RedHead
Installation Procedure
rev 3

1. Required Tools

These are the tools you will need to install your RedHead:

1. Torque wrench –the middle scale should be approximately 130 in-lbs or 15.5 Nm and the bottom of the scale should be approximately 25 in-lbs or 3.5 Nm
2. 3/8 " drive Ratchet
3. 5mm Allen wrench - I prefer the handle type shown in this figure. They are easier to work with.
4. 4mm Allen wrench
5. 3/8" drive 5mm Allen socket
6. 3/8" drive 15mm deep socket.
7. A 6x1.0mm tap and tap handle.
8. A can of light lubrication oil – WD-40 is good.

2. Remove the exhaust

See the Radne manual for instructions.

3. Remove the carburetion

See the Radne manual for instructions.

4. Remove the fan shroud

See the Radne manual for instructions.

5. Remove the cylinder

See the Radne manual for instructions.

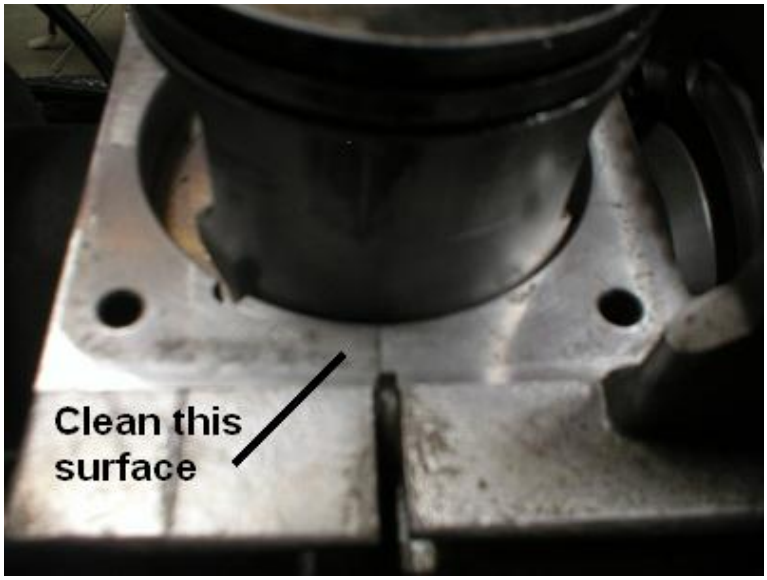
6. Remove the decompression valve

See the Radne manual for instructions.

7. Cleaning in preparation for assembly

The top of the engine case

This is the surface to which the modified Radne cylinder will mate. It should be clean of major defects and gasket materials. Small dimples and scratches are ok.



The cylinder and RedHead mating surfaces

These two mating surfaces are precision ground to a satin finish. When assembled they must seal completely tight again the high pressures created within the combustion chamber. Verify that there are no defects visible on both surfaces. Use a magnifying glass if necessary. If any small radial (outwards across the surface) scratches are found they may be removed through a process called "lapping".

Cleaning the cylinder mounting holes

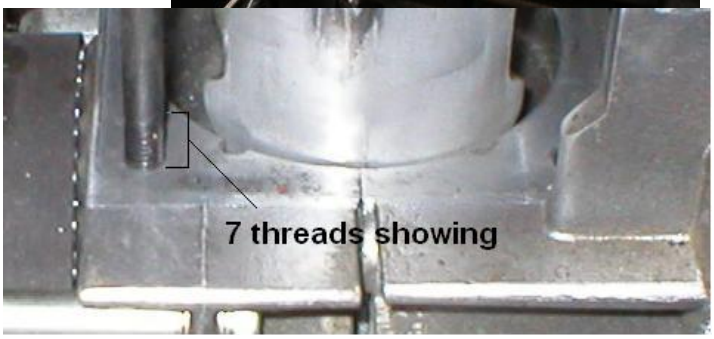
There are four 6x1.0 mm threaded holes tapped into the top of the case. These are used to hold the cylinder and head together. **It is very important that these holes be cleaned and oiled. Failure to do so may result in improper cylinder head torque, which may cause premature engine failure.**

*******Do not skip this step*******

Apply a small amount of WD-40 to one of the long reach cylinder head bolts and thread it into each of the engine case holes. You should be able to thread the bolt all the way in using only your fingers. If the bolt cannot be threaded in entirely by hand, then there is some dirt on the threads that will need to be removed before assembly can continue. This is where the 6x1.0 mm tap and tap handle come in.

