



SAITOFG-14B



Instruction Manual for 4-cycle Gasoline Engine

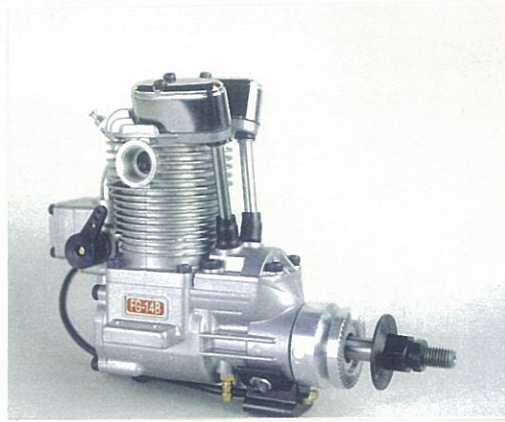
Thanks for buying SAITO FG-14/82 four cycle gasoline engine exclusively for model airplanes.

In order to avoid misuse, please be sure to read well the "Operation Manual," attached "Precautions for use of model plane engine", the "Warranty", and the operation manual of RC device.

If there should be any deficiency, inconvenience, etc. concerning the manufacture, our company will repair them with responsibility.

Any failure or trouble caused by unnecessary disassembly, modification, or other uses than those provided in the instruction manuals is not subject to the warranty, however.

Moreover, all responsibilities for the use of the engine, and other obligations and responsibilities based on laws, regulations, etc. are borne by the purchaser and the user, and SAITO SEISAKUSHO CO., LTD. is exempt from any responsibilities.



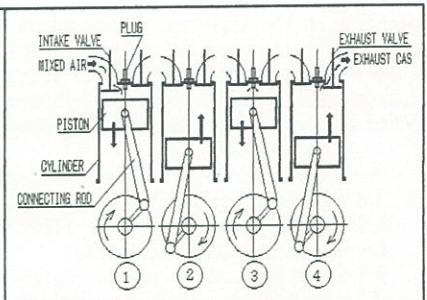
SAITO FG-14/82 is a four cycle gasoline engine exclusively for model airplanes which is designed with emphasis on high performance, durability, and weight saving and whose parts are redesigned to adapt to the gasoline engine based on FA-82a glow engine, equipped with carburetor with a pump, ignition system and small-size spark plug for small-size gasoline engine developed by us

Features of the gasoline engine

- ◎Fuel efficient
- ◎Fuel cost is low.
- ◎The airframe is not easily soiled.

Explanation about four cycle engine

Four cycle engine consists of four strokes as shown in the figure above. Stroke means the motion from the top dead center of a piston to a bottom dead center. With four cycle engine, the change of state of the gas in a cylinder, movement of valves, etc. complete 1 cycle every four strokes, 2 times of up-and-down of a piston, i.e., two rotations of a crankshaft, and return to the first state. It is formally called four-stroke and one-cycle engine.

