



SAITO FG-33R3

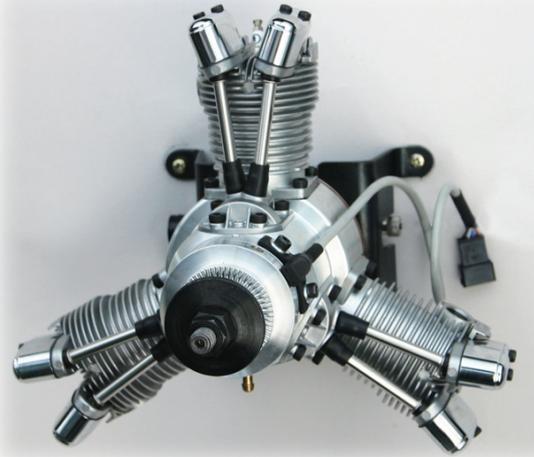
4-Stroke Gasoline radial Engine Operating instructions

Thanks for buying SAITO FG-33R3 4-stroke gas-engine exclusively for model airplanes.

In order to avoid misuse, please be sure to read well this instruction manual carefully. 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 manual 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-33R3 is the gas-version of existing glow FA-200R3. This new designed gas-engine is a figure of integration of many experiences on our radial engines and gas-engines. Additional designs concentrate on durability and high power brought it powerful and beautiful radial sound.

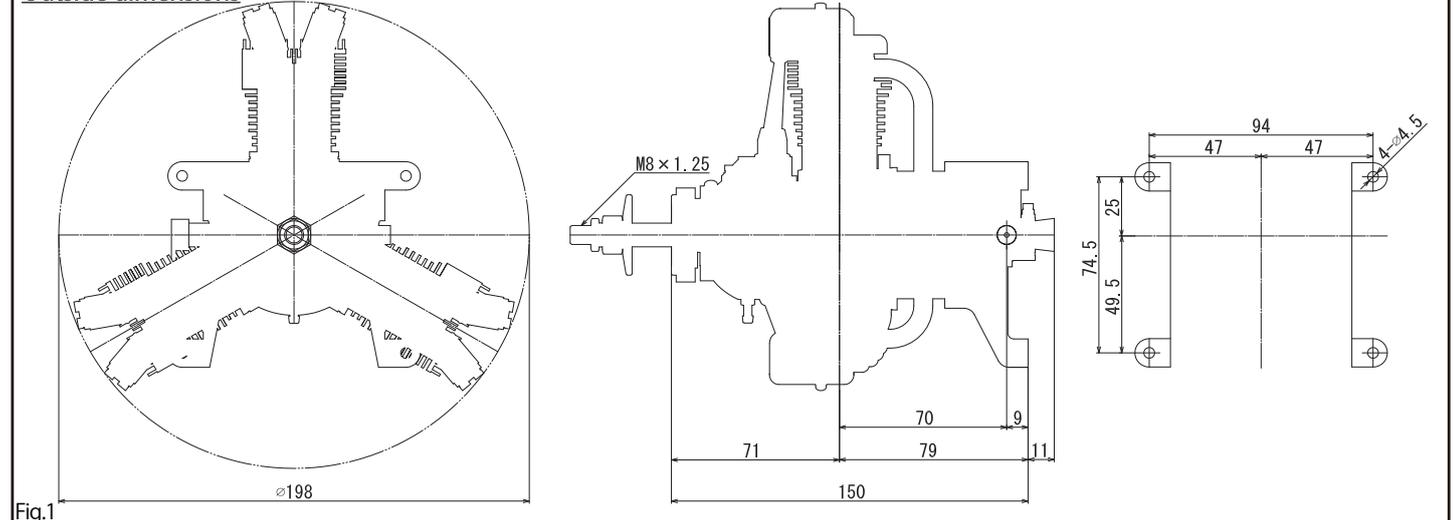
Notification about treatment of 4-stroke model gas-engine

- ◎ Since valve timing is designed to get high power and high speed, the overlap range is relatively wide. So sometimes fuel get flown back from the carburetor. (It may spatter in the engine room.)
- ◎ Since the oil for lubrication is mixed in the fuel, waste oil from the breather nipple is dirty. Depending on treatment of waste oil, it can be spattered on the plane.
- ◎ Since lubrication is through breather, sometimes the oil oozes from each joint or commissure however it's no problem on performance.
- ◎ Depending on the quality of the oil, sometimes there can be rust inside the crankcase. But it's no problem on performance as long as there are no abnormal noise or backlash.
- ◎ During operation, the screws all over the engine can be loosen by heat expansion of metal. So please tighten up them occasionally.

Specifications

Bore	Ø27.0mm x 3	Stroke	19.2mm x 3	Disp.	32.98cc
Weight	Body: 1,440g / Mufflers: 90g / Ignition system: 200g				
Practical speed	Approx. 1,700-9,500rpm	Max on GND	Approx. 8,000-9,000rpm		
Propeller	D16" x P8" ~D18" x P6"	Static thrust	Approx. 4~4.5kgf (Depend on prop)		
Fuel	Regular gasoline : Oil = 20:1 (Volume ratio)		Applications	2st Gas-engine 20~30cc class	
Fuel consumption	Approx. 25cc/min (At full throttle 9,000rpm) *Fuel flow varies depends upon prop load. More fuel flow with larger load and less fuel flow with smaller load.				
Battery for ignition system	Voltage: 6-9V higher than 1,000mA is recommended				
Standard accessories	Limit gauge (0.1t) for tappet adjustment	1pc	Spanner for tappet adjusting lock nut	1pc	
	Plug wrench	1pc	Hexagonal wrench 1.5mm	1pc	
	Spark plug [SAITO SP-1] (Attached to engine)	3pcs	Ignition system (w/ sensor)	1set	
	Muffler set (3 Flexible mufflers & Bracket)	1set			

Outside dimensions



1. Propeller

Standard spec is APC D17" x P8" which brings approx. 8400rpm. Depending on the airframe, please adopt the adequate size in the range of 8,200~9,500rpm from reliable products generally on the market. Since an imbalanced prop is vibratory and dangerous with lowered performance, please maintain balance with a balancer. Moreover, a cracked prop is dangerous. Make sure to check any time and replace it with a new one if it's cracked.

