

**Robin Industrial Engines®**

# **SERVICE MANUAL**

**Models**

**EC05-2, EC07-2, EC10,  
EC17, EC25-2**

1193S119



**ROBIN AMERICA, INC.**  
**ROBIN TO WISCONSIN ROBIN**  
**ENGINE MODEL CROSS REFERENCE LIST**

ROBIN

WISCONSIN ROBIN

SIDE VALVE

EY08	W1-080
EY15	W1-145
EY15V	W1-145V
EY20	W1-185
EY20V	W1-185V
EY23	W1-230
EY28	W1-280
EY35	W1-340
EY40	W1-390
EY45V	W1-450V
EY21	EY21W
EY44	EY44W
EY18-3	EY18-3W
EY25	EY25W
EY27	EY27W

OVERHEAD VALVE

EH11	WO1-115
EH12	WO1-120
EH15	WO1-150
EH17	WO1-170
EH21	WO1-210
EH25	WO1-250
EH30	WO1-300
EH30V	WO1-300V
EH34	WO1-340
EH34V	WO1-340V
EH43V	WO1-430V

TWO CYCLE

EC13V	WT1-125V
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DIESEL

DY23	WRD1-230
DY27	WRD1-270
DY30	WRD1-300
DY35	WRD1-350
DY41	WRD1-410

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1. SPECIFICATIONS

Model	EC05-2		EC07-2		EC10			EC17		EC25-2		
	EC05-2D	EC05-2B	EC07-2D	EC07-2B	EC10D	EC10B	EC10V	EC17D	EC17B	EC25-2D	EC25-2DS	
Type	Air-Cooled, 2-Cycle, Single Cylinder											
	Horizontal P.T.O. shaft							Vertical P.T.O. shaft	Horizontal P.T.O. shaft			
Bore x Stroke (in)	42mm x 40mm (1.65 x 1.57)		50mm x 40mm (1.97 x 1.57)		50mm x 50mm (1.97 x 1.97)			62mm x 58mm (2.4 x 2.3)		72mm x 60mm (2.83 x 2.29)		
Piston Displacement (cu. in)	55.4cc (3.38)		78.5cc (4.79)		98cc (5.99)			175cc (10.68)		244cc (14.91)		
Output	Continuous HP/rpm	1.7/4,500	1.7/1,600	2.2/4,500	2.2/1,600	3/4,000	3/1,600	3/4,000	5/4,000	5/1,600	8.5/4,000	
	Maximum HP/rpm	2.5/5,500	2.5/2,000	3.3/5,500	3.3/2,000	4/5,000	4/2,000	4/5,000	6.5/5,000	6.5/2,000	12.0/5,000	
Maximum Torque kg-m/rpm	0.36/4,000	0.98/1,450	0.50/4,000	1.36/1,450	0.62/3,700	1.53/1,500	0.62/3,700	1.14/3,250	2.85/1,300	1.95/3,500		
Direction of Rotation	Counter-clockwise, viewed from driving shaft (P.T.O. shaft) side											
Cooling System	Forced Air Cooling											
Lubrication	by mixed Lubricating Oil in Fuel											
Lubricant	Engine Oil for 2-cycle engine or SAE30 of high quality											
Carburetor	Horizontal Draft, Float Type											
Fuel	Mixture Fuel (Gasoline 20 ~ 25 : Oil 1)											
Fuel Consumption Ratio	420 g/HP-h		390 g/HP-h		360 g/HP-h			350 g/HP-h		350 g/HP-h		
	at HP/rpm	1.7/4,500	1.7/1,600	2.2/4,500	2.2/1,600	3/4,000	3/1,600	3/4,000	5/4,000	5/1,600	8.5/4,000	
Fuel Feed System	Gravity Type											
Fuel Tank Capacity	Approx. 1.5 liters (0.39 US gal.)				Approx. 2.5 liters (0.6 US gal.)		Approx. 1.9 liters (0.5 US gal.)	Approx. 4 liters (1.1 US gal.)		Approx. 6.2 liters (1.6 US gal.)		
Speed Reduction	-	1/2.75	-	1/2.75	-	1/2.5	-	-	1/2.5	-		
Ignition System	Flywheel Magneto											
Spark Plug	NGK B-6HS				NGK B-4			NGK B-4H		NGK B-6HS		
Lighting Capacity	12 ~ 16V, 6W (Available if required)					6 ~ 8V, 15W (Available if required)					12V, 25W	
Starting Method	Rope type (Recoil Starter is available.)							Recoil Starter	Rope Type (Recoil Starter is available.)		Recoil Starter	Electric Starter
Dry Weight (lbs.)	7.6kg (3.4)	8.6kg (3.9)	7.7kg (3.5)	8.7kg (3.9)	13.9kg (6.3)	14.9kg (6.8)	13.5kg (6.1)	18.5kg (8.3)	20.5kg (9.2)	29.5kg (13.2)		
Dimensions	Length (in)	257mm (10.1)	285mm (11.2)	257mm (10.1)	285mm (11.2)	263mm (10.4)	275mm (10.8)	410mm (16.1)	300mm (11.8)	335mm (13.2)	407mm (16.0)	
	Width (in)	309mm (12.2)				415mm (16.3)		387mm (15.2)	401mm (15.8)		462mm (18.2)	
	Height (in)	290mm (11.4)				385mm (15.2)	285mm (11.2)	387mm (15.2)	428mm (16.9)		497mm (19.5)	

\*Vertical P.T.O. shaft Type: Model EC17V

## 2. PERFORMANCE

### 2-1 MAXIMUM OUTPUT

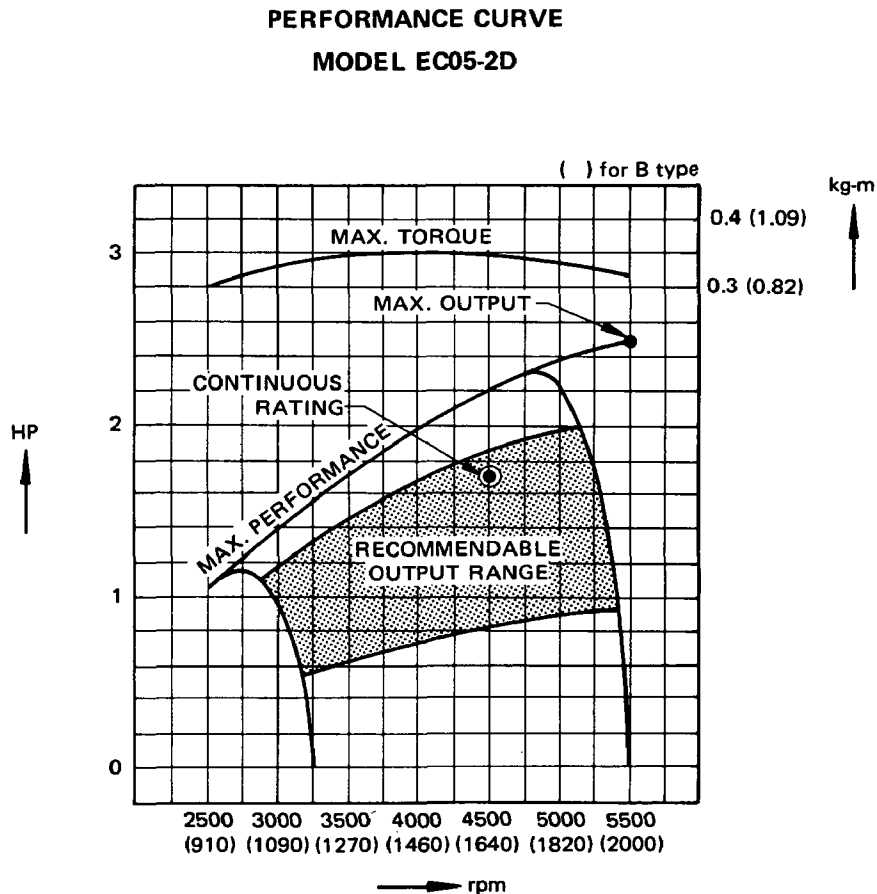
The maximum output of an engine is such standard power as developed by that engine, after its initial run-in period with all the moving parts properly worn-in, when operating with the fully open throttle valve. Therefore, it follows that a new engine may not develop this maximum output in the beginning, because moving parts are not in a properly worn-in condition.

### 2-2 CONTINUOUS RATED OUTPUT

The continuous rated output of an engine is such power as developed by that engine when running at an optimum speed most favorable from the point of view of engine life and fuel consumption ratio. Therefore, it follows that when designing a driving system for any mechanism, with a model EC05-2, 07-2, 10, 17 or 25-2 engine, as a prime mover, the continuous power requirement of that mechanism must be kept below the continuous rated output specified.

### 2-3 MAXIMUM TORQUE and FUEL CONSUMPTION RATIO AT MAX. OUTPUT

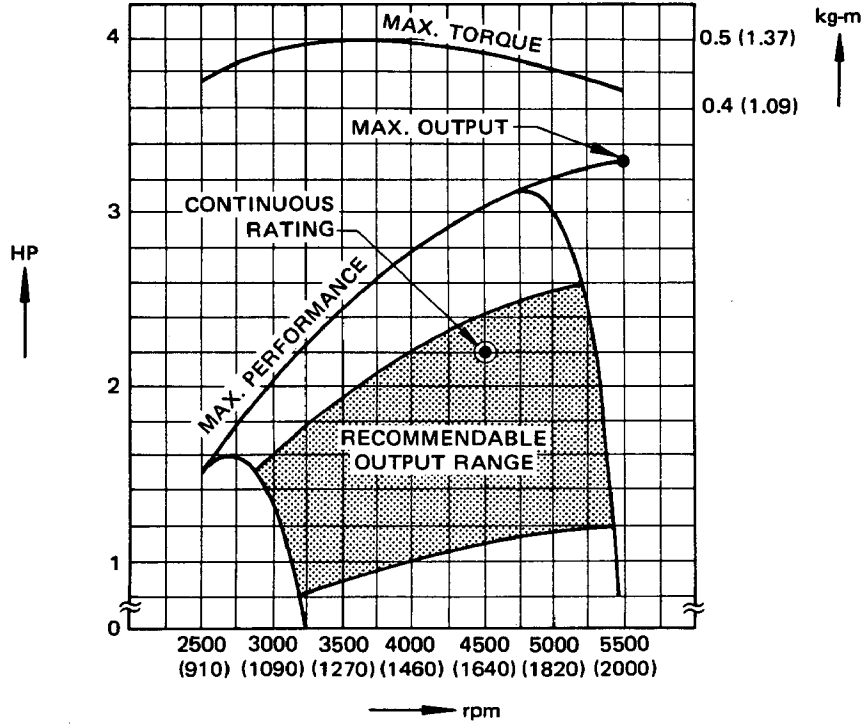
The maximum torque of an engine is that driving torque of the driving shaft at which the engine is driving an external load, while the engine is developing its max. output. The fuel consumption ratio at max. output is that fuel consumption ratio of an engine while that engine is running at the max. output.



**PERFORMANCE CURVE**

**MODEL EC07-2D**

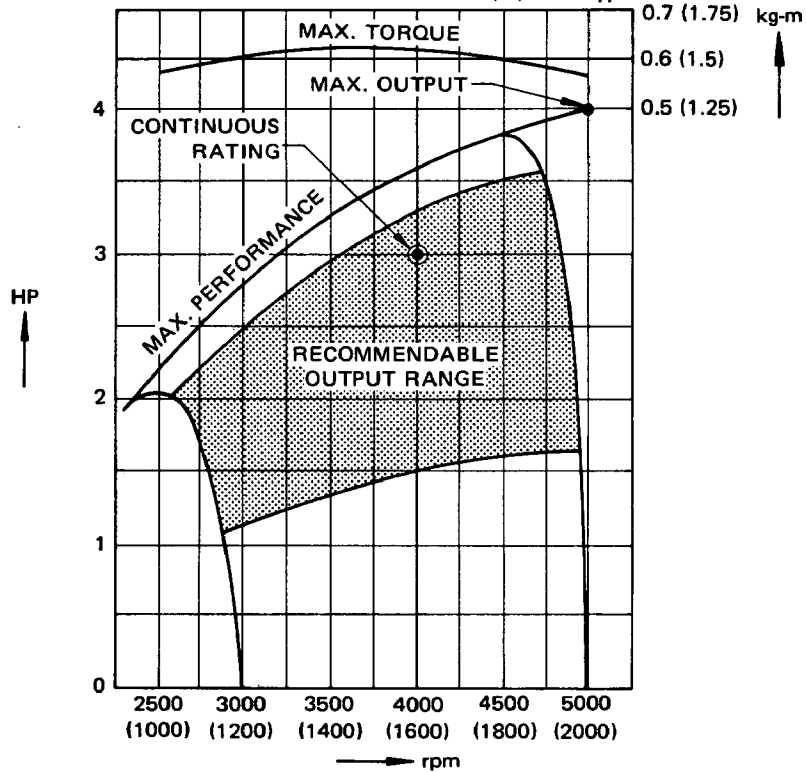
( ) for B type



**PERFORMANCE CURVE**

**MODEL EC10D**

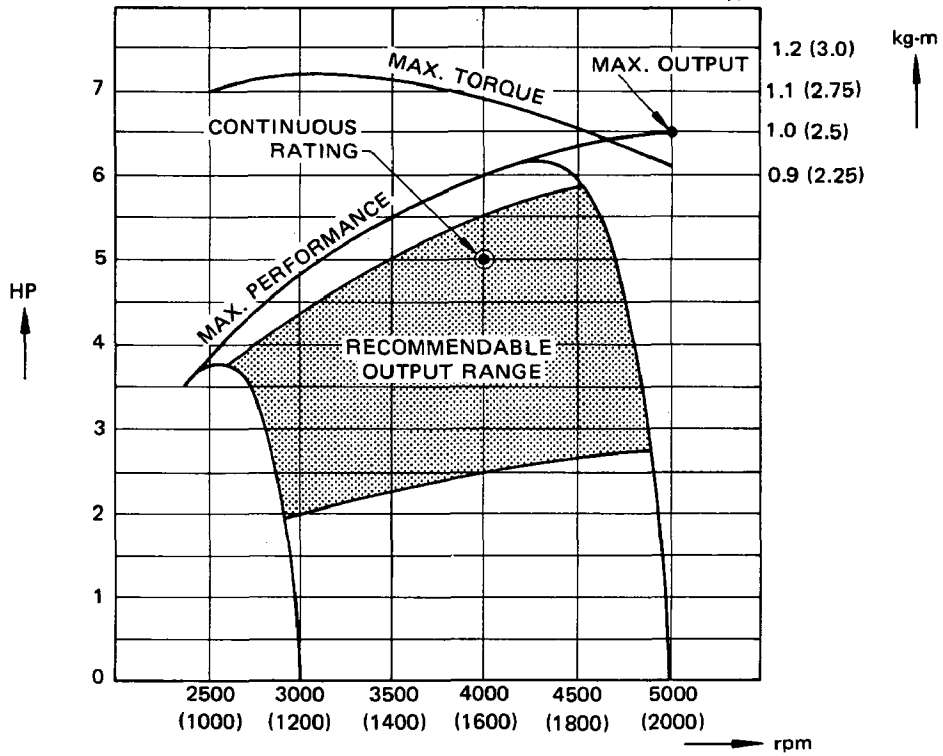
( ) for B type



**PERFORMANCE CURVE**

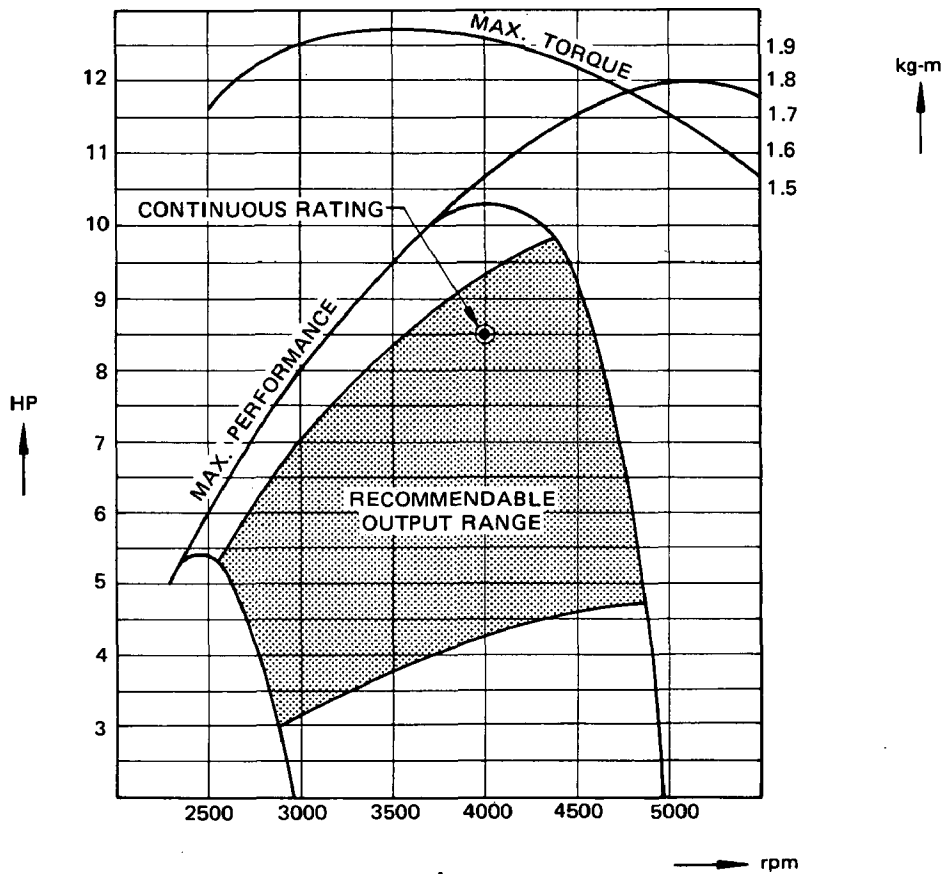
**MODEL EC17D**

( ) for B type



**PERFORMANCE CURVE**

**MODEL EC25-2DS**





### 3. FEATURES

1. **COMPACT, LIGHT WEIGHT, HIGH PERFORMANCE** and **LOW FUEL CONSUMPTION**.
2. **TROUBLE FREE** because of simple design and easy to handle.
3. **HIGH DURABILITY** engine withstand long severe operation.
4. **TILTED OPERATION** available.

As a special feature of 2-cycle engine, can operate at up to about 30° tilted position just before the fuel flooding out from the air-bent of carburetor.

5. **EASY STARTING**

Recoil type starter is available at option.

6. **LIGHTING** for night operation.

Optional lighting is available by installing special lighting coil.

**Lighting Capacity:** EC05-2, 07-2 (12V ~ 16V, 6W)

EC10, 17 (6 ~ 8V, 15W)

EC25-2 (12V, 18 ~ 25W)

7. **VERSATILE APPLICATION**

Direct, or reduction type engine with horizontal shaft or vertical shaft are available.

Wide selection of driving shaft size and shapes are also available beside standard specification.

Further, consult with dealer for smaller fuel tank, heavy-duty filter element for air cleaner and high-performance muffler.

