



## TWIN-CYLINDER FOUR-STROKE ENGINES

### INSTRUCTION MANUAL



- FA-60T
- FA-90TS
- FA-100T
- FA-130TD
- FA-182TD
- FA-300TL
- FA-300TTDP

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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 “chicken 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.

**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 “chicken stick” 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 12V Heavy-Duty Super Starter (HAN110) 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:

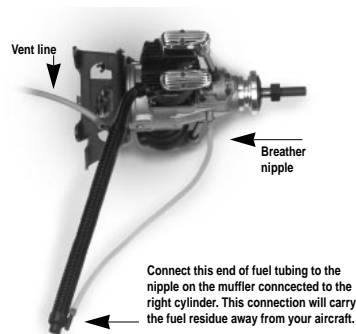
1. Use a break-in fuel as described in the “Support Equipment” Section on page 3 of this manual.
2. Use the proper glow plugs. Your engine includes the Hangar 9/McCoy MC-4C (HAN3010) glow plugs, which are also the standard replacement glow plugs for these engines.
3. Select the correct propeller. To 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 a tachometer is highly recommended since the adjustment of a 4-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

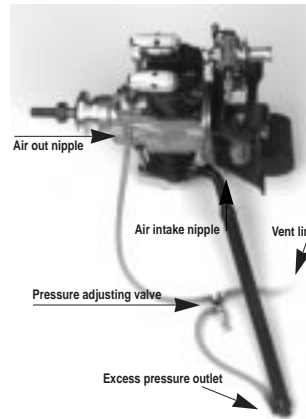
1. Make sure the glow plugs are installed and tightened.
2. Be sure the propeller is properly secured. The use of a “jam nut” is encouraged on 4-cycle engines.
3. Make sure the fuel tank line(s) are properly connected. The main line should be connected to the carburetor spray bar (84).

**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.

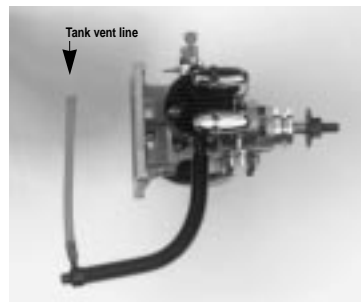
Connect the fuel tank lines as shown in **Figures 1, 2 and 3.**



**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:

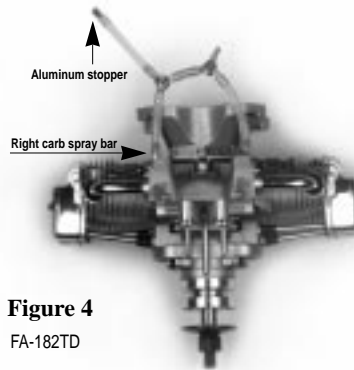
- check to make sure the glow plugs are not connected to the heat source (glow plug clip/locking socket)
- open throttle fully
- close choke valve (92), if applicable
- rotate propeller in a counter-clockwise direction 2–3 times or until fuel begins to drain from the carburetor
- open choke valve (92),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

**NOTE:** The 90-TS is primed by inserting approximately 1–2cc of fuel into the priming nipple on the carburetor with a syringe.

**NOTE:** This process is not applicable for owners of the Saito FA-130 and 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**.

7. Start the engine:

- close the throttle to  $\frac{1}{4}$ – $\frac{1}{3}$  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:** 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 “chicken 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 “hydro-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 “chicken 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.

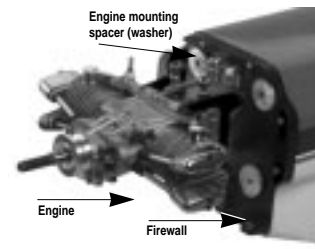
**NOTE:** Due to the excessively “rich” mixture setting, it may be necessary to leave the heat source attached to the glow plugs.

