

# MDS™

## Engine Operating Instructions



Pro Series

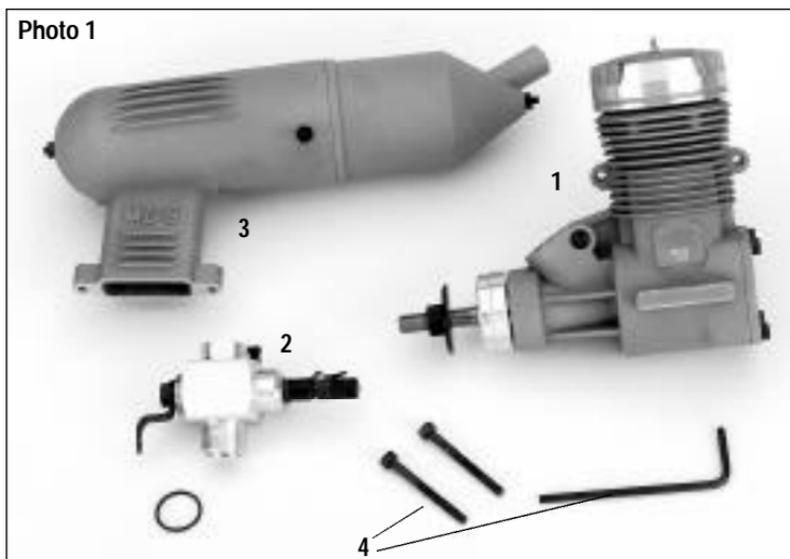


Congratulations on your purchase of an MDS engine. MDS engines are noted for their excellent power, rugged reliability, and efficient operation. All MDS engines are precision machines and should be handled with care. The following information and recommendations are presented to help you become more familiar with the operating characteristics of your new MDS engine. Please closely follow the break-in procedures and maintenance instructions. Also, be sure to read the enclosed safety instructions and warranty information.

## Step 1. Assembly

Inside the MDS engine box you should find the following items:

1. Engine
  2. Aeromix™ carburetor with O-rings (may be pre-installed)
  3. Muffler (style may vary depending on engine)
  4. Complete accessory and tool set with muffler mounting hardware (included tools may vary with different engines)
- Instructions and warranty card

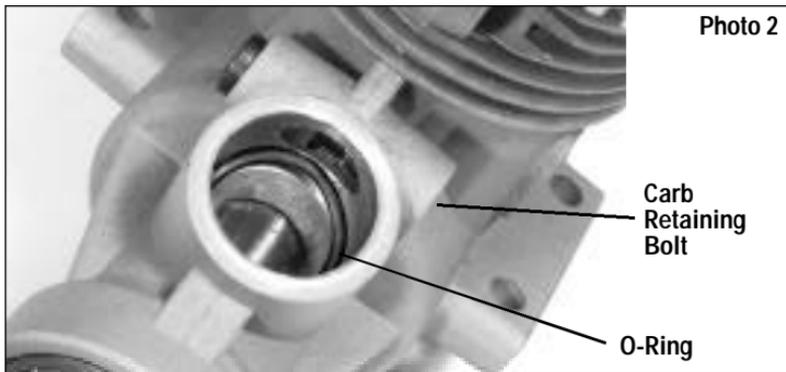


To assemble your new engine, please follow these simple steps:

### Step 1A.

Note: Refer to the exploded view of the engine on the last page to identify the parts discussed in the text.

1. Remove the individual plastic bags from the box and place them on a table or workbench. Remove the engine from its plastic wrapper. Note: Some engines may already have the carburetor installed, but make sure that the carb retaining bolt is tightened.
2. Inspect the carburetor retainer to insure that the curved portion of the carburetor retainer drawbar matches the inside wall of the air intake port. If it does not, simply place it in position with your finger. Next, remove the tools from their protective wrapper. You will need the Allen wrench to tighten the carburetor retainer. (As noted above, some engines come with the carburetor already mounted.)



**VERY IMPORTANT:  
An improperly installed O-ring  
may lead to unreliable performance.**

3. Remove the O-ring from the parts bag. Install the O-ring into the cavity of the air intake port of the crankcase, as shown in **Photo 2**, making sure that the O-ring is seated evenly at the bottom of the cavity and cannot come in contact with the engine crankshaft. The second O-ring is a spare. Insert the carburetor into the intake port.

