

Instructions for FA-170R3 AAC 4 Stroke Cycle Engine

Thank you for your purchase of the Saito FA-170R3 engine.

Saito Company ask you to read the instructions carefully and treat this engine with loving care.

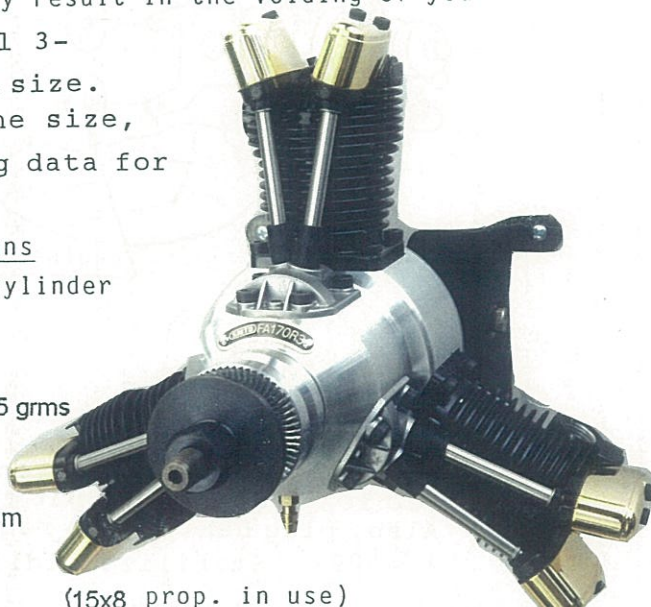
If in case, should you have the need for engine rectification based on manufacturing defective, we guarantee to repair your engine. This FA-170R3 engine is assembled utilizing special jigs and tools. Thus you shouldn't disassemble the engine, however if it becomes necessary to dismantle the engine for such as crush, please forward your engine to Saito Service Center.

Unnecessary engine dismantle may result in the voiding of your SAITO FA170R3 engine is a radial 3-cylinder 4-cycle engine in medium size.

For the selection of airplane size, please refer to the following data for the selection of model.

FA-170R3 engine Specifications

Bore;	24.8 mm dia.x3cylinder
Stroke;	19.2 mm x 3
Capacity;	27.8 cc
Weight;	approx. 1,345 grms
Firing order;	1-3-2
Outer diameter;	200 mm dia.
Practical RPM;	2,000~9,500 rpm
Propeller;	15X8 to 16X8
Static thrust;	Approx. 6.3 kgs. (15x8 prop. in use)
Fuel consumpt;	45 cc per a min.(15% nitro, prop. 15x8 full throttle) note, figures will vary, bigger load consumes more fuel and smaller load will less consumption.



FA-170R3 engine Characteristics

The engine is suitable for Middle model. Low vibration(due to evenly firing). Easy starting(with normal direction turn). Engine sound is like genuine. Idling stability available without plug heating obtained by special port type intake manifold that equalize mixture to individual cylinders.

Cylinder - Hard-chrome plated cylinder bore increases the engine's durability.

The cylinder and head are a single unit. This design results in non-distortion of the cylinder bore and better heat dissipation.

Piston The piston is made of high silicon aluminum and provided with compressing rings for high performance.

Crankshaft The crankshaft is made of chrome-molybdenum steel and of integral structure for very rigid construction. 2-ball bearing support type.

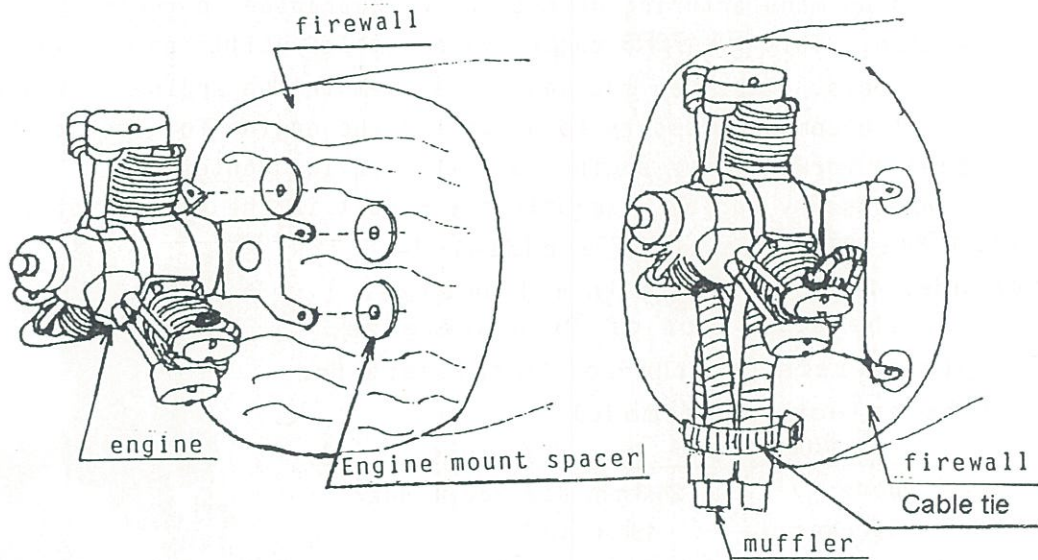
Lubrication; Cam lube is forced by specified adaptor.