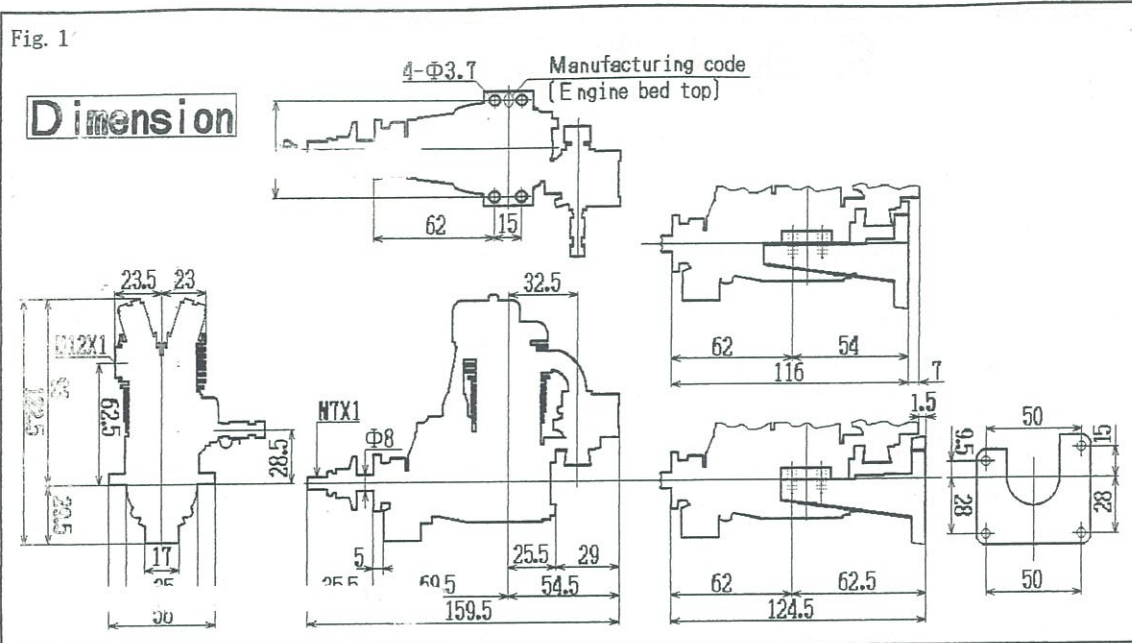


Features of FG-14/82

- ◎Cylinder: The cylinder head is integrated with the cylinder in order to prevent distortion, save weight and improve cooling effectiveness, etc. Hard chromium is plated in the cylinder without using liners for higher durability.
- ◎Piston: High-silicon-containing aluminum piston equipped with compression ring for higher performance.
- ◎Connecting rod: Robust with forged high-strength aluminum.
- ◎Crankshaft: Robust with forged chromium molybdenum steel and supported by two ball bearings
- ◎Cam gear: Placed in the front for compactification.
- ◎Cam: High output type, high cam specification
- ◎Combustion chamber: Volumetric efficiency and combustion efficiency are improved by adoption of a vent roof type combustion chamber.
- ◎Propeller nut: Double nut of drop-off preventing safety design.
- ◎Exhaust sound: Sound quality similar to the exhaust sound of the real machine. As calm as glowing
- ◎Carburetor: Self-designed and developed carburetor with a pump for small-size four cycle gasoline engine.
- ◎Ignition system: Exclusively for our four cycle gasoline engines using the battery type electronic ignition and the electronic spark advance system.
- ◎Spark plug: Small-size spark plug dedicated for our 4-cycle engine, of which screw size is the same as that of glow plug (UNEF1/4-32).
- ◎Fuel: With the same composite fuel as two cycles, handling is easy (20:1).

FG-14/82 major dimensional drawing, various data, etc.

Bore	29 Φmm	Stroke	20.4mm	Cylinder capacity	13.47cc	Airframe target	Four cycle 70 class
Engine main body weight (incl. spark plug & sensor)		Approx. 528g		Muffler weight		Approx. 57g	
Engine Mount weight (incl. Accessories)		Approx. 124g		Ignition main body weight		Approx. 145g	
Practical engine speed		Approx. 1,900~9,500 rpm		Max. ground-level engine speed		Approx. 9,000 rpm	
Propeller (Target)		13'' X8'', 14'' X6''		Static thrust (Target)		APC ⇒ 13'' X8'' -2.3kg, 14'' X6'' -3.2kg	
Fuel	Gasoline : Oil = 20 : 1 (Capacity ratio)			Fuel consumption (Target)			
Electrical usage of ignition system (recommended battery capacity)		Approx. 8cc / 1 min (Full throttle, Approx. 9,000rpm) Fuel consumption depends on the load of the propeller. Load is large. (Diameter & pitch is large.) ⇒ High, Load is small. ⇒ Low (During actual flight, fuel consumption worsens a little.)					
Approx. 13 mAh/rmin. (1000 mA or more)							
Accessories	Limit gauge for tappet adjustment [0.1T]: 1 pc Spanner for tappet adjustment: 1 pc Hexagonal wrench set (each one of 1.5, 2, 2.5): 1 set			Ignition system (with sensor attached): 1 set SAITOSPI Spark plug (attached): 1 pc Plug wrench: 1 pc Muffler set: 1 set Engine mount set: 1 set			



1. Propeller

Depending on the airframe, please adopt the standard size in the data and use a reliable product which is generally marketed. (APC is recommended.)

Please maintain sufficient balance with a balancer.

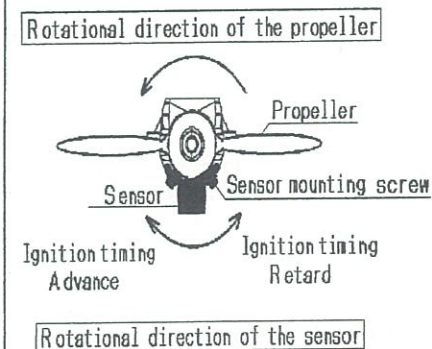
Since an imbalanced propeller is vibratory and dangerous with lowered performance, and a cracked or propeller is dangerous, please be sure to replace it with a brand-new.

※ In addition, at first use a propeller with the on-ground max. engine speed at 8,800 to 9,500 rpm (APC 13x8, 14x6) form the initial break-in to about 20 flights for the engine characteristics.

If it is successful, please replace with a larger load propeller.

If a high load propeller is used from the beginning, the cylinder, piston, piston ring, crankshaft, bearing, connecting rod, gear, etc. are easily worn away

Fig. 2



If a low-load propeller is used and the engine rotation is unstable, it may be stabilized by changing the ignition timing. Refer to Fig. 2 when moving the sensor.

2. Fuel

The fuel which is a mixture of commercial regular gasoline and reliable oil for two cycles (20 : 1) is used. (In addition, unleaded high-octane gasoline is not necessarily required for our engine.)

Example of oil → **POWER LUBE (KLOTZ ORIGINAL TECHNIPLATE) · KLOTZ GS RC model LUBE**
CASTROL POWER1 TTS Racing
Cool power HIGH PERFORMANCE SYNETIC MODEL ENGINE OIL

For the mixture ratio, please be sure to use "gasoline: oil = 20 : 1 or the mixture of which oil ratio is increased to 20:1 or higher

* Any damage caused by the fuel used, in which the oil ratio is lower than the gasoline-oil ratio 20:1, is not warranted.

Since gasoline is a dangerous material, be careful of its storage, use, and transport enough.