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 airbleed 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 airbleed style carburetors, rotating the airbleed screw clockwise will richen the mixture. If the airbleed 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 airbleed screws counterclockwise)  $\frac{1}{4}$  to  $\frac{1}{2}$  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 airbleed screws clockwise)  $\frac{1}{4}$  to  $\frac{1}{2}$  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 airbleed screws clockwise), try turning the idle needle valve clockwise (or airbleed screws counterclockwise) in  $\frac{1}{4}$  to  $\frac{1}{2}$  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-130TD/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.

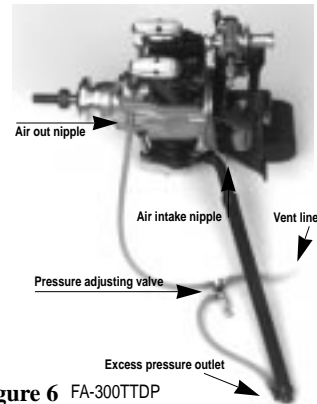
### *Idle Needle Valve Adjustment*

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-130TD or 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:

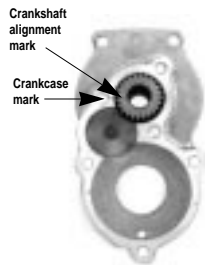
It’s important to maintain identification of the “left” and “right” cylinder parts when dismantling and reassembling the engine. Looking forward from the rear of the engine with the engine upright, the cylinder on the right side is indeed the right cylinder. Therefore, the cylinder to the left is, of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

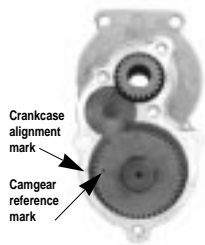
**FA-60T/90TS**

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.



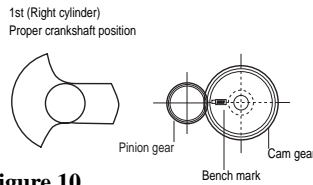
**Figure 9** Finished assembly

**FA-100T/FA-130/FA-182TD**

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

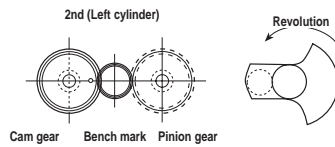
b. Position the cam gear timing mark (dot) at the 9 o'clock position (directly into the crankcase) with the right piston at top dead center. Secure the right cam gear housing in place.

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



**Figure 10**

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**

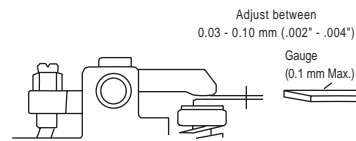
e. Follow the same procedure as described for the FA-100T/FA130 TD/ FA-182TD. However, instead of rotating the crankshaft 180 degrees, rotate the crankshaft 360 degrees to place the left piston at the top dead center.

**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–.10 mm (.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.
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.

### 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.

### 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
<b>Engine fails to fire</b>	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
<b>Engine fires but does not run</b>	Over primed	Disconnect battery and rotate propeller several times to “clear” cylinder
	Incorrect glow plugs	Remove plugs and verify proper heat range
<b>Engine starts but slows down and then stops</b>	Mixture too rich	Close high speed needle valve(s) 1/2 turn and start again. Repeat until engine is running smoothly.
<b>Engine starts, speeds up, and then quits</b>	Mixture too lean	Open high speed needle valve(s) 1/2 turn and start again. Repeat until engine is running smoothly.
<b>Engine quits when starter battery is removed</b>	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
<b>Rough idle</b>	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)