## Step 1B.

4. The carburetor is correctly positioned when the throttle arm is located on the right side of the engine when viewed from the rear. Please note the carburetor can be rotated 180 degrees for those applications that require the needle valve to be on the opposite side. Tighten securely with the appropriate wrench while applying slight pressure on the carburetor to compress the O-ring. This will create a good, airtight seal. CAUTION: Do not overtighten, as doing so will damage the carburetor body.

## Step 2. Break-In Procedures

Prior to starting your new MDS ringed or ABC engine, it's important that you first understand the break-in procedure for your type of engine. Most modelers prefer to do this while the engine is installed in the aircraft or heli. With today's tolerances and available metallurgy, the break-in time has been shortened to the point that bench running is not necessary. If you're not sure whether your engine is ringed or ABC, simply look through the exhaust port and move the piston until you can see the top portion. If it's ringed, you will see a dark metal ring approximately 1/8" from the top. If it's ABC, the piston will be one piece and all the same color of the piston.

### Ringed Engine Break-In

Excessive heat build up during the first few runs can damage the ring and cylinder. A very rich needle setting is required to keep the engine cool while the ring seats. To set a "rich" mixture, lean the high-speed needle for a good 2-cycle, then richen the high-speed needle counter clockwise a full turn. While running rich, the engine will create quite a bit of smoke and the exhaust will be very oily. After a couple of tank fulls at a rich needle setting, you can

begin leaning the high-speed needle a few clicks at a time for best performance, keeping in mind that a too lean setting at any time can damage the ring and cylinder.

## **ABC Engine Break-In**

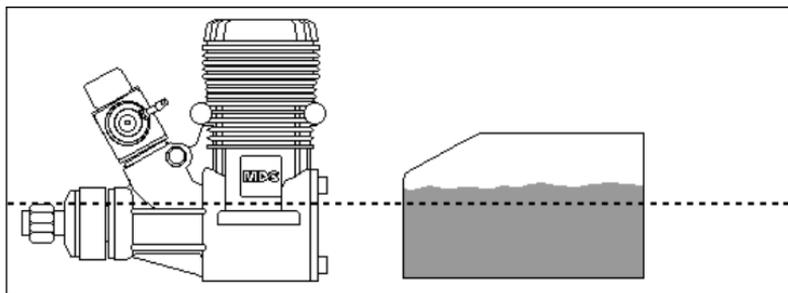
Breaking-in your ABC engine requires the same basic procedure as with the Ringed engine, except for a couple of minor differences. The first couple of runs should be at a slightly rich setting, close to normal operating temperatures. Heat helps the piston seat in the liner. Also, the time involved is shorter; most ABC engines can be fully broken-in within 3 or 4 flights at a slightly rich setting.

### **Step 2A. Muffler Mounting**

Remove the muffler from the plastic bag. The muffler mounting bolts are located in the tool set, as are the tools to mount the muffler.

### **Step 2B. Fuel Tank Placement**

The location of the fuel tank can greatly affect the operation of any engine. Whether mounting the engine on a test stand or in your model, we suggest that you position the tank as close to the engine as possible. The center line of the fuel tank should be as close to level with the engine flange mounts as possible (See diagram on next page).



## Step 2C. Propeller Selection and Installation

Please refer to the propeller selection chart below to determine the proper size and pitch for break-in applicable to your engine size.

**IMPORTANT:** Prior to installation, be sure to balance the prop. Unbalanced props are not only dangerous to operate, but can lead to premature parts failure on both the engine and model. Tightly secure the prop. Remember to inspect the prop thoroughly for any nicks or signs of fatigue which can lead to prop failure.

