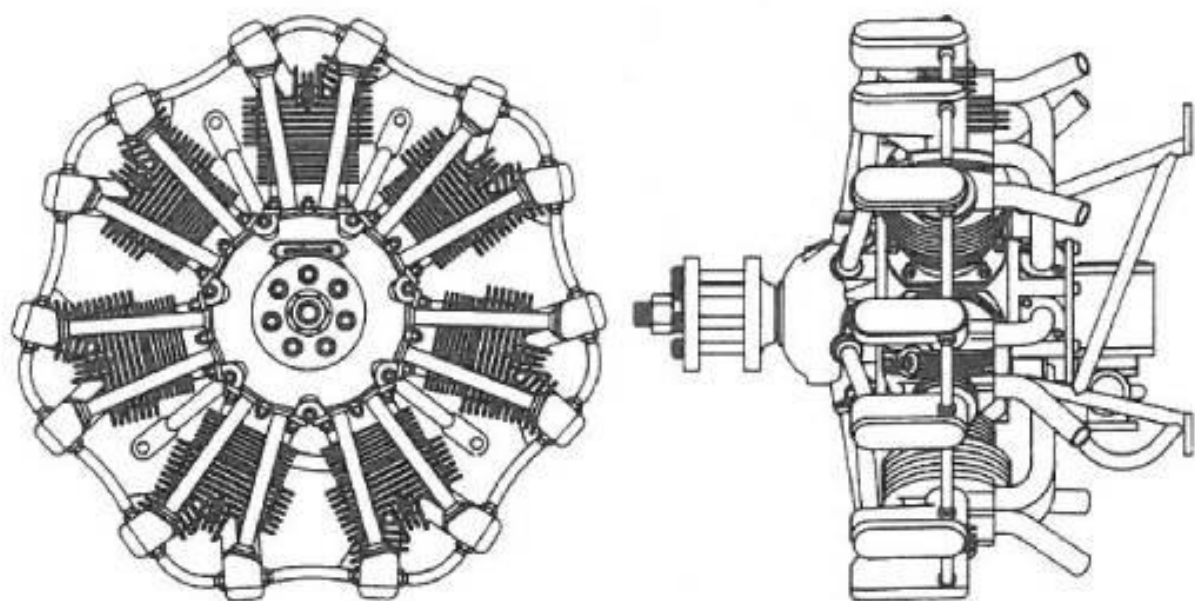


R780

7 CYLINDER RADIAL ENGINE



INSTRUCTION MANUAL

POWER RESEARCH DIV. — ROBERT MFG. CO.

R780

INSTRUCTION MANUAL

IMPORTANT:

Read through these instructions before operating your **R780 RADIAL ENGINE**.

The **R780 7 CYLINDER RADIAL** is an air cooled 4 cycle overhead valve engine. The engine is a small version of the Jacobs engine used extensively in the late 30's and 40's. It has one cam incorporating both the intake and exhaust lifter lobes for operating the valves. The cam is driven from the crankshaft via gears and rotates opposite the direction at 1/6 the speed of the crankshaft. The carburetor is a Saito #FA120. We have a mixer/blower in the plenum chamber for complete fuel distribution.

The **R780** is not a high revving engine, the torque is substantial to swing large diameter props.

We have built this engine to the highest standards. There are 3 ball bearings supporting the crankshaft, 2 ball bearings on the cam gear pinon, 1 special ball bearing for the cam, and 2 ball bearings on the blower. We use rollers on the valve lifters.

We have also incorporated a gear oil pump that scavenges oil from the crank case and the rocker boxes and recirculates the oil through the engine.

Properly cared for this engine should give you many hours of enjoyment.

SAFETY PRECAUTIONS: (READ CAREFULLY)

1. This is a multi cylinder engine. Be careful when the ignition is on. The engine will fire 3-1/2 times per revolution.
2. The engine is designed for model aircraft. Use only quality propellers that have been balanced.
3. Check the propellers every time you start the engine. Replace if it is damaged.
4. When starting the engine, clear the area around you. A hard surface is preferable. Pebbles and small stones can be picked up by the propeller and become missiles.
5. Use genuine parts for replacement.
6. Modifying the engine in any way voids the warranty.
7. When fueling or operating the engine do it outdoors or in a well ventilated place.