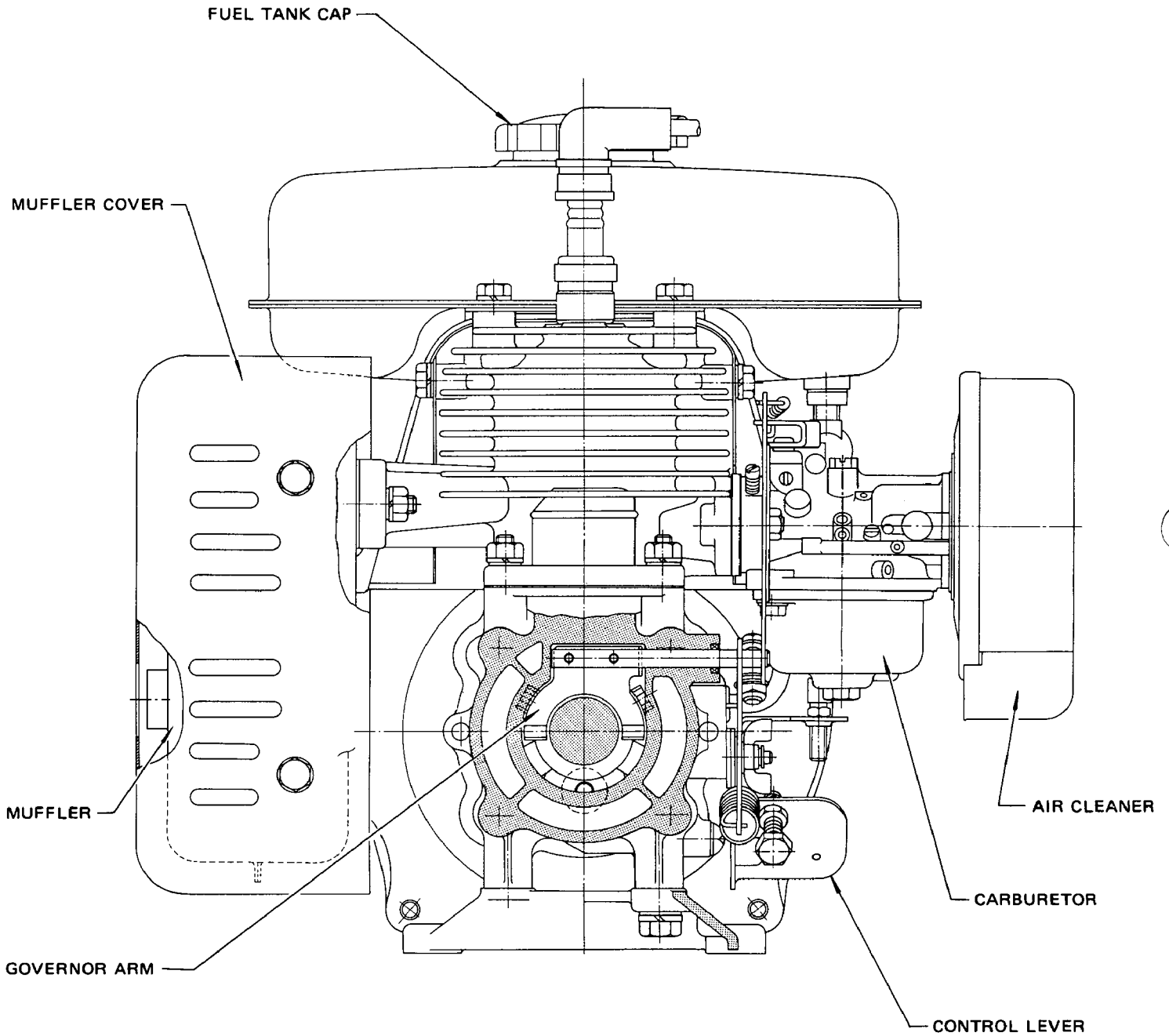
8. The engine can control to the desired speed with a **ALL-SPEED GOVERNOR**.

It can be set for any desired speed by simply moving the control lever. The setting speed is maintained even under varying load.

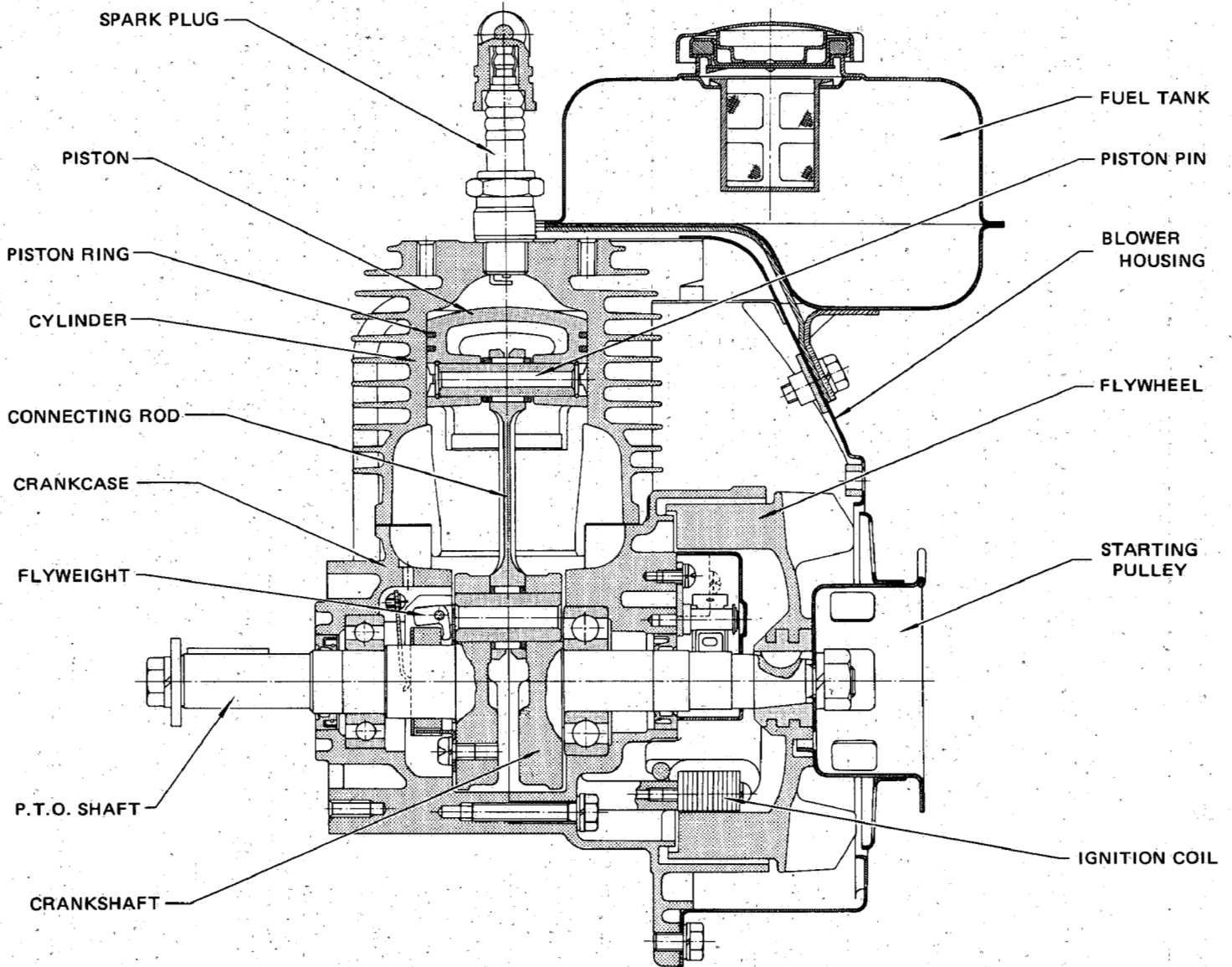
9. Engine withstand **AGAINST HIGH VIBRATION** environment.

