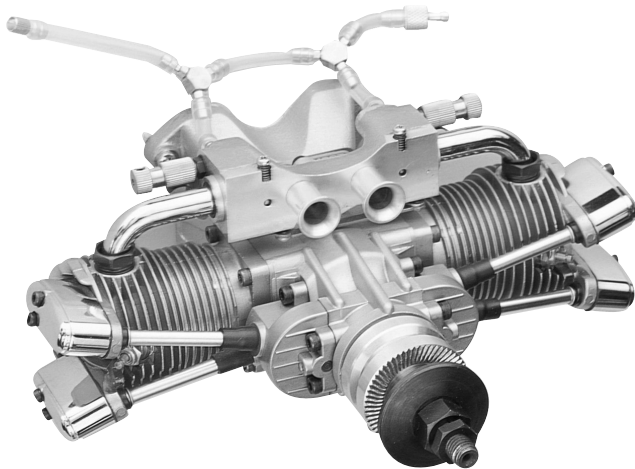


SAITO

TWIN-CYLINDER FOUR-STROKE ENGINES

INSTRUCTION MANUAL



- FA-60T
- FA-90TS
- FA-100T
- FA-182TD
- FA-300TL
- FA-300TTDP

**VERY
IMPORTANT**

*Failure to read
and follow these
instructions before
you proceed may
result in engine
damage and the
voiding of your
warranty.*

Introduction

Congratulations on purchasing a Saito 4-cycle engine. Cared for properly, these high-quality, finely crafted engines offer many years of modeling enjoyment.

This instruction manual has been developed to ensure optimum performance from the Saito engine you have purchased. The instructions must be read through completely and understood thoroughly prior to mounting and running the engine.

Safety Instructions

This model engine will give you considerable pleasure, satisfaction and performance if you strictly follow these safety instructions and take heed of the warnings as to its safe and proper use. Remember at all times, IT IS NOT A TOY, but a precision-built machine with more than enough power to cause harm if misused, or if the safety precautions are not observed.

You should always:

1. Mount the engine securely on the test bench using the high-quality Saito motor mount supplied. Never clamp the engine in a vice.
2. When running the engine, be sure that all spectators, especially children, are at least 20 feet away.
3. Use the correct size and pitch of propeller for your engine; refer to the propeller chart on page 18 of this manual.
4. It is extremely important to balance the propeller prior to installation. Failure to do so may cause damage to the Saito engine and/or the airframe. Install the propeller with the convex (curved) side facing forward. Securely tighten the propeller nut against the washer and propeller. A “jam” nut is suggested for all 4-cycle engines.
5. Inspect the tightness of the propeller nut prior to each flight.
6. Keep your face and body away from the path of the propeller blades when starting or running your engine.
7. Never allow your hands to come close to the propeller. Use either a “Start stick” or electric starter to start the engine.
8. Make all carburetor adjustments from behind the propeller.
9. To stop the engine, cut off the fuel supply (pinch or disconnect the fuel line to the carburetor), or use the throttle linkage to shut off the air.

DO NOT USE HANDS, FINGERS OR ANY OTHER PART OF THE BODY TO STOP THE PROPELLER. DO NOT THROW ANY OBJECT INTO A PROPELLER TO STOP IT.

10. Discard any propeller that is nicked, scratched, cracked or damaged in any way.

It is highly recommended that:

1. Safety glasses or goggles be worn when starting and running your engine.
2. You do not run the engine in the vicinity of loose gravel or sand. The propeller may throw such materials into your face and eyes. The engine may also ingest these harmful materials.
3. Loose clothing should be avoided when operating your model engine. Loose clothing may become entangled in the propeller, creating the possibility of bodily harm. Also, all loose objects (screwdrivers, pencils, nickel cadmium starters, etc.) should be removed from your pockets so they do not fall into the propeller.
4. Glow plug clips and cords are kept well away from the propeller.

5. Your glow fuel is kept in a safe place well away from sparks, heat or anything which can ignite the fuel.

Beware:

1. Model engines get very hot while running. Do not attempt to handle them until they have cooled.
2. Always run your model engines in a well-ventilated area. Similar to automotive engines, model engines produce possibly harmful carbon monoxide fumes.
3. Remember that model engines produce a substantial amount of power, more than enough to seriously injure people and/or do considerable damage to property. Always use common sense, skill and constant observation of safety precautions.

Disassembly

Do not needlessly disassemble your Saito engine. Engine repairs should be performed only by qualified individuals. Damage due to improper disassembly will not be covered under the warranty.

Engine Parts Identification

It is important to be able to identify the parts of your Saito engines. In the back of this manual you will find an exploded view of Saito twin-cylinder engines, as well as a chart which includes part numbers and descriptions. This will assist you in easily and rapidly identifying the respective parts of your Saito engine.

Support Equipment

The following items, which are not included with your Saito engine, are necessary in order to operate the model engine:

1. Fuel. For maximum protection and longevity of Saito engines, Saito recommends a fuel containing 20% oil and 10-15% nitro methane. If this blend is not readily available, the next best selection is a high quality 2-cycle glow fuel, such as Cool Power, K&B, Power Master, etc. Fuels composed entirely of castor oil are not recommended. Use of such fuels will void the warranty.

2. Propeller. Refer to the Propeller Selection Chart, located on page 18, to determine the best initial propeller for your particular application.

3. Glow Plug Battery. Your glow plug may be properly heated by several different sources. The Hangar 9 Power Panel (HAN106), when accompanied by a 12V sealed lead acid battery (HAN102) and a glow plug locking socket (HAN120), is an ideal source of heat for your glow plug. A conventional 1.5V heavy-duty dry cell battery with a glow plug locking socket (HAN120) or alligator clips can also be used. Additionally, there are several very good glow-starters (nickel cadmium powered glow plug ignitors) which work well. (HAN7101).

4. Glow Plug Wrench. A glow plug wrench is used to remove and tighten glow plugs. The Hangar 9 Long Reach Plug Wrench (HAN2510) is an excellent wrench to utilize as a longer shaft may be necessary to access the glow plug. This depends mostly upon engine installation.

5. Manual or Electric Starter. For manual starts, a "start stick" (HAN113) is highly recommended. never use your fingers to start any model engine, as doing so invites injury. There are a variety of electric starters on the market. The Hangar 9 PowerPro-HD 12V Starter (HAN102) will work perfectly on all of the twin-cylinder Saito engines.

Break-In

The first run on any engine, whether 2-cycle or 4-cycle, is critical to the future of the engine itself. During this time, metal mating parts (piston and cylinder, ball bearings, etc.) wear in. Care must be taken that the engine is clean and free of any dust or grit that may have accumulated while building the model.

There are two accepted methods for breaking in a new engine: test stand mounted and run or aircraft mounted and run. Either method is acceptable, however, mounting the engine to a test stand allows the engine to be observed throughout its operation, as well as elevating it above the ground and away from harmful dust and dirt.