*Tighten up the prop nut once in about every 10 flights. Especially a wooden prop tends to compressed so take care of its looseness.

2. Fuel

The fuel is mixture of commercial regular gasoline and reliable oil for 2-stroke. (Unleaded high-octane gasoline is not necessarily required for SAITO engine.)

[Example of oil]

- POWER LUBE (KLOTZ ORIGINAL TECHNIPLATE)
- KLOTZ GS RC model LUBE
- CASTROL POWER1 TTS Racing, etc.

For the mixture ratio, please be sure to use "gasoline : oil = 15~20 : 1" or richer by volume ratio.

(ex. 1000ml of gasoline should be mixed with more than 50ml of oil).

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

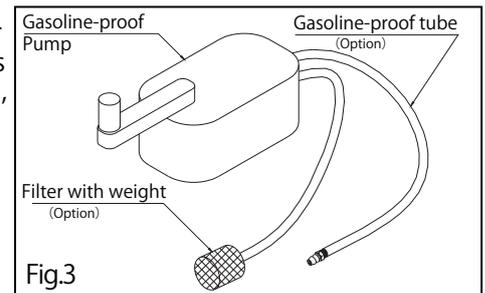
Since gasoline is dangerous material, be careful of its storage, use, and transport enough. (The evaporative emission and exhaust smoke of gasoline have a harmful effect on a human body. Also, if gasoline is leaked, there is danger of fire etc.)

Please note that we take 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-proof fuel pump (Fig.3), and in the fuel tank as well (Fig.4). Without using a filter, the performance of the carburetor is not delivered, resulting in failures.

Using optional part "Filter with weight" is highly recommended.



4. Fuel tank and piping

Use the gasoline proof tank which has adequate capacity (Approx. "Fuel consumption x Flight duration + 100~200cc).

Please be sure to use a filter with weight. To avoid entrain any impurities to the carb, piping with "Fuel feeding pipe" and "Air inhalation pipe" (Fig.5) is recommended.

*Please be sure to use "gasoline-proof" products for the tank, lid rubber, piping, and tubing. Some of the products for glow fuel can't be used for gasoline.

*Please check carefully if there're any crack on the piping, tubing, connection, and tank. All of the connection parts should be bound by thin Nylon strap or wire to avoid fuel leakage or air induction to the fuel line. (If there are any leakages, the performance of the engine decreases dramatically.)

*The carburetor has a pump but its pumping pressure is not so strong. So place the tank close to the engine as much as possible. And set the fuel level slightly lower than the center of the carb.

*When provide "Air inhalation pipe" as Fig.5, arranging the tube above the fuel level is the effective way of fuel leakage prevention.

*The carburetor comes out from the back of the firewall. Sometimes fuel get flown back from carburetor and may spatter inside the firewall. For that case, make sure to cover the batteries, R/C equipment and all the foam members with gasoline-proof material.

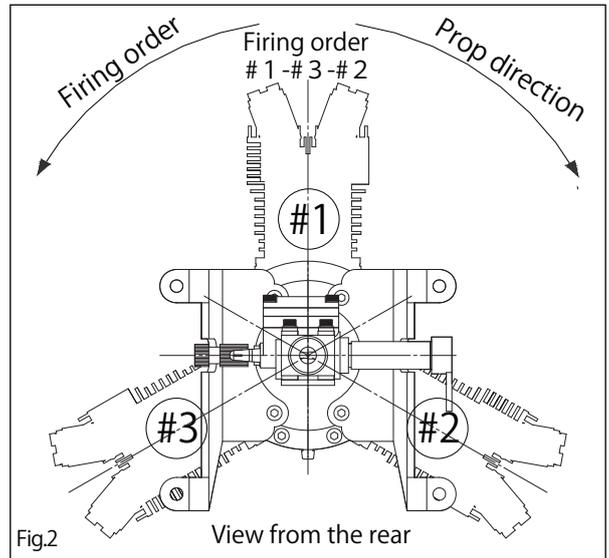


Fig.2

View from the rear

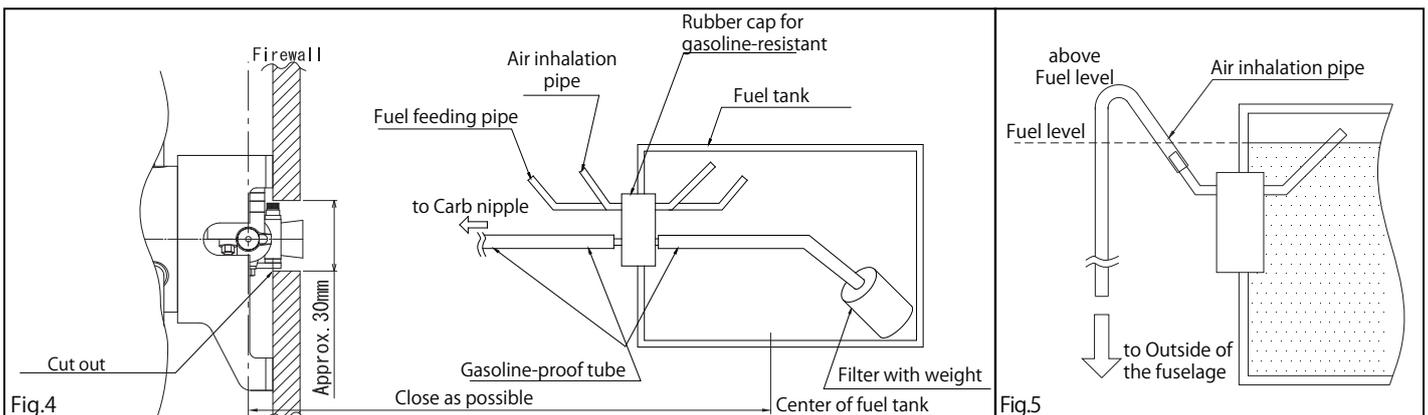


Fig.4

Fig.5

5. Ignition system

*Be careful of possibility of electrical shock as it generates high voltage.

