to "10" (least clean) is used to show an engine's Air Index level. A lower Air Index level represents cleaner exhaust from an engine.

The period of time (in hours) that the Air Index level is measured is known as the durability period. Depending on the size of the engine, a selection of time periods can be used to measure the Air Index level (see below).

| <u>Descriptive Term</u> | <u>Applicable to Emissions Durability Period</u>   |
|-------------------------|--|
| Moderate                | - 50 hours (engine from 0 to 80 cc)<br>125 hours (engine greater than 80 cc)                                     |
| Intermediate            | - 125 hours (engine from 0 to 80 cc)<br>250 hours (engine greater than 80 cc)                                    |
| Extended                | - 300 hours (engine from 0 to 80 cc)<br>500 hours (engine greater than 80 cc)<br>1000 hours (225 cc and greater) |

**Notice :** This hangtag must remain on this engine or piece of equipment, and only be removed by the ultimate purchaser before operation.

**Notice :** FEDERAL EMISSION COMPONENT DEFECT WARRANTY and CALIFORNIA EMISSION CONTROL WARRANTY are applicable to only those engines/ generators complied with EPA (Environmental Protection Agency) and CARB (California Air Resources Board) emission regulations in the U.S.A.