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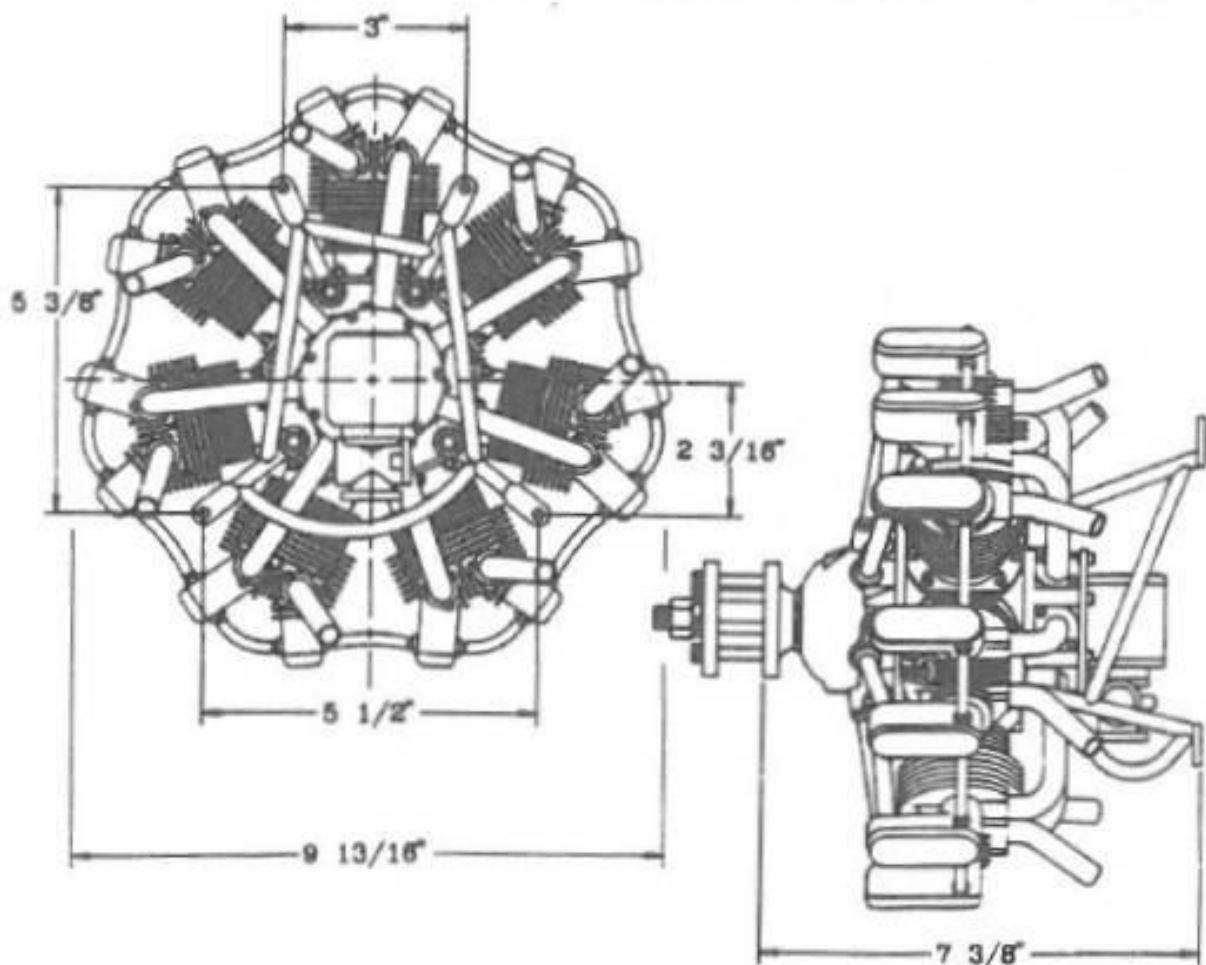


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ST. CHARLES, IL 60174

8. The engine is very powerful!! **DO NOT PUT ANY BODY PARTS IN THE PROPELLER ARC, AS BODILY INJURY WILL OCCUR.**

INSTALLATION:

Mount the engine on at least 1/4" aircraft plywood firewall using 10-32 socket head screws and lock nuts, or blind nuts with lock washers. The motor mount has built-in "Lord Mount," rubber vibration insulators. Do not modify the engine mount in any way. Keep in mind engine maintenance during your installation.



NEEDLE: VALVE AND CHOKE:

The carburetor is equipped with a 4" needle valve extension. If you need a longer extension, the rod from a 2-56 Kwik Link fits into the outer end of the needle valve and locks with a set screw. To operate the choke through a cowl use a threaded ball bolted to the choke plate and a length of 2-56 Kwik Link Rod and a nylon ball link adapter.

FUEL:

The R780 runs on any standard commercially available model 4 cycle fuel. Fuels containing castor-oil and/or synthetic lubricants are acceptable. 10% to 15% nitromethone works best.