#### 4. GENERAL DESCRIPTION of ENGINE CONSTRUCTION

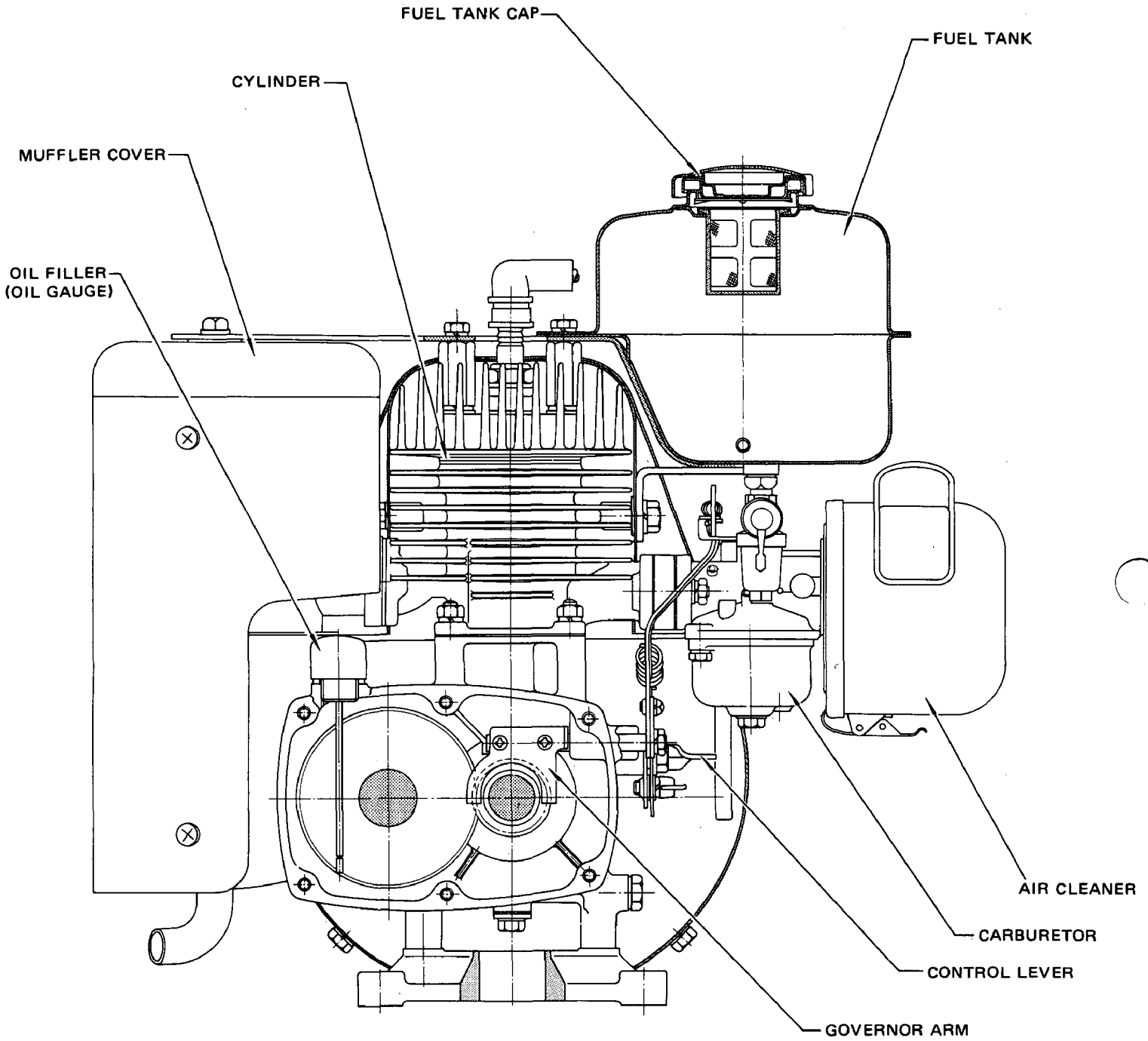
##### 4-1 SECTIONAL VIEW of ENGINE



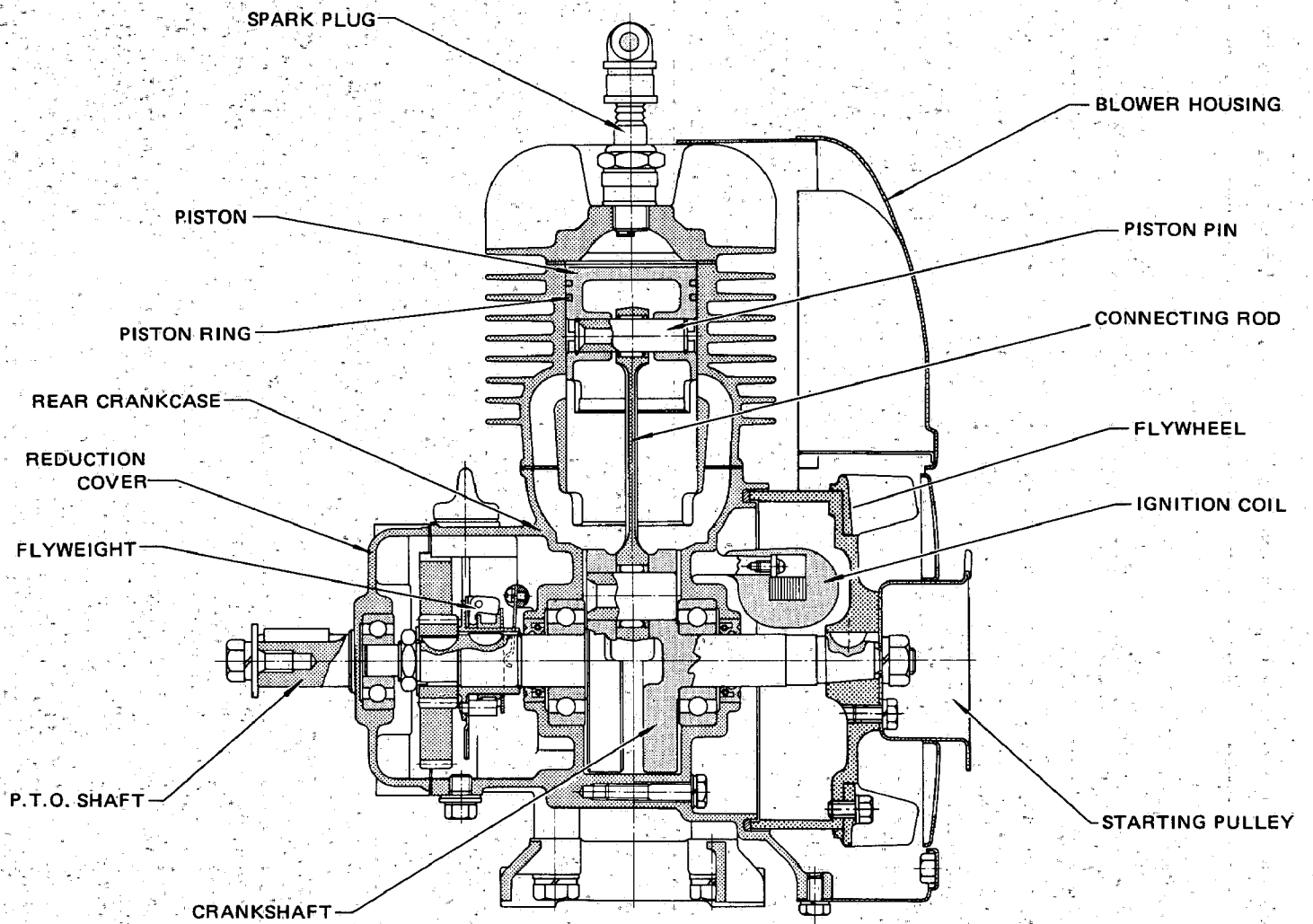
MODEL EC05-2, 07-2



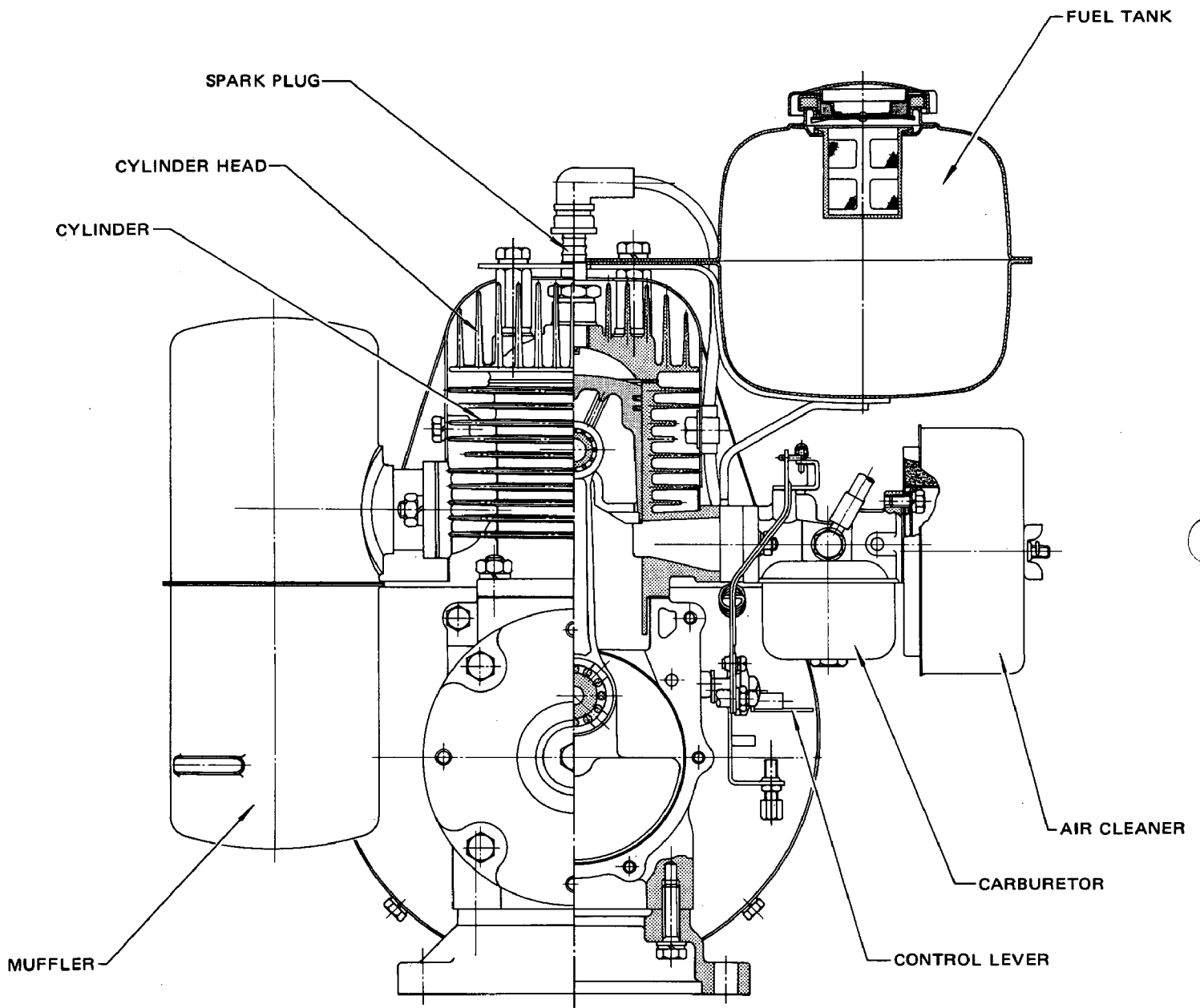
MODEL EC05-2, 07-2



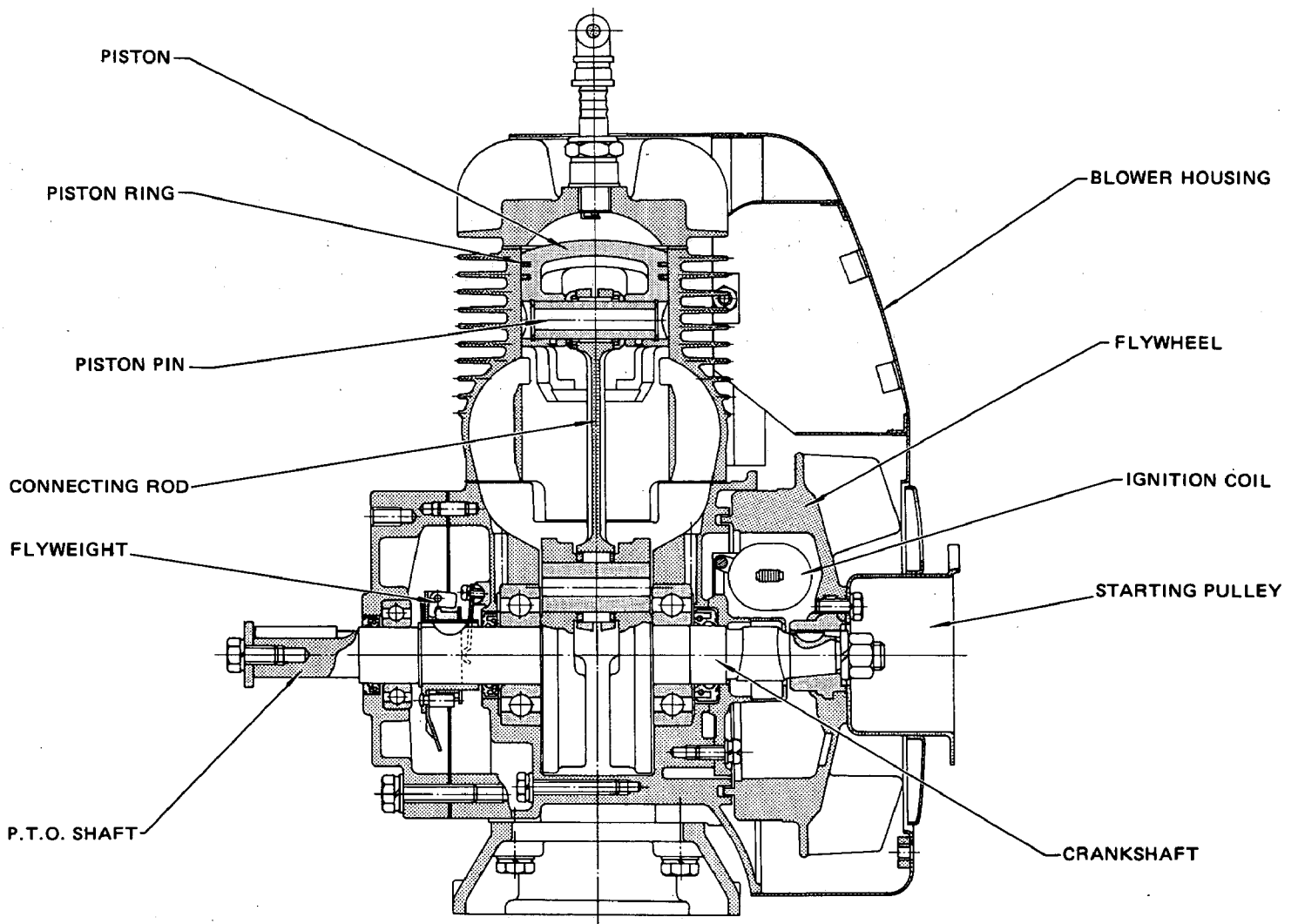
**MODEL EC10**



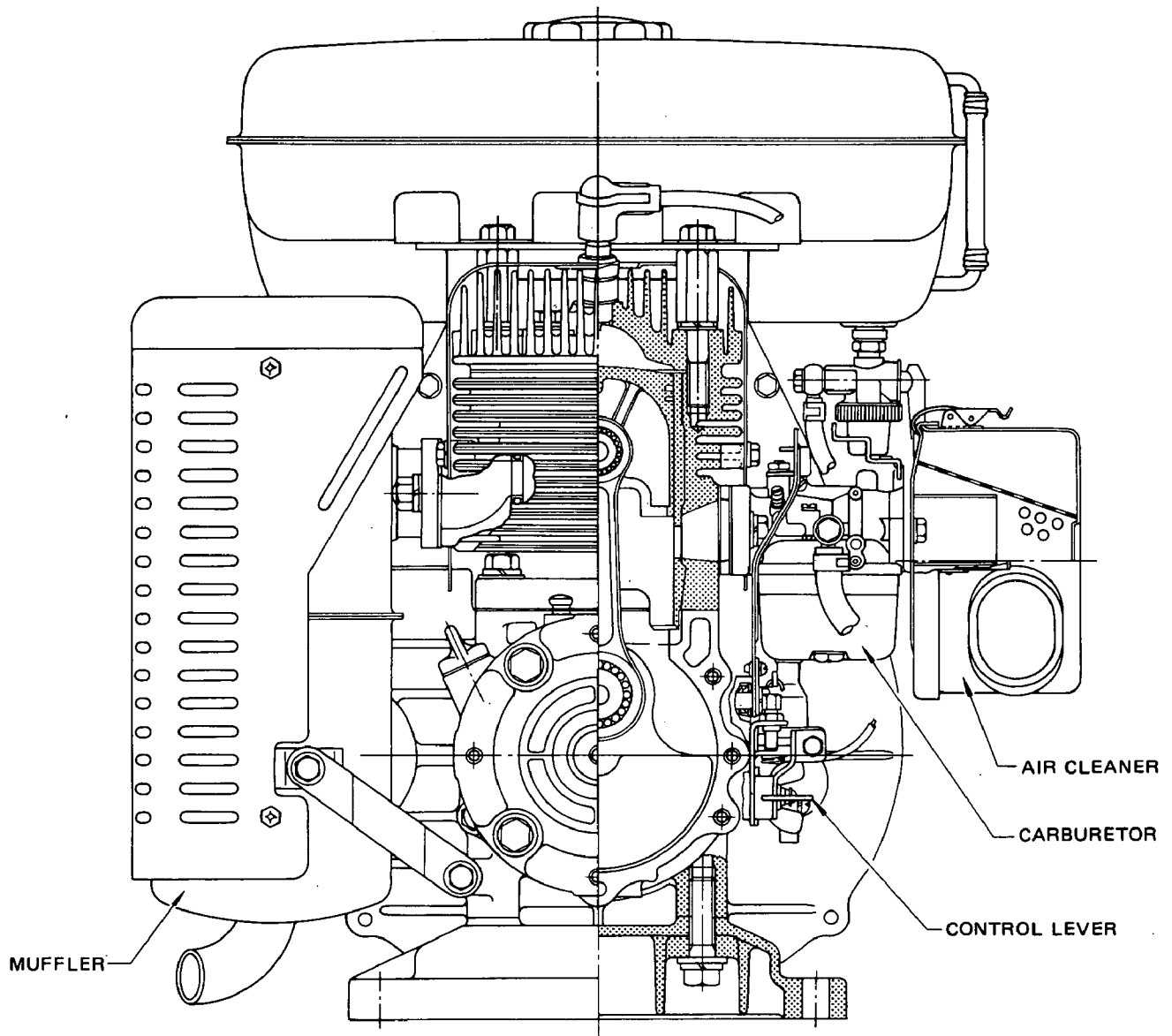
MODEL EC10



MODEL EC17

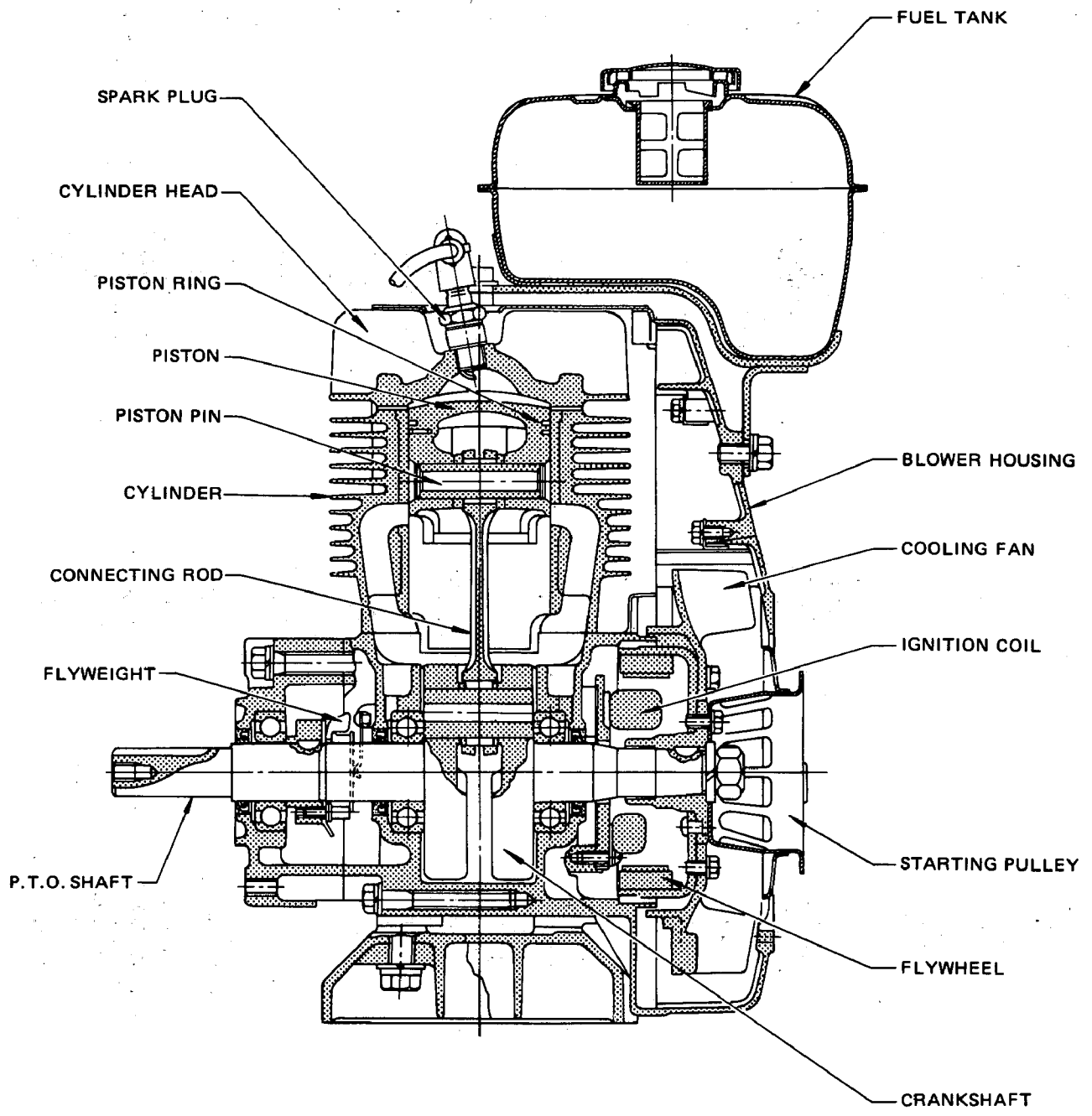


MODEL EC17



MODEL EC25-2





MODEL EC25-2

## 4-2 CRANKCASE

All parts related with crankcase assy are aluminium alloy die-castings, which removed all unnecessary excess thickness for extreme lightness, consist of split-type front crankcase, rear crankcase and crankcase cover (for Model D) or reduction cover (for Model B) depending upon the model as per the following table.

Model		Front Crankcase	Rear Crankcase	Crankcase Cover	Reduction Cover
EC05-2	D	for D type	Exclusive for D		
	B		Exclusive for B		Exclusive for B
EC07-2	D	for D type	Exclusive for D		
	B		Exclusive for B		Exclusive for B
EC10	D	for D type	Exclusive for D	Exclusive for D	
	B		Exclusive for B		Exclusive for B
	V		Exclusive for D	Exclusive for V	
EC17	D	for D type	Exclusive for D	Exclusive for D	
	B		Exclusive for B		Exclusive for B
	V		Exclusive for D	Exclusive for V	
EC25-2	D	for D type	Exclusive for D	Exclusive for D, DS	
	DS	for DS type			

### Model EC10D, V, EC17D, V, EC25-2D, DS:

The rear crankcase forms a governor chamber and provided with crankcase cover. As front, rear crankcase cover has one ball bearing respectively, the crankshaft is supported by 3 ball bearings.

### Model EC10B, EC17B

The rear crankcase forms a part of the reduction gear chamber and after installing the reduction gear and governor, reduction cover is to be fitted. The reduction cover has two ball bearings, one is supporting the crankshaft and the other one is supporting the driving shaft.

## 4-3 BASE PLATE

The base plate made of aluminum alloy die-casting is to be attached to the front and rear crankcase with 4 bolts.

## 4-4 CRANKSHAFT and CONNECTING ROD ASSY.

The crankshaft is separable into the front crankshaft, rear crankshaft and crank pin.

Crankshaft is made of forged carbon steel; Crank pin is made of chromium-molybdenum steel, hardened and precision machined.

Connecting rod is a forged chromium-molybdenum piece which is equipped with needle-bearings at both large and small ends. Both rod ends has an oil grooves to deliver lubricant to prevent burning and wearing.

The front, rear crankshafts and the crank pin are assembled together and force fitted in exact alignment with the special assembling fixture after fitted the needle-bearing and connecting rod on the crank pin. Generally, they can not disassembled. In case of replacing the crankshaft, it is requested to replace crankshaft and connecting rod in assembled manner.

## 4-5 PISTON

The piston is made of precision-casted heat-resistant aluminum alloy which machined precisely into oval section in order to prevent from burning and slapping. It is attached to the connecting rod small end by means of a piston and a needle bearing. Near the top of the piston, there are two grooves for compression rings. In order to prevent the rotating the rings during the operation and damaging the cylinder port, lock-pins are inserted.

#### **4-6 DRIVING SHAFT (P.T.O. shaft) (for Model B only)**

The driving shaft is made of forged carbon steel and reduction gear is force-fitted.

#### **4-7 CYLINDER**

##### **\*Model EC05-2, EC07-2**

Monoblock cylinder and cylinder head is made of aluminum alloy die-casting and inside the cylinder is treated with hard-chromium plating to withstand against the wear by reciprocal motion of the piston.

Outside fins of cylinder-head are arranged to get efficient heat dispersion and provided with threaded hole for mounting a spark plug on the top.

Inside the cylinder, one each of intake port, exhaust port and two scavenging ports are positioned to get the maximum engine performance.

##### **• Model EC10, EC17**

The cylinder is made of precision-casted wear-resistant cast iron provided with fins for perfect heat dispersion.

Inside the cylinder, one each of intake port, exhaust port and two scavenging ports are positioned to get the maximum engine performance.

The cylinder is attached to the crankcase with the flange, which positioned lower part of cylinder, by stud-bolts.

##### **\*Model EC25-2**

The cylinder with the cylinder liner is made of aluminium alloy. The cylinder liner is made of special cast iron and are imbedded in the aluminium casting as inserts. Inside the cylinder, one each of intake port, exhaust port and four scavenging ports are positioned to the maximum engine performance.

#### **4-8 CYLINDER HEAD (Model EC10, 17, 25-2 only)**

The cylinder head is made of heat-conductive aluminum alloy and is provided with the fins, arranged in the direction of cooling air to achieve the efficient cooling.

The combustion chamber forms semi-spherical and is provided with threaded hole for mounting a spark-plug on the top.

#### **4-9 GOVERNOR**

The centrifugal flyweight type governor assures constant-speed operation at selected speed, irrespective of load fluctuations. (The governor is built-in the crankcase for Model EC05-2, 07-2) As to the detail, refer to section "8. GOVERNOR".

#### **4-10 COOLING**

The cooling fan which also serves as a flywheel forcibly feeds cooling air to the cylinder and cylinder head with the aid of blower housing and air baffle.

#### **4-11 IGNITION**

The ignition system is of flywheel magneto type with ignition timing set at 23° before TDC for EC05-2, 07-2, 25-2, 18° before TDC for EC10 and 22° before TDC for EC 17 respectively.

The flywheel with steel magnet piece revolves outside the coil and generates the electric power in the coil. The flywheel also equalize the engine revolution and at the same time, it serves as a blower, with its impellers on the circumstance, for cooling the engine. The ignition coil and the breaker are mounted in the crankcase.

As to the detail, refer to "Section 7. MAGNETO".

#### **4-12 CARBURETOR**

A horizontal draft float type carburetor is employed. Its setting has been carefully determined after thorough testing to achieve best starting, accelerating, fuel consumption, output and performances.

As to the detail such as construction, refer to section "9. CARBURETOR".

#### **4-13 AIR CLEANER**

Air cleaner used in this model is a semi-wet type cleaner, which contains oil soaked filtering element that traps all dust particles floating in the intake air so that clean air is supplied to the carburetor.

#### **4-14 REDUCTION EQUIPMENT (For Model B only)**

With the Model B engine, rear crankcase and reduction cover forms the reduction chamber, and the revolution of crankshaft reduced to 1/2.7 for Model EC05-2, 07-2, to 1/2.5 for Model EC10 and EC17 by reduction-gear and pinion, and then its transmitted to P.T.O. shaft. Governor is also equipped with reduction chamber and lubricated by same lubricant.

Use SAE 30 lubricant. (for EC10, 17)

#### **4-15 STARTING PULLEY or RECOIL STARTER**

Optional recoil starter is available for Model D and B. Model V is equipped with recoil starter.

Starting pulley of Model D and B are identified according to the direction of engine rotation.

By removing the recoil starter, starting the engine can be made by starting pulley.

## 5. INSTALLATION

Since the installation method affects the service life, easy of maintenance, frequency of check and repair, and operating cost of engine, *the following contents shall be carefully examined before installing your engine.*

### 5-1 MOUNTING

When installing the engine, its mounting position, coupling condition with operating machines, and anchoring or supporting methods must be carefully examined. Particularly when determining its mounting position, due care should be taken to assure the convenience of such routines as replenishment and checking of fuel and oil, checking of oil gauge, spark-plug and contact breaker point, maintenance of oil draining. For details, refer to the installation drawing.

Install the engine as much closer as possible to the level. The tilt limit for normal operation should be not more than 30° from the level.

### 5-2 VENTILATION

The fresh air must be supplied to the engine for cooling and fuel combustion. If the engine is operated with a cover or in a small compartment, it is required to provide a cooling air duct and a baffle plate for the purpose of preventing insufficient circulation of heated air after cooling the engine and/or temperature rise of related equipment. High temperature environment will cause engine vapor-lock, deterioration of oil, power reduction, loss of engine life, it is requested to keep the temperature of compartment not to exceed 50°C.

### 5-3 EXHAUST GAS EVACUATION

As the exhaust gas is toxic, it must be exhausted outside in case engine is operated indoor.

Output power of 2-cycle engine is considerably influenced by the length of exhaust duct, so ask for consultation in case any modification of exhaust system is required.

### 5-4 FUEL SYSTEM

In case the standard fuel tank can not be used due to space limitation or any other reason, take the following notes into consideration:—

- 1) When connecting the fuel pipe, carefully examine heat conductivity, pipe diameter, bend and leakage from fittings to eliminate air-blocking and vapor-lock.
- 2) When the fuel is to be fed by gravity, position of fuel tank bottom should lie within the height of 5 ~ 50 cm from the fuel joint of the carburetor.
- 3) Fuel must be filtered before it is fed to carburetor, by means of fuel strainer or filter.
- 4) The standard inner diameter of fuel pipe is 4 ~ 5 mm.
- 5) It is recommended to minimize the length of fuel pipe.

### 5-5 POWER TRANSMISSION to DRIVE MACHINES

#### 5-5-1 BELT-DRIVE

Be careful with the following items.

- \* Use a V-belt rather than a flat-belt.
- \* Set the driving shaft and the driven shaft of machine in parallel for each other.
- \* Align the driving pulleys of engine and machine correctly.

- \* Mount the driving pulley as close to the engine as possible.
- \* Span the driving belt horizontally, if possible.
- \* When starting the engine, disconnect the load.

If a clutch is not available, a tension pulley or other means must be employed.

### 5-5-2 FLEXIBLE COUPLING

When a flexible coupling is used, the run out and mis-alignment between the driven shaft and the engine shaft must be made as small as possible.

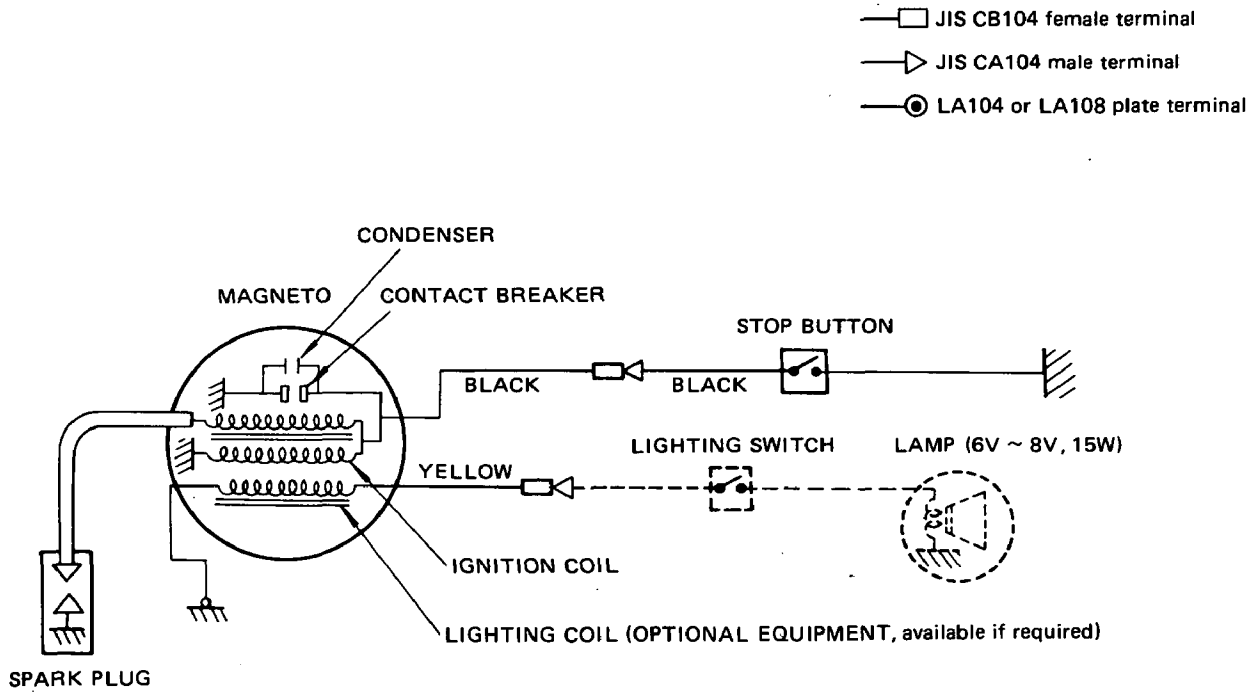
The tolerance on the run out and mis-alignment are specified by each coupling manufacturer.