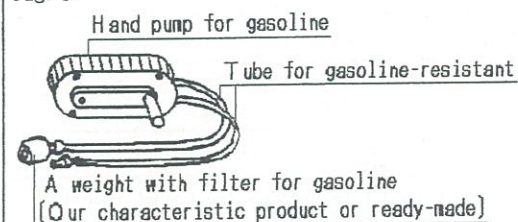
(The evaporative emission and exhaust smoke of gasoline have a harmful effect on the human body. Also, if gasoline is leaked, there is danger of a fire etc. Handling should be carefully performed. In addition, our company takes no responsibility for accidents, health damages, etc. which occur during storage, use, and transport of gasoline.)

3. Fuel filter and fuel pump

Since commercial gasoline has many impurities, please be sure to use a reliable filter for the admission port of the gasoline fuel pump or the spindle in the fuel tank. If an engine is used without using a filter, the performance of the carburetor is not delivered, resulting in failures.

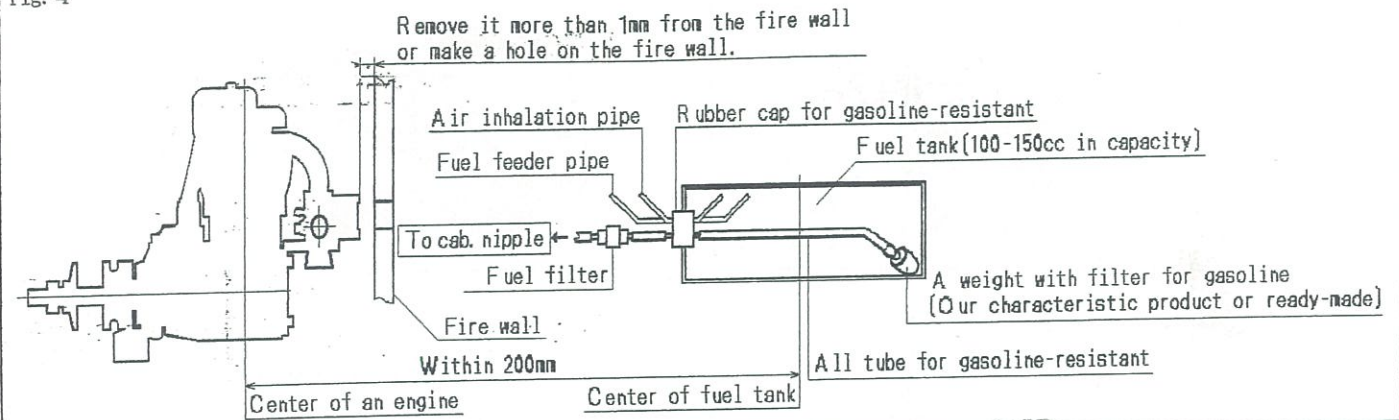
Our "fuel filter" and "filtered spindle" are recommended.

Fig. 3



4. Fuel tank and piping, Positional relation of fuel tanks

Fig. 4



For the capacity [about 100cc - 150cc (About 15 minutes of flight time)], refer to the data and select the best of commercial products.

Please be sure to use a spindle with a reliable filter for the fuel intake. Moreover, it is safer to use a fuel feeding pipe and an air intake pipe, as shown in the drawing.

Please be sure to use "gasoline-proof" products as the tank lid rubber, piping, and tubing. (These are available as an option)

Products for glow cannot be used. It is dangerous if a product for glow is used by mistake.

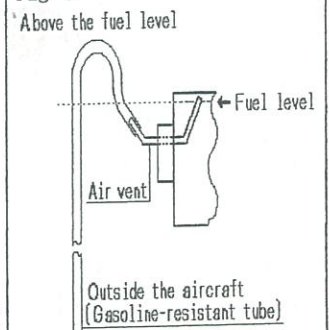
※ Please check well for any crack of the piping, tubing, connection, etc. Please replace, if there is a crack.

※ The tank is placed within the range of 200mm from the engine center to the tank center.

When performing an acrobat with a large change in oil level or that requiring an excessive movement of throttle, the tank must be placed at a position close to the engine as much as possible.

※ When attaching an extension tube to the air intake tube to extend it outside the aircraft, as shown in Fig. 5, raise the extension tube above the fuel level and then bring it down outside the aircraft to prevent fuel leaks.

Fig. 5



5. Ignition system

The ignition system is a dedicated system developed to be suited to the characteristics of our four cycle gasoline engine.

The battery type electronic ignition system and the electronic automatic spark advance method are adopted.

※ Explanation on the cord (Refer to the drawing Fig. 6).

- ① Plug cord (high tension cord) (meshed cord) and plug cap
The cord is inserted so that the engine spark plug may be covered. When inserting the plug cap into the spark plug, hold the plug cap and press it into the plug as shown in Fig. 7, then the grip is inserted into the hexagonal groove cut in the plug. It sounds a "click." Then check that the plug cap does not drop out when pulling it. If it does not drop out, the plug cap is securely inserted. When pulling out the plug cap, put your first finger and forefinger on the grips at both side of the clip, and extend the clip and pull out the plug cap.

- ② Sensor cord (black and white cord covered with a black tube)

It is connected with the cord from the sensor attached to the engine. Since the black harness has an orientation, please do not make a mistake.

- ③ Earth wire (green)

It is a green single wire to be connected with the engine-mounted screw. (In order to prevent spark noise, please connect firmly.)

