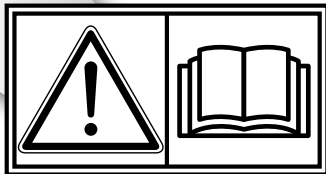


MODEL

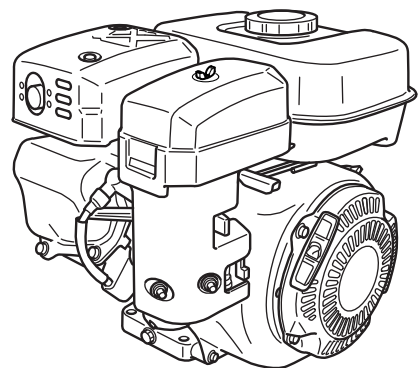
EX13D/EX17D EX21D/EX27D



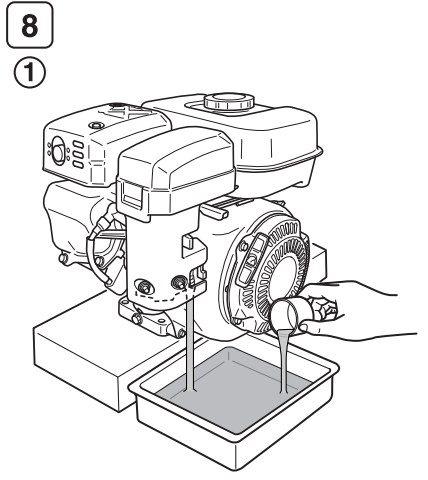
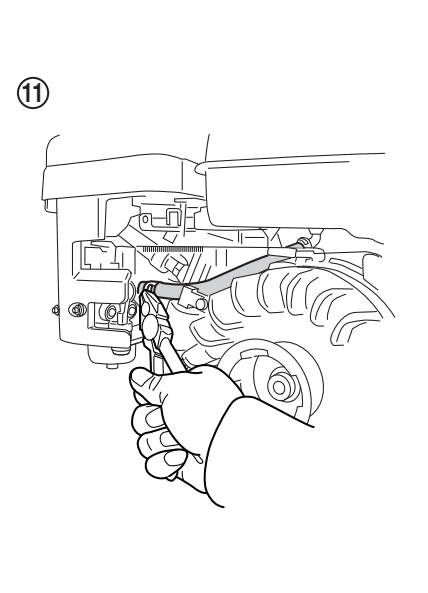
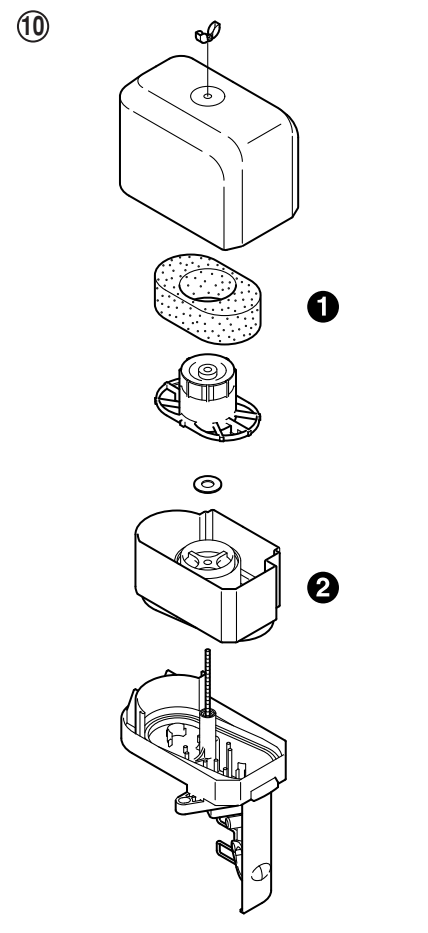
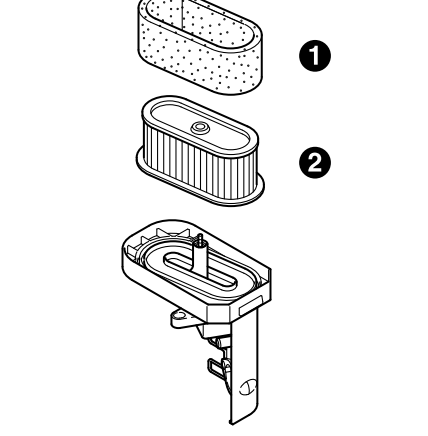
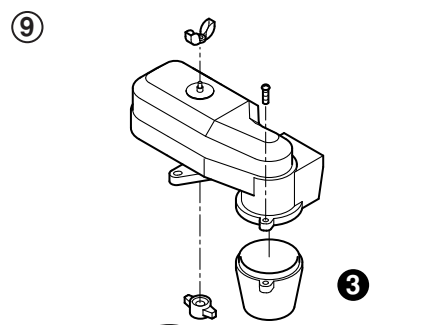
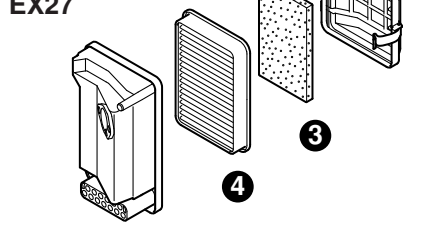
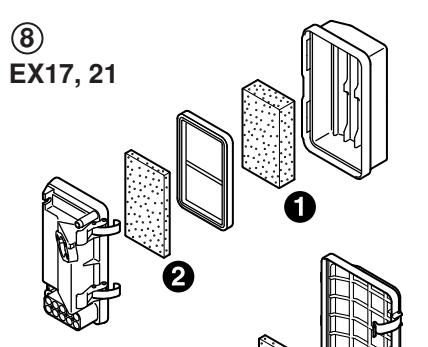
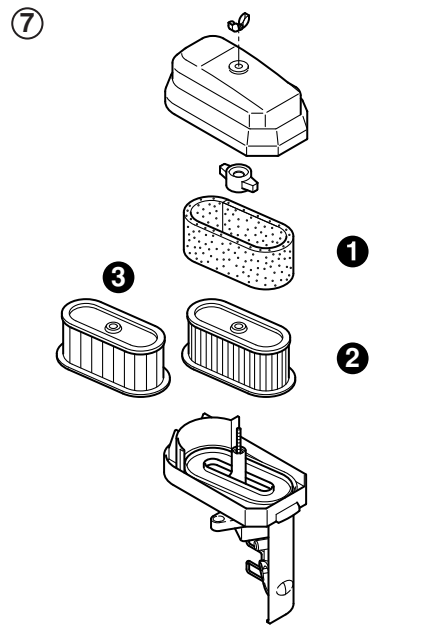
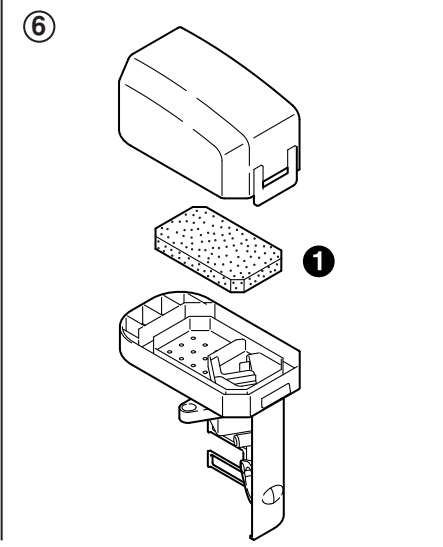
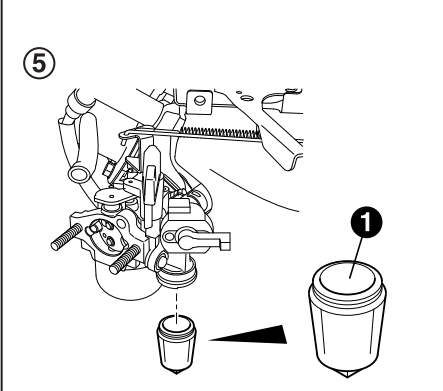
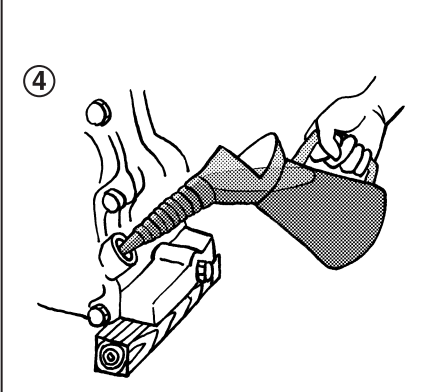
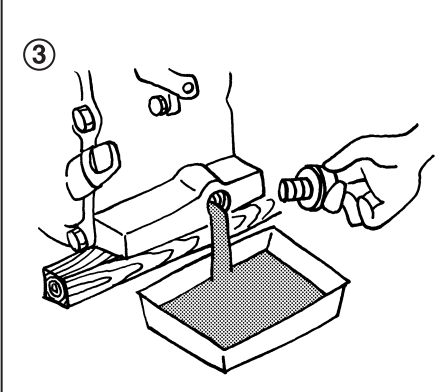
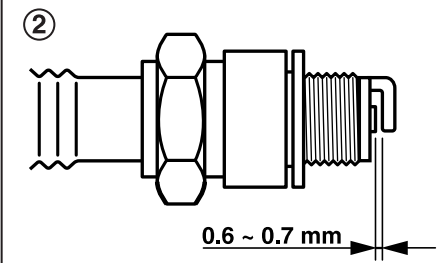