Engine	Recommended Propeller Sizes	Engine	Recommended Propeller Sizes
.18 FS Pro	7 x 4	.58 FS Pro	11 x 7 — Break-in
	7 x 6 — Break-in		11 x 8
	8 x 4		11 x 9
	8 x 5		11 x 10
.28 FS Pro	9 x 5 — Break-in	.68 FS Pro	11 x 7
	10 x 5		11 x 8 — Break-in
.38 FS Pro	9 x 6.5		12 x 6
	10 x 5 — Break-in	.78 FS Pro Ring	12 x 6
	10 x 6		12 x 8 — Break-in
10 x 7	13 x 8		
.40 FS-1 Pro	9 x 6.5	1.48 FS Pro Ring	15 x 10
	10 x 6 — Break-in		16 x 8 — Break-in
	10 x 7		16 x 10
.48 FS Pro	10 x 6		17 x 8
	10 x 7 — Break-in		17 x 10
	11 x 7		

## Step 2E. Starting the Engine

To start the engine, you need the following items:

- We recommend a high-quality, 2-cycle fuel containing 10–15% nitromethane, such as Hangar 9 Aeroblend, Cool Power or Powermaster fuels.
- Fuel pump
- A chicken stick, such as Hangar 9 Start Stick, or electric engine starter
- Glow driver

Note: If this is the first time you've run a model engine, we suggest that you get someone with experience to help. Your local hobby dealer may be able to help or put you in touch with an experienced modeler who would be willing to help you.

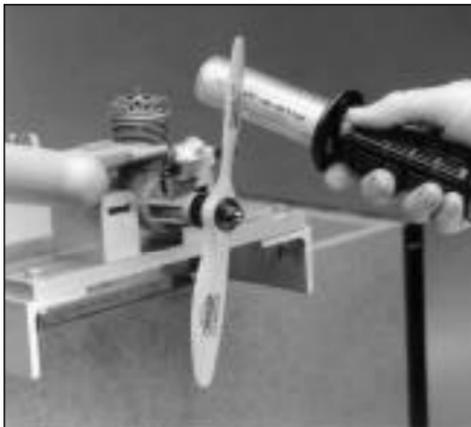
Presetting the High-Speed Needle Valve:

1. Fill the tank with the recommended fuel.
2. Connect the fuel line to the carburetor and the vent line to the muffler pressure nipple.
3. Turn the high-speed needle clockwise until you feel a slight resistance. This closes the needle valve completely.
4. Now, turn the high-speed needle counterclockwise a total of  $2\frac{1}{2}$  turns. This should be a good place to start and will give a rich full throttle setting.

Presetting the Low-Speed Needle Valve

1. Close the throttle barrel and screw the low-speed needle in until resistance is felt. This closes the low-speed needle. Now open (counterclockwise) the low-speed needle  $2\frac{1}{2}$  turns. This will give a slightly rich initial idle setting.
2. Open the throttle barrel to the full throttle position.
3. Place your finger on the carburetor opening (make sure the glow plug battery is not connected) and rotate the propeller counterclockwise several times or until you see fuel flowing up to the carburetor through the fuel tubing.
4. Reduce the throttle to idle ( $1/16$ " opening in throttle barrel).

5. Connect the glow plug battery to the glow plug at this time.
6. Using the chicken stick, turn the propeller counterclockwise through the compression stroke of the engine. If the engine has fuel and a good glow plug, you should feel a pronounced bump against this movement. When you feel the bump, give a quick flip to the chicken stick (counterclockwise) and the engine should start. If it doesn't start, repeat the procedure.



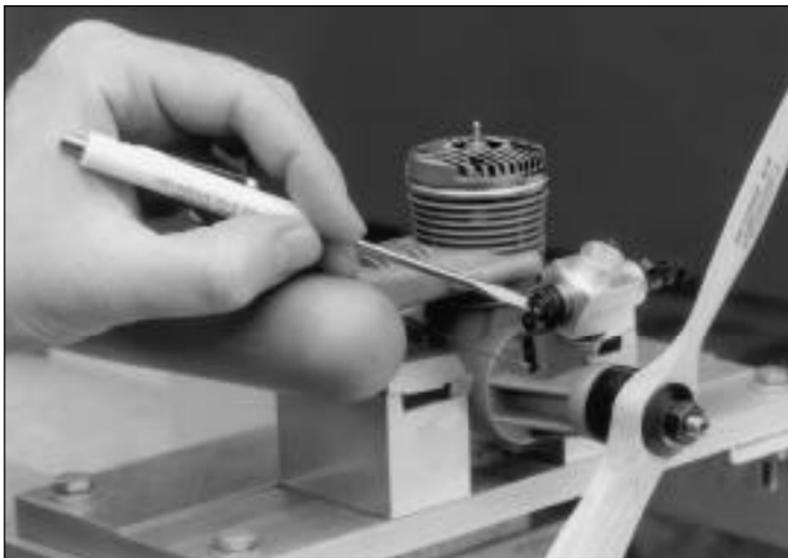
If you use an electric starter, be sure you pull the propeller through a complete compression cycle by hand (without glow plug battery attached) without feeling a heavy resistance to this action (a sign the engine is flooded). Only then should you attempt to start the engine with the electric starter. Failure to do so can result in damage to your engine, which isn't covered under warranty.

