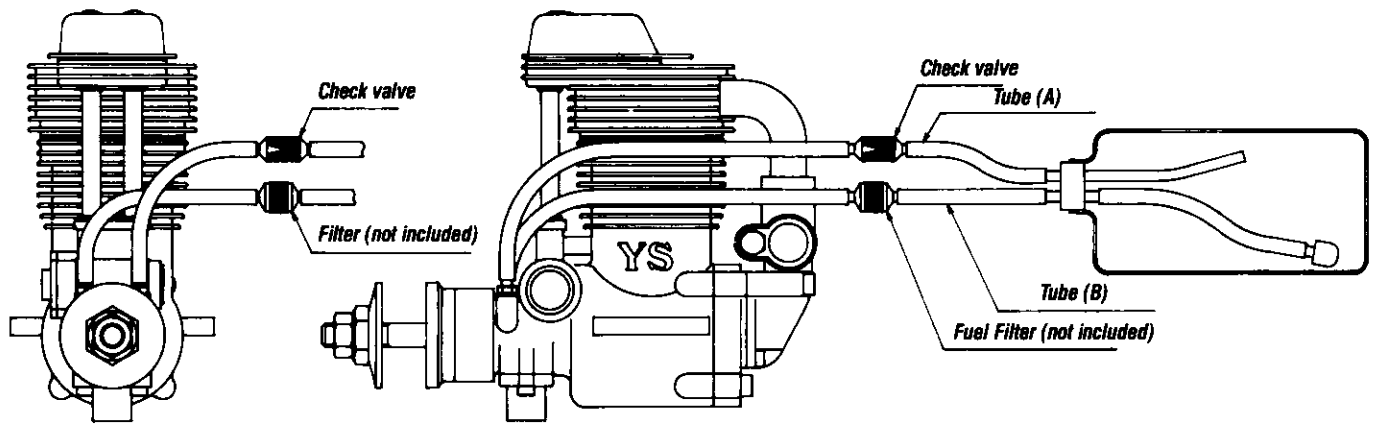


OPERATOR'S MANUAL

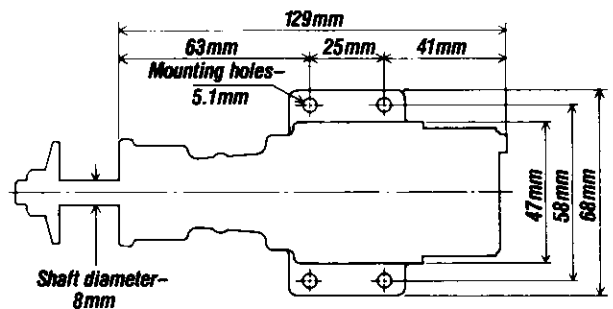
YS.Futaba 120SF (Supercharged. Part No. YS0070)

FIG. 1



SPECIFICATIONS

Bore	30.4mm
Stroke	27.5mm
Displacement	19.96cc
Weight	950g
Practical rpm	2,000-12,500rpm



FEATURES

The YS.Futaba 120SF is a four cycle engine designed primarily for F3A aerobatics, contest pattern flying and scale competition models.

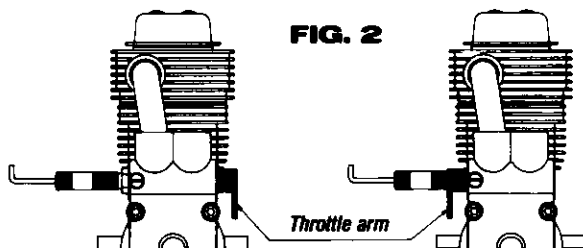
The 120SF is the first four cycle engine to be equipped with a miniature supercharger specially designed for model aircraft. The YS.Futaba supercharger uses crankcase pressure combined with a double throttle valve system for exceptional 4-stroke performance.

Also incorporated into the 120SF is the exclusive YS Variable Pressurization System (VPS) fuel injection. Another first for four cycle engines, the VPS fuel injection provides precisely metered fuel flow regardless of engine speed, tank location or pattern maneuver.

INSTALLATION

1. Connect the engine to the tank as shown in fig. 1. Since high pressure is applied to the tank, tighten all connections carefully. Care must be taken to prevent pressure leakage due to undertightening of the check valve or by kinking the fuel lines.
2. Always use a fuel filter. We recommend the YS.Futaba filter.
3. Match the direction of the check valve arrow to fig. 1, with the arrow facing towards the tank.
4. Throttle arm can be installed on either the left or right side of the carburetor. See fig. 2.