Cam; Introduced high cam design to get longer maximum valve lifting time.

Prop.lock device; designed to positive lock for safety feature (also handy to install prop. spinner).

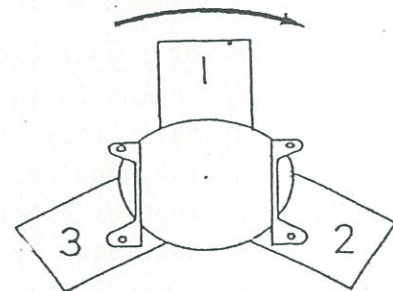
The engine and muffler installation, circuit are shown as below.

Refer as schematic, the engine mount spacers are recommended to install between mount and firewall. This will minimize firewass panel squeezing and also works as reinforcement.
(Engine mount spacers are included in the kit.)

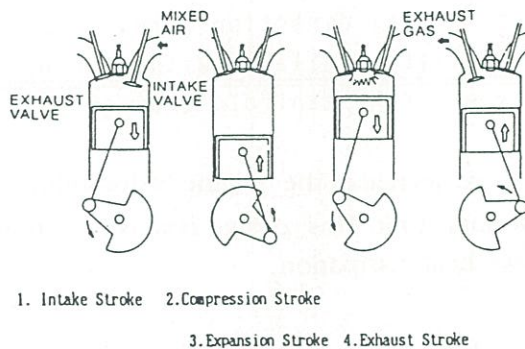


Caution on Wiring
Attached wire harness for the plug must be used in the same length to equalize electric current. If too long, do not cut but tie them. Also, plug heat is not required in idling. Stabilized idling without plug heat

Direction of Propeller Rotation
as Viewed from the Fire Wall Forward



Explanation of 4 Stroke Cycle Engine



The four stroke engine consists of four individual piston movements as illustrated above. "Stroke" means that the piston is moved from the upper dead center to the lower dead center point. In the four stroke engine, one cycle is completed every two revolutions of the crankshaft.

When running-in operation of engine is fully completed and operation becomes in good condition, engine speed will be approximately 9400 rpm with APC-15"x8" and 9,000 rpm with APC-16"x8".

A. Fuel

It is very important for engine to use high quality fuel containing 10~20% nitro. For consistent performance and long engine life, use fuel containing **AT LEAST 20%** lubricant by volume. **(DO NOT USE LOW OIL FUEL)** Since the 4-cycle engine has high exhaust temperature and carbon is apt to accumulate when castor oil type lubricants are used. The fuel filter is to be installed and SAITO F-1 is designed for this model engines. **SAITO fuel filter "F-1" exhibits highest performance.**

B. Fuel tank

We recommend a tank with a capacity of 750cc.

Mount the fuel tank approx. 5mm lower than carburetor center.

C. Plug.

The selection of glow plugs is most important as the engine fires only once per cylinder for every 2 complete rotations. We recommend SAITO P-4 plugs and unsuitable plug will cause the engine malfunctioning. The glow plug is replaced so often as required.

D. Propeller

Use of SAITO "SAI GP01" **SS** Glow Plug is recommended.

The standard range is 15X8 to 16X8 depend on your model. Use a strong, high grade fiberglass or carbon series propeller and make certain it is well balanced. Unbalanced propeller may cause vibration and deteriorate performance and it is danger.

Do not run the engine higher than 8,000 rpm with smaller propeller and choose the propeller that turn 9,000 to 9,500 rpm on the ground running. Beware of propeller rpm differ with same sizes and same size of same manufacture.