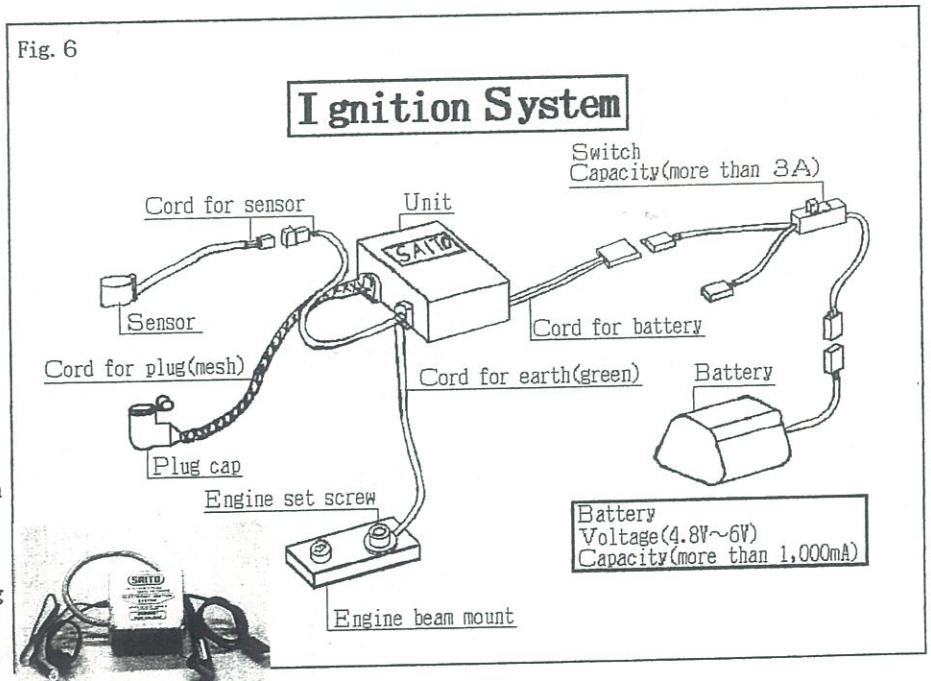
- ④ Battery cord (black and red cord covered with a black tube) (the harness is of FUTABA type)

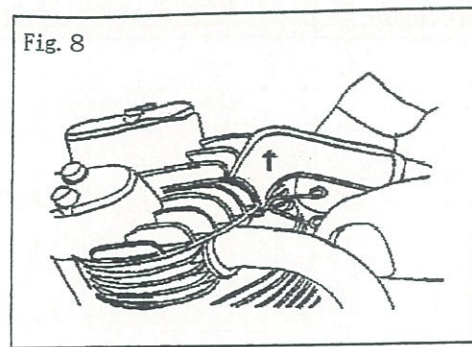
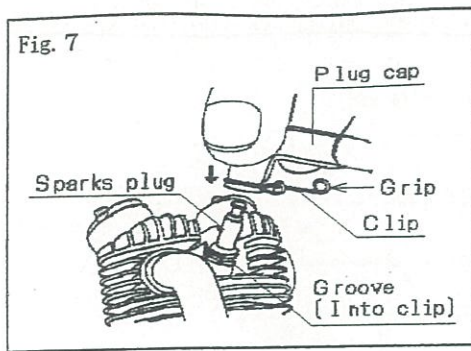
A commercial battery (more than 4.8 to 6V, 1000mA is recommended) is connected. In addition, this ignition system is an antinoise product, but please isolate it completely from the airframe operating receiver, the servo, and the battery or set apart to avoid mounting trouble.

Moreover, it is desirable to utilize a noise filter (line filter) etc.

※ Since high tension is generated, be careful of electrification enough.

Fig. 6





6. Spark plug (dedicated for our ignition system)

Small-size spark plug dedicated for our specially made four cycle gasoline engine is equipped to be standard.

Dimensions:

Hexagon width-across-flat \Rightarrow 8mm, Screw diameter \Rightarrow UNEF 1/4-32, Reach (with a washer) \Rightarrow 6mm, Spark-gap \Rightarrow 0.4~0.5mm

For replacement, please specify "SAITO SP-1".

Since our four cycle engine uses a mixed gasoline, please decide the numbers of flights by yourself and clean the spark plug. Please replace, when it is degraded. (consider the plug as consumable).

7. Carburetor

A carburetor with a pump developed exclusively for our small-size four cycle gasoline engine is mounted, alternative to the muffler pressure.

Since the carburetor with a pump introduces the air from the air hole shown in the next figure, set it 1mm or more apart from the firewall or drill a hole.