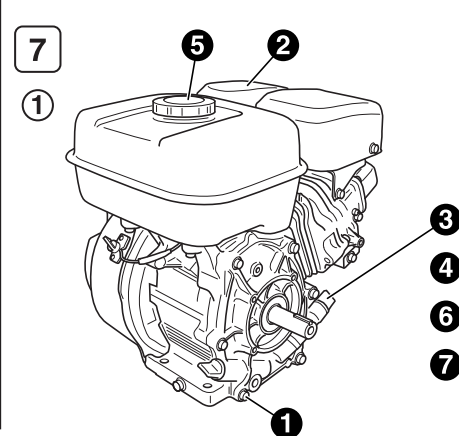
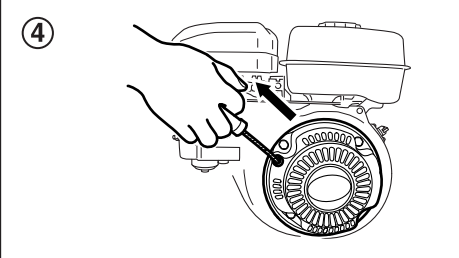
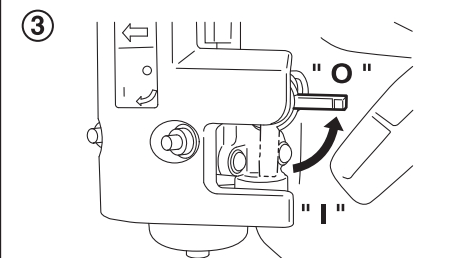
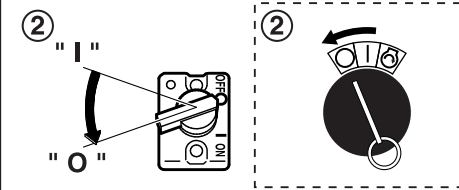
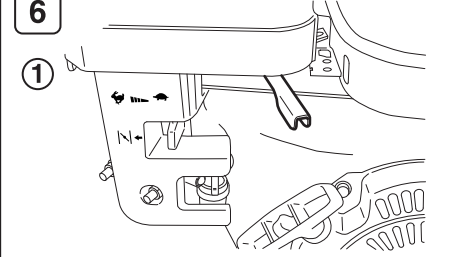
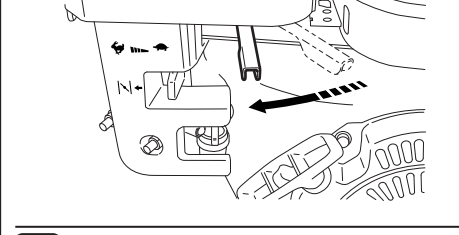
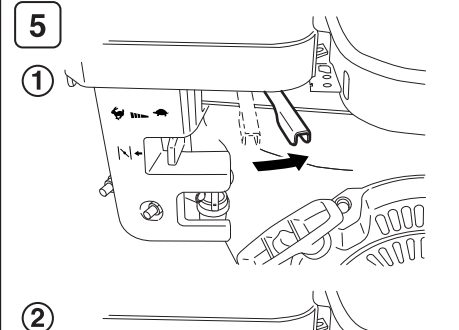
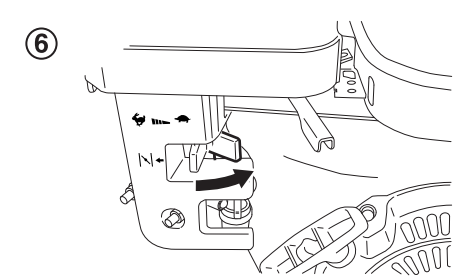
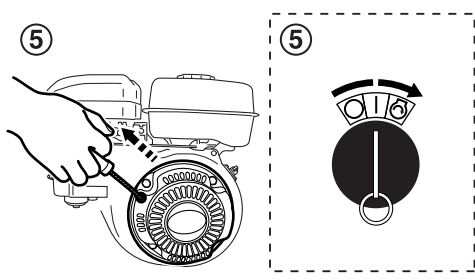
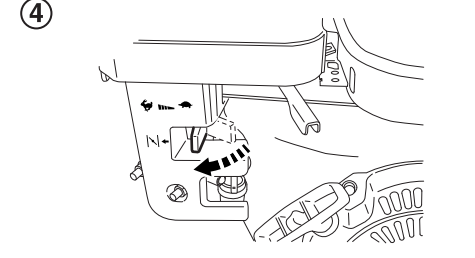
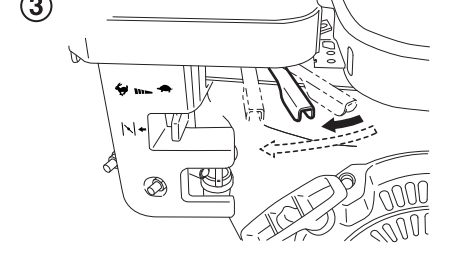
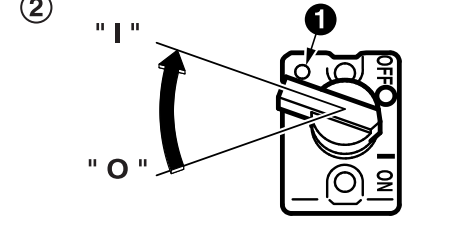
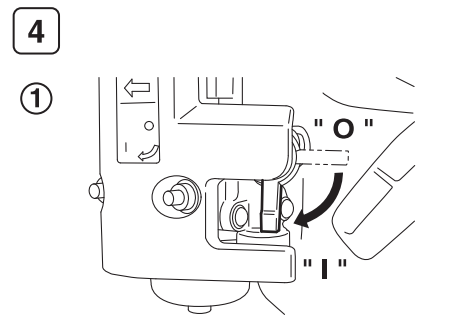
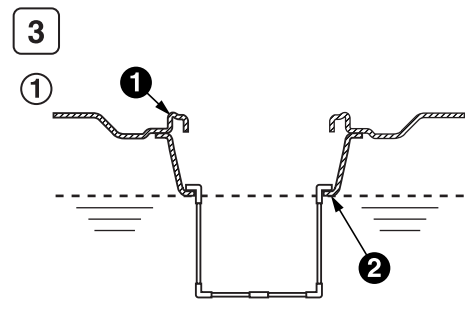
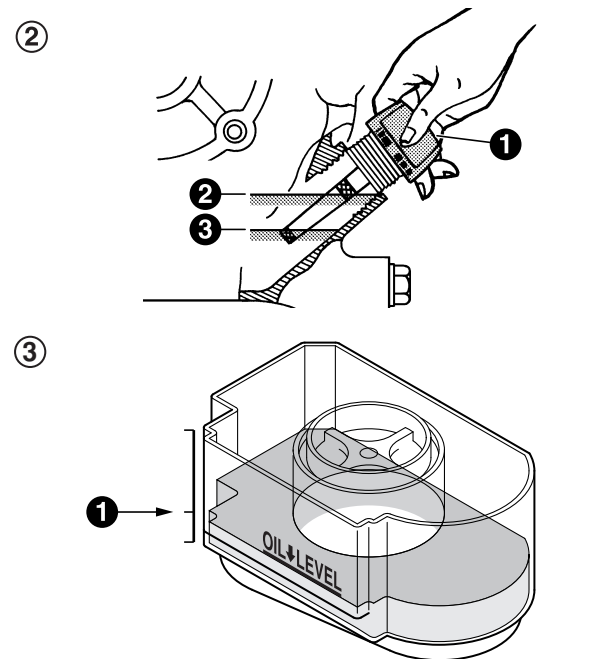