*The unit includes a plastic clip to hold the connectors and spiral tube to protect each wire.

The ignition system is designed to match SAITO 4-stroke gas-engines with automatic advancing system.

However this ignition system is designed to be an anti-noise product, please isolate it completely from the receiver, servo, and battery to avoid a radio-interference trouble. Moreover, it is desirable to utilize a noise filter (line filter). Especially, each switch (for Ignition and for Receiver) should be isolated and set far from each ones.

Caution: A gas-engine generates a noise which has an adverse effect on RC adjustment. Please be sure to carry out a noise check each time while the engine is running before flight. 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 method, after starting engine you can check by removing the antenna of the transmitter and operate it about 50m away from the airplane. If there is no malfunction, it is normal.

The function of each cord;

(1) Plug cord (meshed high tension cord)

As Fig.6 shows there are three cords available for three cylinders. Make sure to attach each number described on the main unit to the cylinder. (Refer to Fig.2 regarding cylinder number). When you put on the plug cap, insert deep into the plug to avoid coming off during flight. And then pull the plug cap to confirm that it won't come off.

(2) Sensor cord (Gray cord with exclusive connector)

Connect with the cord from the sensor attached to the engine.

(3) Battery cord (black/red cord)

Please use the fully charged battery that has adequate spec. (6-9V, more than 1000mA is recommended.). Between the battery and main unit, make sure to set an ignition switch whose capacity is higher than 3A.

(4) Tachometer cord (black/red/white cord)

Connect the digital tachometer (Option). Otherwise the connector is normally vacant.

6. Spark plug

SAITO SP-1 spark plug is the standard equipment.

Dimensions are as follows;

Hexagon width: 8mm

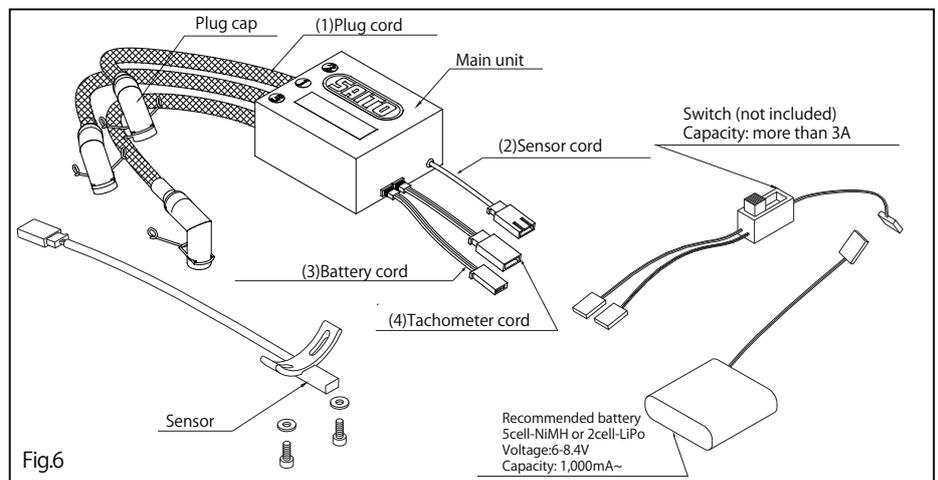
Screw size : UNEF1/4-32mm

Reach : 5.5mm

Spark-gap : 0.4-0.5mm

For replacement, please replace with SAITO SP-1.

Since SAITO 4-stroke engine uses mixed gasoline, please decide the numbers of flights by yourself to 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, instead of using muffler pressure.

Since the carburetor with a pump introduces the air from the air hole, cut out the hole on the firewall as adequate size.

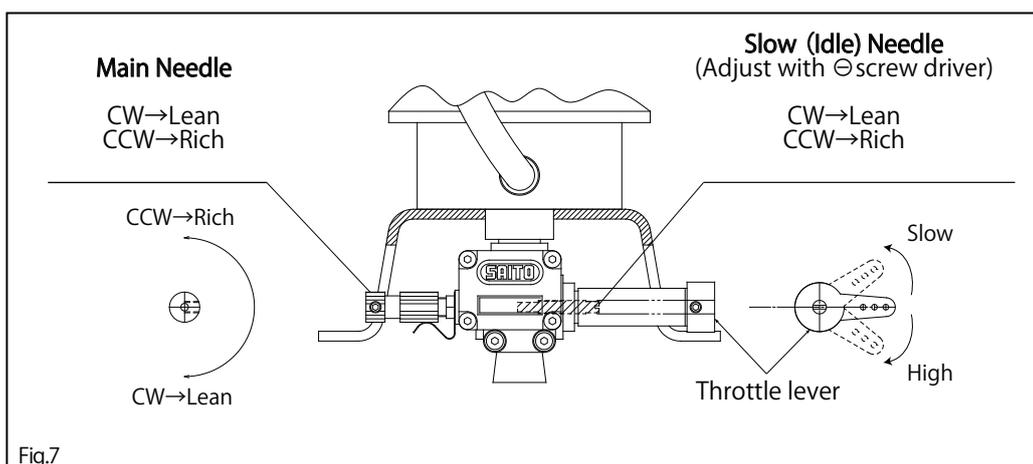
When adjust the carburetor, refer to Fig.7

Main needle: To adjust the speed at the time of full open of the throttle valve.