# 16 TROUBLESHOOTING

## Twin Cylinder Cross Reference Chart

PART	P FA-60T	LL FA-90TS	AA FA-100T	S FA-130TD	DD FA-182TD	Z FA-300TL	W FA-300TDP
01 Cylinder, Left	60T01	90TS01	100T01	130TD01A	182TD01	300T01	300TTDP01A
02 Cylinder, Right	60T02	90TS02	100T02	130TD02A	182TD02	300T02	300TTDP02A
06 Piston	60T06	90TS06	5006	6506	91506	300T06A	300T06A
07 Piston Pin	60T07	4507A	5007	6507	91507	12007	12007
08 Piston Pin Retainer (6 Pc)	4008	5008	4008	6508	6508	300T08	300T08
09 Piston Ring	60T09	45S09	5009	6509	91509	300T09A	300T09A
10 Connecting Rod	60T10	90TS10	90T10	130T10	182TD10	270T10C	270T10C
11 Linked Connecting Rod	—	—	90T11	130T11	182TD11	—	—
13 Connecting Rod Screw	60T13	90TS13	—	—	—	270T13	270T13
14 Cylinder Screw Set	60T14	60T14	4014	6514	6514	12014	12014
15 Crankcase	60T15	90TS15	100T15	130T15	182TD15	270T15A	270T15A
17 Rear Cover (A)	60T17	90TS17	—	130T17	—	270T17A	270T17A
18 Rear Cover (B)	60T18	60T18	—	—	—	—	—
19 Breather Nipple	60T19	6519	4019	4019	6519	4019	—
20 Front Ball Bearing	60T20	5020A	65GK20	8020	182TD20	270T20	270T20
21 Main Ball Bearing	60T21	60T21	—	—	—	270T21	270T21
22 Rear Ball Bearing	60T22	60T22	4022	6522A	182TD22	270T22	270T22
23 Crankshaft	60T23	90TS23	100T23	130T23	182TD23	270T23B	270T23B
24 Pinion-Crankshaft	—	—	4024	—	—	—	—
25 Pinion Gear Pin	—	—	4025	—	—	—	—
26 Collar, Crankshaft	—	—	90T26	—	—	—	—
27 Tapered Collet & Drive Flange	60T27	60T27	6527	130T27A	12507	270T27B	270T27B
28 Prop Washer & Nut	5028	5628	5028	12028A	12028A	270T28A	270T28A
29 Prop Nut, Spinner	—	—	—	12029	—	—	—
30 Prop Nut, Electric Starter	—	5030A	5030	—	—	—	—
31 Crankcase Screw Set	60T31	60T31	90T31	130T31	182TD31	300T31	270TTDP31
32 Engine Gasket Set	60T32	60T32	90T32	130T32	182TD32	300TL32A	300TTDP32
33 Cam Gear Housing	—	—	5033A	130T33A	182TD33	300T33	300T33
34 Cam Gear, Left	—	—	130T34	130T34	182TD34	300T34	300T34
35 Cam Gear, Right	60T35	60T35	5035	5035	6535A	120S35	120S35
36 Cam Gear Shaft	—	—	4036	4036	182TD36	4036	4036
37 Teflon/Steel Washer Set	60T37	60T37	90T37A	90T37A	182TD37	120S37	120S37
38 Tappet (2 Pc)	5038	5038	5038	5038	5038	120S38	120S38
39 Pushrod (2 Pc)	60T39	90TS39	5039	6539	91539	300T39	300T39
40 Pushrod Cover Rubber Seal (Pr)	60T40	90TS40	5040	6540	60T40	300T40	300T40
41 Rocker Arm (Pr)	60T41	60T41	4041	4041	4041	12041	12041
42 Rocker Arm Screw Nut (2 Sets)	4042	5042	4042	4042	4042	300T42	300T42
43 Rocker Arm Pin (2 Pc)	60T43	60T43	4043	4043	4043	12043	12043
44 Rocker Arm Bracket, Left	—	—	—	—	—	12044	12044
45 Rocker Arm Bracket, Right	—	—	—	—	—	12045	12045
46 Valve-In/Out (Pr)	60T46	90TS46	5046	6546	91546	120S46	120S46
47 Valve Spring, Keeper, Retainer (2 Sets)	5047	5047	5047	6547	6547	300T47	300T47
48 Valve Retainer (4 Pc)	5048	5048	5048	5048	5048	120S48	120S48
49 Rocker Arm Cover (Pr)	60T49	60T49	40S49	4049	40S49	120S49	120S49
52 Counter Gear	325R552	325R552	—	—	—	—	—
53 Counter Gear Shaft	60T53	60T53	—	—	—	—	—