### 5-6 WIRING (Fig. 5-6)

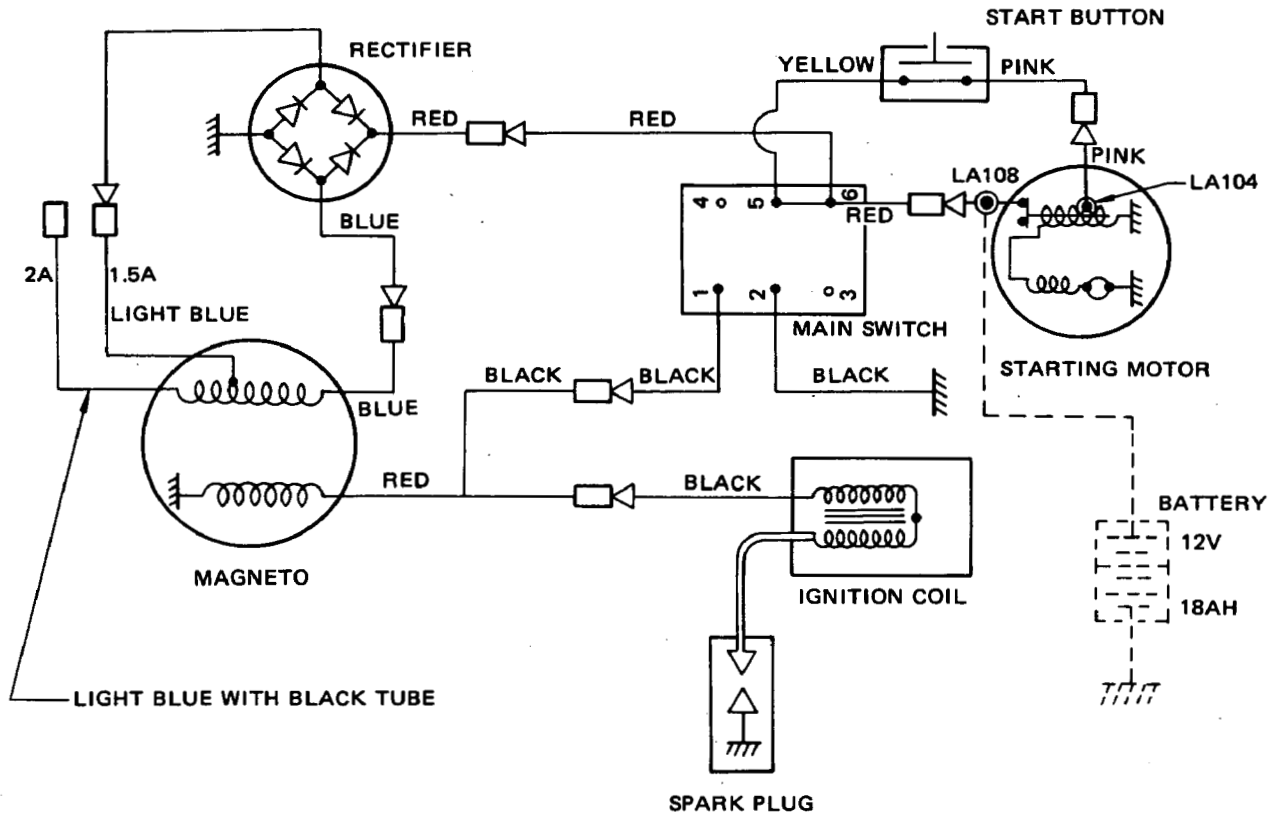
The wiring is indicated in the wiring diagram given below.

Basically, the portions indicated with dotted line are not provided on the engine at the factory.

#### 5-6-1 ROPE STARTING ENGINE



5-6-2 ENGINE with STARTING MOTOR (for EC25-2DS only)



## **6. DISASSEMBLY and REASSEMBLY**

### **6-1 PREPARATIONS and SUGGESTIONS**

#### **6-1-1 DISASSEMBLY**

- 1) When disassembling the engine, memorize where and how each part is assembled in order to be able to reassemble it correctly. Tag parts if there is a possibility of confusion.
- 2) Take care not to damage packings and gaskets, which are fragile.
- 3) In order to prevent missing and misplacing, group related parts together, tentatively assembling them, immediately after disassembled each sub-assembly.
- 4) Handle the disassembled parts carefully, and wash them in Kerosene.
- 5) Use the correct tools in the correct way.
- 6) Standard tools required for disassembly and reassembly.
  - a) Work table
  - b) Washing pan
  - c) Disassembling tools
  - d) Washing oil (Kerosene or gasoline), Mobile oil, Brush
  - e) Emery paper, Cloth
- 7) Before starting to disassemble the engine, drain fuel and lubricant. (To prevent from danger and stain.)

#### **6-1-2 CLEANING before reassembly**

- 1) Check all sliding and rotating parts, such as piston, cylinder, valve, camshaft, crankshaft, gears and bearings for defect.
- 2) Wash the disassembled parts in Kerosene to remove dust, dirt and contaminated oil thoroughly. Wash them twice, first time remove visible dirt roughly, and second time using fresh Kerosene.
- 3) After washing, blow them thoroughly with compressed air.
- 4) Do not wash electric parts. Wipe them with clean cloth and dry them.
- 5) Accumulated carbon on the cylinder-head, gasket, piston, cylinder and inside the muffler to be carefully planed and wrap the piston with oil stone to get smooth surface.
- 6) Parts of carburetor to be washed carefully with gasoline and blow them thoroughly with compressed air.
- 7) Check the cable for any damage.
- 8) Clean contact breaker with dry cloth. Check the breaker-point if its contact surface is flat. If there is an evidence of pitting or pyramidding, this should be corrected with #400 wrapping paper.
- 9) Air-cleaner element shall be soaked in the liquid soap and dry thoroughly. Then put it to mixture of 2 ~ 4 kerosene and 1 engine oil, and assemble it after squeezed well.
- 10) Take special care not to contaminate the parts with dust and apply mobile oil on the surface in order to prevent from rust.

#### **6-1-3 CHECKS and CORRECTIONS before reassembly**

After disassembling and cleaning the engine parts, check them and, if necessary, correct them according to the CORRECTION TABLE of section "12. CHECKS and CORRECTIONS".

Gaskets and fuel pipe shall be replaced to new one.



#### 6-1-4 REASSEMBLY

- 1) Before reassembly, wash parts in gasoline and blow them with compressed air.
- 2) Apply mobile oil on the rotating and sliding surface.
- 3) Take care not to contaminate the parts with dust during reassembly.
- 4) Be sure to assemble those parts provided with alignment marks by bringing the marks in alignment.
- 5) Tighten bolts, nuts and screws to the correct torque specified. When there is no torque specification, tighten them to torque readings appropriate to the size

Standard Fastening Torque for screws are as follows:

6 mm	—	90 kg-cm (6.5 ft-lbs)
8 mm	—	250 kg-cm (18 ft-lbs)
10 mm	—	370 kg-cm (26.7 ft-lbs)

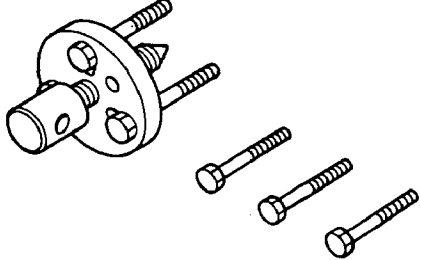
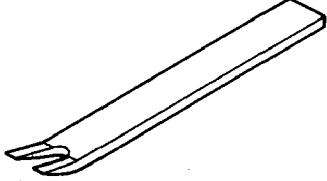
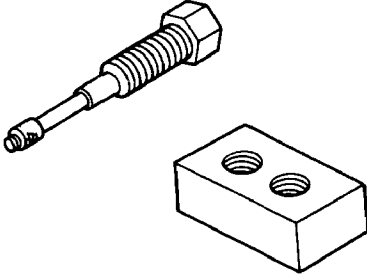
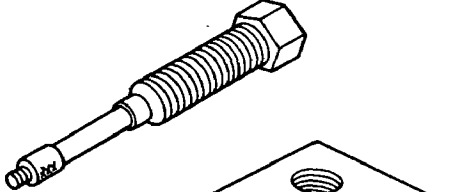

If small screws are tightened too hard, they may get broken. Tighten the large size screws such as ones for the magneto flywheel, enough by giving hammer blows on the socket wrench handle.

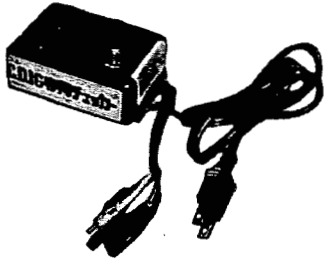
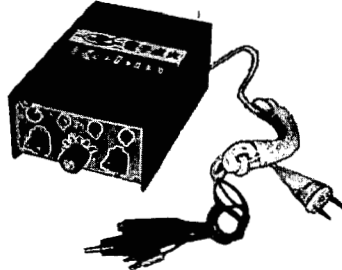
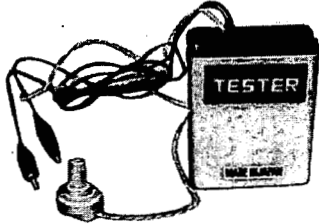
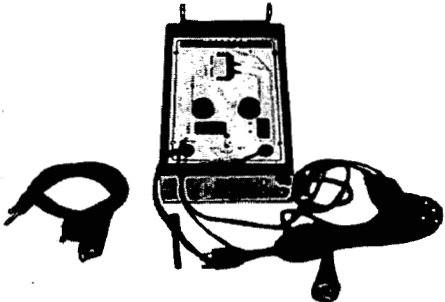
When tightening the several screws fastening the single part, tighten them all evenly, by alternately tightening diagonally located pairs.

- 6) Do not apply oil to the part to which packings or seal-end to be fitted.
- 7) When engine is completely reassembled, make sure that there is no parts remained.
- 8) During the assembly, turn the moving part by hand to check for friction and noise.
- 9) After the completion of reassembly, turn the engine by hand and check if there is any disorder or loose members.

## 5-2 SPECIAL TOOLS

For your reference, the following shows special tools of Robin Engine for Disassembly, Measuring and Inspection instruments.

Part No.	Tool	Use	Applicable Model	Shape
209 95004 07	Flywheel Puller (with bolt)	For pulling off Flywheel	EY10, 13, 14 EY18, 25, 27 EY33, 44 EC05, 07, 10 EC17, 37	
207 95003 07	Valve Spring Retainer	For mounting and dismounting Valve Spring Retainer and Retainer Lock	EY10, 13, 14 EY18, 25, 27 EY21, 80 EY33, 44	
205 95001 07	Valve Guide Puller	For pulling off Valve guide	EY13, 14	
206 95001 07			EY18	
207 95001 07			EY25, 27	

Part No.	Tool	Use	Applicable Model	Shape
214 91301 00	C.D.I. Unit Checker	For checking C.D.I. Unit	EY10, 13, 14 EY18, 25, 27 EY33, 44, 21 EY80 EC03, 04	
106 79901 00	T.C.I. Unit Checker	For checking T.C.I. Unit	EC05, 07 EC10, 17	
M-20248	Timing Tester	For adjusting Timing	EY10, 13, 14 EY18, 25, 27 EY33, 44, 21 EY80 EC03, 04, 05 EC07, 10, 17 EC37	
PF-2L	Coil Tester	For checking Ignition Coil	EY10, 13, 14 EY18, 25, 27 EY33, 44, 21 EY80 EC03, 04, 05 EC07, 10, 17 EC37	

### 6-3 DISASSEMBLY and REASSEMBLY PROCEDURE

#### 6-3-1 FUEL TANK and FUEL TANK BRACKET

- 1) Disconnect fuel pipe between strainer and carburetor at carburetor side.
- 2) Remove mounting bolts, and detach fuel tank from cylinder head or cylinder.
- 3) For Model EC10V

Unscrew 6 x M8 bolts, then remove fuel tank from blower housing.

**CAUTION: REPLACE FUEL PIPE ONCE A YEAR IN ORDER TO PREVENT FROM THE OCCURANCE OF DANGER CAUSED BY THE FUEL LEAKAGE.**

#### 6-3-2 AIR CLEANER

\*Model EC05-2D & B, 07-2D & B, 10D & B, 17D & B, 25-2D & DS

- 1) Remove air cleaner cover and element.
- 2) Unscrew two or three bolts which clamped air cleaner base plate to carburetor and remove base plate.

• Model EC10V

- 1) Remove cover and take out outer element and inner element.
- 2) Loosen three bolts which clamped base plate to carburetor, and remove base plate.

In reassembly:

Wash element based on following procedure before reassembly;

\*Model EC05-2D & B, 07-2D & B, 10D & B, 17D & B, and 25-2D & DS

After washed element with gasoline, soak it into the mixed oil of 2 ~ 4 kerosene and 1 engine oil, then reassemble it after drip the oil off.

\* Model EC10V

After washed outer and inner elements with gasoline, soak them into the mixed oil of 2 ~ 4 kerosene and 1 engine oil.

#### 6-3-3 CARBURETOR

- 1) Remove governor rod and rod spring from carburetor.
- 2) Remove carburetor from cylinder block.

In reassembly:

Refer to section "8. GOVERNOR" and section "9. CARBURETOR".

#### 6-3-4 GOVERNOR LEVER

- 1) Remove governor lever from governor shaft.
- 2) Remove governor spring from control lever.
- 3) Control lever and stop plate can be removed by loosening wing-nut or bolt but do not disassemble unless it necessary.

**NOTE: When control lever device are disassembled, tentatively assemble them together with governor lever.**

In reassembly:

Refer to section "8. GOVERNOR". Assembly shall be made securely including rotation adjustment.

#### 6-3-5 MUFFLER

Unscrew nuts and remove it from cylinder.

#### 6-3-6 BLOWER HOUSING

- 1) Disconnect stop button wires from connector.
- 2) Unscrew bolts and remove blower housing from crankcase.

### 6-3-7 RECOIL STARTER

Standard configuration on Model EC10V, 17V.

Optional equipment for other models.

- 1) Remove recoil starter from blower housing by unscrew 3 × M6 bolts (4 × M6 bolts for Model EC17)
- 2) Remove starting pulley from flywheel by loosening bolts clamped.

**NOTE:** Unless it is necessary, do not disassemble recoil starter as special tools are required for reassembly.

### 6-3-8 STARTING PULLEY and MAGNETO (Fig. 6-3-1)

- 1) Remove starting pulley from flywheel.
- 2) Remove flywheel from crankshaft.

Apply a socket wrench over the nut at end of crankshaft and give the wrench a sharp blow with a soft hammer.

Remove nut and spring washer. Attach flywheel puller to flywheel as illustrated in Fig. 6-3-1, turn center bolt clockwise until flywheel becomes loose enough to be removed.

- 3) Remove spark plug cap from high tension cable of ignition coil and remove ignition coil from crankcase.
- 4) Take off the point cover and remove contact breaker and condenser, from crankcase.

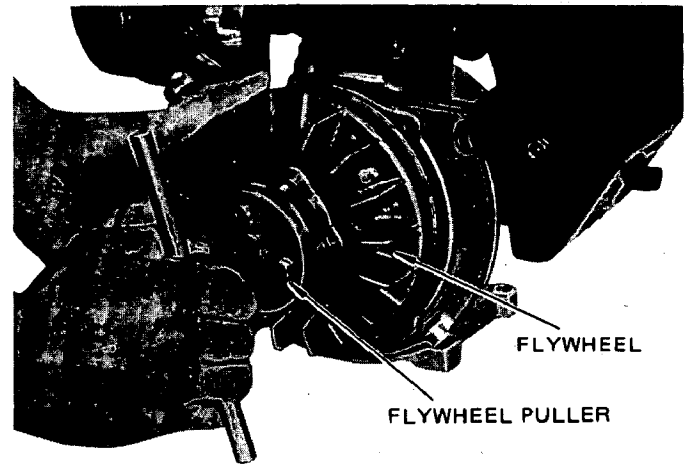


Fig. 6-3-1

In reassembly:

Refer to "7-2 BREAKER POINT ADJUSTMENT", "7-3 TIMING ADJUSTMENT" sections.

### 6-3-9 CYLINDER HEAD (Model EC10, 17 only)

- 1) Remove spark plug from cylinder head.
- 2) Unscrew mounting special bolts and remove cylinder head from cylinder.
- 3) Remove cylinder head gasket from cylinder.

In reassembly:

- 1) Clean carbon from combustion chamber and dirt from between the cooling fins of cylinder head. Check its mounting face for distortion.
- 2) Use new cylinder head gasket.

**NOTE:** Cylinder head gasket must be placed folded edge upside (To the cylinder head).

- 3) Cylinder head fin must be placed in parallel with crankshaft.

Fastening torque of cylinder head is as shown below:

EC10 ——— 180 ~ 220 kg-cm (13 ~ 16 ft-lbs)

EC17 ——— 370 ~ 420 kg-cm (26 ~ 30 ft-lbs)

EC25-2 ——— 200 ~ 250 kg-cm (15 ~ 18 ft-lbs)

- 4) Fastening torque of spark-plug is as shown below:

250 ~ 300 kg-cm (18 ~ 22 ft-lbs)

### 6-3-10 CYLINDER

- 1) Remove cylinder from crankcase by removing nut and spring washer.

**NOTE:** For Model EC05-2, 07-2 Remove spark plug prior to removing cylinder.

- 2) Remove cylinder gasket.
- 3) For Model EC10V remove intake pipe from cylinder.

In reassembly:

- 1) Clean carbon deposit from cylinder head and combustion chamber.

**CAUTION:** WITHOUT CLEANING THE CARBON DEPOSIT, IT MAY DAMAGE THE PISTON AND INNER SURFACE OF CYLINDER WHEN REASSEMBLY.

- 2) Replace cylinder gasket to new one.
- 3) Intake of cylinder should be positioned to the left against view from blower side. Apply oil to piston ring and cylinder walls, then after assembled the cylinder securely, make sure if the crankshaft rotate smoothly.

- |  |  |
|--|--|
| 4) Fastening torque of cylinder is as shown below: | Fastening torque of spark plug for EC05-2, 07-2: |
| EC05-2 ————— 90~100 kg-cm (6.5~7 ft-lbs)           | E05-2 ————— 250~300 kg-cm (18~22 ft-lbs)         |
| EC07-2 ————— 90~100 kg-cm (6.5~7 ft-lbs)           | E07-2 ————— 250~300 kg-cm (18~22 ft-lbs)         |
| EC10 ————— 90~100 kg-cm (6.5~7 ft-lbs)             |  |
| EC17 ————— 180~220 kg-cm (13~16 ft-lbs)            |  |
| EC25-2 ————— 340~400 kg-cm (25~29 ft-lbs)          |  |

**CAUTIONS:**

- 1) WHEN FASTENING CYLINDER, TIGHTEN FOUR NUTS UNIFORMLY.
- 2) BEFORE REASSEMBLE CYLINDER, APPLY OIL ON NEEDLE BEARING LOCATED TO END OF CONNECTING ROD.

### 6-3-11 PISTON

- 1) Remove both side piston pin clips
- 2) Pull out piston pin and disconnect the needle bearing from small end of connecting rod.

**CAUTION:** IN ORDER NOT TO DAMAGE PISTON, PULL OUT PISTON PIN BY FIRMLY HOLD PISTON. ALSO TAKE A SPECIAL CAUTION WHEN DISASSEMBLE NEEDLE BEARING.

- 3) Remove piston rings from piston by expanding the open ends of rings.

In reassembly:

- PISTON RINGS (Fig. 6-3-2, 6-3-3)

If an expanding tool is not available, install rings by placing the open end of the ring on first land of piston, spread ring only far enough to slip over the piston and carry it into correct groove.

**CAUTIONS:**

- 1) BE EXTREMELY CAREFUL NOT TO DISTORT AND BRAKE THE RING.
- 2) STRIKE THE KNOCK PIN TO THE GROOVE LOCATED ON OPEN END OF RINGS (THIS IS TO PREVENT FROM THE ROTATION OF RINGS WHILE OPERATING THE ENGINE.)
- 3) ASSEMBLE RINGS IN THE ORDER OF 2ND RING AND 1ST RING. (Fig. 6-3-3)  
1ST RING — CHROMIUM PLATED SURFACE  
2ND RING — PERKARIZED SURFACE (2ND RING FOR MODEL EC25-2 IS CHROMIUM PLATED SURFACE.)  
(RING FOR MODELS EC05-2, 07-2 IS NOT CHROMIUM PLATED.)