NOTE: Because your engine may have been sitting for an extended period of time prior to running it, a few drops of light oil applied through the crankcase breather nipple (19 on the exploded view), if applicable, and down the pushrod tubes (40) will ensure proper lubrication for the first run.

Regardless of the mounting method chosen for break-in, the following procedures are applicable:

1. Use a break-in fuel as described in the “Support Equipment” Section on page 3 of this manual.
2. Use the proper glow plugs. Your engine includes the Saito 400P (SAIP400S glow plug(s), which are also the standard replacement glow plugs for these engines. You can also use Hanger 9’s Four Cycle Super Plug (HAN3011).
3. Select the correct propeller. To do so, refer to the Propeller Selection Chart on page 18 of this manual.
4. Make sure that the high speed needle valve(s)(85) are opened (turned counterclockwise) five full turns. This guarantees a very rich setting.

Do **not** adjust the low-speed needle valve(s) or airbleed screws (89) at this time. The low speed needle valve(s), or airbleed screws, are pre-adjusted at the factory for initial break-in.

5. The use of tachometer (HAN111) is highly recommended since the adjustment of a four-cycle engine: while similar to that of a 2-cycle engine, is more difficult to “set by ear,” therefore making it easier to damage the engine by “over leaning.”

Starting The Engine

1. Make sure the glow plugs are installed and tightened.
2. Be sure the propeller is properly secured. The use of a “jam nut” is encouraged on 4-cycle engines.
3. Make sure the fuel tank line(s) are properly connected, The main line should be connected to the carburetor nipple on the carburetor spray bar

NOTE: If your Saito engine is equipped with dual carburetors it’s imperative that the fuel lines are identical in length from the Y-fitting to the fuel inlets.

Connect the fuel tank lines as shown in **Figures 1,2 and 3.**

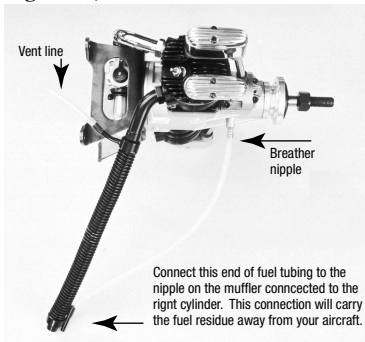


Figure 1 FA-300TL

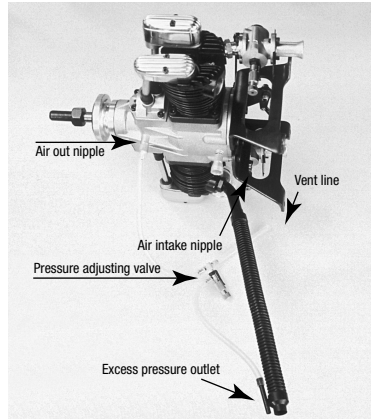


Figure 2 FA-300TTDP

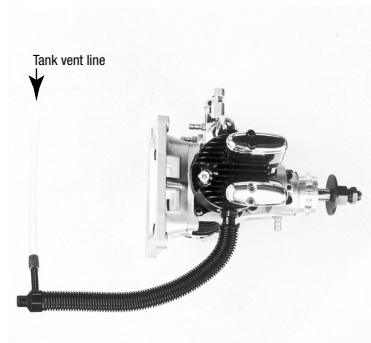


Figure 3 FA-100T

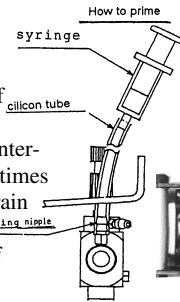
The proper “plumbing” of the lines is extremely important to the performance of any engine.

4. Be certain the mufflers are installed properly by oiling the threads and inserting the muffler gasket(79) if applicable, and that the lines are properly connected.

5. Fill the fuel tank.

6. Prime the engine:

- check to make sure the glow plugs are not connected to the heat source (glow plug clip/locking socket)
- open throttle fully
- close choke valve(92), if applicable
- rotate propeller in a counter-clockwise direction 2-3 times or until fuel begins to drain from the carburetor
- open choke valve(92), if applicable



7. Start the engine:

- close the throttle to 1/4-1/3 open position
- rotate propeller clockwise until it's against the compression stroke
- connect the heating source to the glow plugs

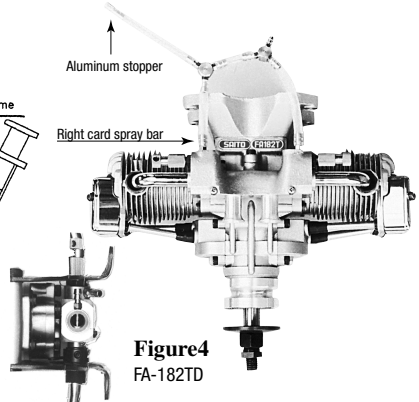


Figure 4
FA-182TD

NOTE: Instructions for the FA-90Ts Flat Twin AAC 4 Stroke Engines. For priming, inject approximate quantity of fuel (about 1-2 cc) into the carburetor with a syringe etc., as illustrated.

NOTE: This process is not applicable for owners of the Saito FA-182TD. Instead, remove the aluminum stopper from the silicone tubing leading to the right cylinder/carburetor spray bar. Inject approximately 5cc of fuel into the silicone tubing. Replace the aluminum stopper. Please refer to **Figure 4.**

NOTE: It is not necessary to ignite all four glow plugs in the dual plugged versions (two glow plugs per cylinder) of the Saito engines. It's only necessary to apply heat to the two rear plugs. The front glow plugs will ignite once the engine reaches operating temperature.

NOTE: A very common error is to remove the glow plug ignitor too early. It is suggested that the ignitor is left attached until after the engine has been run up and the high speed needle valve(s) has been properly adjusted.

- Using either the “Start stick” or electric starter, spin the propeller until the engine is running.

NOTE: When using an electric starter, care should be taken to be sure that the engine does not become “hybro-locked.” While the electric starter will turn the engine over, it may damage the connecting rod or other components. If the engine becomes hydro-locked, simply remove the glow plugs and turn the engine over a few times with the “Start stick” or electric starter. The excess fuel will be forced to exit the engine via the cylinder heads.

8. Initial break-in:

Do **not** exceed 4,000 rpm for the first ten(10) minutes of operation. This allows all parts to mate properly with good lubrication.

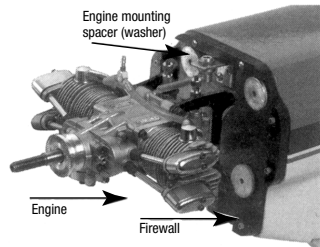
NOTE: Due to the excessively “rich” mixture setting, it may be necessary to leave the heat source attached to the glow plugs.

Subsequent runs may be made while slightly leaning out the mixture with each tank full of fuel. Generally, 40 minutes is considered sufficient for normal break-in prior to the first flight.

9. After break-in:

If a test stand was used for the break-in procedure, the engine may now be mounted in the aircraft using the integral motor mount and mounting hardware supplied with the Saito engine.

NOTE: Always use the engine’s mounting spacers. Place the mounting spacer between the integral motor mount and the firewall of the aircraft.