## 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.*

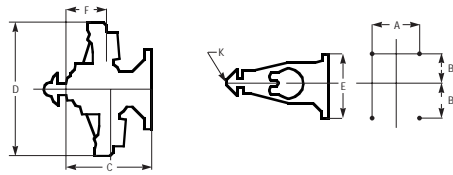
### Saito Twin Cylinder Prop Chart

*NOTE: All recommendations are based on engines using APC props, Power Master 15% 2-stroke fuel, and McCoy MC-4C glow plugs.*

ENGINE	SPORT	SCALE
FA-60T 2000-10,500 rpm	10x6, 10x7 11x5, 11x6, 12x5	11x5, 11x6, 12x4 12x5
FA-90TS 2,000-10,000 rpm	12x8, 13x6, 13x8	13x8, 14x6
FA-100T/130TD 2000-10,500 rpm	12x8, 13x6, 13x8 14x6	13x8, 14x6, 14x8 15x4, 15x5
FA-182TD 2000-10,500 rpm	14x12, 14x10, 15x10 15x8, 16x6, 16x8	16x6, 16x8, 16x10 18x6
FA-300TL/300TTDP 2000-6000 rpm	18x10, 20x8, 20x10, 20x12, 22x8, 22x10	20x8, 20x10, 22x8 22x10, 24x8