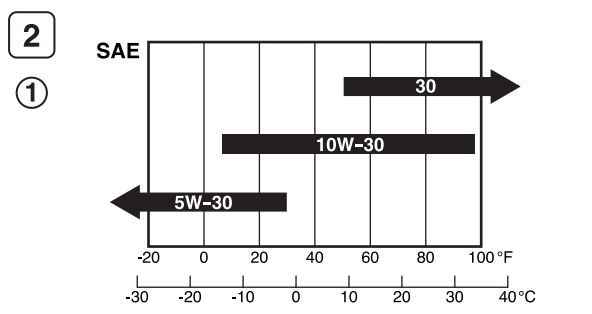
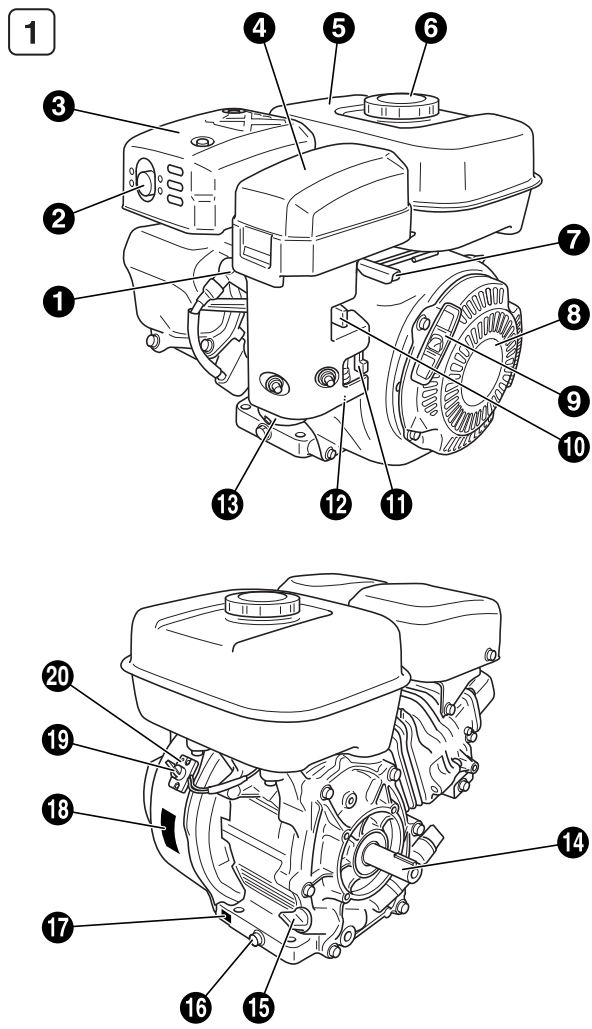
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- JP 取扱説明書
- GB **INSTRUCTIONS FOR USE**
- US *INSTRUCTIONS FOR USE (USA only)*
- FR *MANUEL D'UTILISATION*
- DE *BEDIENUNGSANLEITUNG*
- NL *GEBRUIKSAANWIJZING*
- ES *MANUAL DE INSTRUCCIONES*
- IT *MANUALE D'USO E MANUTENZIONE*
- PT *MANUAL DE INSTRUÇÕES*
- GR *ΟΔΗΓΙΕΣ ΧΡΗΣΕΩΣ ΚΑΙ ΣΥΝΤΗΡΗΣΕΩΣ ΚΙΝΗΤΗΡΩΝ*
- NO *INSTRUKTIONSBOK*
- SE *BRUKSANVISNING*
- FI *KÄYTTÖ-JA HUOLTO-OHJEET*
- DK *BRUGSANVISNING*
- RU *РУКОВОДСТВО ПО ЭКСПЛУАТАЦИИ*
- PL *INSTRUKCJA OBSŁUGI DO SILNIKÓW*
- CN 使用说明书
- AR إرشادات الاستعمال