The idea is to clean the dirt out of the holes, not to rethread them. You should feel very little resistance. The tap should spin into the hole very easily. Apply a bit of oil to help it along. If you encounter significant resistance – STOP – back out, and make sure the tap is going straight in. The worst thing you can do is cross-thread these holes. If you are not confident, call a friend who has done this before. Repeat this for all four holes. Afterwards, double-check that the long-reach cylinder bolts thread easily into the hole.

With the bolt completely in the hole there will be no more than 7 threads showing.



8. Installing the cylinder (complete kit)

Push the piston out the bottom of the cylinder just far enough to remove one of the wrist pin retaining clip. Try not to push the piston out beyond the rings, or you will need to compress the rings before

sliding the piston back in. Push the wrist pin out of the piston far enough to allow the piston to clear the connecting rod. Make sure the needle bearing is still inside the connecting rod. Push the wrist pin in until it contacts the retaining clip on the opposite side. Reinstall the retaining clip you remove above.

Before you push the cylinder all the way down, apply some sealant to the case area cleaned in step 7.1. Make sure the cylinder is completely seated onto the engine case. Look all the way around. Slowly crank the engine over by hand and watch the piston go up and down. You will hear the rings sliding along the inside of the cylinder, but the cranking should feel smooth. Leave the piston at the bottom of its stroke.

9. Installing the cylinder (partial kit)

Ignore this section if you are installing the complete RedHead Kit. Jump to the next section.

There should be a Radne OEM cylinder base gasket glued to the base of the cylinder. If it is missing, do not proceed until you have found it and glued it in place.

<u>Assembling the engine without the base gasket may result in serious damage when the engine is cranked over.</u>

The following step assumes that your piston is attached to your connecting rod. Verify the engraved arrow at the top of the piston is pointing towards the exhaust. Compress the piston rings and slide the cylinder over the piston. This can be somewhat challenging, so take your time. Before you push the cylinder all the way down, apply some sealant to the case area cleaned in step 7.1. Make sure the cylinder is completely seated onto the engine case. Look all the way around. Slowly crank the engine over by hand and watch the piston go up and down. You will hear the rings sliding along the inside of the cylinder, but the cranking should feel smooth. Leave the piston at the bottom of its stroke.

10.Installing the RedHead

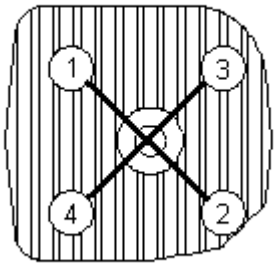
Wipe any dirt off the cylinder and ReadHead mating surfaces. Apply a very thin film of high temperature sealant to cylinder's mating surface. Align the RedHead with the cylinder and carefully place it on top of the cylinder. You should feel the RedHead index onto the cylinder.

11.Torqueing the cylinder head bolts

The following steps are very important and should be performed by someone who has some experience with cylinder head torqueing.

1. Apply a bit of WD-40 to all four cylinder head bolts and slide them all the way down through the RedHead, through the cylinder fins, through the cylinder base flange, until they contact the top of the engine case.
2. Using the 5mm Allen wrench, thread all the bolts into the engine case until the head of the bolt just contacts the lock washer. Make sure the RedHead is in level contact with the cylinder.

Following the torque sequence shown below, go around several times and give each bolt ¼ turn until they are all evenly snug.



Cylinder head bolt torque sequence

3. Crank the engine over by hand and verify smooth piston travel.
4. Using the 3/8 in drive Allen socket, set your torque wrench to 25 in-lbs or 2.8 Nm and torque the head bolts as per the torque sequence above.
5. Repeat with 55 in-lbs or 6.2 Nm.
6. Repeat with 85 in-lbs or 9.6 Nm.
7. Crank the engine over by hand and verify smooth piston travel.

12.Spark Plugs

Your Raket originally used an NGK BPM7A, or Denso equivalent. However, this plug does not have a long enough reach to work with the RedHead. I recommend using the supplied NGK B8HS. This plug has the proper reach and runs somewhat cooler for the higher compression the REDHEAD gives.

13.Reinstall the decompression valve.

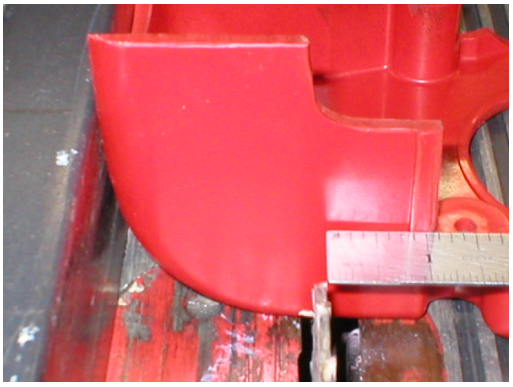
See the Radne manual for instructions.