E. Carburetor Maintenance and Adjustment

SAITO engine carburetor's slow needle is pre-adjusted at the factory for best performance during break-in. However the engine may be necessary to fine tune due to engine installation, propeller size, fuel, plug, weather condition etc. please refer to the followings.

When slow needle valve is turned a number of times and unable to tell its exact location, first, fully close throttle valve while loosening slow needle. Next, screw-in slow needle in clockwise direction until it reaches to its end and loosen it about 3 1/2 turns in counterclockwise direction. This is the position of slow needle valve for its standard condition.

(if original slow needle position is in doubt after rotating, standard position is 1/2 turns clockwise position from flush at the throttle lever face as shown arrow A-mark.)

1. Open main needle valve approx 3 1/2 turns.
2. Open the throttle valve approx. 1/4 and start the engine.
3. Open the throttle valve fully and adjust main needle for best high speed running. (Judge proper operation with exhaust sound and smoke. It is recommended to use Tachometer for accurate adjustment and beware of too lean operation.)
 - . Close the throttle valve slowly and adjust the idling speed.
 - a. too rich mixture.
4. Close the throttle valve slowly and adjust the idling speed.
 - a. Too rich mixture.
 - when you close the throttle valve to idle, the engine will stop.
 - when you open the throttle rapidly and the engine emits white smokes and stutters.Situation above are corrected by turning slow needle clockwise direction and make lean mixture.

b. Too lean mixture.

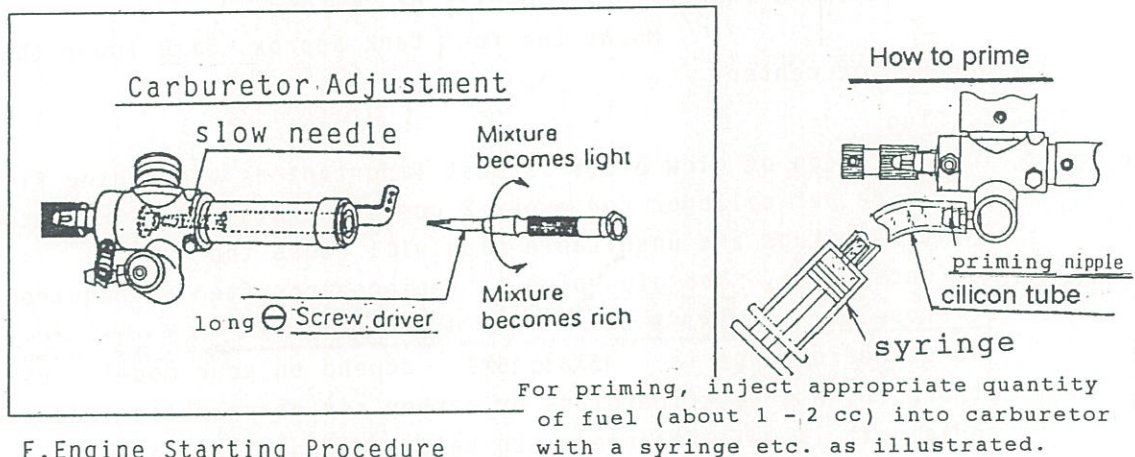
-when you close the throttle valve to slow rpm, the engine will stop.

-when you open the throttle valve rapidly and the engine emits no smoke with stutter sound.

Situation above are corrected by turning slow needle counter-clockwise direction and make rich mixture.

5. With above adjustments, you now will have best response at all settings.

6. After obtaining the proper idling, the throttle valve setting may be made through the servo movement.



F. Engine Starting Procedure

The following procedures should be followed to start your engine.

(Muffler pressure must be used). You should mount the engine on the horizontally leveled test bench or fixing tight on the Airplane.

Fuel tank needs to be bigger than 1,000 cc and approx 15"x8" fiber-glass or carbon series propeller is recommended. If you see visitors at running sight, keep them away backward prior starting.

2. Open needle valve approx. 3 1/2 turns (after engine started, needle valve should open if mixture is lean, and close if mixture is rich. Also open needle valve for gigger prop. and close for smaller prop.)

For priming, inject appropriate quantity of fuel (about 1 - 2 cc) into carburetor with a syringe etc. as illustrated.

4. Turn the prop. one or 2 turns clockwise direction to suck in the fuel. (priming is satisfactory if fuel start to drip from exhaust manifold).

6. If over choke is occurred, piston rod may damage and to confirm that you don't have a hydraulic lock, turn propeller by hand and ensure prop. rotateing free.