Allow the started engine to warm up for about 30 seconds at idle, then advance it to full throttle. Turn the high-speed needle clockwise until you have the engine running in a slightly rich setting. When the engine is running smoothly, disconnect the glow plug battery. Allow the engine to run two full tanks of fuel at this slightly rich setting.

## Step 3. Low-Speed Needle Settings

### The Pinch Test

You may find it necessary to make low-speed needle adjustments for your particular application. The low-speed needle is located on the throttle arm side of the carburetor and requires a small screwdriver to make adjustments. It's best to tune the low-speed needle after setting the high-speed needle.



When you have achieved the proper high-speed setting (running slightly rich), idle the engine and pinch the fuel line with your fingers at the fuel inlet of the carburetor. If the engine dies immediately without increasing in rpm, the low setting is too lean. To correct, back out the low-speed needle 1/2 turn and repeat the process. When the low-speed needle is adjusted correctly for idle, the engine rpm should increase 200–300 rpm when the fuel line is pinched, then the engine should die. If the

engine rpm increases more than 200–300 rpm, the low-speed needle is too rich. To adjust, screw in the needle to 1/16 of a turn and re-test. To achieve the correct setting, always adjust the needle a few clicks at a time.

After you've attained the correct needle settings, the engine will have a very quick throttle response from idle to full throttle, and throughout the mid-range. Be sure to always run the high-speed needle so that the engine is slightly rich at full throttle.

## Troubleshooting

Note: If the engine quits in flight or runs lean after ground set-up, review step 1A of this manual referring to the carb O-ring. If the O-ring is improperly seated or installed, the engine will leak air and may repeatedly run lean.

## Step 4. Engine Care

### Fuel

Always use clean, fresh fuel. Because dirt is the number one enemy of any engine, we highly recommend the use of an in-line fuel filter, like the Hangar 9 HAN143, between the tank and the carburetor. Also, place one between your fuel pump and the tank filler line.

### After-Run Oil

Because model fuel contains methanol, it has the property of drawing moisture from the atmosphere. Exposure to moisture can cause corrosion to such vital engine parts as the bearings and crankshaft. Therefore, we strongly urge that after every flying session you drain all fuel from the tank and then put four to five drops of after-run oil, such as Prather Afterrun or Marvel Mystery Oil, into the carburetor. Turn the prop by hand several times to insure that the after-run oil is distributed throughout the engine.

## Prop Selection

Using the correctly sized prop to fit your particular application is very important. Please check the included prop guidelines to match your engine with the correct size of prop. When breaking in the engine, please use a recommended prop size, as listed on the chart. To fit your particular application, start with the prop you used for break-in, and then experiment with other prop sizes to find the one that produces the desired results without overloading the engine.

If you plan on using a spinner, make sure the cut-outs for the blades are deep enough to prevent any contact between the spinner and the prop blades. This will prevent any possibility of the spinner cutting into the propeller blade and weakening it.

## Glow Plug

Your MDS engine comes complete with a long reach glow plug with idle bar. These plugs are designed for break-in only, and it's common for these plugs to burn out within several runs of the engine. Their use should provide you with quick starts and a reliable idle during the break-in process. The stock break-in MDS glow plug may be replaced with Hangar 9's economy plug (HAN3005) or 2-cycle performance plug (HAN3000).

Do not dismantle the engine unnecessarily, as doing so can cause damage to the precision fit parts, such as the piston and sleeve. If it's necessary to clean the interior of the engine (such as after a crash), remove only the muffler, carburetor, cylinder head and backplate. You should be able to clean all foreign matter from the engine without disturbing the fit of the precision parts. Any further disassembly could result in voiding the manufacturer's warranty.

Periodically remove the muffler and inspect the piston through the

exhaust port. Also, make sure the engine has adequate air flow for proper cooling.

Scale aircraft cowlings may look good, but if they restrict airflow around the engine, they can do a great deal of harm. You need twice as much exhaust area as intake area to provide airflow for your enclosed engine.