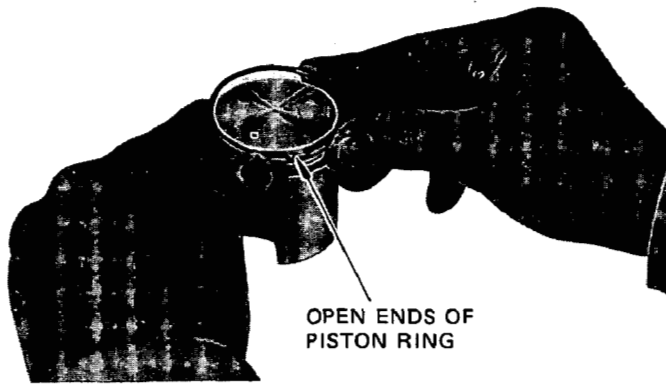


Fig. 6-3-2

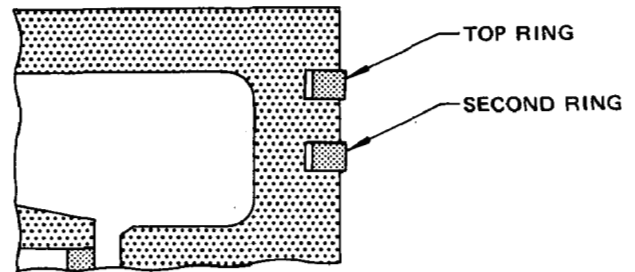


Fig. 6-3-3

• PISTON

- 1) Position the "F" mark of piston to blower side and reassemble the piston and connecting rod by firmly striking the piston pin, and needle bearing.

**CAUTION:** APPLY OIL TO THE NEEDLE BEARING BEFORE REASSEMBLE IT TO PISTON-PIN.

- 2) Assemble piston pin clip.

**CAUTION:** REPLACE PISTON PIN CLIP IF THERE IS ANY LOOSENESS AFTER REASSEMBLE IT.

- 3) Be sure that piston and connecting rod moves smoothly after reassembled.

6-3-12 CRANKCASE COVER (Model D and V only)

(Fig. 6-3-4)

- 1) Discharge oil by opening oil drain plug. (No discharging the oil is required for Model EC05-2 and 07-2)
- 2) Remove bolt and washer from crankshaft end.
- 3) Remove bolts on crankcase.
- 4) Detach cover gasket.

In reassembly:

- 1) Replace cover gasket to new one.
- 2) Check ball bearing and oil seal if there is any damage. And replace it if necessary.
- 3) Apply oil on bearing and oil seal, and coat oil-seal guide to the contact surface of crankcase cover.

Attach oil seal guide on end of crankshaft and mount crankshaft in crankcase with extra care not to damage lips of oil seal. Then fasten the bolts uniformly.

Fastening torque is:

- EC10 ————— 180 ~ 220 kg-cm (13 ~ 16 ft-lbs)
- EC17 ————— 180 ~ 220 kg-cm (13 ~ 16 ft-lbs)
- EC25-2 ————— 200 ~ 250 kg-cm (15 ~ 18 ft-lbs)

6-3-13 GOVERNOR PLATE (Model D and V)

- 1) Pull out governor plate, governor sleeve, washer and clip from crankshaft.
- 2) Remove woodruff key

In reassembly: Reassembly with reverse sequence correctly.

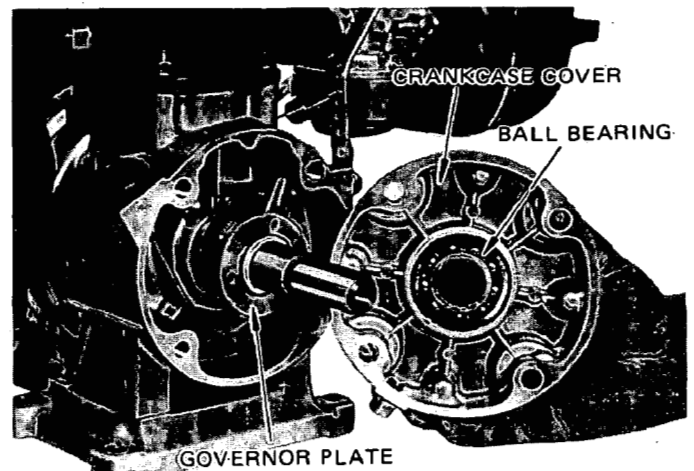


Fig. 6-3-4

### 6-3-14 REDUCTION COVER (Model B)

- 1) Discharge oil by opening oil drain plug.
- 2) Remove reduction cover by loosen the bolts on crankcase.
- 3) Remove washer and bolt on driving shaft end.
- 4) Pull out driving shaft with reduction gear from reduction cover.
- 5) Open tab of lock-washer and pull out pinion, governor plate, governor sleeve, washer and clip from crankshaft, and detach 2 woodruff keys.

In reassembly:

Reassemble with reverse sequences. After tighten the nut, bend the tab of lock-washer without fail.

### 6-3-15 GOVERNOR SHAFT

- 1) Unscrew 2 screws and remove governor arm.
- 2) Pull out governor shaft with governor lever from crankcase.

**NOTE:** Do not disassemble if not necessary.

In reassembly: Refer to section "8. GOVERNOR".

### 6-3-16 CONTROL LEVER

Unless it is required, do not remove control lever from crankcase.

In disassembly and reassembly, refer to section "8. GOVERNOR".

### 6-3-17 BASE PLATE

Base plate can be removed by loosening 4 bolts on crankcase.

In reassembly:

After reassembled base-plate to the crankcase, be sure that crankshaft moves smoothly by holding small end of connecting rod.

### 6-3-18 CRANKCASE

Unscrew 4 bolts which fastening front crankcase and rear crankcase and separate both crankcase by tapping them with soft hammer, and detach crankshaft connecting rod assy.

In reassembly:

- 1) Before reassemble the front and rear crankcase, check bearings and oil seals if there is any damage and replace them in case any damage found.
- 2) Apply oil onto the bearings of both crankcase and ascertain there is no warp on the lip of oil seal.

Clean the joint of both crankcases and apply seal end. Assemble the crankshaft and joint both crankcases with press (or tap them with soft hammer) having extra care not to damage the oil seal.

Fastening torque is:—

EC05-2 — 90~100 kg-cm (6.5~7.0 ft-lbs)

EC10 — 90~100 kg-cm (6.5~7.0 ft-lbs)

EC07-2 — 90~100 kg-cm (6.5~7.0 ft-lbs)

EC17 — 90~100 kg-cm (6.5~7.0 ft-lbs)

EC25-2 — 200~250 kg-cm (15~18 ft-lbs)

**CATUION:** WHEN TIGHTEN THE SEVERAL BOLTS FASTENING CRANKCASE, TIGHTEN THEM ALL EVENLY BY TIGHTENING DIAGONALLY LOCATED PAIRS AT SUGGESTED FASTENING TORQUE.

**NOTE:** After reassemble the crankshaft to the crankcase, be sure that crankshaft moves smoothly.

### 6-3-19 CRANKSHAFT and CONNECTING ROD ASSY.

Reassembly of crankshaft requires special tools.

Sub-assembly of crankshaft and connecting rod assembly is available as a spare parts.



## 7. MAGNETO

### 7-1 MAGNETO

The spark for ignition is furnished by a magneto assembly. The magneto consists of a flywheel, ignition coil and breaker assembly (including condenser), of which flywheel is mounted on crankshaft and ignition coil and breaker assembly are mounted in crankcase directly.

### 7-2 BREAKER POINT ADJUSTMENT (Fig. 7-2)

The breaker points, which are mounted in the crankcase inside the flywheel should be checked twice a season or whenever the ignition spark becomes weak. If there is evidence of pitting or pyramidding, the breaker points must be corrected, and then it becomes necessary to readjust the gap to its proper clearance. (0.4 mm for Model EC10)

The normal breaker point opening is 0.4 mm at full separation. Since the spark timing of 18° is regulated by the point opening, use a timing light to obtain an accurate spark advance. (Refer to "7-3 TIMING ADJUSTMENT.")

**NOTE:** The point gap of other engines than model EC10 is as follows:

EC05	: 0.35 mm
EC07-2	: 0.35 mm
EC17	: 0.30 mm
EC25-2	: 0.35 mm

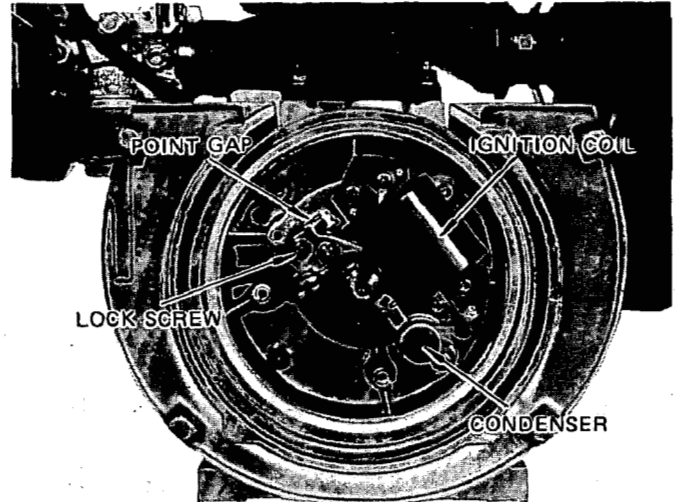


Fig. 7-2

To adjust breaker point opening, remove starting pulley, blower housing and flywheel from the engine and proceed as follows: (See Fig. 7-2.)

- 1) Remove breaker cover from contact breaker.
- 2) Turn crankshaft over until breaker arm comes in contact with the high point of the breaker cam. (maximum point opening of 0.4 mm)
- 3) Loosen contact support plate lock screw just enough so that bracket can be moved.
- 4) Insert a 0.4 mm feeler gauge between the points.

**CAUTION:** ADJUST BREAKER POINT GAP WITHOUT OPENING IT MORE THAN 2 mm, OTHERWISE RATED HEEL-PRESSING FORCE MAY NOT BE OBTAINED DUE TO THE BENDING OF CONTACT BREAKER ARM.

- 5) Apply a screw driver to adjusting tab and move the contact support plate just enough so that a slight drag is felt while sliding the feeler gauge from between the points.
- 6) Tighten lock screw and recheck breaker point gap.

- 7) Pull a strip of 8 ~ 10 mm wide white paper through the closed points to remove oil and dust on the point surfaces.

**CAUTION:** WHEN INSERTING A SHEET OF PAPER, NEVER OPEN THE BREAKER POINT GAP MORE THAN 2mm.

- 8) Mount flywheel, blower housing and starting pulley on engine after adjustment.

### 7-3 TIMING ADJUSTMENT (Fig. 7-3-1, 7-3-2, 7-3-3)

With the Model EC05-2, 07-2, 10, 17 and 25-2 engines, the spark is timed to occur  $18^{\circ} \sim 23^{\circ}$  before the position reaches TDC on the compression stroke. This spark advance of  $18^{\circ} \sim 23^{\circ}$  is controlled by the breaker point opening and this advance is obtained when the breaker point opening is adjusted according to the BREAKER POINT ADJUSTMENT to its proper point opening. However, the advance timing is more accurately adjusted through the following procedures using a timing light as shown in Fig. 7-3-3.

**NOTE:** Spark advance of each model is as follows:

EC05, EC07-2, EC25-2	: $23^{\circ}$
EC10	: $18^{\circ}$
EC17	: $22^{\circ}$

**NOTE:** Refer to section "4-11 IGNITION." and "12. CHECKS and CORRECTIONS."

#### 7-3-1 ALIGNMENT MARK for TIMING ADJUSTMENT (See Fig. 7-3-1.)

For timing adjustment, the following alignment marks are provided as shown on Fig. 7-3-1.

- \*Line mark on crankcase
- \*Line mark on flywheel circumference and cooling fan

#### 7-3-2 DEFERENCE among MAGNETO for D TYPE, V TYPE and B TYPE (See Fig. 7-3-2.)

D type and V type: Clockwise arrow is embossed on cooling fan.

B type: Counter-clockwise arrow is embossed on cooling fan.

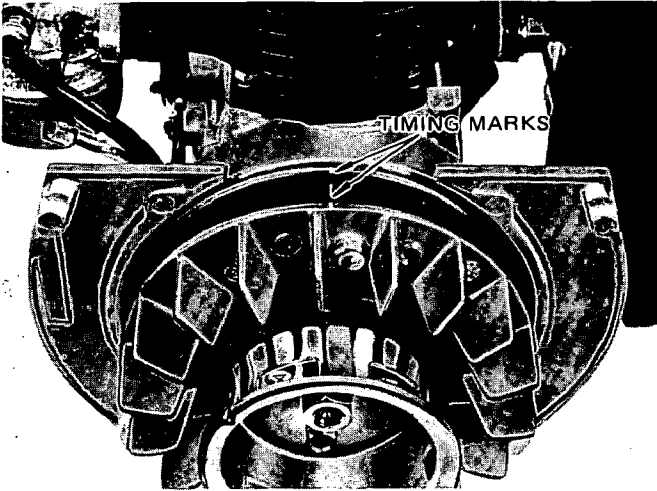


Fig. 7-3-1

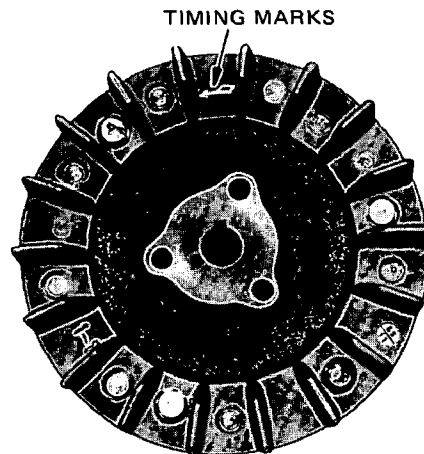


Fig. 7-3-2

### 7-3-3 FOR TIMING ADJUSTMENT, THE FOLLOWING PROCEDURES USING A TIMING TESTER:

- 1) Disconnect the stop button lead wires and the coil primary wire.
- 2) Remove blower housing from engine.
- 3) Connect the timing tester lead with red rubber cap to the coil primary wire and ground the lead with black rubber cap to crankcase. (See Fig. 7-3-3.) While the points are open, the buzzer within tester remains ringing and when the points are closed, the tester remains silent.
- 4) Turn flywheel slowly counter-clockwise (D type and V type engines) or clockwise (B type engines) until the buzzer within tester becomes silent.
- 5) Then, turn flywheel very slowly clockwise (D type and V type engines) or counter-clockwise (B type engines) and stop immediately the moment the buzzer within tester begins ringing.
- 6) Check if line mark on the flywheel is in the line with line mark on the crankcase. When the line marks are in alignment, the timing is correct.
- 7) If the timing mark lines are not in alignment, then readjust the point opening according to the BREAKER POINT ADJUSTMENT, by removing the flywheel and repeat the checking procedures 3) through 5).
- 8) After completing the timing adjustment re-mount the blower housing and connect the coil primary lead to the stop button.

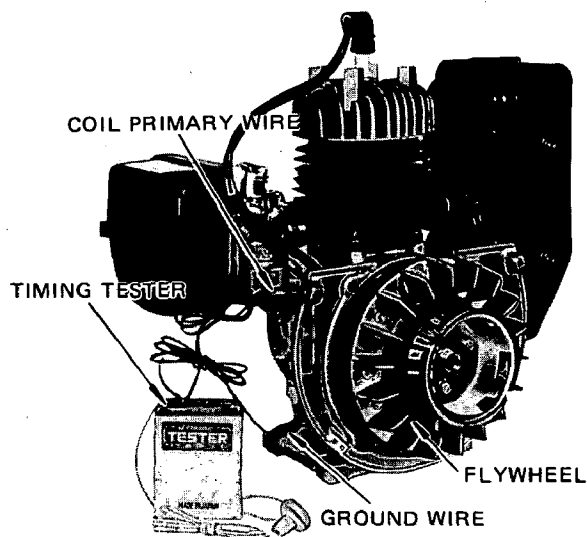


Fig. 7-3-3

### 7-4 MAGNETO TROUBLE SHOOTING

When the engine does not start or starts with difficulty, or when its operation is unstable, the following tests will clarify if they are caused by a defect in the magneto.

- 1) Check ignition cable for possible corrosion, broken, worn insulator or loose connection.
- 2) Check the sparking as described later in this section.
- 3) Check if the breaker points require cleaning, or adjusting or not. If the points are badly corroded or pitted. Condenser may have to be replaced.

Refer to "BREAKER POINT ADJUSTMENT"

- 4) If no spark takes place, replace ignition coil.

#### • SPARK TESTING

Remove spark plug from cylinder head and place it on blower housing, with the ignition cable connected to it.

Crank the engine several times by starting pulley and observe the spark in the spark gap of spark plug. If the spark is strong, the ignition system can be eliminated as the source of trouble.

If the spark is weak or there is no spark at all, repeat the checks according to the procedures 1) through 3) above. The correct electrode gap is 0.5 ~ 0.7 mm. (Refer to section "12. CHECKS and CORRECTION.")

## 8. GOVERNOR

### 8-1 CONSTRUCTION and OPERATION

In the model EC05-2, 07-2, 10, 17 and 25-2 engines, a centrifugal flyweight type governor is used. The governor plate complete, governor sleeve and governor arm are installed in the governor chamber (EC10D, 10V, 17D and 25-2D), in the crankcase (EC05-2D, 07-2D) or in the reduction chamber (type B and V), and lubricated by the lubricating oil (in the model EC05-2, 07-2, by the mixture fuel).

As the engine speed fluctuates, flyweight on the governor plate complete, rotating together with the crankshaft, changes its opening angle and moves the governor sleeve, which in turn rotates the governor shaft through the governor arm. The governor lever is connected to the extending part of the governor shaft and this governor lever is connected to the carburetor throttle lever through the governor rod at the other end; thus the throttle valve is opened or closed and engine speed and output are controlled.

When the crankshaft rotation increases, all the relevant members move in the direction indicated by —→ marks and the carburetor throttle valve closes, reducing the fuel supply and consequently reducing the speed and output. When the crankshaft rotation decreases, the same members move in the direction indicated by ---→ marks and the carburetor throttle valve open, increasing the fuel supply and consequently recovering the failing speed and output.