- JP
- GB
- US
- FR
- DE
- NL
- ES
- IT
- PT
- GR
- NO
- SE
- FI
- DK
- RU
- PL
- CN
- AR



Robin Engines



GB

**MANUFACTURER'S DECLARATION FOR MACHINERY PARTS
IN ACCORDANCE WITH 98/37/EC 1998**
Manufacturer of machinery parts :

FUJI HEAVY INDUSTRIES LTD.
Industrial Products Company
Saitama Plant
4-410 Asahi, Kitamoto City, Saitama 364-8511, Japan

Description of the machinery parts :

"Robin" EC, EY, EH, DY and EX series spark ignition Engines.

Engine Models :

EC01, 02, 03, 04, 06, 08, 10, 12, 17, 25
EY08, 15, 20, 28, 35, 40
EH025, 035, 09, 12, 17, 25, 30, 34, 36, 41, 63, 64, 65, 72
DY23, 27, 30, 35, 41, 42
EX13, 17, 21, 27

Declaration :

The above designated engines are intended for installation in a machine as set out in the EC machines guideline.

Note :

This machinery part must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the appropriate machinery directive.

Signed : K. Ohno

K. Ohno
Department Manager, Customer Service

Dated : July 2004

FR

**DÉCLARATION DU FABRICANT POUR DES PIÈCES DE MACHINES
SELON LA NORME 98/37/CE 1998**
Fabricant des pièces de machines :

FUJI HEAVY INDUSTRIES LTD.
Industrial Products Company
Saitama Plant
4-410 Asahi, Kitamoto City, Saitama 364-8511, Japan

Description des composants de machines :

Moteurs à allumage par étincelle série "Robin" EC, EY, EH, DY et EX.

Modèles de moteur :

EC01, 02, 03, 04, 06, 08, 10, 12, 17, 25
EY08, 15, 20, 28, 35, 40
EH025, 035, 09, 12, 17, 25, 30, 34, 36, 41, 63, 64, 65, 72
DY23, 27, 30, 35, 41, 42
EX13, 17, 21, 27

Déclaration :

Les moteurs indiqués ci-dessus sont prévus pour l'installation dans une machine comme spécifié dans la directive des machines CE.

Remarque :

Ce composant de machine ne doit pas être mis en service tant que la machine dans laquelle il est intégré, n'a pas été déclarée conforme aux directives machines appropriées.

Signé : K. Ohno

K. Ohno
Directeur de Dept., Service de la clientèle

Daté : Juillet 2004

DE

**HERSTELLERERKLÄRUNG FÜR MASCHINENTEILE
ENTSPRECHEND 98/37/EG 1998**
Hersteller von Maschinenteilen :

FUJI HEAVY INDUSTRIES LTD.
Industrial Products Company
Saitama Plant
4-410 Asahi, Kitamoto City, Saitama 364-8511, Japan

Beschreibung der Maschinenteile :

"Robin" Funkenzündungsmotoren der Baureihen EC, EY, EH, DY und EX.

Motorenmodelle :

EC01, 02, 03, 04, 06, 08, 10, 12, 17, 25
EY08, 15, 20, 28, 35, 40
EH025, 035, 09, 12, 17, 25, 30, 34, 36, 41, 63, 64, 65, 72
DY23, 27, 30, 35, 41, 42
EX13, 17, 21, 27

Erklärung :

Die oben aufgeführten Motoren sind zum Einbau in einer Maschine wie in den EG-Maschinenrichtlinien festgelegt gedacht.

Hinweis :

Dieses maschinenteil darf nicht in betrieb genommen werden, bevor die maschine, in der es zum einsatz kommen soll, mit den bestimmungen der entsprechenden maschinenrichtlinie konform bzw. diesen entsprechend erklärt wurde.