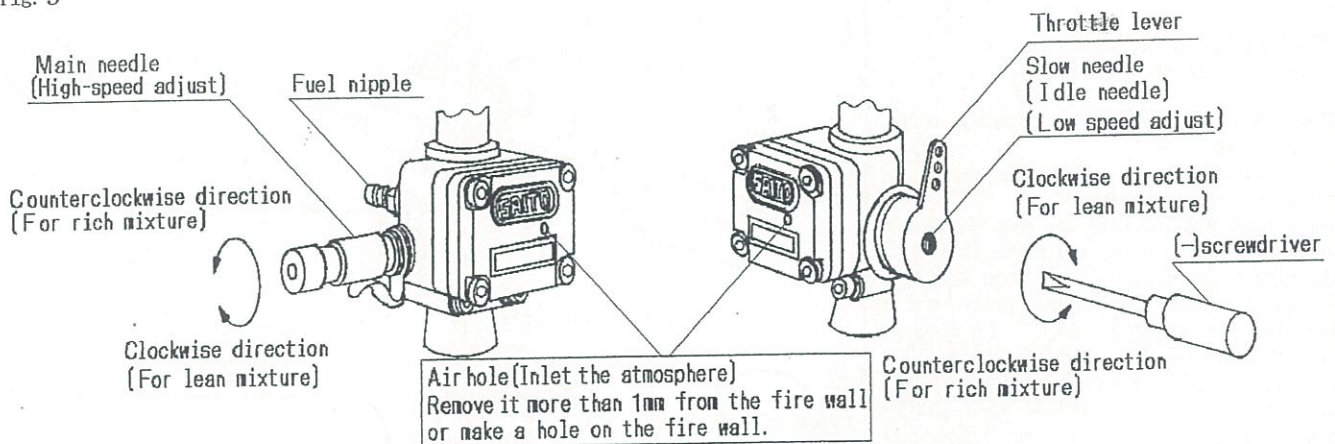
When adjusting the carburetor, refer to the figure.

※ Main needle: To adjust the speed at the time of full open of the throttle valve. When turning it in clockwise direction, the fuel will become leaner and the rotation speed will increase. When turning it in counterclockwise direction, the fuel will become richer and the rotation speed will decrease.

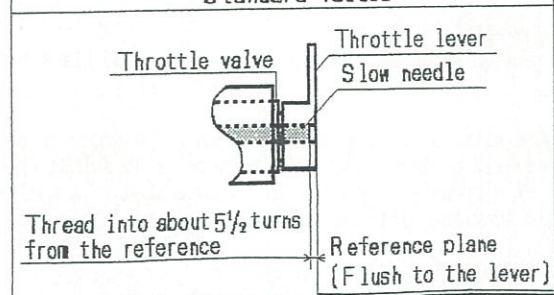
※ Slow needle: To adjust the speed from the idling to the middle speed. When turning it in clockwise direction, the fuel will become leaner and the rotation speed will increase. When turning it in counterclockwise direction, the fuel will become richer and the rotation speed will decrease.

Caution: The gasoline engine carburetor is elaborate and delicate. Please never disassemble it, not to mention purification of the gasoline to be used. If out of condition, please be sure to send it to our service.

Fig. 9



Standard values



8. Engine mounting and muffler attachment

Although FG-14 is normally mounted in an inverted position, it can be upright or side mounted. When mounting the engine, make sure to use the attached aluminum mount for better vibration absorption and heat radiation. (See Fig.1 for the mounting dimensions.) (As shown in the figure, two fire wall to drive flange distances long and short are available to choose from. Choose the distance appropriate for the aircraft. However, for the short distance, the fire wall should be machined to accommodate the rear of the carburetor.)

If a mount with an insufficient heat radiating capability or insufficient strength is used, the engine performance is reduced. A low load propeller, if used, should be sturdy. Otherwise, engine trouble may result. The fire wall to attach the engine mount to should be sturdy as well.

(A wall with insufficient strength may cause vibration, reducing the engine performance. Also, it can break, causing a hazard.) Apply a small amount of screw lock agent to the tip of the engine mount, M3.5 cap screws to prevent them from coming loose.

Modify the cowling to allow the cooling wind to pass through the engine and the muffler.

Insufficient cooling may cause engine trouble or the muffler to come loose. Make sure to allow sufficient fresh air into the carburetor to prevent hot air from remaining in the cowling and thereby the air-intake efficiency from dropping.

When mounting the muffler, screw the threaded end of the exhaust pipe into the engine exhaust port and the muffler as far as you can. Coat the thread with a screw lock agent to prevent the pipe from coming loose and thereby leaking.

9. Preparation before engine start (assuming break-in)

- ① Please mount the engine on a robust and parallelized test bench or on the airframe.
(In either case, the engine should be fixed and immobile.)
- ② Check whether the throttle valve becomes fully closed and fully opened certainly.
- ③ Check whether each wiring of the ignition system is connected certainly.
- ④ Use a 150-200cc tank for the test bench. In the case of the airframe, use the mounted tank.
- ⑤ For piping, only connect the carburetor with the tank.
- ⑥ For fuel, prepare a mixed gasoline with a capacity ratio of "gasoline: oil = 20 : 1."
(No problem will occur when the oil ratio is 20:1 or higher)
- ⑦ Prepare an APC13 "x8 or 14" x6 propeller (Approx. 8,800 - 9,500 rpm).
(At the break-in stage, please use a propeller with a load as light as possible).
- ⑧ Because starting with a starter is the basic operation, prepare a starter and the starter battery.
Because starting with a starter is the basic operation, also mount a spinner and the spinner nut.
- ※ In the case of starting for the second or subsequent time, the manual starting is possible; however, starting with a starter is the basic operation.

Note: Please tighten up once in about 10 flights. In particular, if a wooden propeller is used, compression can loosen the nuts.
Please tighten up carefully enough.