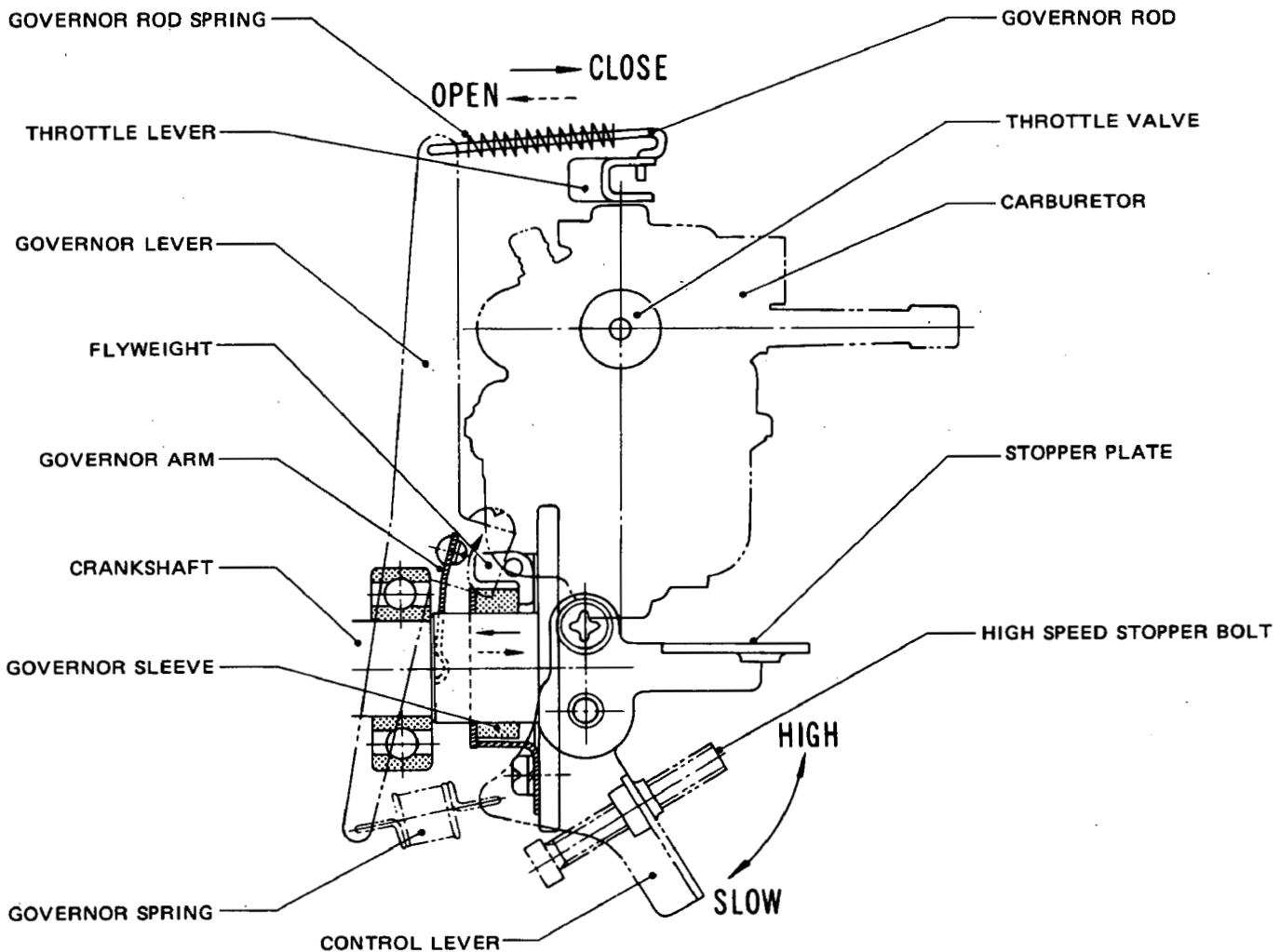


Fig. 8-1-1 Model EC05-2, 07-2

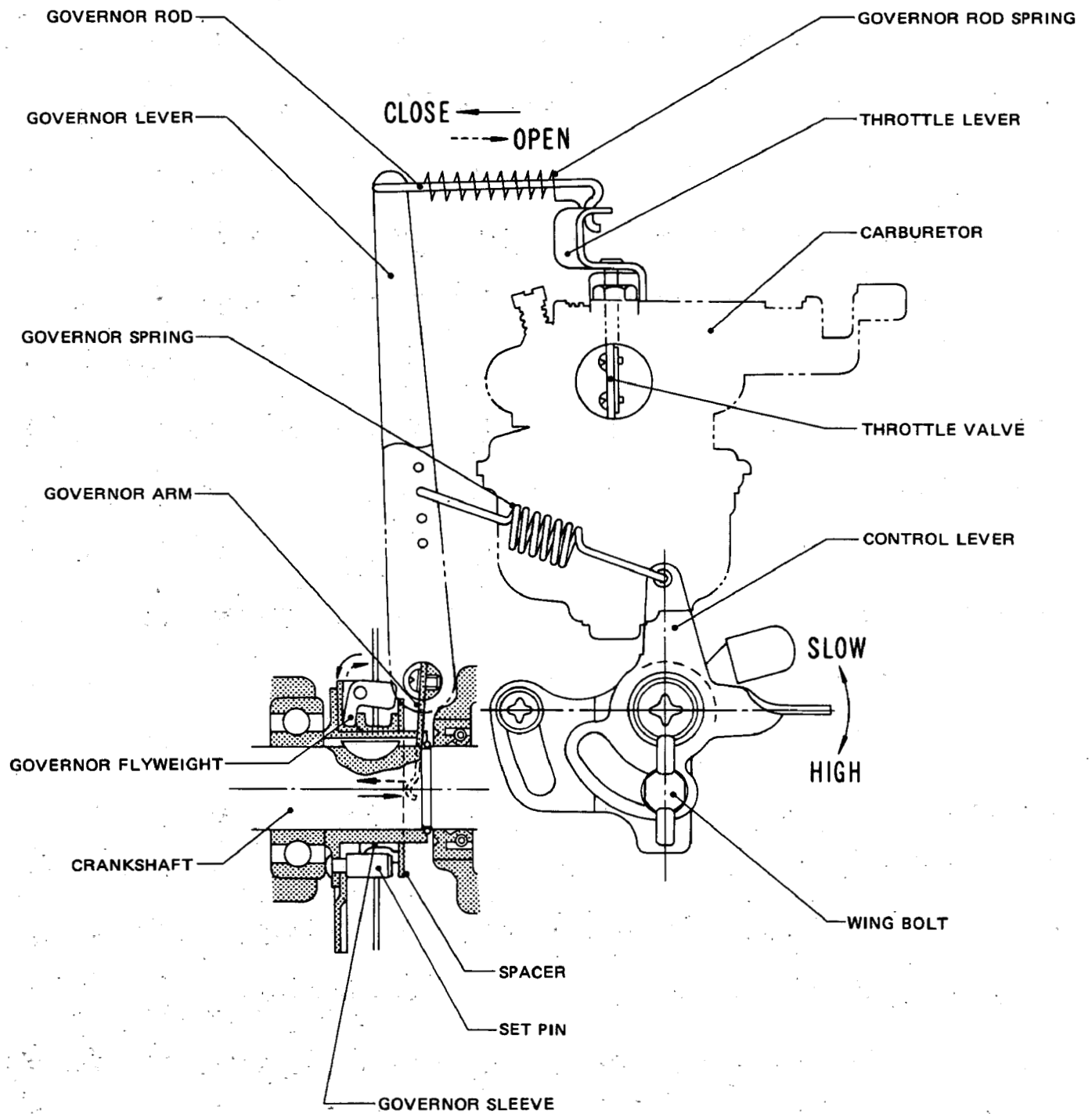


Fig. 8-1-2 Model EC10, 17, 25-2

## 8-2 GOVERNOR ADJUSTMENT

The governor linkage should be adjusted, after reassemble it according to the following procedures.

- 1) Connect governor rod and rod spring to carburetor throttle lever and governor lever, then install these to governor shaft.

**NOTE:** Never tighten adjusting plate set screw at this time, and do not fixed adjusting plate, governor lever and governor shaft.

- 2) Connect governor lever and control lever with governor spring, and install control lever on crankcase.

### 8-2-1 IN CASE OF MODELS EC10, EC17 (See Figs. 8-2-1, 8-2-2 and 8-2-3.)

- 1) As shown by arrow mark on Fig. 8-2-1 turn control lever to high speed side (clockwise) until stop fully, and fasten the control lever by tightening wing bolt.
- 2) Loosen lock nut at the end of governor shaft and set screw on adjusting plate.
- 3) As shown by the arrow on Fig. 8-2-2, move adjusting plate all the way until it will not travel any more.
- 4) Tighten both lock nut at the end of governor shaft as shown on Fig. 8-2-3 and set screw on adjusting plate.

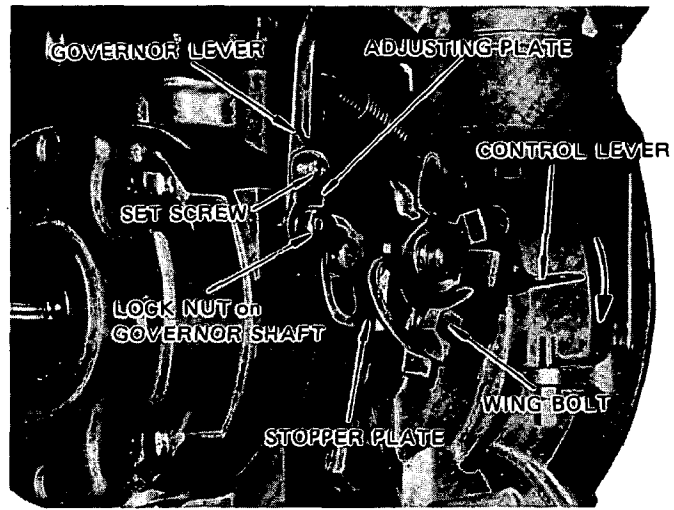


Fig. 8-2-1

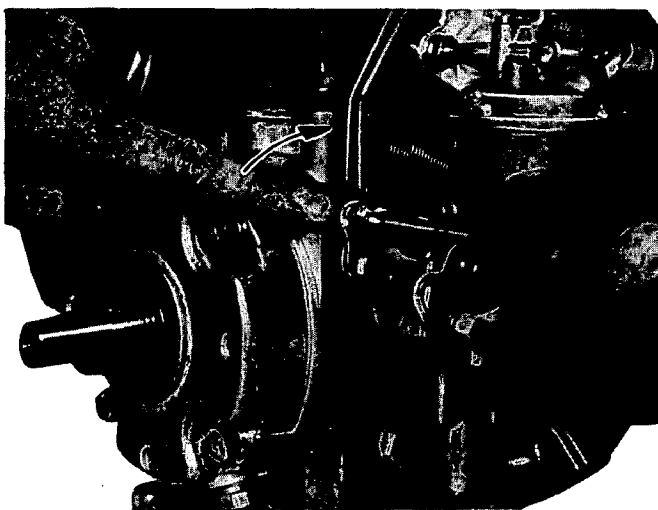


Fig. 8-2-2

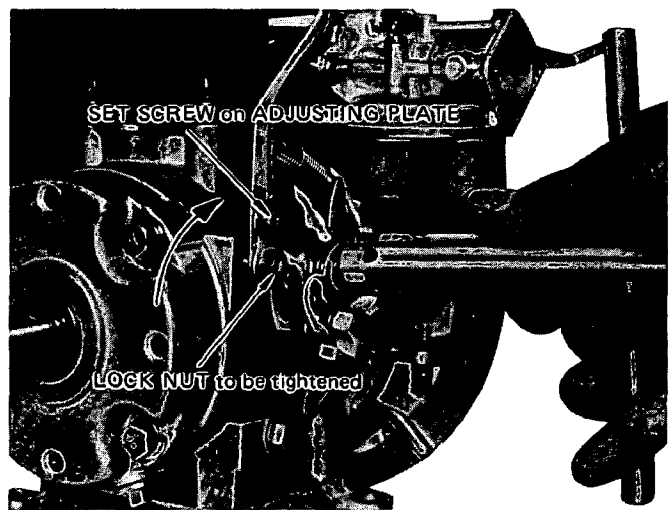
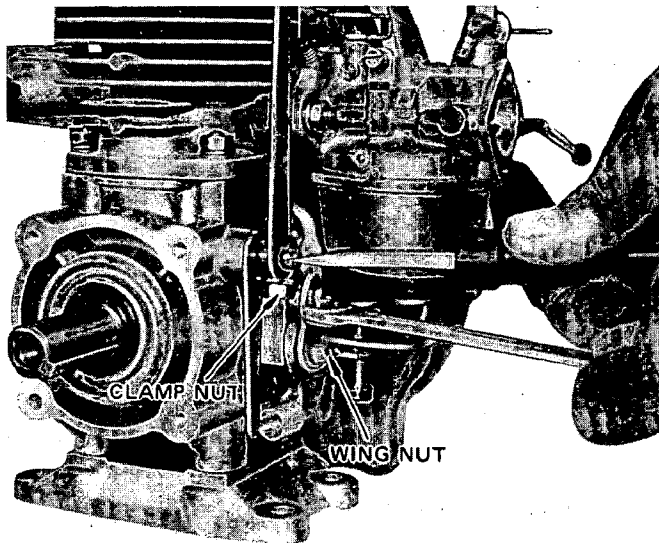


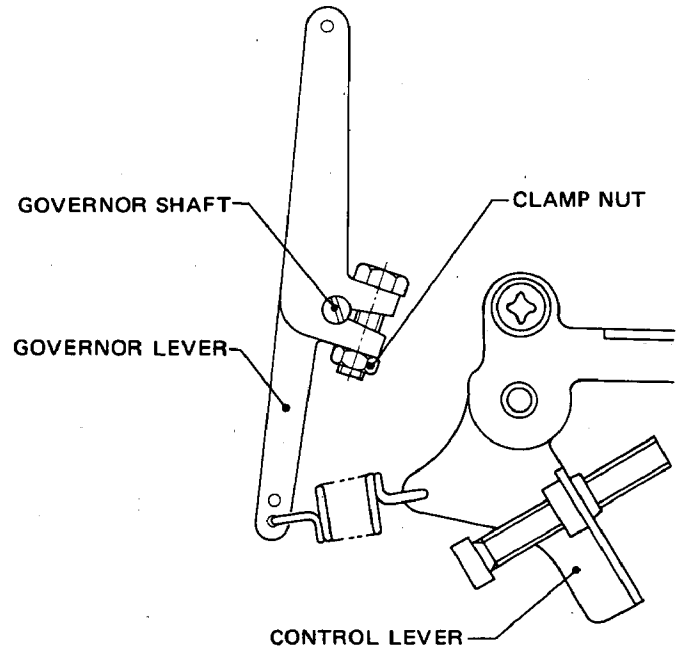
Fig. 8-2-3

**8-2-2 IN CASE OF MODELS EC05-2, EC07-2 (See Figs. 8-2-4 and 8-2-5.)**

- 1) As shown by arrow mark on Fig. 8-2-5 turn control lever to high speed side (counter-clockwise) until stop fully, and fasten the control lever by tightening wing nut.
- 2) With a screw driver inserted in the groove of governor shaft, turn it counter-clockwise fully (until it will not turn any more) and then lock governor lever to governor shaft by tightening clamp nut. (See Figs. 8-2-4 and 8-2-5.)



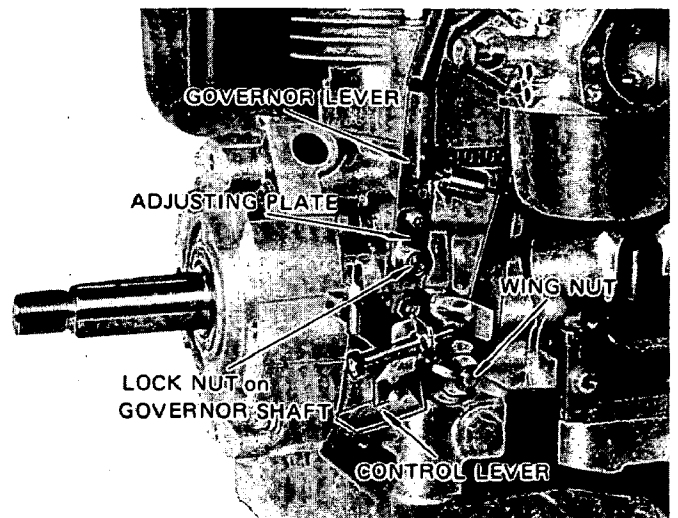
*Fig. 8-2-4*



*Fig. 8-2-5*

**8-2-3 IN CASE OF MODEL EC25-2 (See Fig. 8-2-6.)**

Governor adjustment procedure is exactly same as that for model EC10.



*Fig. 8-2-6*

### 8-3 HIGH SPEED ADJUSTMENT (Fig. 8-3)

\* Maximum speed for standard engine:

EC05-2 . . . . .	5,500 r.p.m.	EC17 . . . . .	5,000 r.p.m.
EC07-2 . . . . .	5,500 r.p.m.	EC25-2 . . . . .	5,000 r.p.m.
EC10 . . . . .	5,000 r.p.m.		

#### 8-3-1 WHEN NO TACHOMETER IS AVAILABLE

Unless required in the process of disassembling, do not remove control lever stopper plate and/or other related parts from crankcase. If it is necessary to remove them, in models EC10 and EC17 record the dimension "L" prior to removing. (This case, control lever must be turned clockwise all the way.) In models EC05-2, EC07-2 and EC25-2, never turn high speed stopper bolt on control lever (Fig. 8-3-1).

When reassembling, re-establish the recorded dimension "L" in models EC10 and EC17.

#### 8-3-2 WHEN A TACHOMETER IS AVAILABLE

- 1) Install stopper plate, control lever and other related parts.
- 2) By turning control lever with governor spring on it, increase gradually the engine speed up to specified engine speed.
- 3) Then follow the below:

In case of models EC05-2, 07-2 and 25-2, locate high speed stopper bolt on the control lever and lock it so that it will work as stopper of control lever against the stopper plate.

In case of models EC10 and EC17, locate stopper plate and fasten it to crankcase so that wing bolt on stopper plate will work as stopper of control lever.

Make sure that the governor spring is put back in the same hole on the governor lever as before. There are 5 holes (EC10) or 2 holes (EC05-2), 4 holes (EC17) or 3 holes (EC25-2) on the governor lever.

Normally, hook governor spring in the second hole from the top (EC10, 17) or in the lower hole (EC05-2, 07-2 and 25-2).