FIG. 2



GLOW PLUG

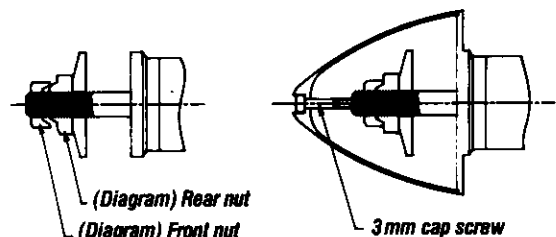
Select the most appropriate glow plug from those designed specifically for 4 cycle engines. Glow plug selection greatly affects the maximum engine output and low idle. If RPM's decrease or stop when the booster cord is removed, replace the plug. We recommend OS type F or Enya No. 3 glow plugs.

PROPELLER INSTALLATION

Due to the high torque of the 120SF engine, we have equipped it with double locknuts for safety.

1. Mount the propeller and tighten the rear nut with the wrench supplied with the engine. Next, tighten the front nut as shown in fig. 3.
2. When using a spinner, the spinner can be screwed into the 3mm threaded hole in the crankshaft with a 3mm screw as shown in fig. 4.

FIG. 3



3. Select a good quality propeller that will turn in the 8,000 to 12,500 RPM range. We recommend sizes 13x11-12, 13.5x11-12 or 14x8-10.

START-UP

1. Remove tube (B) from the filter; remove tube (A) from the check valve, then fill the tank.

2. Open the needle valve two turns from the fully closed position.
3. Open the throttle fully and slowly turn the propeller ten turns. This primes the system by pressurizing the tank and sending fuel to the carburetor.
4. Pour several drops of fuel into the carburetor.
5. Close the throttle to the idle position and connect the glow plug cord. The engine is now ready for starting.

Do not attempt to start at full throttle, as this is very dangerous.

BREAK-IN

To maximize engine performance and increase durability, please follow this break-in procedure:

1. Use the same size (or slightly smaller) propeller than you intend to use in flying.
2. Use a good quality fuel which contains 10-15% nitromethane and an oil content of 15-20%. Synthetic or castor oil can be used, or a combination of synthetic and castor.
3. During the break-in procedure, leave throttle at full open position.
4. The needle valve should be set so that the engine is running at a rich setting. Run the engine approximately 20 minutes with this setting.
5. Mount the engine to the model and fly ten times with this setting. This concludes the break-in procedure. It is advisable to always use a slightly rich setting to keep the moving parts lubricated, even after the break-in period.

HIGH SPEED ADJUSTMENT

1. Adjustment of high speed is done by the carburetor needle valve. When the needle valve is turned clockwise, the mixture is leaner. When it is turned counterclockwise, the mixture is richer.
2. When the engine is started, open the throttle gradually. Next, find the peak position (highest RPM) by adjusting the needle valve. Then the needle valve should be opened approximately $\frac{1}{8}$ of a turn from full RPM to achieve best performance. The engine may stop if the throttle is opened to full immediately after starting. Wait until the engine temperature rises and then open the throttle slowly.
3. For flying, it is advisable to use a slightly richer mixture setting. By using a richer mixture, the engine temperature is maintained and RPM stability improves.

LOW SPEED ADJUSTMENT

Regulator adjustment of the low speed is factory preset. No adjustment is required until after the break-in period. After break-in, use this procedure if necessary:

1. The adjustment of low speed revolution is done by the diaphragm-regulator valve screw. When the regulator screw is turned clockwise, the mixture is leaner. When it is turned counterclockwise, the mixture is richened.
2. The regulator should be set after the high speed needle valve has been set. Close the throttle gradually and then let idle for approximately ten seconds. Then fully open the throttle. The adjustment is satisfactory at low speed if transition is smooth at this time. If the throttle is quickly opened and the fuel mixture is too rich, turn adjustment screw clockwise $\frac{1}{8}$ to $\frac{1}{4}$ turn at a time to achieve smooth throttle response. If the mixture is too rich it is possible to stop the engine (flooding) when the throttle is open.