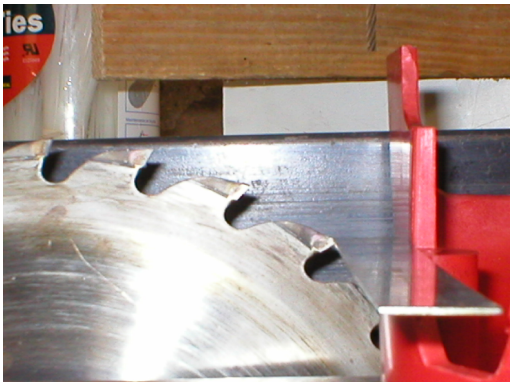
14.Extended fan shroud option for the ES engine

The fan shroud was originally designed for the shorter Radne cylinder head. The RedHead cooling fins are approximately 1½ inch taller. The RedHead kit comes with a fan shroud extender, which raises the height of the fan shroud to provide forced-air cooling through the REDHEAD fins.

Cut the fan shroud

1. Lay the fan shroud face down onto a table saw with the top of the shroud flush against the fence. Adjust the fence until the saw blade is 1 1/8 inches from the edge shown in this picture. Raise the saw blade high enough to cut completely through the shroud





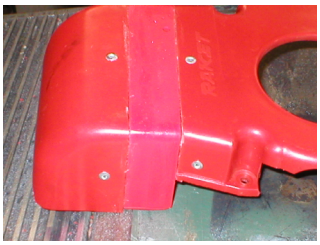
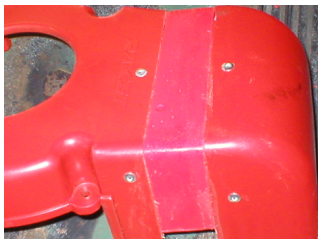
2. Carefully cut the shroud in two and trim off any remaining plastic.

Clean and roughen the inner surfaces of the shroud

1. Thoroughly clean the inside of the fan shroud. Hold the fan shroud extender against the inside of the shroud and trace a line along the edge of the extender. This will give you a reference for the next step.
2. Use 100-grit sandpaper to roughen the inner surface of the fan shroud.

Attach the fan shroud extender with rivets

1. Hold the fan shroud extender against one half of the fan shroud and using a 1/8 in drill put a total of six hole holes through both parts in the locations shown.


2. Apply a liberal amount of two-part epoxy to the roughened shroud area, hold the extender to the shroud half, and secure the two parts with the supplied pop rivets. It is easier to start with the two rivets in the front face. Putting rivets in a side face first will pull the face holes out of alignment, and make it difficult to install their rivets. Be sure to put a washer on the inside of the pop rivets. Repeat for all of the other holes.

15.Reinstall the fan shroud

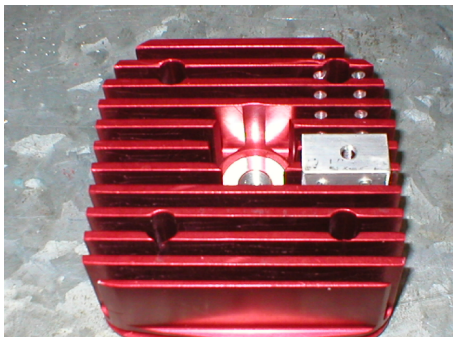
A minor amount of shroud shaping may be required. See the Radne manual for instructions.

16.Reinstall the exhaust system

See the Radne manual for instructions.

17.Reinstall the carburetion

See the Radne manual for instructions.



The NRG harness has a support bracket connected between the cylinder head and the air box. The REDHEAD has a special mount for this support. The hole is threaded to 6x1.0 mm.

18.Re-torqueing the cylinder head bolts

Static torque vs. Dynamic torque

Static torque is the torque applied to the head bolt while it is stationary. Dynamic torque is the torque applied when the bolt is moving, as when it is being tightened. Static torque is about 30% greater than dynamic torque due to an added friction factor commonly called ‘stiction’. You don’t really need to understand the physics behind this phenomenon. Just remember to loosen the head bolt ¼ turn before re-torqueing.

After your engine is completely reassembled, start and run it up to normal operating temperatures (approx. 325F CHT). Shut off the engine and let it cool back down to ambient temperature. Loosen each

cylinder head bolt 1/4 turn, and re-torque it to 85in-lbs following the cylinder head bolt torque sequence in step 10.

Your engine thermal cycles ever time you run it, causing minute changes as the metal parts expand and contract, and it is possible for the cylinder head bolts to loosen. As a precaution, I recommend re-torqueing the head bolts after every flight during the break-in period. Thereafter, I recommend re-torqueing the head bolts at the beginning of your flying season.