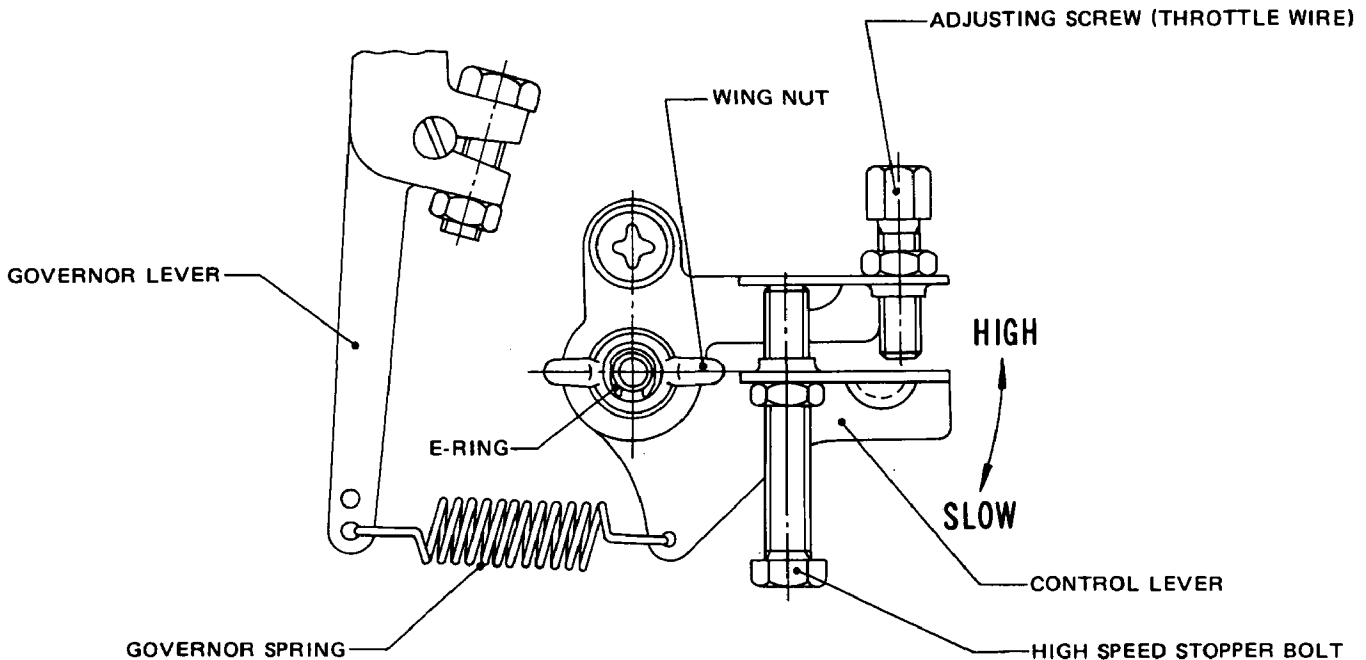


Fig. 8-3-1 Model EC05-2, 07-2



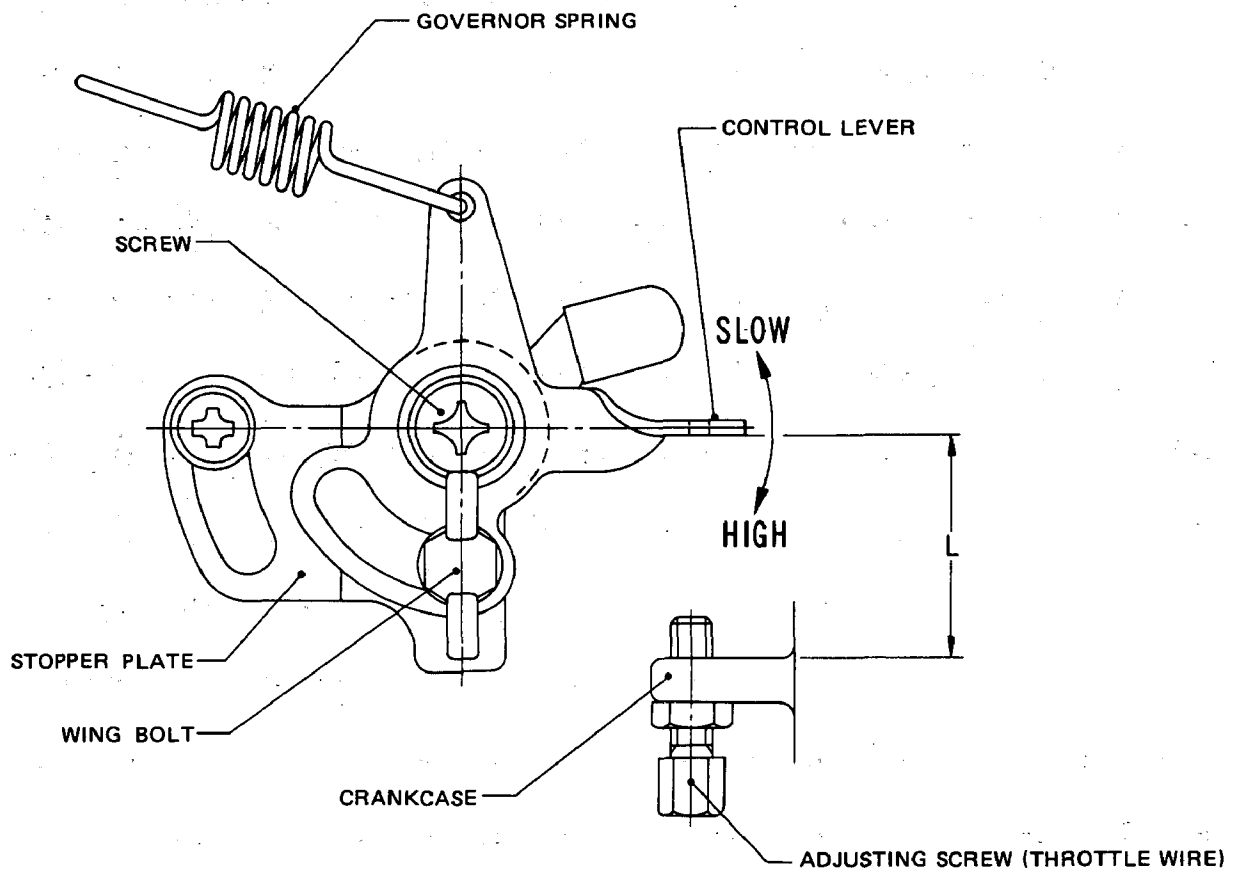


Fig. 8-3-2 Model EC10, 17

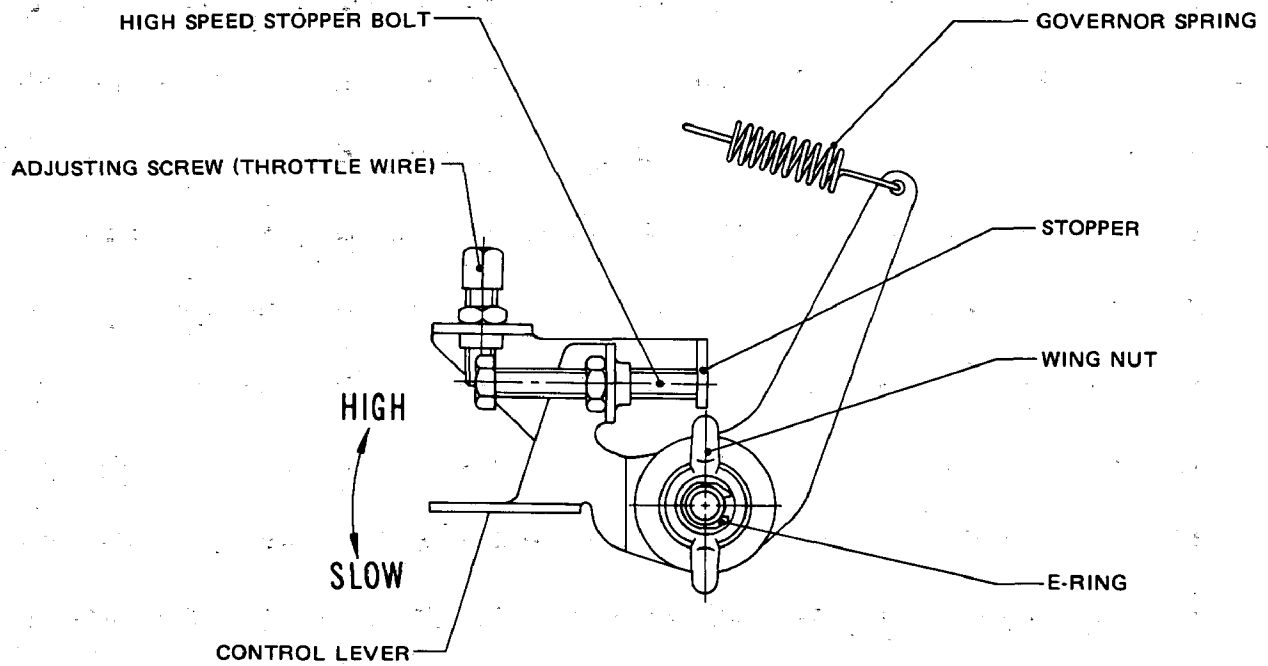


Fig. 8-3-3 Model EC25-2

# 9. CARBURETOR

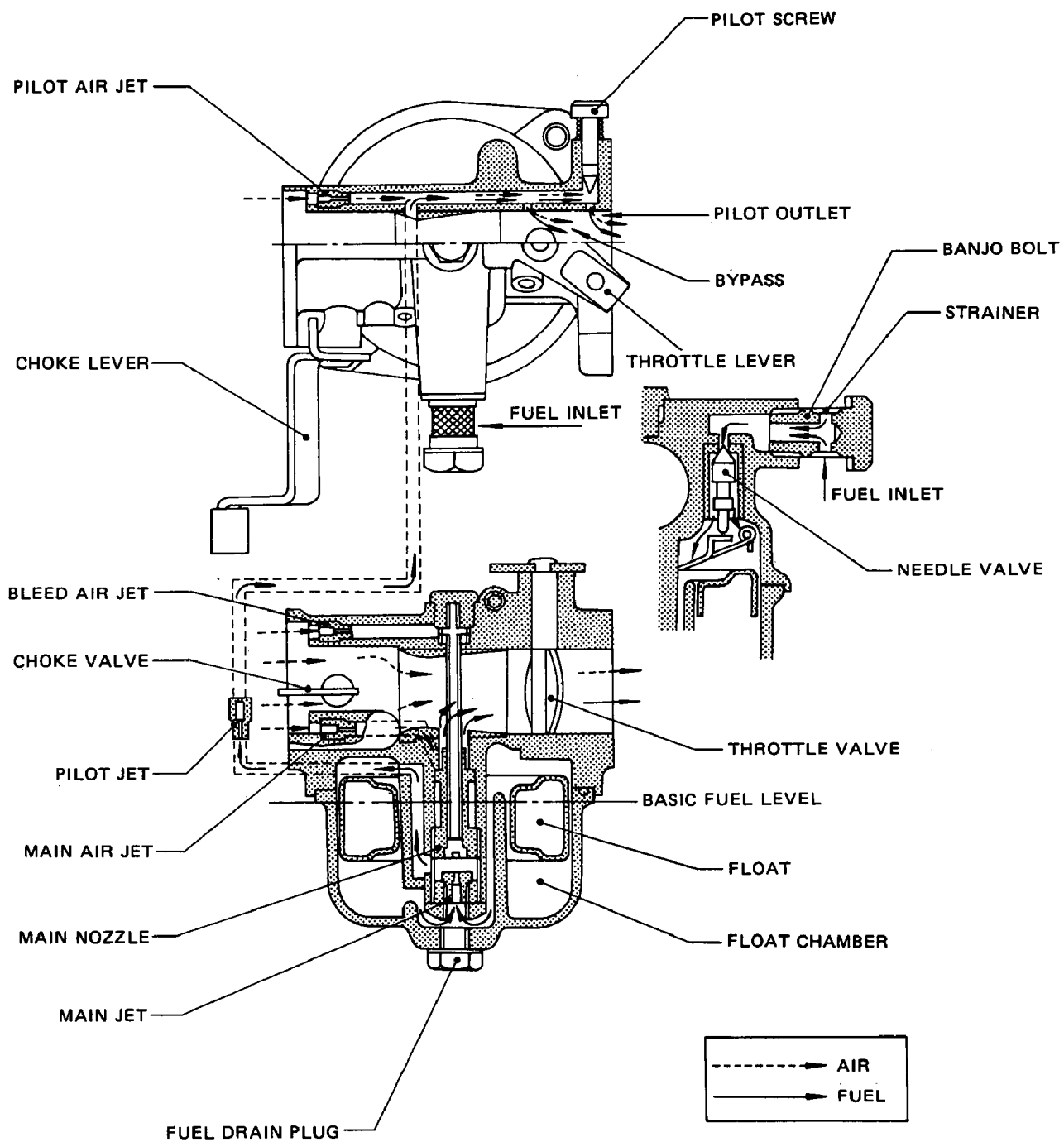


Fig. 9-1

## **9-1 CONSTRUCTION and OPERATION**

### **9-1-1 FLOAT SYSTEM**

The float chamber is located just below carburetor main body and serves to maintain the fuel level at a constant height by a joint action of float (F) and needle valve (NV) incorporated. The fuel flows from the fuel tank into float chamber via needle valve, which is kept open while the fuel level is low, but closed when the fuel level reaches a predetermined level causing the float to move up.

### **9-1-2 THROTTLE VALVE**

The throttle valve is operated by the control lever and controls the amount of air-fuel mixture and controls engine output power.

The richness of mixture or the air-fuel ratio is automatically regulated at the optimum valve regardless of the throttle valve position.

### **9-1-3 CHOKE VALVE**

The choke valve is operated by the choke lever and when it is closed, the air-fuel mixture becomes rich, and as it is opened the more, the leaner will be the mixture. The choke system serves to facilitate start-up in cold season. When engine is cranked with choke closed, the negative pressure to main nozzle increases to introduce fuel in large quantities to make start-up easy.

### **9-1-4 PILOT SYSTEM and MAIN SYSTEM**

This pilot system feeds fuel to engine during idle and slow speed operation.

The fuel fed through main jet (MJ) is measured by pilot jet (PJ), mixed with air measured by pilot air jet (PAJ), regulated by pilot screw, and then fed to engine through pilot outlet (PO) and bypass (BP).

The fuel is mainly fed from pilot outlet (PO) during idling.

This main system feeds fuel to engine during medium and high-speed operation.

The air measured by main air jet (MAJ) is mixed into fuel through bleed holes of main nozzle (MN) and discharged to main bore (MB) as atomized fuel where it is mixed with intake air through air cleaner to become an optimum air-fuel mixture to be supplied to engine.

## **9-2 DISASSEMBLY and REASSEMBLY (Fig. 9-2)**

Besides mechanical failures, most trouble are caused by incorrect mixing ratio. The most common causes of such incorrect fuel-air mixtures are clogged jets, restricted air and fuel passages, and variations in fuel level. In order to obtain the full performance of carburetor, it is necessary to keep air cleaner and carburetor clean so that air and fuel flow without any restriction.

Observe following disassembly and reassembly procedures. (see Fig. 9-2)

**CAUTION: AFTER DISASSEMBLY, CLEAN ALL PARTS IN A SUITABLE SOLVENT, ALL JETS AND VALVES SHOULD BE BLOWN OUT WITH FRESH COMPRESSED AIR, NEVER USE A DRILL OR WIRE TO CLEAN OUT JETS OR IDLE HOLES.**

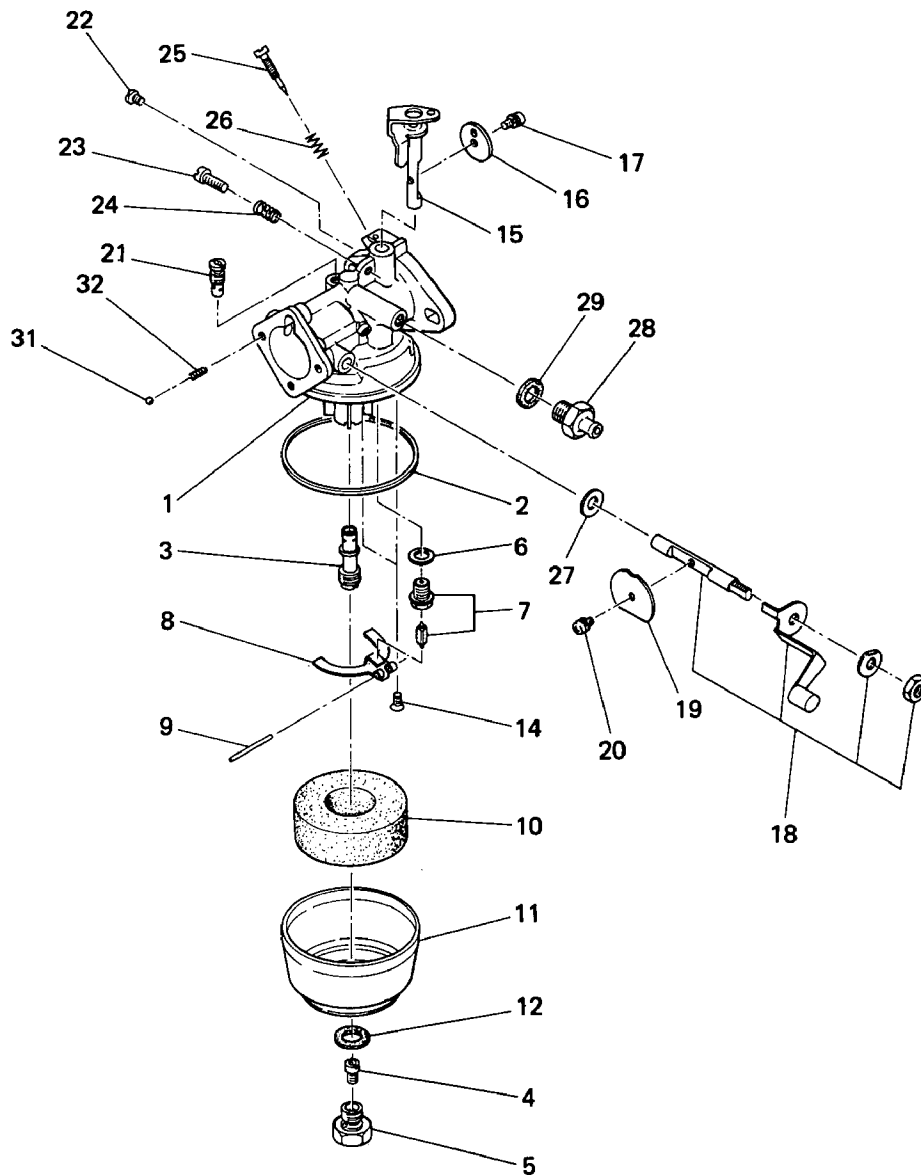


Fig. 9-2

### 9-2-1 THROTTLE SYSTEM

1) Remove guide screw (22), Philips-screw (17), remove throttle valve (16), and then pull out throttle shaft (15).

**CAUTION: TAKE CARE NOT TO DAMAGE ENDS OF THROTTLE VALVE.**

2) Remove spring (24) by unscrewing throttle stop screw (23).

### 9-2-2 CHOKE SYSTEM

1) Take out Philips-screw (20), remove choke valve (19), pull out choke shaft (18).

2) When choke shaft is pull out, choke spring (32) and steel ball (31) should be removed, lest they be lost.

**In reassembly:**

1) Insert spring (32) and steel ball (31) in the hole and install choke shaft (18).

2) When assembling choke, the flat on choke valve must be toward the main air jet side.

### 9-2-3 PILOT SYSTEM

- 1) Remove pilot jet (21) using a suitable tool while taking care not to damage it.
- 2) Remove pilot screw (25) and spring (26)

In reassembly:

- 1) Tighten pilot jet and pilot plug firmly to prevent fuel leakage.
- 2) Replace pilot screw if tapered end is damaged.

**CAUTION: DO NOT OVERTIGHTEN.**

### 9-2-4 FLOAT SYSTEM

- 1) Remove guide holder (5) and float chamber (11).
- 2) Remove screw (14) and float arm (8) by taking out float pin (9).

**CAUTION: TAKE CARE NOT TO DAMAGE FLOAT AND FLOAT ARM.**

- 3) Remove needle valve (7) and packing (6).

**CAUTION: WHEN REPLACING NEEDLE VALVE, REPLACE IT TOGETHER WITH VALVE SEAT WITHOUT FAIL.**

In assembly:

Wash inside of float chamber with gasoline.

### 9-2-5 MAIN SYSTEM

- 1) Remove main jet (4) from guide holder (5) using a suitable tool.

**CAUTION: TAKE CARE NOT TO DAMAGE IT.**

- 2) Remove main nozzle (3).

**NOTE: In case of EC10, no need to remove main nozzle because of main nozzle being incorporated into carburetor body.**

In reassembly:

- 1) Tighten main jet securely to guide holder and tighten guide holder to carburetor body.
- 2) Tighten guide holder to 70 ~ 80 kg-cm (5.5 lbs-ft).

A too rich fuel mixture will result if not tightened securely.

### 9-3 ADJUSTMENTS

When the control lever is set at slow speed side, the engine should be operated on idling speed.

\*The idling speed of engine is adjusted in the following sequence.

Specified idling speed:

EC05-2 . . . . .	1300 r.p.m. ± 100	EC25-2 . . . . .	1500 r.p.m. ± 100
EC07-2 . . . . .	1300 r.p.m. ± 100		
EC10 . . . . .	1300 r.p.m. ± 100		
EC17 . . . . .	1300 r.p.m. ± 100		

- 1) Adjust pilot screw by turning it counterclockwise by 1 turn (1½ turn for Model EC17) after fully closing it once.

**CAUTION: DO NOT OVERTIGHTEN PILOT SCREW WHEN CLOSING IT FULLY. THE NEEDLE POINT MIGHT BE DAMAGED BY OVERTIGHTENING.**

- 2) THROTTLE STOP SCREW

Turn throttle stop screw clockwise until the specified idling speed is obtained.

If this speed exceeds specified idling speed, turn throttle stop screw counterclockwise.

## 10. RUN IN OPERATION of REASSEMBLED ENGINE

An overhauled engine must be carefully run-in to get proper surface condition on newly installed parts. Especially when cylinder, piston or piston rings are replaced, a thorough run-in operation is indispensable. The recommended run-in schedule is as follows:

LOAD					SPEED	TIME
EC05-2	EC07-2	EC10	EC17	EC25-2		
No load					2,000 rpm	10 min.
No load					3,000 rpm	10 min.
No load					4,000 rpm	10 min.
1.5 HP	2.0 HP	3.0 HP	5.0 HP	8.0 HP	4,000 rpm	30 min.
1.8 HP	2.3 HP	3.5 HP	5.5 HP	9.5 HP	4,500 rpm	60 min.

## 11. TROUBLE SHOOTING

For a gasoline engine to start and run satisfactorily, the following three requirements must be met:

- 1) The cylinder filled with a proper fuel-air mixture.
- 2) An appropriate compression in the cylinder.
- 3) Good spark at correct time to ignite the mixture.

If all the three requirements are not met simultaneously, an engine can not be started. There are also other factors such as heavy load at starting and too long an exhaust pipe causing a high back pressure, which contribute to hard starting.

The most common causes of engine troubles are given below.

### 11-1 STARTING DIFFICULTIES

	Cause	Remedy	Preventive measure
Little or No Spark	Defects in spark plug	<ol style="list-style-type: none"> <li>1) If contaminated, wash in gasoline, remove foreign material and dry.</li> <li>2) If spark plug is broken and lost insulation, replace plug.</li> <li>3) Adjust spark gap to 0.5 ~ 0.6mm. (for Model EC10)</li> </ol>	<ol style="list-style-type: none"> <li>1) Use spark plugs of specified heat range. Do not use poor grade oil. Clean air cleaner and avoid dust entry.</li> <li>2) When spark gap is adjusted, if center electrode is hit or bent, insulator may get damaged.</li> </ol>
	Defects in high-tension cable	If cable is burnt, replace cable along with coil.	
	Defects in contact breaker	<ol style="list-style-type: none"> <li>1) If breaker points are rough, smooth out surface with emery paper (#400).</li> <li>2) If breaker point gap is incorrect, adjust it to specified <math>0.4 \pm 0.05</math>mm (for Model EC10) by loosening contact support plate lock screws.</li> <li>3) If spark timing is incorrect, adjust it to <math>18^\circ \sim 23^\circ</math> before TDC. (refer to 4-11)</li> <li>4) If breaker is defective in insulation, replace breaker.</li> <li>5) If condenser is defective, replace.</li> </ol>	
	Defects in magneto	<ol style="list-style-type: none"> <li>1) If wire or insulation is broken, replace magneto.</li> <li>2) If magnetism is weak, re-magnetize (at the magneto maker) or replace.</li> </ol>	
	Other defects in electric system	<ol style="list-style-type: none"> <li>1) If stop-button is faulty, (short circuiting) replace or repair.</li> <li>2) If primary wire is grounded to the engine body, insulate it with insulating adhesive tape.</li> </ol>	
Little or No Compression	Gas leak through head gasket or other parts	<ol style="list-style-type: none"> <li>1) If head gasket is defective, replace.</li> <li>2) If head bolts are loose, tighten.</li> <li>3) If spark plugs are loose, tighten.</li> <li>4) If spark plugs are defective, replace.</li> </ol>	
	Defects in piston assembly	<ol style="list-style-type: none"> <li>1) If piston is worn, replace.</li> <li>2) If cylinder is worn, re-bore and use oversize piston and piston ring. (No oversize for EC05-2 and 07-2.)</li> <li>3) If piston rings are worn, replace.</li> <li>4) If piston rings are stuck, clean or replace rings.</li> </ol>	<ol style="list-style-type: none"> <li>1) Keep air cleaner always clean.</li> <li>2) Do not use poor grade oil. Change oil regularly.</li> </ol>

	Cause	Remedy	Preventive measure
No Fuel supply	Defects in fuel tank system	1) Clean clogged tank outlet. 2) Clean clogged fuel strainer. 3) If incorrect fuel is poured into tank or water is mixed, drain tank completely and fill it with correct fuel. 4) When fuel pipe is locked with air, expell air.	1) Be sure to use a filter when adding fuel. 2) Use mixture (gasoline 25 : oil 1) as fuel.
	Defects in carburetor	1) If clogged with dust, clean. 2) If defective, replace. Clean jets and other orifices, if they are clogged.	
Excessive Fuel		1) Start engine with fully open choke valve and half open throttle valve. 2) Remove drain plug from crankcase, and close fuel cock, repeat starting operation several times to evacuate excess fuel.	1) Never close choke valve when engine is warm. 2) When stopping the engine, run it at slow speed for a while. This practice not only favourably affects next starting, but also improves engine life. 3) Clogged air-cleaner results in too rich air-fuel mixture. Clean it throughly.
	Defects in carburetor	If fuel overflows, check needle valve seat for wear. Replace, if necessary.	Be careful clogged carburetor.
Too much resistance in starting	Excess load	1) If power transmission belt is too tight, correct tension. 2) If load is still too heavy, install a clutch.	
	Piston or Connecting Rod seized	1) If piston seizes, correct or replace. 2) If connecting rod large end or small end seize, replace.	1) Do not use poor grade oil. 2) Use fuel of proper mixing ratio.