When tightening bolts, put washers between the engine mount and firewall to minimize depression on the firewall and for reinforcement.

Figure 5

The spacers will minimize firewall depression and serve to reinforce. Soft mounting of Saito engines is not required due to low vibration levels found in the Saito twins. The idle needle valve(s)(89) may now be refined. Please refer to the Carburetor Adjustments Section on pages 8 & 9 for information on how to do so.

The valves may be checked at this time. Refer to the Engine Maintenance Section on page 13 for information on the valve adjustment.

The use of a tachometer is encouraged for setting the high-speed needle valve(s)(85) prior to flight. The peak rpm should be obtained and then reduced by approximately 200-300 rpm by turning the high speed needle valve(s) counterclockwise.

Low Speed Carburetor Adjustments

The low speed, or idle needle valve(s), or airbled screws(s)(89), is/are pre-adjusted at the factory for best performance during break-in. After break-in it may be necessary to “fine tune”the low speed adjustment using the following procedure.

1. Start the engine and let it warm up prior to attempting any adjustments.
2. Close the throttle slowly and adjust the low speed setting by rotating the needle valve(s)(89) clockwise to lean the mixture and counterclockwise to richen the mixture. The direction of rotation is reversed for the Saito FA-100T and FA-182TD. These engines are equipped with airbled style carburetors, rotating the airbled screw clockwise will richen the mixture. If the airbled screw is rotated counterclockwise the mixture will become lean.

NOTE: The fuel mixture is too rich if when you open the throttle rapidly the engine emits white smoke and “stutters” or “stumbles.”Correct this by rotating the idle needle valve(s) clockwise (or airbled screws counterclockwise) 1/4 to 1/2 turn at a time until the engine transitions smoothly without hesitation upon opening the throttle rapidly. The fuel mixture may be too lean when the engine stops at the lowest idle position, or if the engine stops when the throttle is rapidly opened from idle. Attempt to correct this by rotating the idle needle valve(s) counterclockwise (or airbled screws clockwise) 1/4 to 1/2 turn at a time until the engine transitions smoothly without hesitation upon opening the throttle rapidly. If the situation is not rectified by counterclockwise rotations of the idle needle valve(s) (or airbled screws clockwise), try turning the idle needle valve clockwise (re airbled screws counterclockwise) in 1/4 to 1/2 turn increments.

3. After obtaining the proper idle setting, the low rpm setting can be made through the positioning of the throttle adjustment screw if applicable. If not, adjust the idle setting via the throttle trim of your transmitter.

FA-100T FA-182TD Dual Carburetor Adjustment

Upon completing the break-in and carburetor adjustment procedures mentioned previously, the following method should be utilized to balance the dual carburetor Saito engines:

1. Start the engine and allow it to warm up prior to attempting any adjustments.
2. Rotate both high speed needle valves clockwise an equal amount until the engine reaches the peak rpm.
3. Back off both high speed needles (rotate counterclockwise) equally until the rpm drops by 300.
4. Rotate the high speed needle valve clockwise on the right cylinder to peak the engine. Next, rotate the needle valve counterclockwise until an rpm drop of 300 is noticed.
5. Repeat Step 4 for the left cylinder.

The cylinders of your Saito twin are now correctly balanced.

FA-300TTDP Dual Carburetor/Fuel Pump Adjustment

Prior to starting the FA-300TTDP it's imperative that the fuel pump connections are properly installed. Please refer to Figure 2 on page 5.

High Speed Needle Valve Adjustments

1. Start the engine and allow it to warm up prior to attempting any adjustment.
2. Advance the engine to full throttle.
3. Rotate the high speed needle valve of the right cylinder clockwise (leaning the mixture) until the rpms begin to sag or drop slightly. Then richen the mixture for the right cylinder by 4 or 5 clicks, not turns, of the high speed needle valve. Rotate the high speed needle valve of the left cylinder clockwise (leaning the mixture) until the rpms begin to sag or drop slightly. Then richen the mixture for the left cylinder by 4 or 5 clicks, not turns, of the high speed needle valve.

Again, lean the right cylinder by turning the high speed needle valve clockwise until the rpms begin to drop. This time, however, richen the

fuel mixture by rotating the high speed needle valve counterclockwise 3 clicks. Lean the left cylinder by turning the high speed needle valve clockwise until the rpms begin to drop. This time, however, richen the fuel mixture by rotating the high speed needle valve counterclockwise 3 clicks. The high speed needle valve adjustments are now completed.

Idle Needle Valve Adjustment

1. Lower the throttle of the Saito FA-300TTDP to the lowest possible idle while retaining its reliability. Make sure the carburetor linkage assembly is secured to prevent movement of the throttle levers.

2. Lean the right cylinder low speed mixture screw (turning the screw clockwise) until the rpms drop off slightly. Richen the low speed mixture by turning the idle screw $\frac{1}{8}$ to $\frac{1}{4}$ turn counterclockwise. Lean the left cylinder low speed mixture screw (turning the screw clockwise) until the rpms drop off slightly. Richen the low speed mixture by turning the idle screw $\frac{1}{8}$ to $\frac{1}{4}$ turn counterclockwise.

Fuel Pump Adjustment

See **Figure 6**.

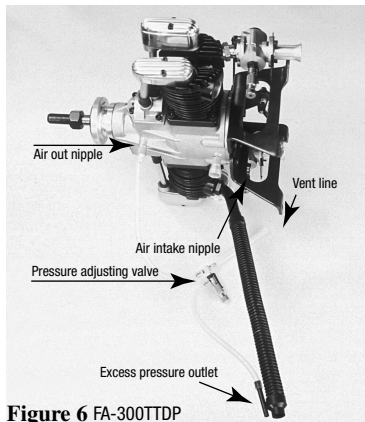


Figure 6 FA-300TTDP

1. Begin with the pressure adjusting valve open $2\frac{3}{4}$ turns.

2. start the engine and allow it to warm up prior to attempting any adjustments.

3. Advance the engine to full throttle.

4. Rotate the pressure adjusting valve in $\frac{1}{4}$ turn increments--first clockwise $\frac{1}{4}$ turn (rich) then rotate counterclockwise $\frac{1}{4}$ turn (lean) until the best rpm is achieved. It's important to note that the pump system has a definite response lag. This lag is approximately 2-5 seconds. With each $\frac{1}{4}$ turn change of the pressure adjusting valve, allow the engine rpm enough time to stabilize. This will prevent "chasing" of the correct setting.

Normal Engine Operation

If break in was accomplished on a test bench your engine may be mounted to the aircraft and flown. The initial flight should be performed with the engine adjusted for a rich fuel mixture.

1. Your Saito engine should be securely mounted to the aircraft using the motor mount and hardware kit provided. Soft mounting of the Saito twins is not necessary due to the extremely low vibration level of these engines. Please refer to Step 9 in the Starting The Engine section for the proper mounting procedure.

2. General operating procedures which ensure long engine life are:

Do **not** operate the engine with a “lean” mixture setting.