GLOWPLUGS:

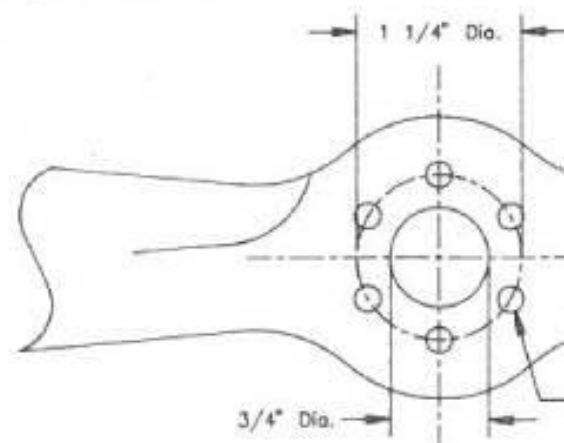
We have tried all brands of 4 cycle plugs. All have performed well.

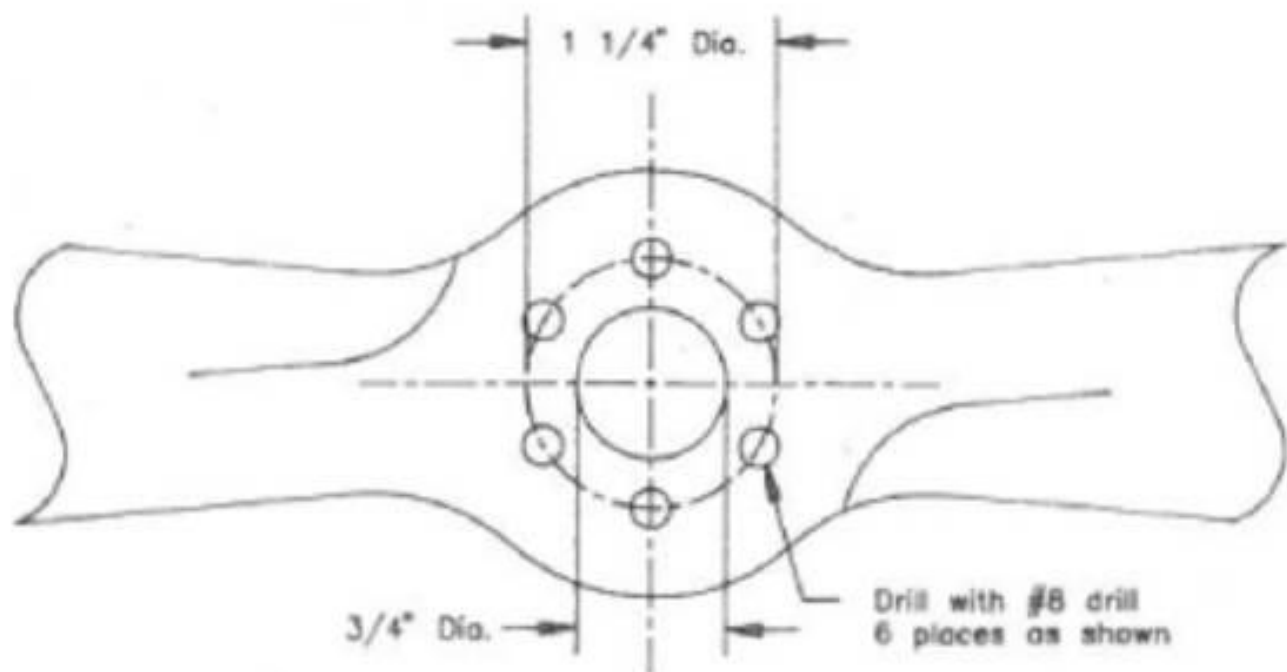
PROPELLERS:

We have been running Zinger propellers extensively both on the test bench and flying. We have tried others, but find the shape of the zinger props best for the torque and RPM. Max RPM - 6000.

The results so far are as follows:

Zinger 24 - 12	5500 RPM
Zinger 24 - 14	5250 RPM
Zinger 24 - 16	5100 RPM
Zinger 26 - 10	5200 RPM
Zinger 26 - 12	5050 RPM





CARBURETOR:

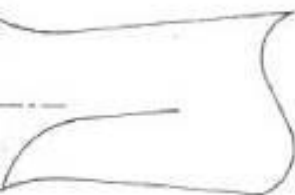
We have chosen the Saito carburetor from their 120, 270, 300 Series engines. This carb is superbly machined and has a great range of adjustment. The idle adjust is made by rotating the fuel inlet end. This end piece has a tapered spiral groove machined into its face giving a variable rate of fuel in relation to the throttle barrel setting.

The needle valve has a hole in the outboard end with a set screw, this makes it easy to make an extension. There is also a built in sliding choke plate.

The carburetor does not have an idle stop screw. It is best to use the throttle servo for idle adjust. When setting up the throttle servo, use the trim adjust for low end. The carburetor barrel should be closed when both the throttle stick and throttle trim lever are in the full low position. The carburetor barrel should open approximately 1/16 inches when you move the trim lever to its highest position. This will be a very fast idle. You can then find a low idle by moving the trim lever down to suit your needs. We have found that the **R780** runs best at 2-1/2 to 3-1/2 turns out of the needle.