When the starter is used, engine must be manually cranked without fail before it is started.

7. Open the throttle valve to just above the idling position. (if opened throttle farther more, airplane will move forward and an attention is required in big model).

8. Turn the propeller clockwise untill compression stroke and energize the glow plugs. (if battery is small, energize glow plugs individually by 3 batteries).

9. Swing the propeller smartly clockwise for the engine start. (There is no kick-back in the multi-engine starting however use strong glove for hand starting and we recommend you use an electric starter. For your personal safety, beware of big prop. diameter and needle adjustment is to be done from the engine backward.

G. Break-in.

The correct break-in for your engine can be assured of long lasting and maximum performance. After the engine started, open the throttle valve to about 1/2, and needle valve set rich to give approx.

4,000 RPM(recommend you to use Tachometer) for 20 min. run engine. If required, glow plugs are remain energized. (This break-in is ensured all moveable parts like connecting rod, gears etc. to make smooth operation). After this, adjust needle valve 80% out of peak RPM and run the engine one tank of fuel. Lastly, adjust needle valve to set peak RPM and then set rich until the engine is running smooth then the engine may now be mounted in the Airplane. The break-in will complete by the first 5 flights flying with mixture set slightly rich.

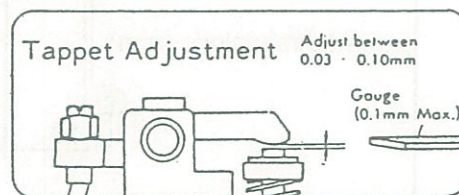
The break-in may be accomplished with the engine mounted on the airplane, and flying higher altitude with throttle valve set at about mid position.

Carburetor adjustment after break-in.

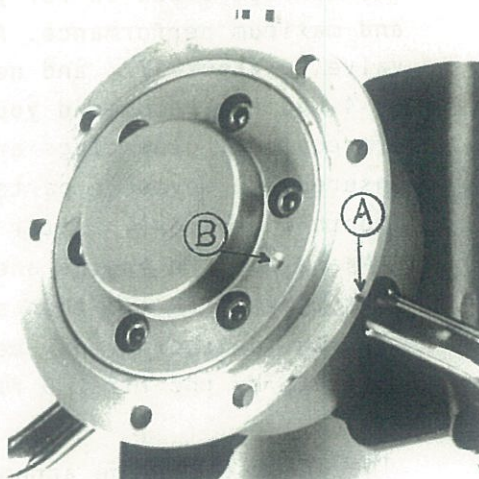
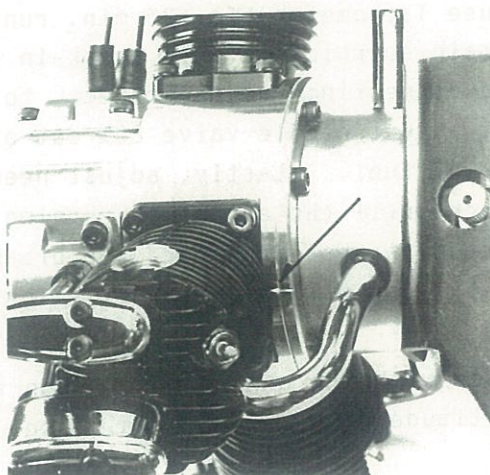
1. Fully open the throttle valve.
2. Obtain peak RPM with adjusting main needle, then turn needle 2 to 3 clicks counter-clockwise direction.
3. Close throttle valve to obtain idling speed and adjust slow needle to set approx. 2,000 rpm running.
4. Lastly, fine adjustment is required to obtain smooth response at all settings.
5. Now you may fly out of sky high but recommend you to fly higher for awhile and ensure to have enough altitude in case of engine stoppage.

H. Normal engine operation and Maintenance.

1. Do not operate the engine with a leaner that may cause overheating. Keep the engine mixture slightly richer. (too lean will cause knocking, engine stoppage and also damage to connecting rod, cam gears.)
2. After approx. 1 hour operation, tappet gap adjustment may be necessary. The tappet gaps must be adjusted with the engine cold and valves must be in the compression stroke as shown in the figure, and use supplied wrenches. When adjustment is completed, make sure you tighten the lock nut. The engine need to be checked occasionally and when 0.1mm gauge may be inserted between gapas, adjustment is required. This is important factor in maintaining 4 cycle engine, otherwise will lead to deteriorate your engine performance.