- ⑨ It is hard to know the peak condition of a four cycle engine unlike two cycle engines.
In order to prevent over throttling or overheating, it is recommendable to use a rotating meter.
- ⑩ Prepare a gasoline fuel pump. (Be sure to attach a filter to the admission port. It is available as an option.)
- ⑪ In order to check discharge of the breather, attach a heat-proof and gasoline-proof transparent tube.
- ⑫ Prepare a fine (-) driver for slow needle adjustment.

Warning: If an onlooker is in front, be sure to move the person behind. (Please keep clear of exhaust smoke for health)
Be careful of the propeller for one arm holding the airframe. When the engine starts, be sure to go behind to adjust the engine. If the airframe can be fixed, it is safe to make the assistant hold the airframe.
Since the airframe is large, pay enough attention to safety.

10. Method of starting the engine (using a starter)

The following procedure is based on the assumption of mounting the engine in the airframe. Moreover, the tank is filled up. (The switch of the ignition system must be turned ON, and turned OFF in normal times.)

- ① Turn ON SW of the transmitter first, then turn ON SW of the receiver, and check the operation of the throttle and others.
Then, position the throttle stick in full close.
- ② Open the main needle to 1 1/2 to 2 turns or so.
(As this value is not the peak value of the main needle, adjust it to the optimal value corresponding to the condition at the time of real flight)
- ③ Next, power on the ignition system.
- ④ Open the throttle valve about 1/4 from full close with the throttle stick.
(Start with the throttle over opened is dangerous because the airframe will jump out).
- ⑤ By revolving the propeller for about 5 seconds with the starter, it will start.

11. Break-in of engine

Since break-in is an important method of maximizing engine performance, please perform carefully.

※ The low speed needle of the carburetor is nearly set to the appropriate value. Therefore, break-in is performed only by adjustment of the main needle.

- ① After filling up the fuel tank, start the engine in the manner of Section 10 and operate it at a low speed in the condition for about 3~5 seconds.

- ② Next, in the condition of ①, fully opening the throttle valve, turn back the main needle to make the air-fuel mixture very rich in the range where the engine does not stall (5,000 rpm or less). Operate in the condition with 2 (or more) tanks. [Conduct this step checking the density of the exhaust and the breather' waste oil (inky-black waste oil)].
- ③ Next, after filling up the tank, re-start the engine. With the throttle valve fully opened, throttle the main needle and operate the engine for one tank at 7500 ~ 8,000 rpm.
- ④ Next, after filling up the tank, re-start the engine. With the throttle valve fully opened, operate with the main needle several times from the rich state to the peaks. When the peak become stable, use the throttle valve responding to low speed to high speed, and elongate the time of high-speed operation. Conduct this operation for one tank.
- ⑤ When the revolution is stabilized at peak, the ground-level break-in is completed. After adjusting the tappet gap in the manner of Section 14(⑥), adjust the carburetor according to the following section. The running-in is completed by performing some 20 flights in a little loose way. Subsequently, however, the flight should be performed in such a loose way as not to influence the flight.

Caution for flight: At first, select a distance to enable to return to the airfield in the case of an engine failure, face the wind and take a high altitude.
If flight is performed at a low altitude from the beginning, the airframe may be broken during an emergency landing due to an engine trouble.

1 2. Adjustment of carburetor (The method of adjustment is the same as that for our glow engine)

- * The low speed needle is set so that idling rotation may be 1900rpm to 2100rpm at the time of shipment. However, since it may vary depending on the condition at the time of operation, adjust it so as to meet the operating condition.
(For the slow needle's reference value, refer to the figure in the section for carburetor).

In principle, a carburetor is adjusted by first achieving peak (the highest revolution) with the main needle valve and then performing idling (low speed revolution) with the throttle valve and the low speed needle valve.
(Unless the peak is certainly achieved, idling adjustment will be difficult and not stabilized.)

- ① After filling up the fuel tank, start the engine following the procedure in Section 10 "Starting the engine."
Then, turn the engine with a high fuel air ratio for about one minute.
 - ② Fully open the throttle valve using the throttle stick. Then, slowly open the main needle valve to get the maximum engine power by watching the tachometer and listening to the exhaust sound.
- * As for adjusting the main needle in the case of actual flight, If the air frame can be stood perpendicularly with a propeller in the upward direction, since the peak is not set so severely when the air frame is turned horizontally, the air frame can be kept in the state close to that at the time of flight, if the peak can be surely achieved,

Warning: Over closing the main needle valve is very dangerous because it may cause knocking and propeller nut loosening.
Immediately, turn the main needle valve counterclockwise to loosen it a little.