Unterzeichnet : K. Ohno

K. Ohno
Abteilungsleiter, Kundendienst

Datum : Juli 2004

NL

**VERKLARING VAN DE FABRIKANT VOOR MACHINE ONDERDELEN
VOLGENS 98/37/EG 1998**
Fabrikant van machine onderdelen :

FUJI HEAVY INDUSTRIES LTD.
Industrial Products Company
Saitama Plant
4-410 Asahi, Kitamoto City, Saitama 364-8511, Japan

Beschrijving van de machine onderdelen :

"Robin" EC, EY, EH, DY en EX series interne verbrandingsmotoren.

Motormodellen :

EC01, 02, 03, 04, 06, 08, 10, 12, 17, 25
EY08, 15, 20, 28, 35, 40
EH025, 035, 09, 12, 17, 25, 30, 34, 36, 41, 63, 64, 65, 72
DY23, 27, 30, 35, 41, 42
EX13, 17, 21, 27

Verklaring :

De hierboven aangegeven motoren zijn bedoeld voor installatie in een machine als beschreven in de EG machinerichtlijn.

Opmerking :

Deze machine onderdelen mogen niet in werking worden gesteld alvorens zeker is dat de applicatie waarvoor deze onderdelen worden gebruikt geheel volgens figerende richtlijnen zijn.

Ondertekend : K. Ohno

K. Ohno
Afdelingshoofd Klantenservice

Datum : Juli 2004

ES

**DECLARACIÓN DEL FABRICANTE DE CONFORMIDAD DE LAS
PARTES DE LA MAQUINARIA CON LA DIRECTIVA 98/37/CE 1998**
Fabricante de las partes de la maquinaria :

FUJI HEAVY INDUSTRIES LTD.
Industrial Products Company
Saitama Plant
4-410 Asahi, Kitamoto City, Saitama 364-8511, Japan

Descripción de las partes de la maquinaria :

Motores de encendido por chispa "Robin" de las series EC, EY, EH, DY y EX.

Modelos de motores :

EC01, 02, 03, 04, 06, 08, 10, 12, 17, 25
EY08, 15, 20, 28, 35, 40
EH025, 035, 09, 12, 17, 25, 30, 34, 36, 41, 63, 64, 65, 72
DY23, 27, 30, 35, 41, 42
EX13, 17, 21, 27

Declaración :

Los motores arriba designados están hechos para su instalación en una máquina según lo estipulado en la normativa de máquinas de la CE.

Nota :

Esta pieza no debe ser puesta en funcionamiento hasta que la máquina a la cual se incorpore haya sido declarada conforme con las disposiciones de las correspondientes directivas sobre maquinaria.

Firmado : K. Ohno

K. Ohno
Jefe del departamento, Servicio de clientes

Fecha : Julio de 2004

IT

**DICHIARAZIONE DEL COSTRUTTORE RELATIVA AI COMPONENTI
PER MACCHINE IN ACCORDO ALLA DIRETTIVA 98/37/CE 1998**
Costruttore dei componenti per macchine :

FUJI HEAVY INDUSTRIES LTD.
Industrial Products Company
Saitama Plant
4-410 Asahi, Kitamoto City, Saitama 364-8511, Japan

Descrizione del componente della macchina :

Motori a candela "Robin" delle serie EC, EY, EH, DY ed EX.

Modelli di motore :

EC01, 02, 03, 04, 06, 08, 10, 12, 17, 25
EY08, 15, 20, 28, 35, 40
EH025, 035, 09, 12, 17, 25, 30, 34, 36, 41, 63, 64, 65, 72
DY23, 27, 30, 35, 41, 42
EX13, 17, 21, 27

Dichiarazione :

I motori sopra specificati sono destinati all'installazione a bordo di macchine secondo quanto disposto dalle direttive macchine CE.

Nota :

Questo componente non può essere messo in servizio se la macchina della quale fa parte non è stata dichiarata conforme alle prescrizioni della vigente direttiva macchine.

Firma : K. Ohno

K. Ohno
Direttore di dipartimento, Servizio dei clienti

Data : Luglio 2004

FOREWORD

Thank you very much for purchasing a **ROBIN ENGINE**.

Your **ROBIN 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.

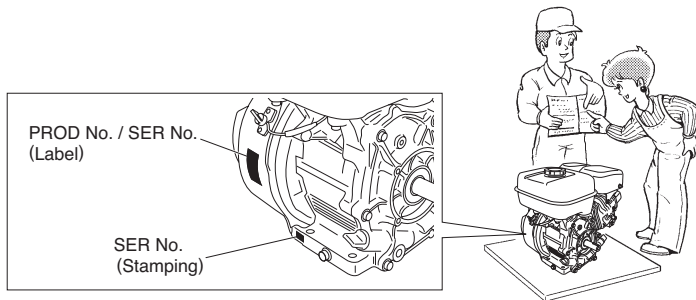
Keep this owner's manual at hand, so that you can refer to it at any time.

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.				



GB

NOTICE

The engines which have emission label are allowed to be exported to USA. The emission label placed on the engine indicates that the engine is complied with EPA (Environmental Protection Agency) and CARB (California Air Resources Board) emission regulations in USA. Exporting any engine to USA which does not have the emission label is a violation of EPA/CARB emission law subject to civil penalty.

CONTENTS

	Page
1. SAFETY PRECAUTIONS	2
2. COMPONENTS	4
3. PRE-OPERATION CHECKS	5
4. ELECTRIC STARTER MODELS	5
5. BELT PULLEY INSTALLATION ONTO KEYWAY-TYPE CRANKSHAFT	6
6. OPERATING YOUR ENGINE	8
7. MAINTENANCE	9
8. PREPARATIONS FOR STORAGE	11
9. OIL SENSOR INSTRUCTIONS (OPTIONAL)	11
10. EASY TROUBLESHOOTING	11
11. SPECIFICATIONS	12

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. SAFETY PRECAUTIONS

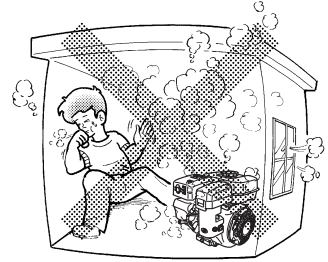
Please make sure you review each precaution carefully.
Pay special attention to statement preceded by the following words.

⚠ 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.