CAUTION: When mounting the propeller to the engine, use both the 3/8-24 full nut and 3/8-24 jam nut provided. Do not use a lock washer. Use the hardened steel washer provided. This hardened steel washer pushes the prop hub onto the bronze collet, locking the prop to the crankshaft. You must keep the hub and collet clean.

Modify the prop to fit the prop hub per the drawing. It is recommended to use a 3/4" counter bore with a 1/4" pilot to drill out the center hole. Drill the other 6 holes with a #8 drill on a 1 1/4" bolt circle. Note: There is a drill called an "unibit" sold in most hardware stores for drilling sheet metal. This bit has a 1/4" pilot and is stepped to 3/4". It will make a very good hole.



Drill with #8 drill
6 places as shown

GLOW DRIVER:

We have chosen the McDaniel's #477 multi cylinder glow driver for the **R780**.

Follow all of the directions provided with the glow driver. We have found that a 4000 MA to 5000 MA NiCad 4 cell pack works best with the drive control to be "ON" at 1/3 to 1/2 throttle. One word of caution is to solder the 8 connections you have to make. See special note in the glow driver instructions from McDaniel's.

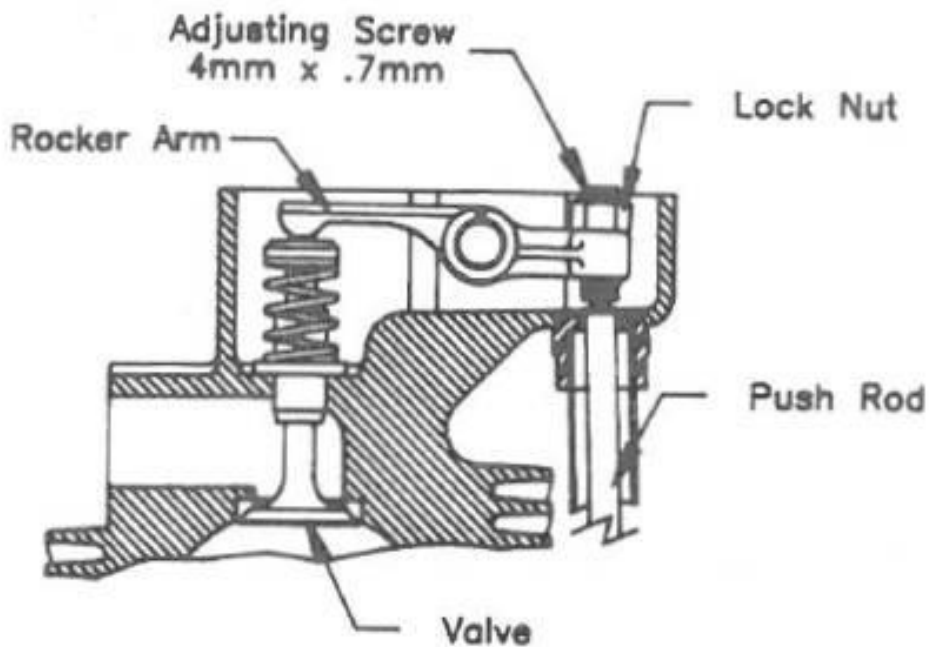
VALVE CLEARANCE ADJUSTMENT:

Valve clearances are correctly set before The **R780** leaves the factory. During the first hour or two of running the engine, everything seats. This may cause the valve clearance to become too loose. To check this, follow the steps outlined. Valve clearance should be between .002 and .005 inches.

Since it is very difficult to use a feeler gauge between the rocker arm and the valve stem, we have a simple way of determining the correct valve clearance. The rocker arm adjusting screw is a 4mm x .7mm socket set screw modified. One full turn of this screw equals .0275 inches. A 1/8 turn of this screw equals .0034 inches.

Follow these easy steps to adjust valve clearance.

1. Remove 3 of the 4 screws holding the rocker box cover. Loosen the 4th screw and rotate cover 180 degree out of the way and snug this screw. This keeps all of the covers in place and saves you time.
2. Remove all 7 glow plugs.
3. Rotate propeller until you see the piston at the top with both valves closed.
4. Check rocker arm for excessive "play" between the rocker arm and the valve stem.
5. If there is no "play" felt, or too much "play," the valve should be readjusted.
6. Loosen the lock nut with the special 7/32 wrench, and with a hex key through the wrench into adjusting screw. Loosen the adjusting screw and tighten until there is no "play" between the rocker arm and the valve stem. Now back off the adjusting screw 1/8 turn (counter clockwise using the hex key.) While still holding this setting, tighten lock nut. This will give proper valve clearance.



Valve clearance should be $\frac{0.002 \text{ to } 0.005 \text{ inches}}{0.051 \text{ to } 0.127 \text{ mm}}$

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