When installing the mufflers, oil both the manifold threads and the engine cylinder threads. Secure the mufflers to the airframe using the muffler brackets supplied.

NOTE: The muffler brackets are not supplied with the FA-182TD.

Regularly check all screws and nuts on both the engine and muffler.

After 1-2 hours of operation, valve adjustment may be necessary. Adjust the valves as shown in the Engine Maintenance Section following.

For engines equipped with a breather nipple, it's recommended that a length of silicone fuel tubing be attached to this crankcase breather nipple(19). This is used to route away expelled oil from the engine compartment.

Engine Maintenance

DO NOT DISMANTLE THE ENGINE UNLESS ABSOLUTELY NECESSARY.

If it becomes necessary to dismantle your Saito engine, the following procedure should be followed:

It's important to maintain identification of the “left” and “right” cylinder parts when dismantling and reassembling the engine. Looking forward from the rear of the engine with the engine upright, the cylinder on the right side is indeed the right cylinder. Therefore, the cylinder to the left is, of course, the left cylinder.

1. Cylinder and cam housing screws should be loosened in a criss-cross pattern.

2. Cam Gear Alignment-Refer to the specific section below pertaining to your Saito engine.

FA-60T/90TS

a. The crankshaft alignment mark should line up with the crankcase mark when the crankshaft is at the top dead center. Refer to **Figure 7**.

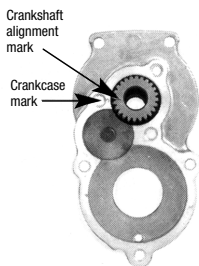


Figure 7

b. Locate the cam gear reference mark and align it with the crankcase mark. See **Figure 8**.

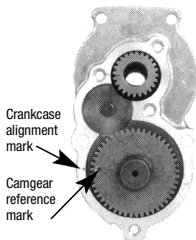


Figure 8

c. Be sure there is a spacer on the counter gear shaft. Next, insert the counter gear onto the shaft, followed by another spacer. During this step

it's important that neither the crankshaft nor the cam gear are moved from their alignment marks. Refer to **Figure 9**.

NOTE: Crankshaft alignment mark and cam gear reference mark are aligned with their respective crankcase marks. This is extremely important.

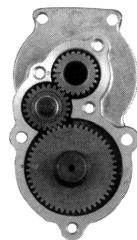


Figure 9 Finished assembly

FA-100T/FA-182TD

a. Viewing the engine from the rear and looking forward, adjust the cam timing beginning with the right cylinder.

b. Position the cam gear timing mark (dot) at the 9 o'clock position (directly into the crankcase) with the right piston at top dead center. Secure the right cam gear housing in place.

c. Rotate the crankshaft counter-clockwise 180 degrees, placing the left piston at top dead center. Refer to **Figure 10**.

1st (Right cylinder)
Proper crankshaft position

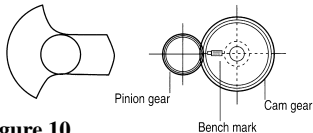


Figure 10

d. Position the left cam gear timing mark (etched line) at the 3 o'clock position (directly into the crankcase) and secure the left cam gear housing. See **Figure 11**.

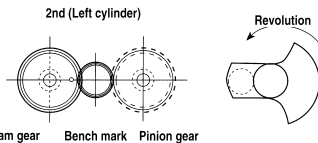


Figure 11

NOTE: When tightening the cam gear housing bolts, apply a drop of oil to each bolt to prevent thread damage. Also, tighten the bolts in a criss-cross pattern to avoid warping.

FA-300TL/FA-300TDP

e. Follow the same procedure as described for the FA-100T/FA130TD/FA-182TD. However, instead of rotating the crankshaft 180 degrees, rotate the crankshaft 360 degrees to place the left piston at the top dead center.

3. Reassemble the piston, rod, rocker arm, pins, pushrod, tappet, etc. in their original positions. Engine parts are mated after running the engine, and they must be reassembled as close as possible to their original position.

4. Assemble the engine reversing the criss-cross pattern used in the disassembly. Prior to tightening each of the screws, apply a drop of oil to prevent thread damage.

5. Adjust the valves to a clearance of .03mm-.10mm (.002"-.004") using the supplied gauge. The valves must be adjusted with the engine cold due to thermal expansion.

NOTE: Valves must be in the closed position.

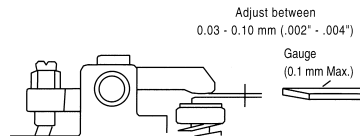


Figure 12 Tappet adjustment

Carburetor Maintenance

Should you experience difficulty with the carburetor of your engine:

1. Remove the high speed needle(s) (85) and flush out the spray bar with clean fuel. Replace the high speed needle(s) and follow the instructions in the carburetor adjustment section.
2. Always use a high-quality 4-cycle glow plug. The Hangar 9/McCoy MC-4C is highly recommended.

Tips For Extended Engine Life

To add longer life to your Saito engine, we recommend the following:

1. Use a fuel containing 20% lubricants.
2. Use the recommended glow plugs.
3. Use the proper propeller size and balance the propeller prior to use.
4. Use a tachometer for precise engine adjustments.
5. Use an “after-run” oil when you’re finished flying for the day.

6. For long-term storage, make sure there is no fuel left in the tank and the engine. Remove the glow plug and apply several drops of high-quality oil (i.e., Marvel Air Tool Oil) to the top of the engine, down the pushrod tubes, and through the crankcase pressure vent if applicable. Rotate the crankshaft several times. Store the engine in the box or on the airplane with the nose down in order to keep oil in the bearings.

Troubleshooting

Generally speaking, there are very few things that will keep today’s modern glow engines from starting. To that end, make sure you’re using good quality “fresh” fuel, there are good glow plugs installed, and the starting battery is charged and in good condition. Should the engine fail to start after these items are verified, refer to the chart on the following page.

SYMPTOM	CAUSE	CORRECTIVE ACTION
Engine fails to fire	Low voltage on starting battery	Replace/recharge the starting battery
	Bad glow plug(s)	Inspect/replace bad glow plug(s)
	Insufficient priming	Repeat priming procedure
	“Flooded” due to excessive priming	Disconnect battery, remove glow plugs, and rotate propeller several times to “clear” cylinder
Engine fires but does not run	Over primed	Disconnect battery and rotate propeller several times to “clear” cylinder
	Incorrect glow plugs	Remove plugs and verify proper heat range
Engine starts but slows down and then stops	Mixture too rich	Close high speed needle valve(s) 1/2 turn and start again. Repeat until engine is running smoothly.
Engine starts, speeds up, and then quits	Mixture too lean	Open high speed needle valve(s) 1/2 turn and start again. Repeat until engine is running smoothly.
Engine quits when starter battery is removed	Mixture too rich	Close high speed needle valve(s) 1/2 turn and restart
	Incorrect glow plugs	Change glow plugs
	Incorrect or bad fuel	Change fuel
Rough idle	Plug	Change plug type

In the event that none of the above procedures results in the engine running properly, contact our service department for suggestions at:

Horizon Service Center
 4105 Fieldstone Road
 Champaign, Illinois 61822
 217-355-9511 (Mon-Fri 8:00-5:00 CST)

TWIN CYLINDER CROSS REFERENCE CHART (2006)

ITEM	P FA-60T	LL FA-90TS	AA FA-100T	DD FA-182TD	Z FA-300TL	W FA-300TDP
01 Cylinder, Left	60T01A	90TS01	100T01	182TD01	300T01A	300TDP01A
02 Cylinder, Right	60T02A	90TS02	100T02	182TD02	300T02A	300TDP02A
06 Piston	60T06A	90TS06	5006	91S06	300T06A	300T06A
07 Piston Pin	60T07	4507A	5007	91S07	120S07	120S07
08 Piston Pin Ret	5008	5008	5008	6508	300T08	300T08
09 Piston Ring	60T09	45S09	5009	91S09	300T09A	300T09A
10 Con Rod	60T10	90TS10	100T10	182TD10	300T10C	300T10C
11 Linked Con Rod	*	*	100T11	182TD11	*	*
12 Conrod Linkpin/Scr	*	*	*	*	*	*
13 Con Rod Screw	60T13	90TS13	*	*	300T13	300T13
14 Cyl Screw Set	60T14	60T14	5014	6514	120S14A	120S14A
15 Crankcase	60T15	90TS15	100T15	182TD15	300T15B	300T15B
17 Rear Cover(A)	60T17	90TS17	*	*	300T17	300T17
18 Rear Cover(B)	60T18	90TS18	*	*	*	*
19 Breather Nipple	6519	6519	5019	6519	6619	*
20 Frt Ball Bearing	5020A	5020A	100T20A	182TD20	300T20A	300T20A
21 Main Ball Bearing	60T21	60T21	*	*	300T21	300T21
22 Rear Ball Bearing	60T22	60T22	100T22A	182TD22	300T22	300T22
23 Crankshaft	60T23A	90TS23A	100T23A	182TD23A	300T23D	300T23D
24 Pinion-crankshaft	*	*	100T24	*	*	*
25 Pinion gear pin	*	*	5025	*	*	*
26 Collar, Crankshaft	*	*	100T26	*	*	*
27 Tapered Collet & Drv	60T27	60T27	6527	120S27A	300T27B	300T27B
28 Prop Wash/Nut	5628	5628	5628	170R328	300T28B	300T28B
29 Prop Nut Spinner	*	*	*	120S29	*	*
30 Prop Nut Elect	5030A	5030A	5030A	120S30	*	*
31 Crankcase Screw S	60T31	60T31	100T31	182TD31	300T31	300TDP31
32 Eng Gasket Set	60T32	60T32	100T32A	182TD32A	300TL32A	300TDP32A
33 Cam Gear Housing	*	*	5033A	182TD33A	300T33	300T33
34 Cam Gear Left	*	*	130T34	182TD34	300T34	300T34
35 Cam Gear Right	60T35	60T35	5035	6535A	120S35	120S35
36 Cam Gear Shaft	*	*	5036A	182TD36A	5036A	5036A
37 Tef/Steel Wash Set	60T37	60T37	5037	5037	120S37	120S37
38 Tappet	5038	5038	5038	5038	120S38	120S38
39 Pushrod	60T39	90TS39	5039	91S39	300T39	300T39
40 Push Rd Cvr Rb sea	60T40	90TS40	5040	60T40	300T40A	300T40A
41 Rocker Arm	60T41	60T41	5041	5041	120S41	120S41
42 Rckr arm scrw nut	60T42	60T42	5042	60T42	300T42	300T42
43 Rckr arm pin	60T43	60T43	5043	5043	120S43	120S43
44 Rckr arm brak left	*	*	*	*	120S44	120S44
45 Rckr arm brak right	*	*	*	*	120S45	120S45
46 Valve in/out	60T48	90TS46	5046	91S46	120S46	120S46
47 Viv spg/kpr/rtr	5047	5047	5047	6547	300T47	300T47
48 Viv Retainer	5048	5048	5048	5048	120S48	120S48
49 Rocker Arm Cover	60T49	60T49	5049A	5049A	120S49	120S49
52 Counter Gear	325R552	325R552	*	*	*	*
53 Counter Gear Shft	60T53	60T53	*	*	*	*
64 Air pump Assy	*	*	*	*	*	*
65 Air pump housing	*	*	*	*	*	*
66 Diap/chk viv rbr set	*	*	*	*	*	*
67 Diap/push rd/retn sp	*	*	*	*	*	*
68 Check valve in/out	*	*	*	*	*	130T68A
69 Intake manifold, rt	60T69	90TS69	100T69	182TD69	300TL69A	*
70 Intake manifold, lft	60T70	90TS70	100T70	182TD70	300TL70B	*
71 Intake manifold nut	60T71	100T71	100T71	182TD71	300TL71	*

TWIN CYLINDER CROSS REFERENCE CHART (2006)