Slow needle: To adjust the speed from the idling to the middle speed.

Turning each needle in clockwise direction, the fuel will become leaner and the rotation speed will increase. Turning it in counterclockwise direction, the fuel will become richer and the rotation speed will decrease.

Note: The carburetor for the gasoline engine is the assembly of very strict and delicate parts. So please make sure to use filtered gasoline. Moreover, DO NOT disassemble by yourself. If there're any troubles regarding carb, please consult the shop from which you bought the engine.



Standard value for the needles

For Main needle:
1+1/4~1+1/2 turn open
from full close

For Slow needle:
Approx. 8 turn open from
full close
(Then throttle valve should be
fully closed)

Actually the best condition of the
needles varies depending on the
prop, temperature, humidity and
so on.

Please adjust seeing the engine
performance during flight.

8. Engine mounting, muffler attachment, and breather waste disposal

As the carb comes out from back of the firewall, cut out the firewall as adequate size. Make the firewall robust enough because this part has to endure vibration and torque caused by prop rotation. Especially with a low load prop, engine tend to generate large vibration that is very dangerous.

It is preferable to apply some adhesives (such as screw lock) on the tip of each cap screw to avoid looseness when you install the engine.

To ensure that cooling wind passes through the engine, the cowling should be devised. Also make the air flow outlet larger than the inlet.

Building some baffles inside the cowling to flow the cool air through the surface of the engine effectively that is highly recommended. Insufficient cooling may cause engine trouble such as overheat, percolation, or muffler looseness.

The mufflers should be securely inserted deeply into the adopter and tightened up using spanners. (Adhesives, such as a screw lock agent, are effective against looseness and leakage.) Make sure to fix the outlet of the flexible mufflers outside of the cowling using the bracket included.

For breather treatment, attach the gasoline proof tube to the breather nipple and fix the other side of the tube on outside of the cowling. Fix a thin aluminum pipe to the outlet of the tube and bind it to the muffler outlet to diffuse the hot air together with exhaust gas into the air.

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

- (1) Mount the engine on a robust and parallelized test bench or on the fuselage. (Either way, the engine should be fixed and immobile.)
- (2) Check whether the throttle valve becomes fully closed and opened certainly.
- (3) Check whether each code of the ignition system is connected certainly.
- (4) Use about 1000cc tank for the test bench, or a tank which has appropriate capacity for the fuselage.
- (5) For piping, only connecting the carburetor with the tank is needed. (Make sure there's no leakage at all the connections.) In order to check discharge of the breather, attach a heat-proof and gasoline-proof transparent tube to the breather nipple.
- (6) For fuel, prepare a mixed gasoline with a volume ratio of "gasoline : oil" = "15~20 : 1".
- (7) Prepare a well balanced 17"x 8" prop (APC is recommended). As it should be started with a electric starter, the prop can be attached as you prefer.
- (8) To start with an electric starter, attach a spinner to the end of the shaft.
- (9) As it is difficult to judge clearly the peak condition of 4-stroke engines, prepare a tachometer to prevent over-throttling or overheat. You can also use digital tachometer (Option).
- (10) Prepare a fuel pump for gasoline. (Be sure to attach a filter to the intake port. It is available as an option.)

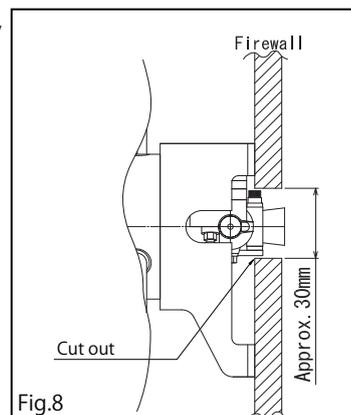


Fig.8

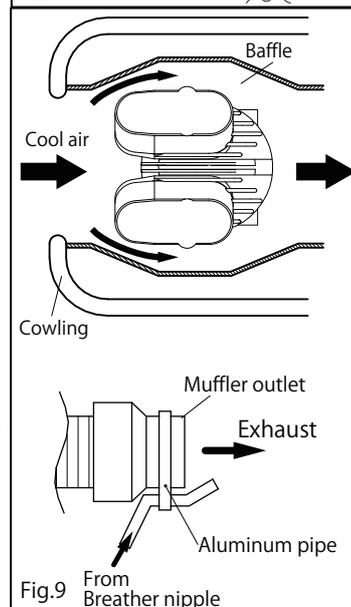


Fig.9

Caution: If there's anyone stand in front of the engine, be sure to have them move behind the airplane before starting the engine. Also keep in mind that the exhaust smoke is harmful for health. Keep away one of your arm holding the airplane away from the prop. Once the engine starts, move behind the airplane. Make needle adjustment or other control from rear. If the airplane cannot be fixed, ask your assistant to hold the airplane for safety.

10. Method of starting the engine

The following is the procedure with the engine mounted on the airplane. Fill up the tank with fuel. (Be sure to turn off the switch of the ignition system until just before trying to start up the engine.)

- (1) After confirm that the throttle stick is located at the full-close position, turn on the transmitter switch. Then turn on the receiver switch to check throttle valve and other operation. After that, fully close the throttle valve.
- (2) Power on the ignition system.
- (3) Open the throttle valve about 1/4 from the full close position by using the throttle stick. (Starting with excessively opened throttle is dangerous since the airplane jumps forward.)
- (4) Apply the starter to the prop and activate for about 5 seconds to start the engine.