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

PROPELLER SELECTION 19

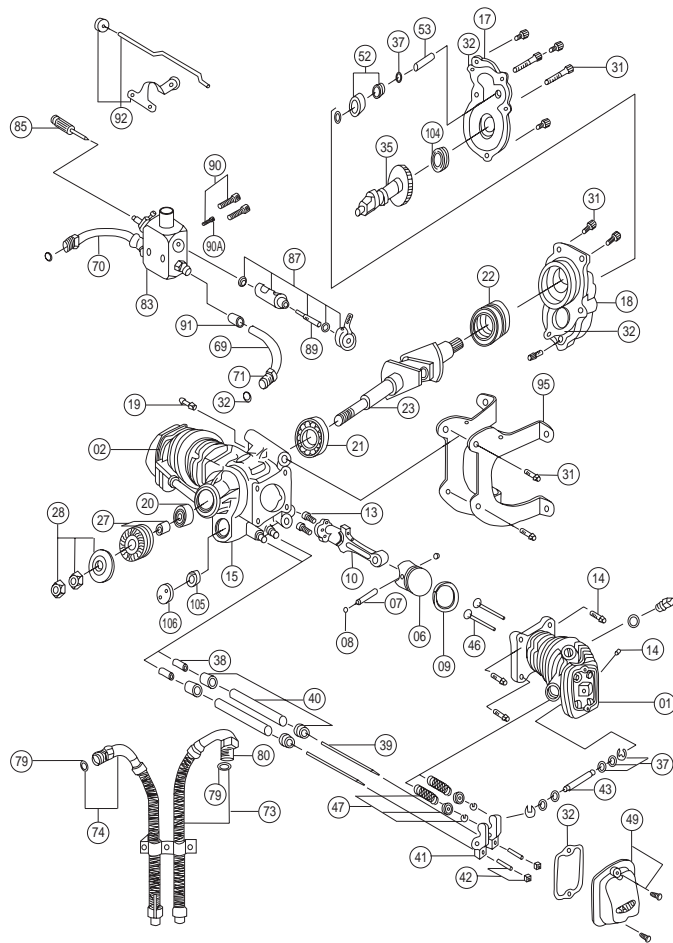


OUTSIDE DIMENSIONS (mm)							
Items	A	B1	B2	C	D	E	F
FA-60 Twin Cylinder	61	10	43	125	160	64	50
FA-90TS Twin Cylinder	61	10	42	121	170	64	52
FA-100 Twin Cylinder	50	35	35	100	169	80	63
FA-130 Twin Cylinder/Dual Plugs	78	30	43	131	188	82	68
FA-182 Twin Cylinder/Dual Plugs/Dual Carb	70	28	28	133	195	81	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

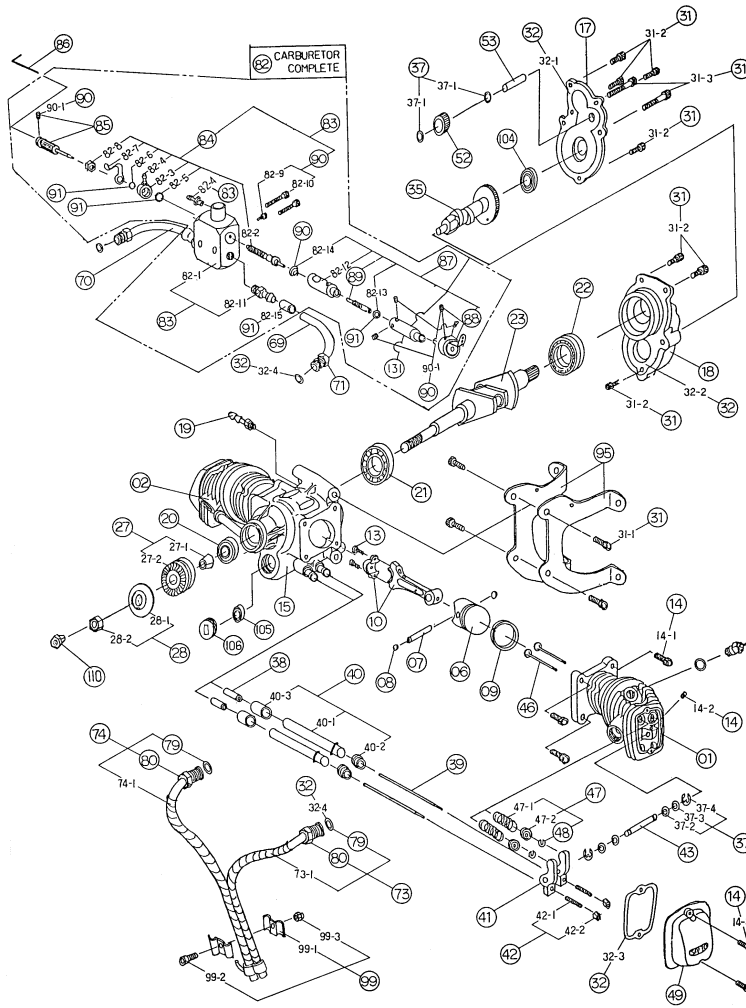
SPECIFICATIONS							
Items	Disp (cc)	Bore (mm)	Stroke (mm)	Weight (g)	K (ISO)	Cylinder	HP
FA-60 Twin Cylinder	10.0	20.0	16.0	750	M7x1	5ccx2 ABC	0.9
FA-90TS Twin Cylinder	14.98	22.4	19.0	723	M7x1	7.4x2AAC	1.4
FA-100 Twin Cylinder	16.4	23.4	19.0	820	M7x1	8.2ccx2 ABC	1.6
FA-130 Twin Cylinder/Dual Plugs	21.2	24.8	22.0	1,300	M8x1.25	10.6ccx2 ABC	1.9
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