ITEM	P FA-60T	LL FA-90TS	AA FA-100T	DD FA-182TD	Z FA-300TL	W FA-300TDP
72 Intake manif w/prim	*	*	*	*	*	*
73 Muffler, Left	60T73B	90TS73	100T73	182TD73	300T73B	300T73B
74 Muffler, Right	60T74B	90TS74	100T74	182TD74A	300T74B	300TDP74B
79 Muffler gasket	60T79	60T79	60T79	325R579	300T79	300T79
80 Muffler nut	60T80	60T80	60T80	325R580	300T80	300T80
81 Priming harness	*	*	*	182TD81	*	*
821 Carb comp left	60T821C	90TS821C	100T821	182TD821	300T821C	300TDP821B
822 Carb comp Right	*	*	*	*	*	300TDP822B
831 Carb body assy lft	60T831A	90TS831	100T831	182TD831	300T831B	300TDP831A
832 Carb body assy rt	*	*	*	*	*	300TDP832A
84 Spray bar assy	60T84	60T84	*	*	450R3D84A	450R3D84A
85 High spd need vlv	60T85	90TS85	100T85	182TD85	120S85A	120S85A
86 High spd nd viv ext	5086	5086	100T86	100T88	5086	100T86
87 Throttle barr assy	60T87A	90TS87A	100T87	182TD87	300T87A	300TDP87A
88 Throttle lever	60T88B	60T88B	100T88	182TD88	300T88A	300TDP88A
89 Idle needle valve	60T89	60T89	100T89	182TD89	120S89	120S89
90 Carb scr/spring set	60T90A	90TS90A	100T90	182TD90	120S90A	120S90A
91 Carb gasket set	60T91	90TS91	100T91	182TD91	300T91A	300TDP91
92 Choke Valve assy	60T92	*	100T92	*	120S92	120S92
93 Intake velocity stk	*	*	*	182TD93	120S93	120S93
94 Glow plug harness	60T94	60T94	60T94	300T94	300T94	300T94
95 Engine mount	60T95A	60T95A	*	*	325R595A	325R595A
96 Tool set	60T96	60T96	100T96	182TD96	300T96	300TDP96
97 Instruction Manual	saiman2	saiman2	saiman2	saiman2	saiman2	saiman2
99 Muffler bracket	60T99	60T99	60T99	300T99A	300T99A	300T99A
101 Twin carb cont asy	*	*	*	*	*	300TDP101
102 Fuel pump system	*	*	*	*	*	300TDP102
103 Carb fitt flange/scr	*	*	*	*	*	300TDP103
104 Cam gear ber, rear	60T104	60T104	*	*	*	*
105 Cam gear ber, Frt	60T105	60T105	*	*	*	*
106 Cam gear ber shiel	60T106	60T106	*	*	*	*
107 Carb bracket	*	*	*	*	300TL107	*
109 Fuel Filter	50109	50109	50109	50109	50109	50109
110 Anti-loos Prop nut	56110	56110	56110	170R3110	300T110	300T110
111 Flex Exh Pipe	*	*	*	182TD111	*	*
116 M3 Nut for spinner	50116	*	*	*	*	*
117 M4 Nut	65117	65117	65117	120S117	*	*
118 M5 Nut	65118	65118	65118	120S118	*	*
119 Rear Cvr/w int mm	*	50120B	100T119B	182TD119	*	*
120 SAIIP400S Glow pl	50120B	*	50120B	50120B	50120B	50120B
121 Crank pin spacer	*	60T122	100T121	*	*	*
122 Spr bar w/p2/p5	60T122	50123	100T122	*	*	*
123 Rub bush PRC U	50123	50124	50123	50123	300T123	300T123
124 Rub bush PRC L	50124	*	50124	50124	120S124	120S124
125 Muffler (right) Opt	*	50126	*	*	*	*
126 Needle stopper/nut	50126	90TS131	56135	50126	120S126	120S126
131 Thro Viv Ext Adpt	*	56135	50139	*	*	*
135 Prop w/nut/entl nu	56135	50139	100T140	170R3135	300T135	300T135
139 Valve Guide	50139	100T140	50143	65139	120S139	120S139
140 Muff Rt Angle Adp	100T140	50143	*	65140	120S140	120S140
143 Flex exh pipe w/zn	50143	*	100T147	65143	120S143	120S143
145 Spbr w/int P2-O*	*	30S147	*	*	120S145	120S145
147 Carburelor nipple	30S147	*	*	30S147	30S147	30S147

Propeller Selection

Below you will find a propeller selection chart. This chart will enable you to select the best propeller for initial set-up of your Saito engine.

Remember, it is imperative to balance each propeller prior to installation onto your Saito engine.

Failure to do so may cause unwanted vibration in your aircraft.

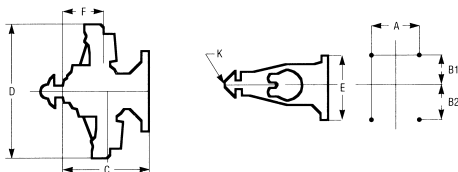
You will note a letter (A, B, C, etc.) stamped on the top of the motor mount. This letter identifies the production version of your engine. Should you ever need to order a part or have a question pertaining to your engine, specify this letter along with the engine type. This will allow ease in identifying your engine.

Saito Twin Cylinder Prop Chart

NOTE: All recommendations are based on engines using APC props, Power Master 15% 2-stroke fuel, and Saito SAIP 400S glow plugs.

ENGINE	SPORT	SCALE
FA-60T 2,000-10,500 rpm	10×6, 10×7 11×5, 11×6, 12×5	11×5, 11×6, 12×4 12×5
FA-90TS 2,000-10,000 rpm	12×8, 13×6, 13×8	13×8, 14×6
FA-100T 2,000-10,500 rpm	12×8, 13×6, 14×6	14×6
FA-182TD 2,000-10,500 rpm	14×12, 14×10, 15×10 15×8, 16×6, 16×8	16×6, 16×8, 16×10 18×6
FA-300TL/300TTDP 2,000-5,000 rpm	18×10, 20×8, 20×10 20×12, 22×8, 22×10	20×8, 20×10, 22×8 22×10, 24×8

NOTE: Observe operating rpm ranges as excessive rpm can result in damage to the engine.

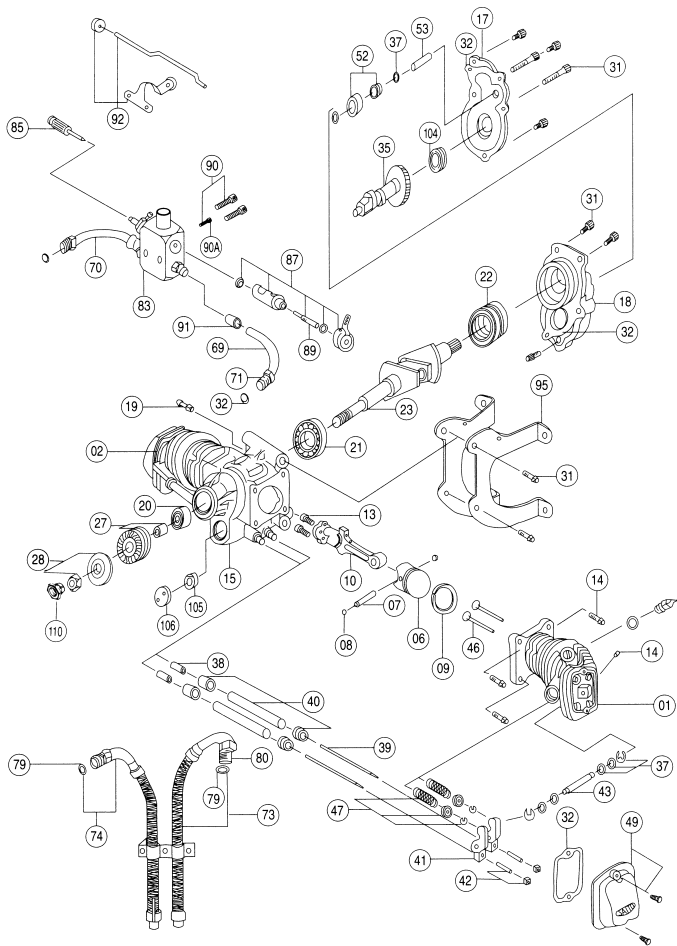

OUTSIDE DIMENSIONS (mm)

Items	A	B1	B2	C	D	E	F
FA-60 Twin Cylinder	61	10	43	125	160	64	50
FA-90TS Twin Cylinder	61	10	42	121	170	64	52
FA-100 Twin Cylinder	50	35	35	100	169	80	63
FA-182 Twin Cylinder/Dual Plugs/Dual Carb	70	28	28	133	195	81	73
FA-300 Twin Cylinder	112	30	49	175	233	92	83
FA-300 Twin Cylinder/Dual Plugs/Fuel Pump/Dual Carb	112	30	49	175	233	102	83