11. Break-in

As Break-in is an important procedure to pull out the maximum performance of the engine, it must be cautiously done. The purpose of break-in is initial lubrication and adjusting of the mobile parts under the condition with rich fuel mixture. Never make the fuel mixture lean. Lean fuel mixture could cause seizure even during idling or low speed running. There's no need to adjust the slow needle at this step as it's already set adequately, so you will adjust only the main needle during break-in.

Procedure;

- (1) After filling up the fuel tank, start the engine as described in the above Chapter 10 and run it for 10 sec in low speed.
- (2) Opening the main needle gradually and open the throttle valve to full open. If rich air-fuel mixture can't be obtained, open the main needle additionally. Then continue running for 2 tanks. During this initial operation, contact of each part inside the engine will be matched. So make the fuel mixture rich as much as the engine doesn't stop. Do not care about running smoothness at this step.
- (3) Refill the tank and run the engine at full throttle for 1 tank.
- (4) Refill the tank and run the engine. Open the throttle full and turn the main needle to achieve peak and less speed (richer) alternately about 5 times. And then maintain the peak condition long gradually. When it gets stable, then operate the throttle stick to vary slow speed to high speed several times to check the response. After that run it for 1 tank keeping high speed. When it comes to run smoothly at peak, break-in on the ground is completed.
- (5) Then tighten up the whole screws and adjust the tappet gap referring to the next chapter. After that, fly it for about 20 times in rich condition to finish break-in in the air. Also after break-in, please run the engine in rich condition as long as it doesn't affect to the flight.

Note: During early stage of flights, take the height high enough to land safely in case the engine stop in the air suddenly. It will reduce the risk of crash or landing accident.

12. Adjustment of carburetor

Before adjustment, please set both needles as the standard values.

In principle, the carburetor should first achieve peak by adjusting the main needle. Then performing idling with the throttle valve and the slow needle. (Unless the peak is certainly achieved, idle adjustment will be difficult and not stabilized.)

- (1) After filling up the fuel tank, start the engine as described in Chapter 10 and run it for 1 minutes in rich condition. Then fully open the throttle valve with the throttle stick.
- (2) By turning the main needle observing tachometer and exhaust sound, achieve peak carefully.

Caution: Too much throttling the main needle is very dangerous because it might cause knocking and the prop nut might be came off. Once you notice abnormal vibration or sound during throttling the main needle, just return to open the needle immediately.

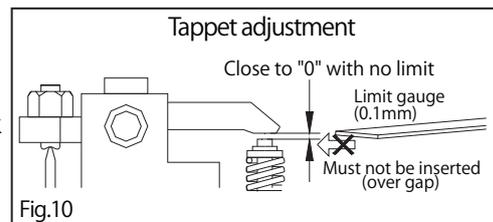
- (3) Next, close the throttle valve until the engine runs stably with an idling rotation around 1,800rpm by adjusting the slow needle with a (-) screw driver carefully. (During flight, it's rather stable with slightly high adjusted at idling.)
 - *The best richness of the air-fuel mixture at slow speed is depend on the flight style. Generally, Scale flight requires stability in low speed so slightly lean condition is preferable. On the other hand Acrobatic flight requires quick response from low through high, so slightly rich condition is preferable.
- (4) Once the idling is set, get the throttle valve fully opened gradually. If the revolution becomes slow or goes up suddenly, adjust the slow needle carefully until rpm raises linearly from idling to peak by fine-tuning.
- (5) After adjustment of (4) is completed, perform the process from idling to peak quickly. If revolution gets delayed to achieve peak even if the throttle valve is fully opened, fine-tune the main needle and perform the same process. Repeat this fine-tune and response check carefully until the response improves.
 - *Tip for adjustment of the slow needle is to make lean as possible as the engine don't get stole when open the throttle valve quickly. At the same time, since a gas-engine has narrow range of air-fuel ratio, adjustment of the needles is stricter than a glow-engine. And both needles are interfered slightly from each other so confirm the balance of peak and response after adjustment.
 - *To keep the engine life longer, adjust the fuel mixture as rich as possible in the range it doesn't affect to the running. Carb adjustment is affected by many factors such as prop, flight style, atmosphere (humidity, temperature, ...) ,oil, plug, fuel, and so on. Please keep trying to find the best condition to match your plane.

13. Normal operation, maintenance, and additional information

- (1) Just after start up the engine, perform warm up running in rich condition for about 1 minute, and just before stop run it at idling for 1 minute to cool down as well. When stop the engine after the final flight of the day, be sure to stop by cutting the fuel to remove fuel from the carburetor. And remove the fuel from the tank and reserve it with special care.
- (2) Charge the battery for the ignition system and RC device fully. (Since the ignition system generates high tension, be careful of electrical shock.)
- (3) 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 piston. Therefore the engine life is affected by the property of the fuel oil. Please use reliable oil.
- (4) Since over closing the main needle causes overheating, adjust a little more rich than peak. Over closing leads to knocking or overheat and has an adverse effect on the connecting rod and cam gear. Where the airplane achieves peak completely at the attitude of ascent should be a proper peak of the engine during flight.
- (5) When connecting the exhaust pipe to the cylinder or attaching the prop nut, apply thin coat of silicon rubber (not excessively) or adhesive on the thread section before tightening. This prevents leakage or loosening.
- (6) Occasionally tighten the prop nut, exhaust nut, and whole screws.
- (7) Take an extreme care for safety when operating the engine or flying the model airplane not to bother others.
- (8) An engine for a model airplane is not a toy. Handle it with an extreme care.
- (9) After completing ground break-in or operating the engine for 1 hour, adjust tappet gaps (valve clearances) by following procedure to compensate initial wearing, while the engine is cold.

#1 cylinder should be adjusted first, next #3, finally #2 cylinder should follow in order by the same procedure.