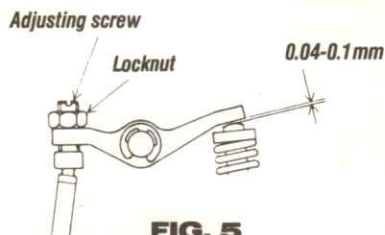


FIG. 5

TAPPET CLEARANCE ADJUSTMENT

1. Tappet clearance is factory preset. No adjustment is necessary until after 1 hour of operation (including break-in period).
2. Clearance adjustment should be done when the engine is cool. When the engine temperature is high, clearance is higher due to thermal expansion.
3. The proper clearance setting should be at 0.04-0.1 mm. The adjustment is achieved by loosening the locknut (fig. 5) and turning the adjusting screw. Tighten the locknut after the adjustment is achieved. After the initial 1 hour adjustment, this procedure should be performed after every 2 hours of use.

CAM GEAR TIMING ADJUSTMENT

If for some reason you have to disassemble your engine, please follow these important steps on reassembling the cam gear box.

1. Turn drive washer so the piston is at top dead center. This can be accomplished by aligning the "I" mark on the drive washer to the top of the mold line on the engine front case.
2. When re-installing the cam gear, the side with a point mark should be facing the opening of the cam gear box. Note that it should also be mounted with the point mark located towards the top of the engine just below the cam followers.

DIAPHRAGM AND CHECK VALVE DISASSEMBLY

Diaphragm:

1. Remove the adjustment screw of the valve, and then remove the inside valve and spring.
2. Clean the inside with alcohol or appropriate cleaner. Reassemble.
3. Screw in the valve adjustment screw until flush with the diaphragm body. Refer to "Low speed adjustment."

Check valve:

1. Open the valve by rotating the body counterclockwise.
2. Reassemble the check valve carefully.

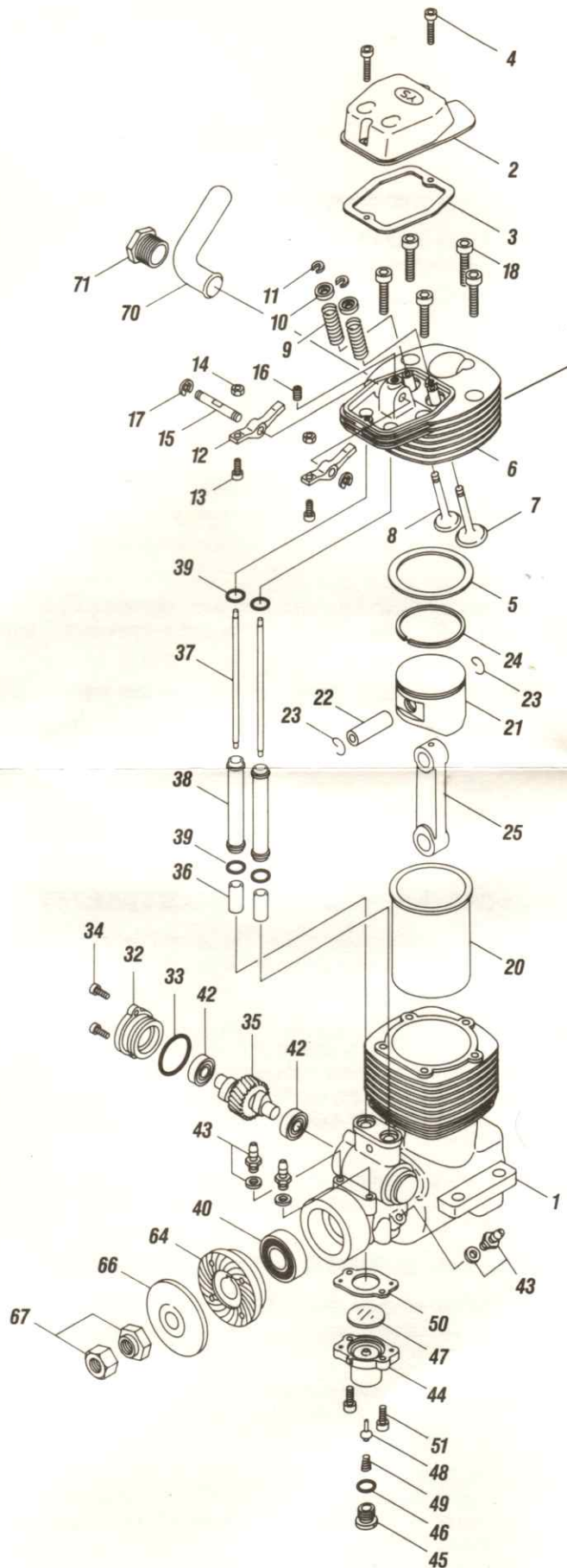
IMPORTANT! Silicone rubber is used in many parts of the YS Futaba engine. Use only glow fuel or methanol for cleaning. Gasoline and other volatile solutions will damage the silicone if used.