### 11-2 SLOW-SPEED out of order

- 1) If the pilot screw in the carburetor is not correctly adjusted, correct it. Refer to section "9-3. ADJUSTMENTS of CARBURETOR".
- 2) Most defects listed as causes for starting difficulty are also causes for faulty slow-speed operating.

### 11-3 OVERHEATING and KNOCKING

- 1) If the ignition timing is too far advanced, correct it.
  - Model EC05-2, 07-2, 25-2 . . . . . 23°
  - Model EC10 . . . . . 18°
  - Model EC17 . . . . . 22°
- 2) If too much carbon deposits in the combustion chamber, remove it.
- 3) If the heat range of the spark plug is too cool, replace it with correct one.
  - Model EC05-2, 07-2, 25-2 . . . . . NGK B6HS
  - Model EC10 . . . . . NGK B-4
  - Model EC17 . . . . . NGK B-4H
- 4) If the air-fuel mixture is too lean, clean jets and other holes in the carburetor.  
Clean the aircleaner also.
- 5) If the load is in excess, reduce it below the specified continuous load.



#### 11-4 POWER DROP

- 1) If the cylinder, piston or piston rings are worn, replace them or re-finish the cylinder by boring and fit oversize piston and piston rings. Replace or clean sticking piston rings.

**NOTE:** No oversize for EC05-2, 07-2.

- 2) If the carburetor is out of order, re-adjust or clean it.
- 3) If the spark plug is faulty (contamination, gas leakage or faulty insulation), clean it or replace it.
- 4) If combustion gas leaks through the cylinder, and cylinder head joint, re-tighten the clamping screws.  
If the gasket is faulty, replace it.
- 5) If the magneto or the contact breaker is faulty, replace them or re-adjust them.
- 6) If the aircleaner is clogged, clean it.
- 7) If the fuel system is clogged, clean it.
- 8) If the oil seals at the crankshaft are worn and let the compressed gas through, replace them.

#### 11-5 EXCESSIVE FUEL CONSUMPTION

- 1) If too rich air-fuel mixture, clean jets and small holes in carburetor.
- 2) If the throttle shaft of carburetor is worn, replace throttle shaft. (carburetor).
- 3) If fuel leakage, re-tighten screws or replace.
- 4) If beside these causes, also caused by power drop, perform remedies for power drop, according to 11-4. POWER DROP.

#### 11-6 ENGINE HUNTING

- 1) If the governor lever, governor shaft, governor spring or other members are incorrectly adjusted, re-adjust or correct them.
- 2) If the fuel-air mixture is too lean. Clean the carburetor.
- 3) If the pilot screw in the carburetor is incorrectly adjusted, re-adjust it.
- 4) If the governor spring is deformed permanently, replace it.
- 5) If the governor sleeve is not functioning correctly, correct it.
- 6) If the flyweight or the governor sleeve is worn, replace the worn one.
- 7) If the governor shaft is not functioning properly, correct it.

#### 11-7 OTHER COMPLAINTS

- 1) Fuel overflow from carburetor

If the fuel flows towards the aircleaner or much fuel flows into the crankcase while the engine is standing still (overflowing), the needle valve or the float is faulty. Correct or replace them.

- 2) If the engine suddenly stops with abnormal noise, the piston or the crankshaft and connecting rod assembly is seized. Correct them or replace them.
- 3) If the engine produces abnormal noise during operation, be sure to stop the engine and do not start it again before the cause is found.

If the cause for the trouble is not found, contact our distributor and entrust the engine in the hand of our service engineer.

## 12. CHECKS and CORRECTIONS

After disassembling and cleaning the engine parts, check them, and if necessary, correct them according to the correction table.

The correction table applies whenever engines are repaired. Its contents should be thoroughly understood by those who undertake the repairing.

Its specifications must be abided by to effect correct maintenance.

Below, terms employed in the correction table are explained.

### 1) CORRECTION

All operations performed on the engine parts for the purpose of improving or recovering the engine performance, consisting of repairs, readjustments, and replacements.

### 2) STANDARD SIZE

The design dimension of the part without the tolerance.

### 3) CORRECTION TOLERANCE

The tolerance on the re-finished part dimension or on the readjusted dimension.

### 4) CORRECTION LIMIT

The limit on the part and adjustment, beyond which any dimensional and functional changes, due to wear, burn, and other causes will adversely affect the normal engine performance.

### 5) USE LIMIT

The limit, beyond which the part is no longer usable, due to defects in function or strength.

*NOTE: All dimensions in the "CORRECTION TABLE" are given in millimeter, except where otherwise specified.*

**CORRECTION TABLE**

ITEM		ENGINE MODEL	STANDARD SIZE	CORRECTION		USE LIMIT	REMARKS	TOOL	CORRECTION METHOD
				TOLERANCE	LIMIT				
Flatness of cylinder head		EC05-2 EC07-2							
		EC10 EC17 EC25-2		0.1	0.2		Surface plate, Feeler	Correct	
		Cylinder		EC05-2	S.T.D. 42φ	+0.016 0	0.15	0.65	Cylinder gauge
EC07-2	S.T.D. 50φ								
EC10	S.T.D. 50φ O.S. 50.25φ O.S. 50.50φ								
	EC17			S.T.D. 62φ O.S. 62.25φ O.S. 62.50φ					
EC25-2				S.T.D. 72φ O.S. 72.25φ O.S. 72.50φ					
	Roundness			All		0.01			
Cylindricity	All		0.015						
Outside Diameter		EC05-2	S.T.D. 41.96φ	0 -0.020	-0.1	-0.1	Diameter at 3~18(EC05,07) 5~23 (EC10) 3~28(EC17) 10~25(EC25-2) from bottom, in transverse to piston pin. (max. dia.)	Micrometer	Replace
		EC07-2	S.T.D. 49.96φ						
		EC10	S.T.D. 49.93φ O.S. 50.18φ O.S. 50.43φ						
			EC17						
		EC25-2							
Piston pin hole		EC05-2	10.5φ	+0.011 0	0.03	0.03	Cylinder gauge	Replace	
		EC07-2 EC10	12φ	-0.009 -0.020					
		EC17	16φ	-0.001 -0.012	-0.035	-0.035			
		EC25-2	18φ	+0.005 -0.008					
Width of ring groove		Top	EC05-2 EC07-2 EC10	1.8	+0.05 +0.03	0.15	0.15	Vernier caliper	Replace
			EC17	2.09	+0.02 0				
			EC25-2	1.59					
		2nd	EC05-2 EC07-2 EC10	1.8	+0.03 +0.01				
			EC17	2.0	+0.04 +0.02				
			EC25-2	1.59	+0.02 0				

ITEM		ENGINE MODEL	STANDARD SIZE	CORRECTION		USE LIMIT	REMARKS	TOOL	CORRECTION METHOD	
				TOLERANCE	LIMIT					
Piston	Clearance between piston ring and piston groove	EC05-2 EC07-2	2nd	0.05~0.09	0.15	0.15		Feeler gauge	Replace	
		EC10		0.05~0.1						
		EC17								
		EC25-2								
	Clearance between piston and cylinder	EC05-2 EC07-2		0.08~0.04	0.25	0.25	Max. cylinder dia. and max. piston dia.	Cylinder gauge, Micrometer	Replace	
		EC10		0.11~0.07						
		EC17		0.10~0.06						
		EC25-2		0.10~0.04						
	Fit between piston and piston pin	EC05-2 EC07-2		0.006L~ 0.025L	0.06L	0.06L		Cylinder-gauge, Micrometer	Replace	
		EC10		0.007L~ 0.012T						
		EC17								
		EC25-2		0.005T~0.013L						
Piston Ring	Ring gap	EC05-2 EC07-2	Top 2nd	0.1~0.3	1.5	1.5		Feeler-gauge	Replace	
		EC10	Top 2nd							
		EC17 EC25-2	Top 2nd							0.2~0.4
	Ring width	EC05-2 EC07-2 EC10	Top 2nd	1.8	-0.02 -0.04	-0.1	-0.1	Top ring is keystone	Micrometer	Replace
		EC17	Top 2nd	2.0 2.0	-0.01 ~ -0.03 -0.03 ~ -0.05					
		EC25-2	Top 2nd	1.5	-0.01 -0.03					
Piston pin O.D.	EC05-2	10.5φ	-0.006 -0.014	-0.03	-0.03		Micrometer	Replace		
	EC07-2 EC10	12φ	-0.008 -0.016							
	EC17	16φ	-0.005 -0.013							
	EC25-2	18φ	-0.003 -0.008							
Crankshaft & Connecting Rod	Large end I.D.	EC05-2 EC07-2	20.2φ	+0.017 +0.004	+0.020	+0.020		Cylinder-gauge	Replace	
		EC10	24φ	+0.009 0						
		EC17	29.68φ	+0.014 0						
		EC25-2	33φ	+0.013 0						
	Clearance between rod large end I.D. and crank pin needle bearing	EC05-2 EC07-2		0.032~ 0.004	+0.055	+0.055	Clearance in radial direction	Cylinder-gauge, Micrometer	Obtain correct clearance by replacing parts	
		EC10		0.025~ 0.004						
		EC17		0.030~ 0.005						
		EC25-2		0.011~ 0.035						

ITEM	ENGINE MODEL	STANDARD SIZE	CORRECTION		USE LIMIT	REMARKS	TOOL	CORRECTION METHOD
			TOLERANCE	LIMIT				
Small end I.D.	EC05-2	14φ	+0.018 0	+0.020	+0.020		Cylinder-gauge	Replace
	EC07-2 EC10	16φ	+0.011 0					
	EC17	20φ	+0.008 -0.005					
	EC25-2	23φ	+0.013 0					
Clearance between small end I.D. and piston pin needle bearing	EC05-2 EC07-2		0.038~ 0.006	0.055	0.055	Clearance in radial direction	Cylinder-gauge, Micrometer	Obtain correct clearance by replacing parts
	EC10		0.03~0.01					
	EC17		0.03~0.004					
	EC25-2		0.025~0.003					
Large end side or small end side	EC05-2 EC07-2		0.6~0.1	0.7	0.7		Feeler-gauge	Replace
	EC10		0.5~0.1					
Large end side clearance	EC17		0.6~0.1	0.9	0.9			
	EC25-2		0.8~0.1					
Parallelism and Twist between large end and small end bores	EC05-2 EC07-2 EC10	Parallelism	0.05	0.1	0.1	Holding large end as reference, measure test bar, (L=100) inserted in small end.	Test bar, Dial-indicator	Replace
	EC17 EC25-2	Twist	0.1	0.3	0.3			
Large and small end I.D. roundness & cylindricity	EC05-2 EC07-2 EC10	Roundness	Max. 0.005				Cylinder-gauge	
	EC17 EC05-2	Cylindricity	Max. 0.005					
Distance between large end & small end bores	EC05-2 EC07-2	75	±0.05		±0.25		Mandrels, Micrometer	Replace
	EC10	100	0 -0.1					
	EC17	116	±0.05					
	EC25-2	120						
Crankpin O.D.	EC05-2 EC07-2	15.2φ	0 -0.011	-0.020	-0.020		Micrometer	Replace
	EC10	18φ	0~-0.008					
	EC17	21.675φ	0~-0.007					
	EC25-2	25φ	-0.003~ -0.010					
Crankpin O.D. Roundness & Cylindricity	EC05-2 EC07-2 EC10	Roundness	Max. 0.005				Micrometer	Replace
	EC17 EC25-2	Cylindricity	Max. 0.005					
Crankshaft journal O.D.	EC05-2 EC07-2 EC10	20φ	0 -0.01	-0.04	-0.04		Micrometer	Replace
	EC17	25φ						
	EC25-2	30φ						

Crankshaft & Connecting Rod

ITEM	ENGINE MODEL	STANDARD SIZE	CORRECTION		USE LIMIT	REMARKS	TOOL	CORRECTION METHOD	
			TOLERANCE	LIMIT					
Crankshaft & Connecting Rod	Thrust clearance between crankshaft & crankcase	EC05-2 EC07-2		0.1~0.84	1.0	1.0	Measure between bearing & crankshaft	Feeler-gauge	Replace
		EC10 EC17 EC25-2		0.1~0.6					
	Runout of crankshaft	EC05-2 EC07-2 EC10 EC17 EC25-2		0.05	0.12		Supporting assembled crankshaft between centers, measure journal	Dial-indicator	Correct
	Dia. of small end needle bearing needles	EC05-2	1.75φ	0 -0.003				Micrometer	Replace
EC07-2 EC10		2φ	0 -0.004						
EC17			-0.002 -0.004						
EC25-2		2.5φ	0 -0.002						
Carburetor	Metering needle unscrew	EC05-2 EC07-2	Fixed				Model BV18		
	Pilot screw unscrew	EC10	1	±¼					
	Metering needle unscrew	EC17	Fixed				Model BV21		
	Pilot screw unscrew		1½	±¼					
	Metering needle unscrew	EC25-2	Fixed				Model BV28		
	Pilot screw unscrew		1	±¼					
Electric Equipments	Spark plug	EC05-2 EC07-2	NGK B-6HS						
		EC10	NGK B-4						
		EC17	NGK B-4H						
		EC25-2	NGK B-6HS						
Electric Equipments	Spark timing (before T.D.C.)	EC05-2 EC07-2	23° (fixed)	±3°	±5°		Timing-tester	Adjust	
		EC10	18° (fixed)						
		EC17	22° (fixed)						
		EC25-2	23° (fixed)						
	Spark plug gap	EC05-2 EC07-2	0.6~0.7	±0.05	±0.1	1.0		Feeler-gauge	Adjust
		EC10	0.5~0.6						
		EC17 EC25-2	0.6~0.7						
	Point opening	EC05-2 EC07-2	0.35					Breaker contact point Spanner Feeler-gauge	
EC10		0.4							
EC17		0.3							
EC25-2		0.35							
Spark gap	EC05-2 EC07-2 EC10 EC17 EC25-2	Min. 8				Three needles test at 300 (500) r.p.m. magnet revolution			

ITEM	MODEL	HP/rpm	CORRECTION LIMIT	REMARKS
Max. Output	EC05-2	2.5/5,500	Below 110% of rated output	
	EC07-2	3.3/5,500		
	EC10	4/5,000		
	EC17	6.5/5,000		
	EC25-2	12/5,000		
Continuous Rated Output	EC05-2	1.7/5,500		
	EC07-2	2.2/5,500		
	EC10	3/4,000		
	EC17	5.0/4,000		
	EC25-2	8.5/4,000		

ITEM	MODEL	Liter/hr	CORRECTION LIMIT	REMARKS
Fuel Consumption	EC05-2	0.95	Up 135% Standard consumption	At continuous rated output
	EC07-2	1.14		
	EC10	1.44		
	EC17	2.33		
	EC25-2	3.97		

ITEM	MODEL	REMARKS
Lubricating oil	EC05-2 EC07-2 EC10 EC17 EC25-2	Engine Oil for 2-cycle engine or SAE30 of high quality (Mixture Fuel, gasoline 25 : oil 1)

ITEM	MODEL	STANDARD	CORRECTION TOLERANCE	REMARKS
Min. Accelerating revolution	EC05-2 EC07-2 EC10 EC17	1,300	±100	
	EC25-2	1,500	±100	

ITEM		MODEL	kg-cm	ft-lbs	TOOL	REMARKS
Specified Fastening Torque	Magneto clamp nuts	EC05-2 EC07-2	390~420	28~30		
		EC10	400~500	29~36		
		EC17	450~500	33~36		
		EC25-2	800~1000	58~72		
	Spark plug	EC05-2 EC07-2 EC10 EC17 EC25-2	250~300	18~22	Torque wrench	
	Cylinder clamp nuts	EC05-2 EC07-2 EC10	90~100	6.5~7.3		
		EC17	180~220	13~16		
		EC25-2	340~400	25~29		
	Crankcase clamp bolts	EC05-2 EC07-2 EC10 EC17	90~100	6.5~7.3		
		EC25-2	200~250	15~18		
	Reduction cover clamp bolts	EC05-2 EC07-2	90~100	6.5~7.3		
		EC10	180~220	13~16		
		EC17	90~100	6.5~7.3		
	Crankcase cover clamp bolts	EC17 EC10	180~220	13~16		
		EC 25-2	200~250	15~18		



### 13 MAINTENANCE and STORING

The following maintenance jobs apply when the engine is operated correctly under normal conditions. The indicated maintenance intervals are by no means guarantees for maintenance free operations during these intervals.

For example, if the engine is operated in extremely dusty conditions, the air cleaner should be cleaned every day, instead of every 50 hours.

#### 13-1 DAILY CHECKS and MAINTENANCE

Checks and Maintenance	Reasons for requiring them
Remove dust from whatever parts which accumulated dust.	The governor linkage is especially susceptible to dust.
Check external fuel leakage. If any, retighten or replace.	Not only wasteful but also dangerous.
Check screw tightening. If any loose one is found, re-tighten	Loose screws and nuts will result in vibration accidents.
Check oil level in governor or reduction chamber and add up as necessary.	If the engine is operated without sufficient oil, it will fail.

#### 13-2 EVERY 50 HOURS (10 DAY) CHECKS and MAINTENANCE

Checks and Maintenance	Reasons for requiring them
Clean air cleaner.	Clogged air cleaner harms engine operation.
Check spark plug. If contaminated, wash in gasoline or polish with emery paper.	Output power is reduced and starting is made difficult.

#### 13-3 EVERY 100-200 HOURS (MONTHLY) CHECKS and MAINTENANCE

Checks and Maintenance	Reasons for requiring them
Clean fuel strainer and fuel tank.	The engine will be out of order.
Clean contact breaker points.	The engine output drops.
Change governor or reduction chamber oil.	Contaminated oil accelerates wear.

#### 13-4 EVERY 500-600 HOURS (SEMIANNUAL) CHECKS and MAINTENANCE

Checks and Maintenance	Reasons for requiring them
Remove cylinder head and remove carbon deposit. Remove carbon deposit from exhaust port and muffler.	The engine will be out of order.
Disassemble and clean carburetor.	

**13-5 EVERY 1000 HOURS (YEARLY) CHECKS and MAINTENANCE**

Checks and Maintenance	Reasons for requiring them
Perform overhauls, clean correct or replace parts.	The engine output drops and become out of order.
Change piston rings.	
Replace fuel pipe once a year.	To prevent from danger caused by the fuel leakage.

**13-6 PREPARATION for LONG ABEYANCE**

- 1) Perform the above 13-1 and 13-2 maintenance jobs.
- 2) Drain fuel from the fuel tank and carburetor float chamber. Drain oil from governor or reduction chamber.
- 3) To prevent rust in the cylinder bore, apply oil through the spark plug hole and turn the crankshaft several turns by hand. Re-install the spark plug.  
Turn the starting pulley by hand and leave it where the resistance is the heaviest.
- 4) Clean the engine outside with oiled cloth.
- 5) Put a vinyl or other cover over the engine and store the engine in dry place.









**Robin Engine**





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