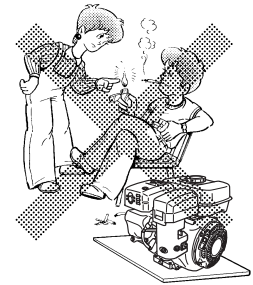
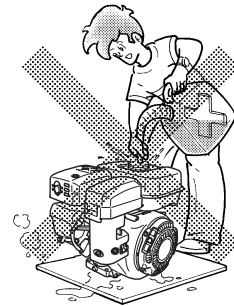
⚠ WARNING : EXHAUST PRECAUTIONS

- 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.



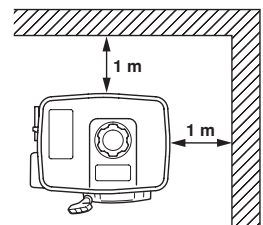
⚠ WARNING : REFUELING PRECAUTIONS

- 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 spilled, 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.



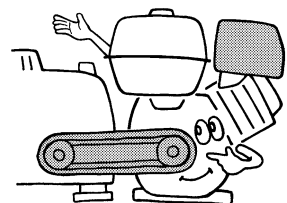
⚠ WARNING : FIRE PREVENTION

- 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).

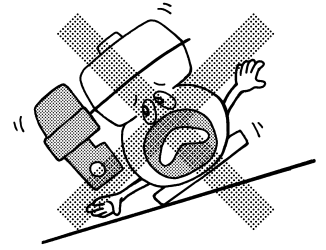


⚠ WARNING : OTHER SAFETY PRECAUTIONS

- 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.



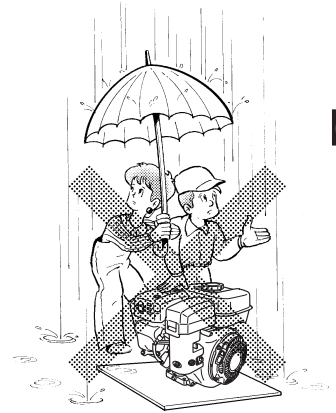
NOTE

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 cock 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

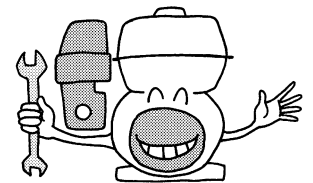
- Battery electrolyte contains sulphuric acid. Protect your eyes, skin and clothing. In case of contact, flush thoroughly with water and get prompt medical attention, especially if your eyes are affected.
- Batteries generate hydrogen gas, which can be highly explosive. Do not smoke or allow flames or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



GB

⚠ 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

		Read the owner's manual.	
		Stay clear of the hot surface.	
		Exhaust gas is poisonous. Do not operate in an unventilated area.	
		Stop the engine before refueling.	
		Fire, open flame and smoking prohibited.	
	On (Run)		Plus ; Positive polarity
	Off (Stop)		Battery
	Engine oil		Engine start (Electric start)
	Add oil		

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 | ⑪ FUEL COCK |
| ② EXHAUST OUTLET | ⑫ FUEL CUP |
| ③ MUFFLER COVER | ⑬ CARBURETOR |
| ④ AIR CLEANER | ⑭ P.T.O. SHAFT |
| ⑤ FUEL TANK | ⑮ OIL GAUGE (OIL FILLER) |
| ⑥ FUEL TANK CAP (FUEL FILLER) | ⑯ OIL DRAIN PLUG |
| ⑦ SPEED CONTROL LEVER | ⑰ ENGINE SERIAL NO. (STAMPING) |
| ⑧ RECOIL STARTER | ⑱ ENGINE NAME LABEL (SPEC. No.) |
| ⑨ STARTER HANDLE | ⑲ STOP SWITCH |
| ⑩ CHOKE LEVER | 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)
EX13/17/21	0.6
EX27	1.0

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) :	
EX13/17/21	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.

- Stop the engine and open the cap.
- Use unleaded automotive gasoline only.

Fuel tank capacity :	(L)		
EX13	2.7	EX17	3.6
EX21	3.6	EX27	6.1

- Close the fuel cock before filling the fuel tank.
- Do not fill above the top of the fuel filter screen (marked ②), or the fuel may overflow when it heats up later and expands.
- When filling the fuel tank, always use the fuel filter screen.
- 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.

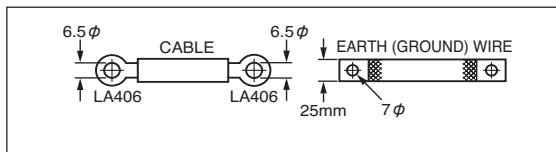
⚠ WARNING

- 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 dismantling.
- 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.

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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.



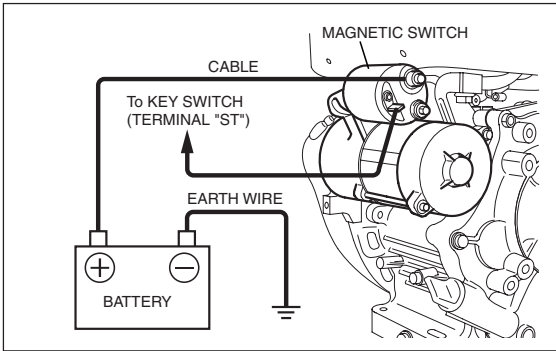
Cable length	Cable dia.	Wire gauge		
		AWG (BS) BWG	SAE	JIS
Less than 1.5m	7.3 mm	1	6	AV15
1.5 m to 2.5 m	8.4 mm	0	4	AV20
2.5 m to 4 m	10.8 mm	3/0	2	AV30

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 1.5 m	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



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- (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.

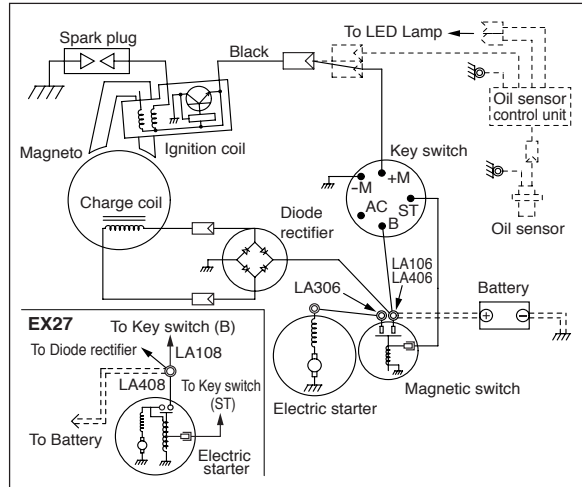
- (2) Ground negative terminal of the battery to the engine body or machine with ground wire.