20 ENGINE SPECS  
FA-60T

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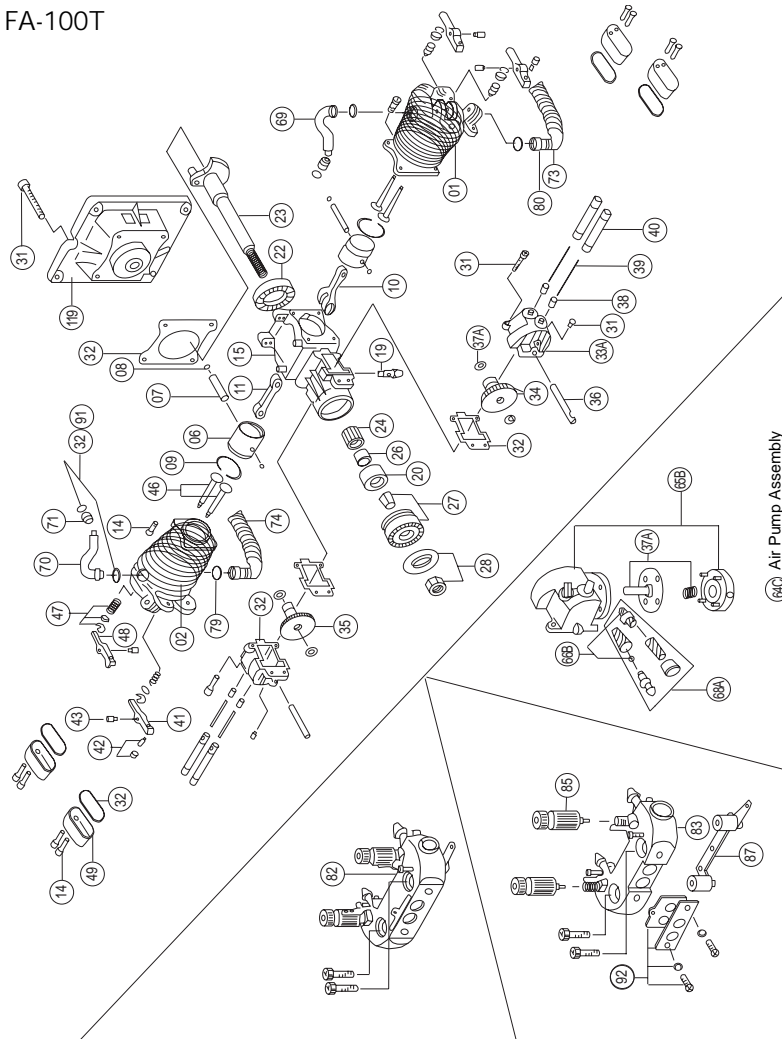