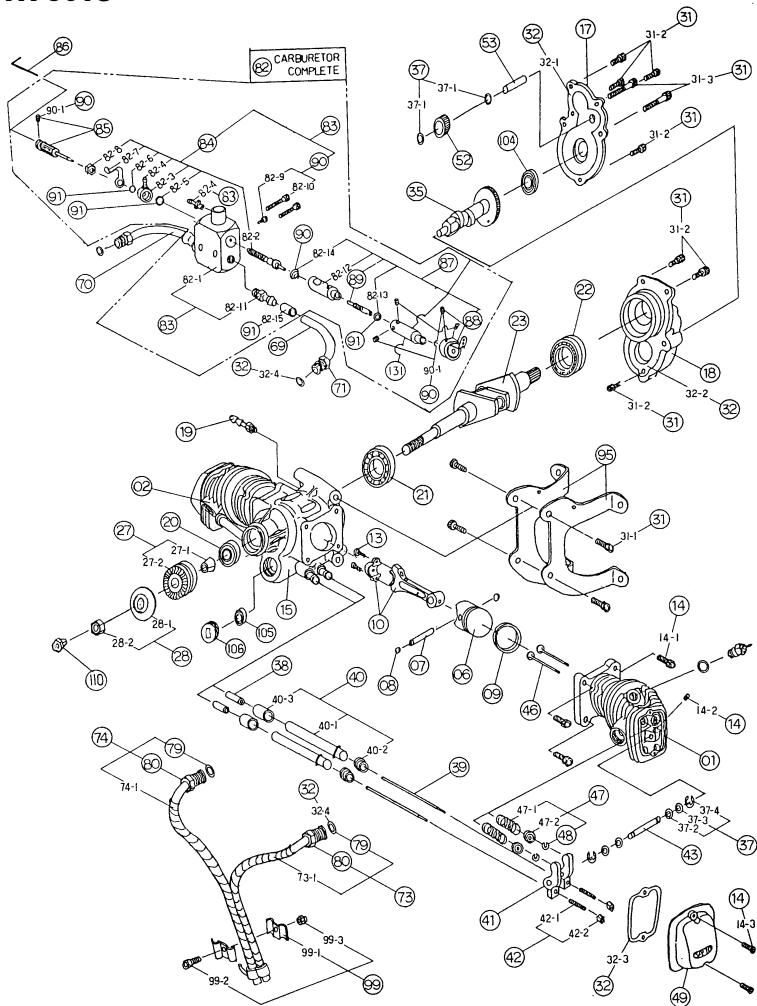
SPECIFICATIONS

Items	Disp (cc)	Bore (mm)	Stroke (mm)	Weight (g)	K (ISO)	Cylinder	HP
FA-60 Twin Cylinder	10.0	20.0	16.0	750	M7x1	5ccx2 ABC	0.9
FA-90TS Twin Cylinder	14-98	22.4	19.0	723	M7x1	7.4x2AAC	1.4
FA-100 Twin Cylinder	16.4	23.4	19.0	820	M7x1	8.2ccx2 ABC	1.6
FA-182 Twin Cylinder/Dual Plugs/Dual Carb	29.98	28.2	24.0	1,040	M8x1.25	14.99ccx2 AAC	2.8
FA-300 Twin Cylinder	50.0	34.0	28.0	1,750	M10x1.25	25ccx2 AAC	4.7
FA-300 Twin Cylinder/Dual Plugs/Fuel Pump/Dual Carb	50.0	34.0	28.0	1,800	M10x1.25	25ccx2 AAC	4.8