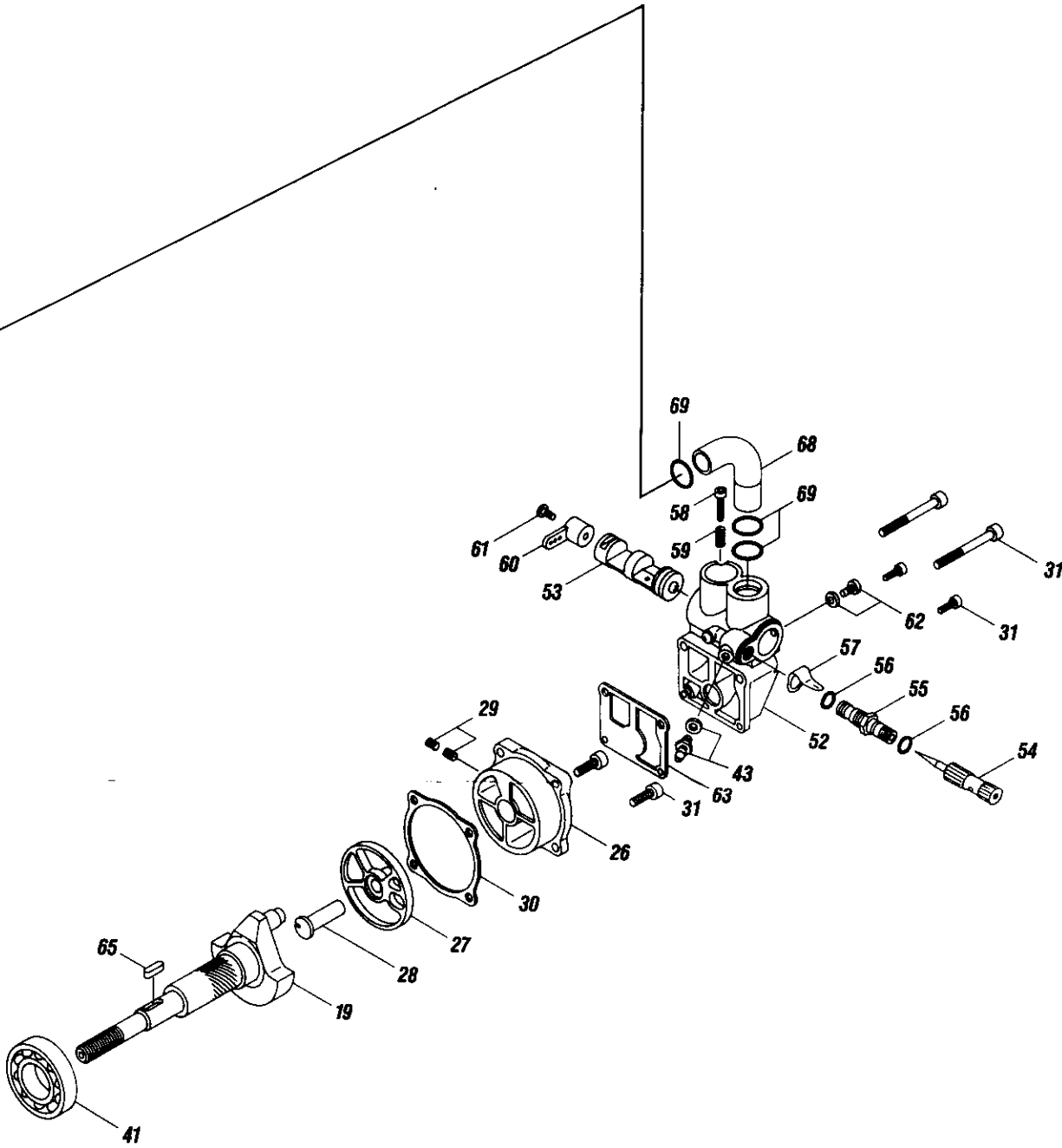
WARRANTY

Strict quality control is implemented by our factory in all phases, from parts manufacturing to final assembly. If performance deteriorates or a part fails due to a manufacturing error, YS Futaba will repair or replace the engine at no charge.