FA-90TS



# 22 P A R T S L I S T

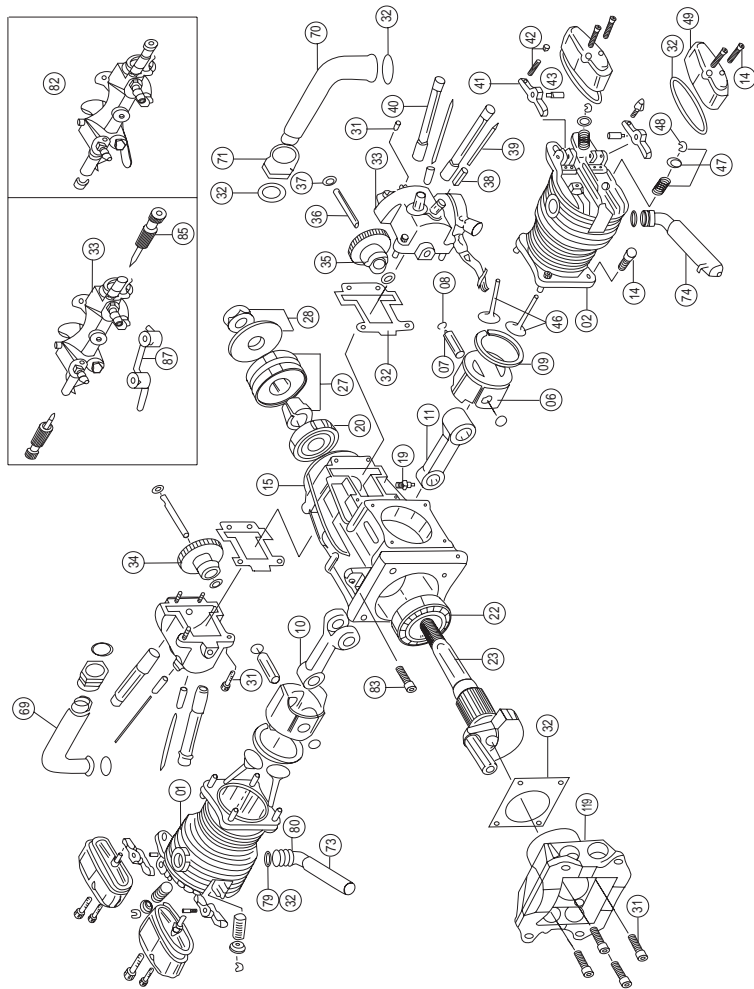
FA-100T



80C Air Pump Assembly

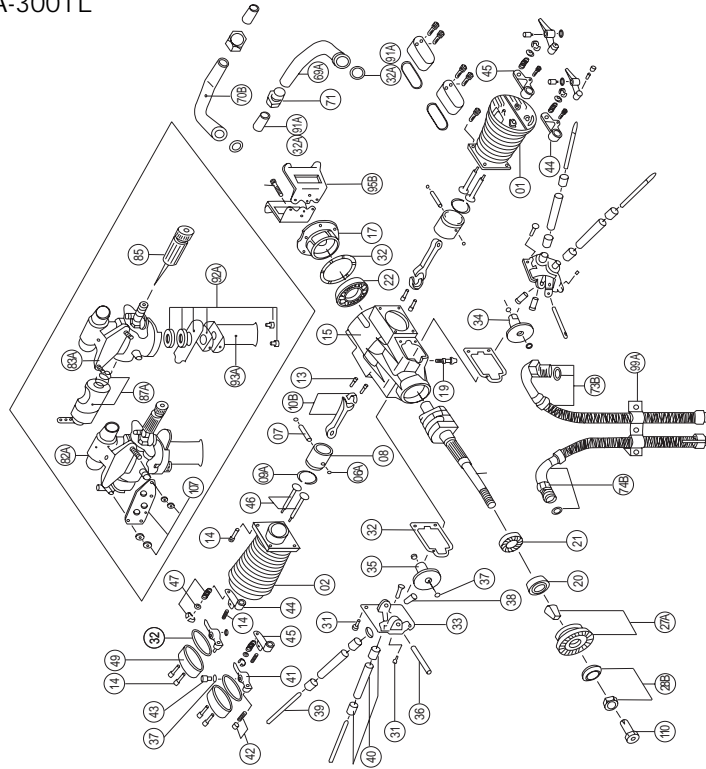


FA-182TD

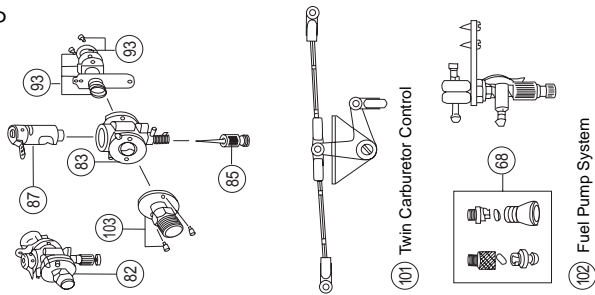


# 24 P A R T S L I S T

## FA-300TL



## FA-300TTDP





## 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

Fill in and mail this form 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, IL 61822

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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