## **Step 5.**

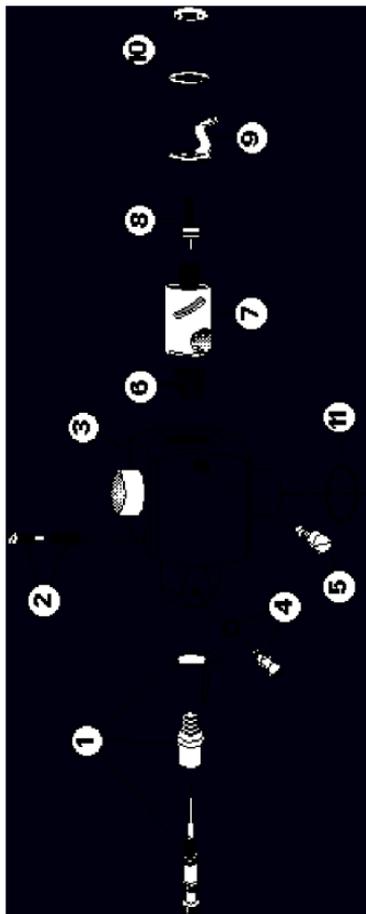
### **MDS Safety Instructions and Warnings**

See the enclosed safety instruction card for details.

## **Step 6. Service and Warranty**

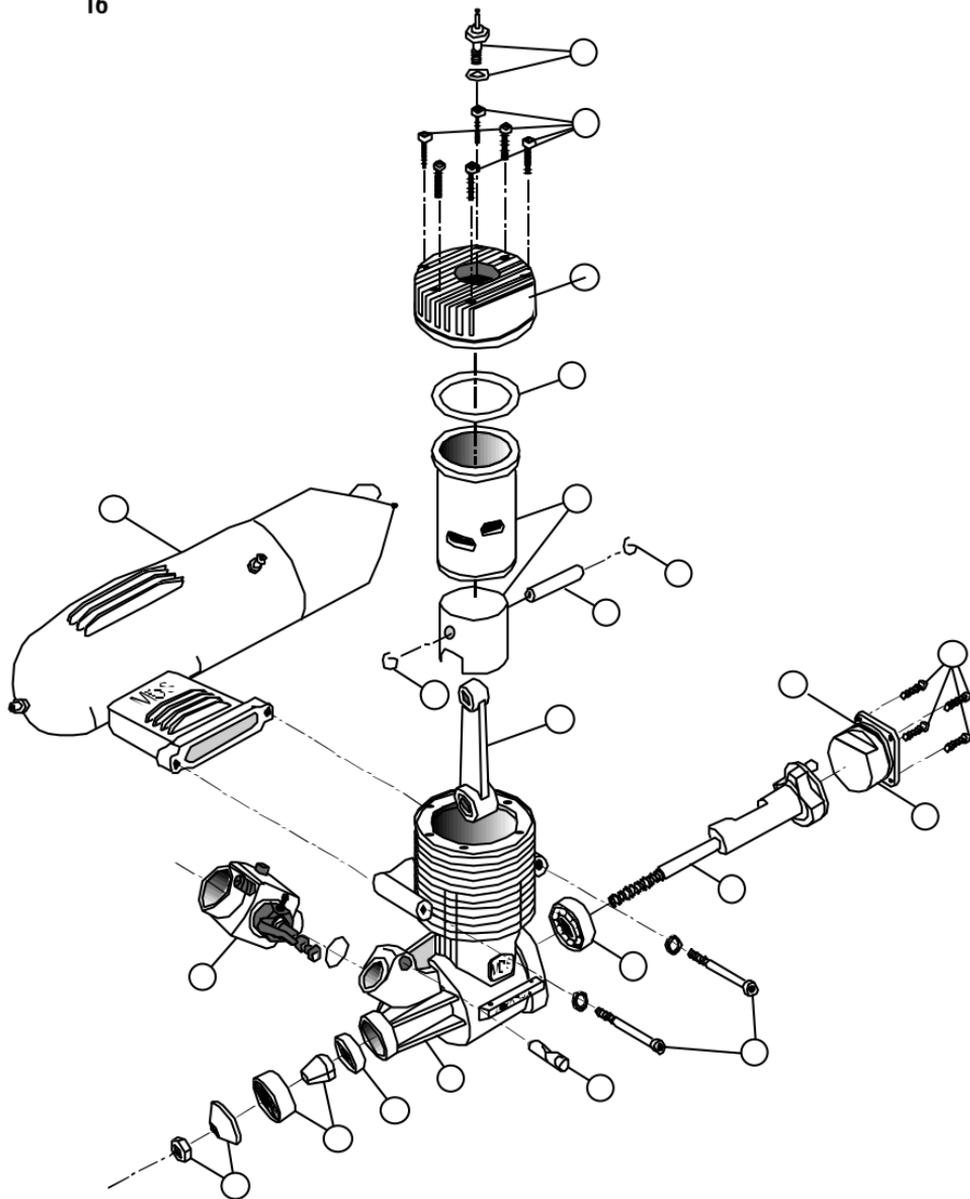
See the enclosed registration card for details.