- ③ Next, close the throttle valve until the engine operates stably with an idling rotation of around 1,900~2,100rpm, and adjust the low speed needle valve with the carburetor adjustment bar and the opening of the throttle valve with the throttle stick carefully.
- * Since the thickness level of the air-fuel mixture varies corresponding to the nature of the airframe, please adjust it depending on the user's skill. Generally, in a scale flight in which the stability of a low-speed zone is considered as important and the engine is started slowly, adjust the air-fuel mixture to be relatively lean.
In an acrobatic flight in which the early standup from a low speed is considered as important, adjust the air-fuel mixture to be slightly rich.
- ④ After the idling is determined, get the throttle valve slowly fully opened. If the revolution becomes slow or goes up suddenly, adjust carefully until it changes linearly from idling to peak, by fine-tuning with the low speed needle valve.
 - ⑤ After the above-mentioned adjustment is completed, perform the process from idling to peak quickly.
If the revolution does not achieve peak but get delayed as the throttle valve is fully opened, fine-tune the main needle valve and perform the process from idling to peak quickly. Repeat this carefully until the response improves.
- * Giving a leeway to the engine without eventually affecting the flight is a knack to increase the engine life.
Adjustment is needed depending on the engine attachment direction, the propeller, the fuel, the plug, the climate condition, etc.
During the flight, please fine-tune so that low speed, medium speed, and high speed match best with the airframe.

1 3. Noise check (required)

A gasoline engine generates a noise which has an adverse effect on RC adjustment unlike a glow engine.
Please be sure to carry out a noise check each time before the flight after engine start.
Since a noise which occurs during flight may lead to a large-scale accident, please carry out a noise check without fail.
As a simple noise check, after engine start, remove the antenna of the transmitter and operate it about 50m away from the airframe. If there is no malfunction, it is normal.
Moreover, it is preferable to obtain advice from an expert of gasoline units.

1 4. Normal operation, maintenance, and additional information

- ① When starting the engine, warm it up for 30 seconds to one minute with a high fuel air ratio. Before stopping the engine, turn the engine at a low speed for about one minute in the idling mode. When stopping the engine after the last flight of the day, turn the engine at a low speed, and then cut the fuel supply to the engine to prevent fuel from remaining in the carburetor.
[A gasoline oil mixture with a ratio of 20:1 is used as fuel. Therefore, if the exhaust valve does not move smoothly due to carbon or oil attached to it, which can often occur at low outdoor temperatures, turn the starter with the ignition switch off to dilute the oil content with fuel, and then remove the fuel from the carburetor and the engine. The exhaust valve will move very smoothly.]
After the end of the day's flight, make sure to remove fuel from the tank and keep it.
(When the exhaust valve does not smoothly, remove the locker cover and spray a rust inhibitor for the smooth movement of the valve.)

- ② Please charge the battery of the ignition system and RC device enough.
(Since an ignition system generates high tension, please be careful of electrification.)
- ③ For discharge of the waste oil (breather), connect a heat-proof and gasoline-proof tube to the breather nipple to eject the waste oil, or diffuse it together with exhaust.
- ④ Lubrication for piston, connecting rod, bearing or cam gear is a blow-by lubrication in which the oil in the fuel goes into the crankcase from the clearance between the cylinder and the piston. Therefore, the engine life is affected by the property of the fuel oil. Please use reliable oil.
- ⑤ Since over closing the main needle valve causes overheating, adjust a little more loosely than peak.
(Closing leads to knocking or engine failure and has an adverse effect on the connecting rod and the cam gear.)
The case where the airframe achieves peak completely at the time of ascent is a proper peak of the engine during flight.

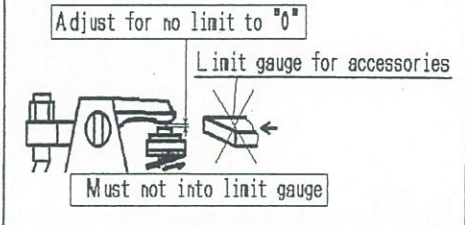
- ⑥ Adjustment of tappet gap (see the drawing Fig.10)
When the break-in on the ground is completed, adjust the tappet gap (valve clearance).
(Subsequently, determine the frequency of flight or the hour of use on one's own and adjust the tappet gap periodically.)

Adjustment of the tappet gap is performed when the engine has got cold.

How to adjust: remove the plug and the locker arm cover and revolve the propeller slowly in the direction of positive rotation by hand. The intake side rocker arm stops, and by turning it, the piston achieve the compression top dead center.

In that position, adjust with the attached spanner and hexagonal wrench so that it may be set to almost zero in the presence of compression. After the gap is checked, tighten the lock nut securely. (Don't tighten too strongly.)

Fig. 10



- ※ A little clearance is given supposing the elongation of the valve in the case of the engine of a real vehicle.
In the case of our engine, however, during operation, the cylinder (aluminum die casting) elongates more than the valve, and the clearance is larger. Therefore, in cold condition, it is necessary to bring the clearance close to zero.

Subsequently, sometimes inspect it in the above-mentioned procedure, and, if the attached gage (a limit gauge with 0.1mm of thickness) can enter, the clearance is the maximum, needing adjustment.

The tappet gap is the most important factor in the maintenance of four cycle engines, and operation with an excessive clearance will degrade performance. In particular, a large gap aggravates abrasion of the tappet and the cam and also increases the unusual sound.

- ⑦ When attaching an exhaust pipe to the cylinder or attaching a propeller nut, please apply some screw lock agent etc. thinly to the thread part and then screw them in. Such an agent is effective against looseness and leakage.
- ⑧ A propeller nut, an exhaust nut, etc. should sometimes be tightened up (when hot).
- ⑨ See to it that the storage of the battery and the fuel cause no accident.
- ⑩ If the engine is not operated for a long period of time, remove the plug, the rear cover, the cylinder-head cover, etc., and wash them with alcohol enough. Then, after lubricating them, assemble them in the original condition with a plastic bag on.
- ⑪ Please take great care so that neither noise nor exhaust trouble others and pay enough attention to safety.
- ⑫ Although it is the engine for model airplanes, you cannot treat it like a toy. Please handle it carefully.