- (a) Remove the plug and rocker covers from the #1 cylinder.
- (b) Turn the prop slowly forward by hand until the rocker arm of intake stops. Further turn the prop to bring the piston to the TDC (Top Dead Center) of compression stroke.
- (c) Use the attached wrench and hexagonal wrench to adjust the gaps indefinitely close to zero within the range compression exists. If the gap is lower than 0, the valve has to be opened at all phases so the compression doesn't occur (then, loosen the screw to reset). After adjustment, put on the spark plug and turn the prop forward to check if the compression is enough.
- (d) Checking the gap, securely tighten (but not excessively) the lock nut.
- (e) Do the same adjustment for #3 cylinder.
- (f) Finally do the same adjustment for #2 cylinder.



* In the case of the engines for vehicle, small gap is given to tappets to absorb valve elongation. However for SAITO engines, gap becomes larger during operations due to thermal expansion of the cylinder (made of aluminum). Therefore set the gap indefinitely close to zero when the engine is cold.

Note: Occasionally check tappet gap by those procedure. When the attached gauge (limit gauge, t=0.1mm) comes to be inserted, gap has been enlarged beyond the allowable limit. Make an adjustment to lessen the gap. Tappet gap is one of the most important factors in the maintenance of 4-stroke engines. Operating the engine with the tappet gap enlarged excessively will cause poor performance or troubles.

- (10) Since the fuel contains more than 5% of oil, sometimes the exhaust valve gets dull by carbon or sludge especially in cold atmosphere. Then turn off the ignition switch and rotate the prop by electric starter. After dilute the oil content by this way, remove the fuel from inside the carb and the engine. It helps the valve to move smoothly.
Or, remove the rocker cover and applying some anti-rust spray to the exhaust valve is effective as well.
- (11) Please notice that our guarantee will not cover any breakage or trouble on the engine caused by user's disassembling or modification.
- (12) Notes for purchasing parts:
Please give orders to the shop you purchased from with "Engine model", "Part No. or part name", and "Quantity".

Optional parts

- Filter with weight [G36-154]
- Spark plug SP-1 [G20-120]
- Tappet adjusting kit [30-161]
- Neoprene tube for gasoline(1m) [G36-155]
- Aluminum spinner nut [120S-30]
- Digital tachometer [G17-167]

All specifications and models are subject to change without notice.