- (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.

WIRING DIAGRAM (ELECTRIC STARTER MODELS)

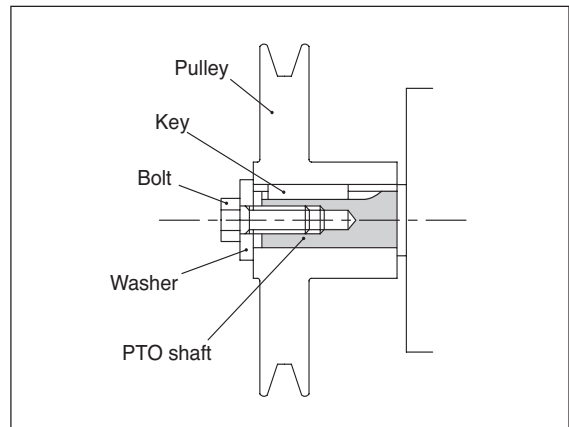
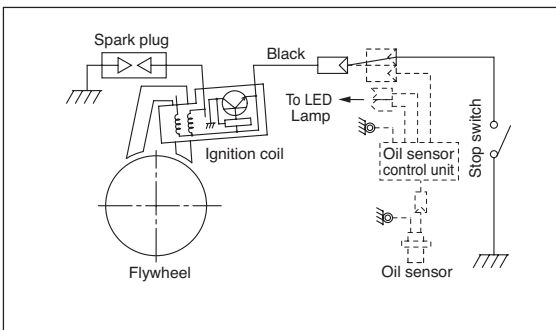


Optional hardware shown by dotted lines.

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.

5. WIRING DIAGRAM (RECOIL STARTER MODELS)



■ Metric keyway-type crankshaft

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

	EX13/17/21	EX27
Washer Thickness	4.5 mm or over	
ROBIN genuine part	020-00801-40, Washer Thickness; 4.5 mm OD; 28 mm ID; 8.5 mm Material; SS41P	020-00800-20, Washer Thickness; 4.5 mm OD; 35 mm ID; 8.5 mm Material; SS41P

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

	EX13/17/21	EX27
Effective thread length	16 to 22 mm	18 to 27 mm
Strength	"8T" or higher	
Tightening Torque	20 - 22 N·m (204 - 224 kgf·cm)	
ROBIN genuine parts	011-00802-50, Flange Bolt (Screw length; 25 mm)	

■ SAE (inch) keyway-type crankshaft

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

	EX13/17/21	EX27
Washer Thickness	0.177 in. (4.5 mm) or over	0.248 in. (6.3 mm) or over
ROBIN genuine part	020-00801-40, Washer Thickness; 4.5 mm OD; 28 mm ID; 8.5 mm Material; SS41P	(NA)

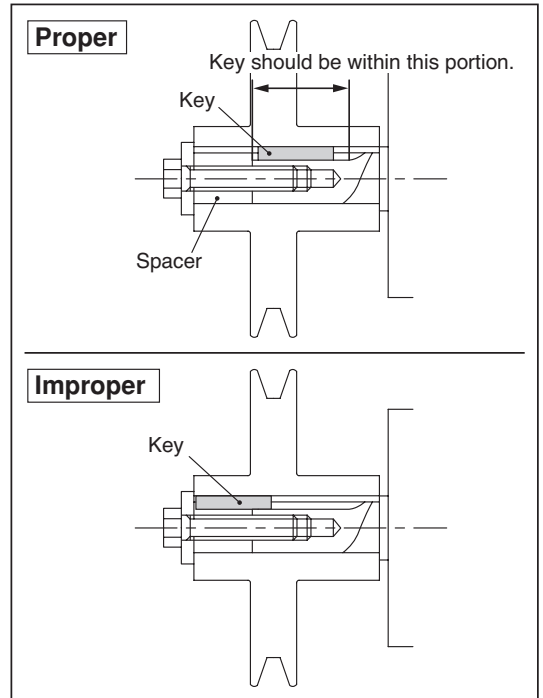
Bolt; Select the proper bolt and tighten it to the specified tightening torque, as mentioned below;

	EX13/17/21	EX27
Thread dimensions	5/16 - 24UNF2B	7/16 - 20UNF2B
Effective thread length	0.63 to 0.87 in. (16 to 22 mm)	0.71 to 1.06 in. (18 to 27 mm)
Strength	"8T" or higher	
Tightening Torque	20 - 22 N·m (204 - 224 kgf·cm) (14.8 - 16.2 ft·lb.)	50 - 60 N·m (510 - 612 kgf·cm) (36.9 - 44.3 ft·lb.)

(No ROBIN genuine part is available.)

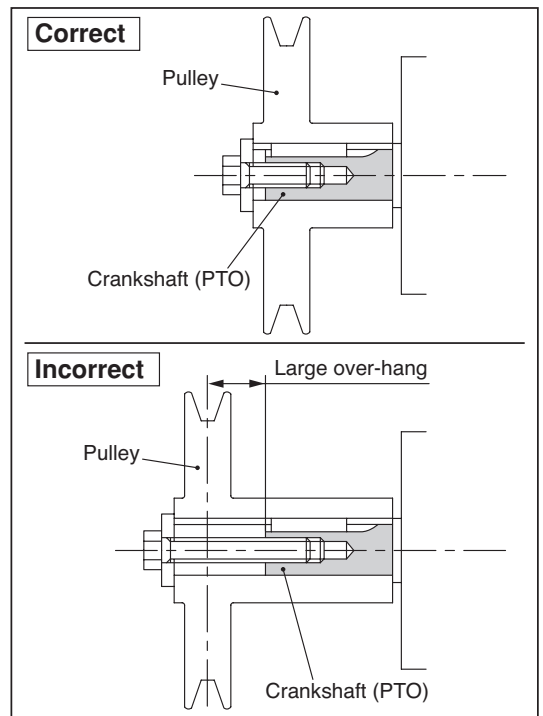
Key Location

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.



6. OPERATING YOUR ENGINE

(See Fig. 4)

1. STARTING

- (1) Open the fuel cock. (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 cock. (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 COCK

Close the fuel cock 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 0.7 mm (0.02 inch.-0.03 inch.). Adjust the gap, if necessary, by carefully bending the side electrode.