(Note: The parts list for the carburetor and engine are added at the end of these instructions.)

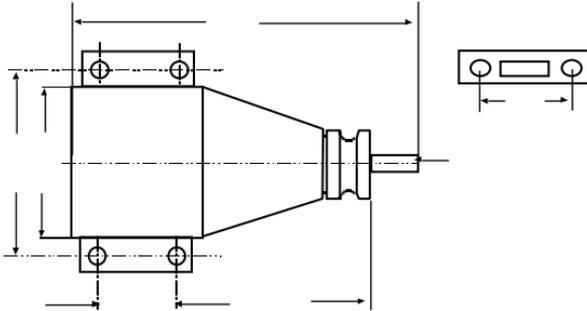


## Aeromix™ Carburetor Parts Diagram

No.	Description	.18	.28	.38	.40	.48	.58	.68	.78	1.48
1	High-Speed Needle Valve Assembly	01800250	04600250	04600250	04600250	04600250	04600250	04600250	04600250	04600250
2	Idle Stop Screw & Spring	04600240	04600240	04600240	04600240	04600240	04600240	04600240	04600240	04600240
3	Carburetor Body	01800201	---	03800201	---	---	---	---	---	14600201
4	Fuel Inlet Nipple & Gasket	04000230	04000230	04000230	04000230	04000230	04000230	04000230	04000230	04000230
5	Throttle Barrel Retaining Screw	01800212	04600212	04600212	04600212	04600212	04600212	04600212	04600212	04600212
6	Throttle Barrel Spring	01800211	04000211	04000211	04000211	04000211	04000211	04000211	04000211	04000211
7	Throttle Barrel	01800210	04000210	04600210	04600210	04600210	04600210	06100210	06100210	06100210
8	Low-Speed Needle Valve	01800215	14600215	14600215	14600215	14600215	14600215	14600215	14600215	14600215
9	Throttle Lever Arm	04000220	04000220	04000220	04000220	04000220	04000220	04000220	04000220	04000220
10	Throttle Lever Nut & Washer	04000221	04000221	04000221	04000221	04000221	04000221	04000221	04000221	04000221
11	Carburetor O-Ring	01700290	04600290	04600290	04600290	04600290	04600290	04600290	04600290	04600290
	Complete Carburetor	01800200	02800200	03800200	03800200	03800200	06800500	06800500	07800200	14600200
	Rennote Needle Adaptor	02800260	02800260	02800260	04600260	04600260	04600260	07800260	07800260	14600260







Dimensions (mm)	A	B	C	D	E	F	G	H	I
.18 FS Pro	25	32	11	35	63.5	77	10/32	28	3
.28 FS Pro	29	38	15	47	75	92	1/4 x 28	35	3
.38 FS Pro	31	38	15	47	77	92	1/4 x 28	35	3
.40 FS-1	36	44	17.5	51	87	110	1/4 x 28	37	3
.48 FS Pro	36	44	17.5	51	87	115	1/4 x 28	37	3
.58 FS Pro	36	44	17.5	55	94	115	1/4 x 28	42	3
.68 FS Pro	40	52	25	55	100	120	3/16 x 24	42	4
.78 FS Pro Ring	40	52	25	55	100	120	3/16 x 24	42	4
1.48 FS Pro Ring	48	58	30	60	122	148	3/16 x 24	40	4

N/A= data unavailable at this time