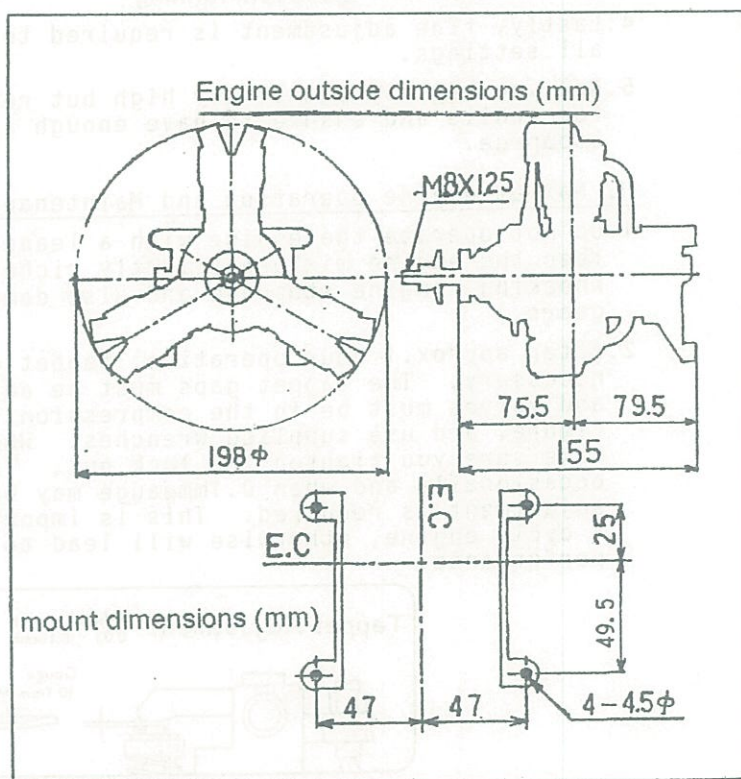


3. When you checking locker arm and valves, lubricate the moveable parts as required.
4. After engine running, spray lubricant to crankcase via breather nipple.
5. Apply lubricant to cylinder via glow plug hole while spinning crankshaft.
6. If spray type lubricant is not available, open the throttle fully and apply rust inhibitor lubricant and spin crankshaft 4 to 5 turns like chokeing procedure.
7. If the engine may have been sitting for certain period of time, (recommend to cover with plastic bag).



To assemble rear covers A and B, match arrow mark and arrow marked

When rear cover AB assembly (at right in photo) is attached to crank case, match arrow marked (-) at the attaching section of No. 3 cylinder to arrow mark (A) of AB assembly.



All specifications and models are subject to change without notice.

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SAITO FA-170R3 Parts List

NO	Description	Q'ty	NO	Description	Q'ty
01	Cylinder	3	37	Steel Washer set	1set
06	Piston	3	38	Tappet (Valve lifter)	6
07	Piston pin	3	39	Pushrod	6
08	Piston pin retainar	6	40	Pushrod cover & Rubber seal	6ea.
09	Piston ring	3	41	Rocker arm	6
10	Connecting rod (Master rod)	1	42	Rocker arm screw & Nut (Adjust screw & lock nut)	6ea.
11	Linked conrod (Link rod)	2	43	Rocker arm pin	6
12	Linked conrod pin (linkpin)	2	46	Valve (in & out)	6
13	Linked conrod pin retainar (E-ring)	4	47	Valve spring & Keeper & Retainer lock	6ea.
14	Cylinder screw set	3set	48	Valve spring retainer lock	12
15	Crankcase	1	49	Rocker arm cover	6
17	Rear cover (A) (Intake manifold)	1	69	Intake manifold (Intake pipe)	3
18	Rear cover (B)	1	73	Muffler	2
19	Breather nipple	1	74	Muffler /nut w/pressure	1
20	Front bearing	1	80	Muffler nut	2
22	Rear bearing	1	82	Carburetor complete	1set
23	Crankshaft	1	83	Carburetor body assembly	1set
27	Taper collet & Drive flange	1ea.	85	Full throttle needle	1
28	Prop washer & Nut	1ea.	87	Throttle barrel assembly	1set
31	Crankcase screw set	1set	95	Engine mount	1set
32	Engine gasket set	1set	110	Anti-loosening nut	1
33	Cam gear housing	3	121	Crank pin spacer (Master rod retainar)	1
35	Cam gear	3	131	Throttle valve extension adopter	1
36	Cam gear shaft	3			

FA-170R3