Recommended Spark Plug :
BR-6HS (NGK) or RL86C (CHAMPION)

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.

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⚠ CAUTION

To prevent injury, pay attention to the hot oil.

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

Oil capacity (Upper level) :	(L)
EX13/17/21	0.6
EX27	1.0

- (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.

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 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					●	
OVERHAUL ENGINE IF NECESSARY						●

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

WARNING Flame Prohibited

- (1) Inspect fuel cup for water and dirt. (See Fig. 7-5-1)
- (2) To remove water and dirt, close the fuel cock 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 10)

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.

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

Remove the element and wash it in kerosene or diesel fuel. Then saturate it in a mixture of 3 parts kerosene or diesel fuel and 1 part engine oil. Squeeze the element to remove the mixture and install it in the air cleaner. (See Fig. 7-6-1)

B. Dual Element Type (Urethane Foam and Paper elements) (See Fig. 7-7)

- Urethane Foam cleaning (See Fig. 7-7-1)
Wash and clean the urethane foam with detergent. After cleaning, dry it.
Clean the urethane foam every 50 hours.
- Paper Element Cleaning (See Fig. 7-7-2)
Clean by tapping gently to remove dirt and blow off dust. Never use oil. Clean the paper element every 50 hours of operation, and replace element set every 200 hours.

C. Dual Element Type (Urethane Foam and Nonwoven Cloth elements) (See Fig. 7-7)

- Remove the urethane foam from the nonwoven cloth element and clean it in the same way as described A. (See Fig. 7-7-1)
- Wash the element in kerosene and drain off the kerosene. Then saturate it in a mixture of **3 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)

- EX17/21 (See Fig. 7-8-1, 2)
Clean both elements in the same way as described A Urethane Foam Element Type.
Remove the frame before cleaning elements.

- EX27 (See Fig. 7-8-3, 4)
Remove both elements and clean them in the same way as described B Dual Element Type (Urethane Foam and Paper elements).

E. With Pre-cleaner Type (See Fig. 7-9)

Clean the elements (Fig. 7-9-1 and 2) in the same way as described C Dual Element Type (Urethane Foam and Nonwoven Cloth elements). Wash the dust pan of pre-cleaner (Fig. 7-9-3) in water or kerosene and install it after drying.

F. Oil Bath Type (See Fig. 7-10)

Clean the urethane foam (Fig. 7-10-1) in the same way as described A Urethane Foam Element Type. Drain the dirty oil from the oil pan (Fig. 7-10-2) and wash it in kerosene.
Then fill the new engine oil upto the specified oil level.

Oil Capacity in the Oil Bath (oil pan) :

EX13/17/21 About 55 mL

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. 7-11)

WARNING

Take extreme caution when replacing fuel hose ; gasoline is extremely flammable.

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

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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.

- Remove the fuel cup, place it over a container and open the fuel cock 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.

9. OIL SENSOR INSTRUCTIONS (OPTIONAL)

1. FUNCTION OF OIL SENSOR

The engine will stop automatically when the oil level falls below the safety limit. The engine cannot be started unless the level is raised above the prescribed limit. (See Fig. 2-2)

2. RESTARTING

- (1) Fill the crankcase with oil up to the proper level.
 - (2) As for restarting and operating the engine, refer to section "6. OPERATING YOUR ENGINE" on page 8 .
- Check the wire connector from the engine. It must be connected securely to the wire from oil sensor.
 - When selecting the engine oil, refer to page 5 for the recommended oil.

10. EASY TROUBLESHOOTING

WHEN ENGINE WILL NOT START :

Perform the following checks before you take the engine to your Robin dealer. If you still have trouble after completing the checks, take the engine to your nearest Robin dealer.

1. Is there a strong spark across the electrode ?

- (1) Is the stop switch at position " I " (ON)?
- (2) Remove and inspect the spark plug.
If the electrode is fouled, clean or replace it with new one.
- (3) Remove the spark plug and connect it to the plug cap.
Pull the starter handle while grounding spark plug against engine body. Try with a new spark plug if the spark is weak or there is no spark.
The ignition system is faulty if there is no spark with a new spark plug.

⚠ WARNING

- Wipe out spilled fuel carefully before testing. Place spark plug as far away from spark plug hole as possible.
- Do not hold spark plug by hand while pulling recoil starter.

NOTE

The engine with oil sensor will stop automatically when the oil level falls below the prescribed limit. Unless the oil level is raised above the prescribed limit, the engine will stop immediately after starting.

2. Is there enough compression?

Pull the starter handle slowly and check if resistance is felt. If little force is required to pull the starter handle, check if the spark plug is tightened firmly. If the spark plug is loose, tighten it.

3. Is the spark plug wet with gasoline?

- (1) Is the fuel cock opened?
- (2) Choke (close choke lever) and pull the starter handle five or six times. Remove the plug and check if its electrode is wet. If the electrode is wet, fuel is well supplied to your engine.
- (3) When the electrode is dry, check where the fuel stops. (Check the fuel intake of the carburetor.)
- (4) In case the engine does not start with well supplied fuel, try using fresh fuel.

4. Is the battery well charged?

If the battery for the electric starter is discharged, the engine will not start.

11. SPECIFICATIONS

MODEL		EX13D	EX17D	EX21D	EX27D
Type		Air-cooled, 4-cycle single cylinder, overhead camshaft, gasoline engine			
Displacement	mL (cc)	126	169	211	265
Continuous Output	kW/rpm (HP/rpm)	2.2/3600 (3.0/3600)	2.9/3600 (4.0/3600)	3.7/3600 (5.0/3600)	5.1/3600 (7.0/3600)
Maximum Output	kW/rpm (HP/rpm)	3.2/4000 (4.3/4000)	4.2/4000 (5.7/4000)	5.1/4000 (7.0/4000)	6.6/4000 (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	2.7	3.6		6.1
Spark Plug		NGK BR-6HS (CHAMPION RL86C)			
Starting System		Recoil starter	Recoil starter / Electric starter		
Dry Weight	kg	14	15	16	21
Dimensions (L x W x H)	mm	297 x 341 x 318	304 x 354 x 335	311 x 366 x 335	355 x 420 x 410

Specifications are subject to change without notice

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