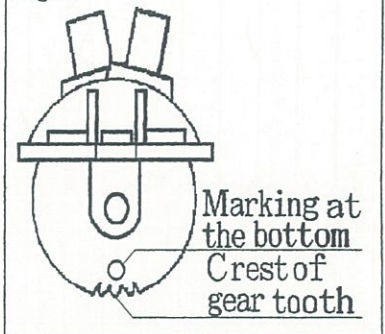
15. Cautions on disassembling and assembling the engine

It is not recommendable to disassemble or assemble the engine, however, if you try it, please conduct the work carefully paying attention to the following points.

In addition, never disassemble the carburetor and ignition system.

- ① When disassembling, check the direction of every part, put a match mark for each part in your own way (using a felt pen), and proceed the work in good order. In addition, every part must be cleaned up.
Particularly, pay attention to valve's timing, valve's inlet and exhaust, piston direction, con rod direction, etc.
- ② Loosen cylinder screws at opposite sides in about 3 times, not loosening one screw at once.
(loosing a screw at once may cause the distortion.)
- ③ Perform the assembling work in the way reversal to disassembling work. At this time, apply oil at the tip of screws and tighten them...
(Note that if screws are tightened in the dry state, female screws may be easily damaged.
Screws are also required to be lubricated.)
- ④ For cam gear, put a match mark at right under (keeping a gear tooth at the crest), and match the top dead center of the crankshaft (The gear tooth on the extension of the crank pin must be kept at the root position). (see the drawing Fig.11)
- ⑤ For the best result, mount piston, con rod, locker arm, pins, bush rod, tappet, etc. at their original position. (A pressure mark is provided for each common part.)
At the time of assembling, apply oil on each part, and assemble the engine in good order, checking each match mark and direction, not tightening too much.

Fig. 11



Three principles of disassembly

- 1) Put a match mark on every part
- 2) Do not make a mistake in a direction
- 3) Loosen screws at opposite sides evenly

Three principles of assembly

- 1) Clean up every part
- 2) Apply oil on every part
- 3) Tighten screws at opposite sides evenly (do not tighten too much)

All specifications and models are subject to change without notice.

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SAITO FG-14 Parts List

NO	Description	Q'ty	NO	Description	Q'ty
01	Cylinder	1	46	Valve set (In & Ex)	1set
06	Piston	1		46-1, 46-2	
07	Piston pin	1	47	Valve spring & Keeper & Retainer	2ea.
08	Piston pin retainer	2		47-1, 47-2, 48	
09	Piston ring	1	48	Valve retainer (Cotter)	2
10	Connecting rod	1	49	Rocker arm cover	2
14	Cylinder screw set	1set	69	Intake manifold (Intake pipe)	1
	14-1, 14-2		74	Muffler	1
15	Crankcase	1	75	Muffler manifold set (75-1, 80)	1set
17	Rear cover	1	80	Muffler nut	2
19	Breather nipple	1	82-1	Carburetor complete	1set
20	Front bearing	1	83-1	Carburetor body assembly	1set
22	Rear bearing	1		32-5, 91-1, 82-1-1, 82-1-2, 82-1-3 82-1-4, 82-1-7, 82-1-8, 82-1-13 82-1-14, 82-1-15, 82-1-27, 82-1-28	
23	Crankshaft	1	85	Full throttle needle	1
27	Taper collet & Drive flange	1ea.		85, 90-1	
	27-1, 27-2		87	Throttle barrel assembly	1set
28	Prop washer & Nut	1ea.		82-1-5, 82-1-9, 88B, 89, 90-1	
31	Crankcase screw set	1set	88B	Throttle lever	1
	31-1, 31-2, 31-3			88B, 90-1	
32	Engine gasket set	1set	89	Idle needle	1
	32-1, 32-2, 32-3, 32-4, 32-5, 32-6, 32-8		90	Carburetor screw & spring set	1set
33	Cam gear housing	1		82-1-7, 82-1-8, 82-1-13, 82-1-16 82-1-17, 82-1-26, 82-1-28, 90-1	
35	Cam gear	1	91	Carburetor gasket set	1set
36A	Cam gear shaft	1		32-4, 32-5, 32-6, 82-1-9, 82-1-14 82-1-18, 82-1-20, 82-1-22, 91-1	
37	Steel washer set	1set	95	Mount set	1set
38	Tappet	2		95-1, 95-2, 95-3, 95-4, 95-5, 95-6	
39	Pushrod	2	110	Anti loosening nut	1
40	Pushrod cover & Rubber seal	2ea.	152	Screw-pin (For drive flange setting)	1
	40-1, 40-2, 40-3		153	Electronic ignition system	1set
41	Rocker arm	2		153-1, 153-2, 153-3, 153-4	
42	Rocker arm screw & Nut	2ea.	160	Pump assembly	1set
	42-1, 42-2			82-1-17, 82-1-18, 82-1-19, 82-1-20 82-1-21, 82-1-22, 82-1-23, 82-1-24 82-1-25, 82-1-26	
43	Rocker arm pin	2			