FA-60T

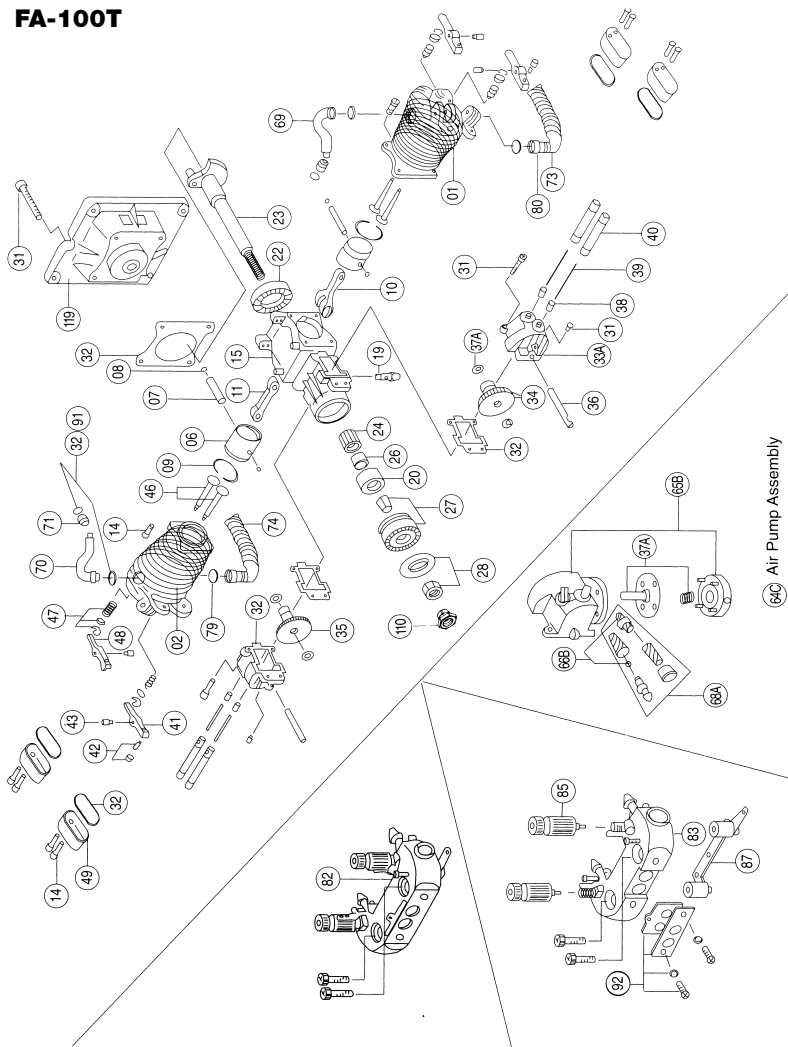


FA-90TS

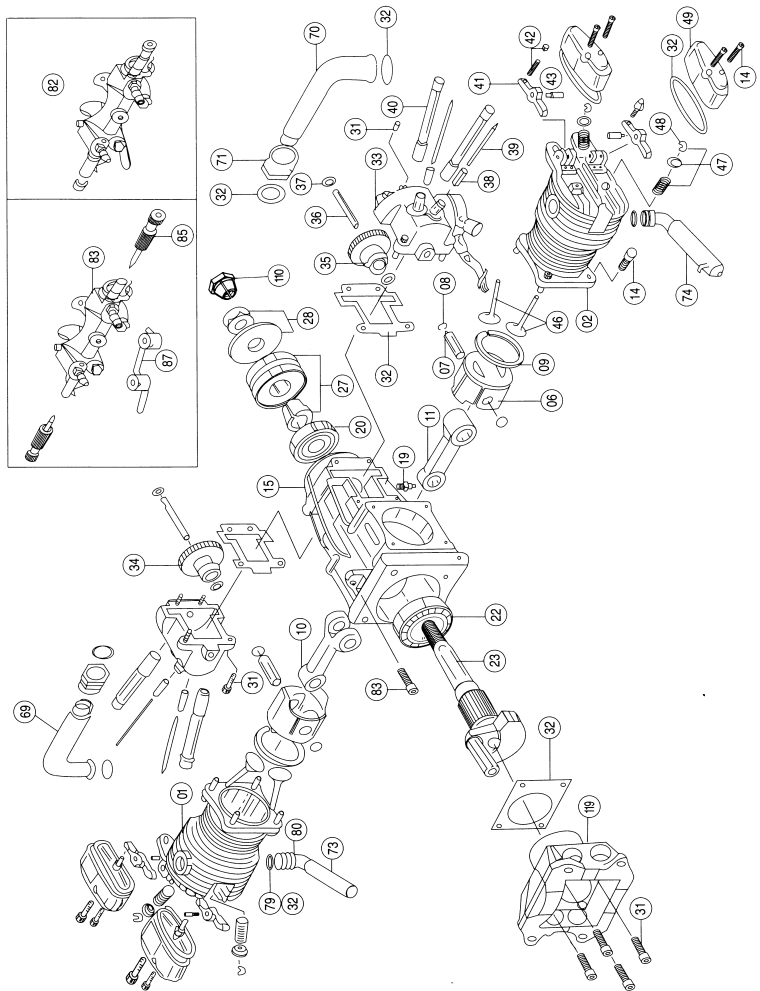


22 PARTS LIST

FA-100T

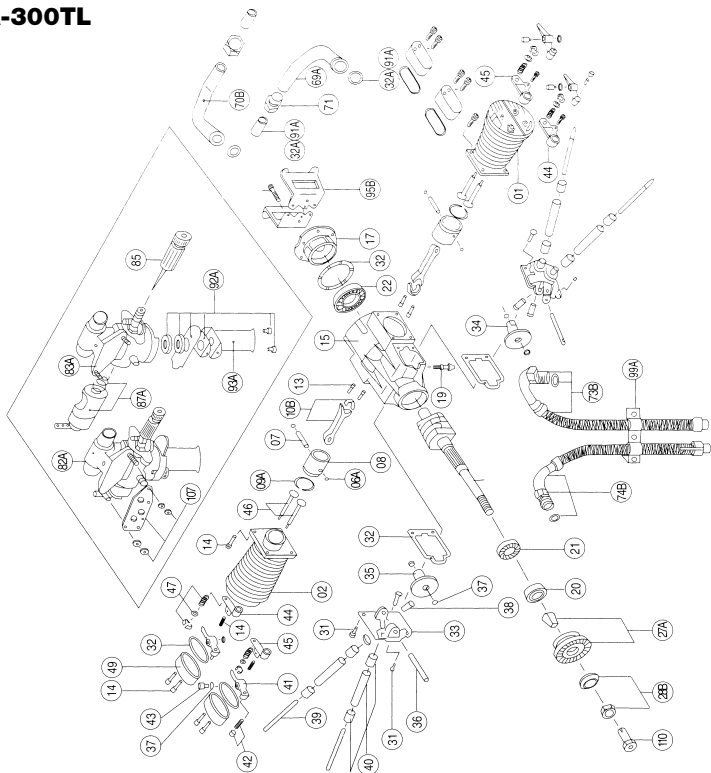


FA-182TD

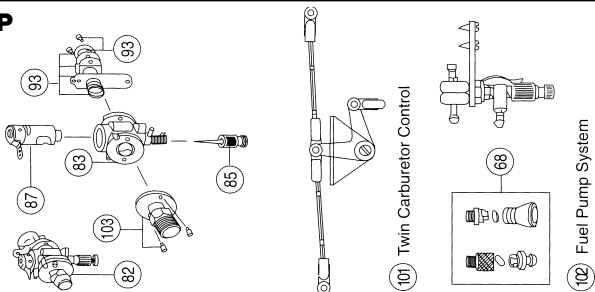


24 PARTS LIST

FA-300TL



FA-300TDP



Consumer Warranty and Repair Policy

Saito engines are guaranteed against workmanship and manufacturing defects for a period of 3 years from the original date of purchase. This warranty is limited to the original purchaser of the engine and is not transferable. *Warranty repairs will not cover:*

- Normal engine wear
- Damage due to insufficient maintenance
- Damage related to overrevving of engine due to small prop size or unreasonable use
- Rusted bearings
- Crash damage
- Damage due to use of improper fuel and/or glow plug
- Damage due to lean runs such as rusted bearings, seized connecting rod or piston, etc.
- Damage caused by foreign objects (dirt or broken glow plug filaments)
- Damage caused by unreasonable mounting or running conditions (dust, insufficient cooling, improper mounting, improper propeller size or lack of balancing, etc.)
- Damage due to improper disassembly
- Modifications of any kind

If your engine needs repair, please do the following:

1. Ship your engine, freight prepaid, in its original box packed inside a sturdy shipping container, to:

Horizon Service Center
Attn: Saito Service
4105 Fieldstone Road
Champaign, IL 61822
Phone:(217)355-9511

Include complete name and address information inside the carton, as well as clearly writing it on the outer label/return address area.

2. Include a note containing a brief summary of the difficulty experienced and include the following information:

- Nitro content and brand of fuel
- Propeller size and brand used
- Type of glow plug used
- Type of engine mount
- Approximately how much running time the engine had before experiencing the difficulty

Date your correspondence and be sure your name and address appear on this enclosure. Also, include a phone number where you can be reached during the business day.

3. Warranty Repairs

To receive warranty service you must include your original dated sales receipt to verify your proof-of-purchase date. Providing that warranty conditions have been met, your engine will be repaired without charge.

4. Non-Warranty Repairs

Should your repair cost exceed 50% of the retail purchase cost, you will be provided with an estimate advising you of your options. Any return freight for non-warranty repairs will be billed to the consumer.

- 5.** Please advise us of the payment method you prefer to use. Please specify VISA or MasterCard, or we can return C.O.D. cash only. If you prefer to use a credit card, include your card number and expiration date.

The consumer warranty registration card in this manual must be completely filled out and mailed to:

Horizon Service Center
Attn: Saito Warranty
4105 Fieldstone Road
Champaign, IL 61822

Consumer Warranty Registration

Complete this form and mail along with your dated sales receipt (send copy, keep original for your files) within 10 days of purchase to: Horizon Service Center

Attn: Saito Warranty Dept.
4105 Fieldstone Road
Champaign, IL61822

Engine Type _____

Date of Purchase _____

Owner's Name _____

Street Address _____

City/State/Zip _____

Daytime Phone Number _____

Purchased From: _____

Dealer's Name _____

Street Address _____

City/State/Zip _____

Please cut on dotted line.





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