<http://www.saito-mfg.com>

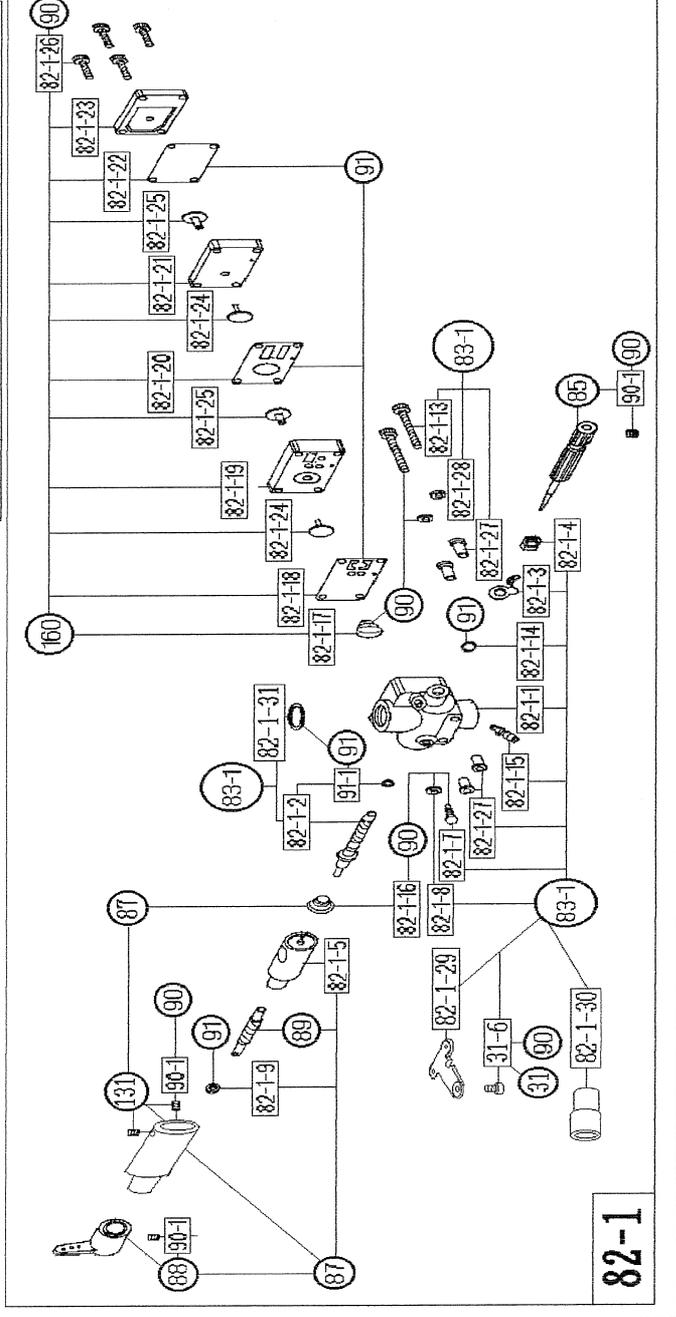
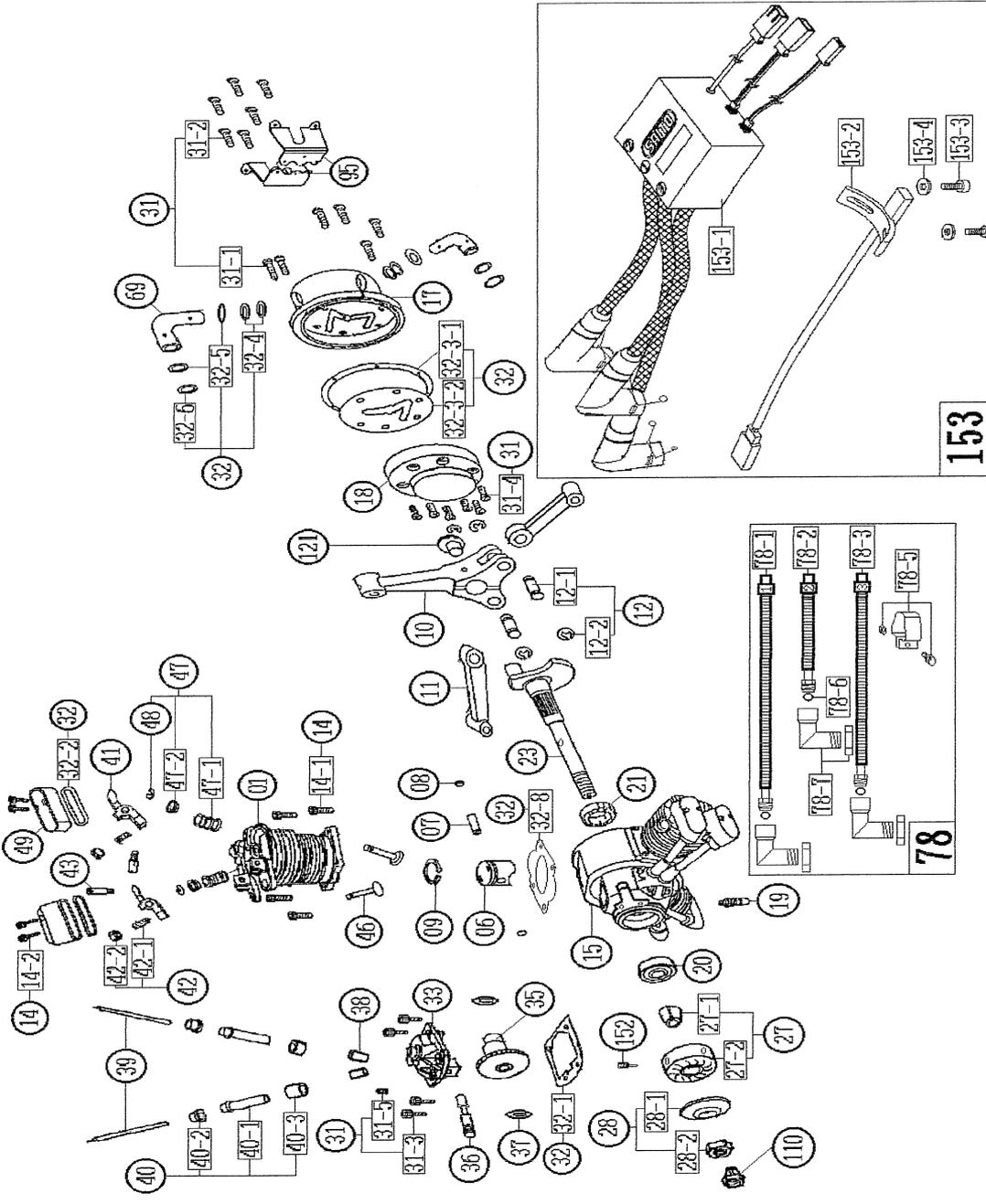
SAITO SEISAKUSHO, CO., LTD.

22-7, 3-chome, Tokagi, Ichikawa-shi, Chiba prefecture 272-0024, Japan

Phone: 047-378-2459 FAX: 047-378-4155

SAITO FG-33R3 Parts List

NO	Description	Qty	NO	Description	Qty
01	Cylinder	3	43	Rocker arm pin	6
06	Piston	3	46	Valve (in & out)	6
07	Piston pin	3	47	Valve spring & Keeper & Retainer lock 47-1, 47-2, 48	6ea.
08	Piston pin retainer	6	48	Valve spring retainer lock	6
09	Piston ring	3	49	Rocker arm cover	6
10	Connecting rod (Master rod)	1	69	Intake manifold (Intake pipe)	3
11	Linked conrod (Link rod)	2	78	Muffler complete	1set
12-1	Linked conrod pin (Linkpin)	2	82-1	Carburetor complete	1set
12-2	Linked conrod pin retainer (E-ring)	4		Carburetor body assembly	
14	Cylinder screw set (14-1, 14-2)	3set	83-1	32-6, 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, 82-1-29, 82-1-30, 82-1-31, 91-1	1set
15	Crankcase	1	85	Full throttle needle (85, 90-1)	1
17	Rear cover (A) (Intake manifold)	1	87	Throttle barrel assembly 82-1-5, 82-1-9, 82-1-16, 88, 89, 90-1, 131	1set
18	Rear cover (B)	1	88	Throttle lever (88, 90-1)	1
19	Breather nipple	1	89	Idle needle	1
20	Front bearing	1	90	Carburetor screw & spring set 82-1-7, 82-1-8, 82-1-13, 82-1-16, 82-1-17 82-1-26, 82-1-28, 31-6, 90-1	1set
21	Main bearing	1		Carburetor gasket set	
23	Crankshaft	1	91	82-1-9, 82-1-14, 82-1-18, 82-1-20, 82-1-22 82-1-31, 91-1	1set
27	Taper collet & Drive flange (27-1, 27-2)	1ea.	95	Mount set (R&L)	1set
28	Prop washer & Nut (28-1, 28-2)	1ea.	110	Anti loosening nut	1
31	Crankcase screw set 31-1, 31-2, 31-3, 31-4, 31-5, 31-6	1set	121	Crank pin spacer (Master rod retainer)	1
32	Engine gasket set 32-1, 32-2, 32-3-1, 32-3-2, 32-4, 32-5, 32-6 32-8	1set	131	Throttle valve extension adapter	1
33	Cam gear housing	3	152	Screw-pin (For drive flange setting)	1
35	Cam gear	3	153	Electronic ignition system 153-1, 153-2, 153-3, 153-4	1set
36	Cam gear shaft	3	160	Pump assembly 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	1set
37	Steel Washer set	3set			
38	Tappet (Valve lifter)	6			
39	Pushrod	6			
40	Pushrod cover & Rubber seal 40-1, 40-2, 40-3	6ea.			
41	Rocker arm	6			
42	Rocker arm screw & Nut (42-1, 42-2)	6ea.			