YS.Futaba 120 SF PARTS LIST

#	PART #	DESCRIPTION	QTY
1	YS0500-120FS	Crankcase	1
2	YS0505-120FS	Valve cover	1
3	YS0510-120FS	Valve cover gasket	1
4	YS0515-120FS	Valve cover screw set	2
5	YS0520-120FS	Head Gasket	1
6	YS0525-120FS	Cylinder head	1
7	YS0530-120FS	Intake valve set	2
8	YS0535-120FS	Exhaust valve set	2
9	YS0540-120FS	Valve spring set	2
10	YS0545-120FS	Spring retainer set	2
11	YS0550-120FS	C Ring	2
12	YS0555-120FS	Rocker arm set	2
13	YS0560-120FS	Tappet adjusting screw set	2
14	YS0565-120FS	Tappet adjusting lock nuts	2
15	YS0570-120FS	Rocker arm shaft	1
16	YS0575-120FS	Rocker arm shaft screw	1
17	YS0580-120FS	E Ring set	2
18	YS0585-120FS	Head Screws	5
19	YS0590-120FS	Crankshaft	1
20	YS0595-120FS	Cylinder liner	1
21	YS0600-120FS	Piston	1
22	YS0605-120FS	Wrist pin	1
23	YS0610-120FS	Wrist pin retainer set	2
24	YS0615-120FS	Piston ring	1
25	YS0620-120FS	Connecting rod	1
26	YS0625-120FS	Back plate	1
27	YS0630-120FS	Disc valve	1
28	YS0635-120FS	Disc valve pin	1
29	YS0640-120FS	Disc valve set screw	1
30	YS0645-120FS	Back plate gasket	1
31	YS0650-120FS	Back plate screws	6
32	YS0655-120FS	Cam gear cover	1
33	YS0660-120FS	Cam gear cover O-ring	1
34	YS0665-120FS	Cam gear cover screw set	2
35	YS0670-120FS	Cam gear	1
36	YS0675-120FS	Cam followers set	2
37	YS0680-120FS	Push rod set	2
38	YS0685-120FS	Push rod cover set	2
39	YS0690-120FS	Push rod cover O-ring	4
40	YS0695-120FS	Front bearing	1
41	YS0700-120FS	Rear bearing	1
42	YS0705-120FS	Cam gear bearing set	2
43	YS0710-120FS	Fuel nipples	4
44	YS0715-120FS	Regulator body	1
45	YS0195-45FS	Regulator adjusting screw	1
46	YS0725-120FS	Regulator adjusting screw O-ring	1
47	YS0730-120FS	Diaphragm	1
48	YS0175-45FS	Regulator plunger	1
49	YS0180-45FS	Plunger spring	1
50	YS0745-120FS	Regulator gasket	1
51	YS0750-120FS	Regulator screw set	2
52	YS0755-120FS	Carburetor body	1
53	YS0760-120FS	Throttle barrel	1
54	YS0765-120FS	Needle valve	1
55	YS0770-120FS	Needle valve socket	1
56	YS0775-120FS	Needle valve socket O-ring set	1
57	YS0385-60/45FS	Needle valve detent spring	1
58	YS0785-120FS	Throttle stop screw	1
59	YS0790-120FS	Throttle stop spring	1
60	YS0200-45FS	Throttle arm	1
61	YS0200-45FS	Throttle arm screw	1
62	YS0380-120FS	Throttlet barrel retainer screw	1
63	YS0810-120FS	Carburetor gasket	1
64	YS0815-120FS	Drive washer	1
65	YS0820-120FS	Shaft key	1
66	YS0825-120FS	Propeller washer	1
67	YS0830-120FS	Propeller nut set	2
68	YS0835-120FS	Intake pipe	1
69	YS0840-120FS	Intake pipe O-ring	4
70	YS0845-120FS	Exhaust pipe	1
71	YS0850-120FS	Exhaust pipe locknut	1





YS.Futaba 120 SF PARTS SETS

#	PART #	DESCRIPTION	QTY
72	YS0855-120FS	Valve cover assembly	1
73	YS0860-120FS	Rocker arm assembly	1
74	YS0865-120FS	Cam gear cover assy.	1
75	YS0870-120FS	Carburetor assembly	1
76	YS0875-120FS	Needle valve assembly	1
77	YS0880-120FS	Throttle stop screw assy.	1
78	YS0885-120FS	Drive washer set	1
79	YS0890-120FS	Intake pipe assembly	1
80	YS0895-120FS	Exhaust pipe assembly	1
81	YS0900-120FS	Gasket set	1
82	YS0905-120FS	O-ring set	1
83	YS0200-120FS	Throttle arm assembly	1

YSFutaba

Futaba Corporation of America

4 Studebaker/Irvine, CA 92718

(714) 455-0988