フレキシブルエキゾーストパイプの接続について

How to Fix the flexible exhaust pipes

①写真を参考に、下の組み合わせで各シリンダーとエキゾーストパイプを接続します。

接続ナットは、各パイプが回転する程度に仮止めしておきます。

- | | | |
|---------|---|----------|
| #1シリンダー | → | 最長のパイプ |
| #2シリンダー | → | 最短のパイプ |
| #3シリンダー | → | 中サイズのパイプ |

②ブラケットとM3ボルト、ナットで、排気端を絞り込むようにまとめます。仮止めは、一部紐で束ねておくとブラケットでまとめ易くなります。

④各シリンダーの接続ナットを本締めします。

※エキゾーストパイプと防火壁、インテークパイプがなるべく接触しないように固定して下さい。

※無理な曲げ方をすると、パイプが破損しますのでご注意ください。

①Referring the picture, insert the exhaust pipes to the cylinders as following pairs.

At this step, leave the bushing nuts temporary fixed to allow the pipes to turn.

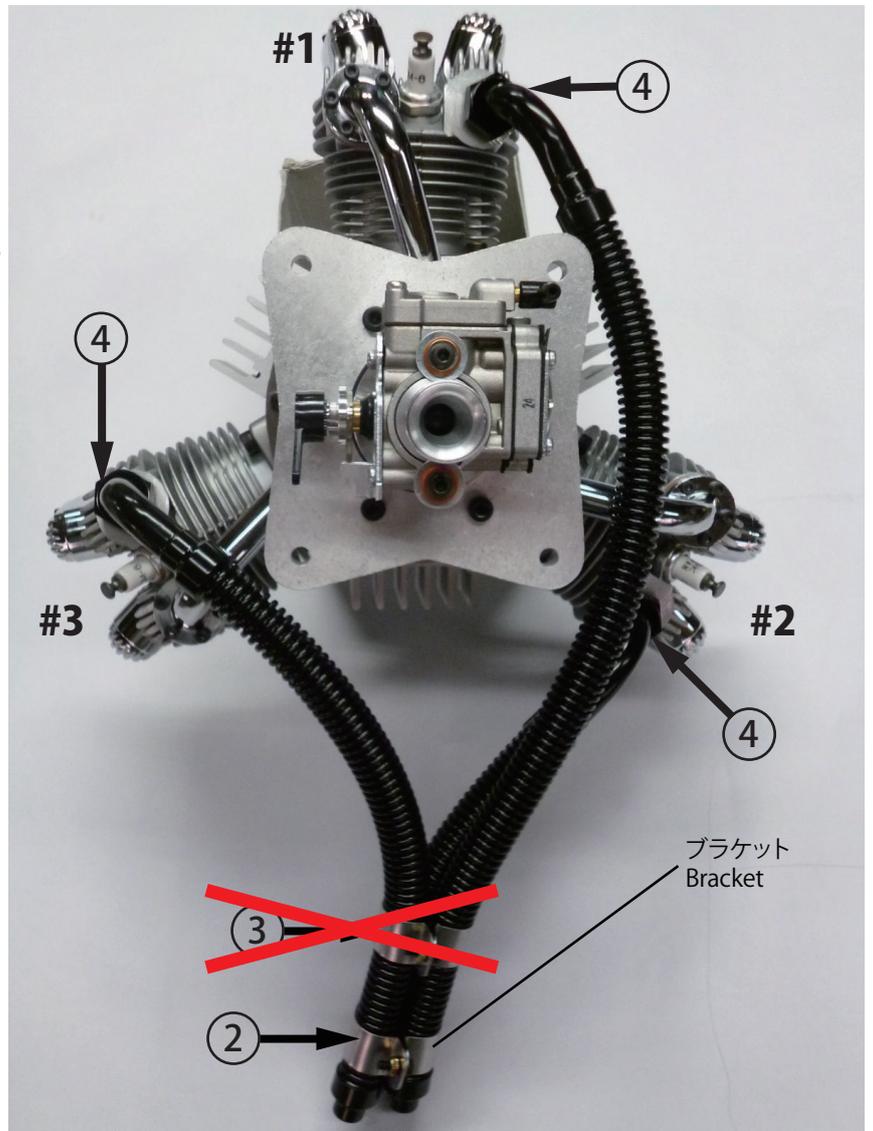
- | | | |
|------------|---|---------------|
| #1Cylinder | → | Longest pipe |
| #2Cylinder | → | Shortest pipe |
| #3Cylinder | → | Middle pipe |

②Fix the ends of the pipes with the bracket , M3 screw and nut. Temporary binding the pipes with a band will help to fix the bracket.

④Finally tighten the bushing nuts to fix the pipes completely.

※Fix the pipes not to touch the firewall and the intake pipes as possible.

※Be careful not to tear the pipes by too much bend.



※写真はFG-84R3ですが、方法は同じです。

※Though the above sample picture is FG-84R3, the procedure is just the same.