

# Break-in Summary

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## The N11HC Break-in Plan

Minimum ground run

Slow accelerate to 40 KIAS

Full throttle

Bring RPM back to 2500

Minimum climb angle

Quickly Accelerate to 130 KIAS to get cooling air flowing ASAP

Bring MP back to 75% power

Add throttle in climb to maintain 75% power

Continue shallow climb with CHTs under 400°

Level off at about 5000' MSL

Keep 75% power for between 30 and 60 minutes

Cycle power between 65 and 75% power for another 60 minutes

If CHT's are ok at full power – use full power for another 30 minutes

Descend for landing >15" MP and <140 KIAS

Change oil for 20W-50 straight Mineral Oil (no AD) after about 5 hours.

Change again after another 10 hours

## RAM Aircraft

### **Mineral Oil and Mineral Based Oils**

- Break-in procedures: RAM uses Mineral Oil.
- Normal operations: RAM uses Mineral Based Ashless Dispersant (AD) oils.

### **Ashless Dispersant (AD) Oil**

Ashless Dispersant Oil could be written as Ashless and Dispersant Oil. There are two distinct features to remember about AD oil. Ashless stems from a requirement to clarify that the oil does not leave behind any ashes, or burning embers as it cleans. Decades ago in aviation history, oils that cleaned involved metallic cleaning particles that left embers. Such glowing metallic embers contributed to pre-ignition. Detergent oils have long since been removed from aviation piston engines. Aviation oils that clean are required to be Ashless. When an oil has Dispersant qualities, the particles created and removed by cleaning are suspended (dispersed) within the oil. Being dispersed, they are collected better by the oil filter. **During the initial engine break-in period, RAM believes that AD cleansing is premature.** RAM recommends a non dispersant Mineral Oil during the initial twenty-five hour break-in period of an aircraft piston engine, or replacement cylinder.

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## Break-in Oil

The use of break-in oil and performing break-in procedures should be followed whether replacing one cylinder or six. For direct drive engines, Mineral Oil such as SAE 20W-50 Phillips Type-M should be used, and for geared engines, RAM prefers AeroShell Straight Weight Mineral Oil to be used. This procedure should be followed for the first twenty-five hours of operation (and can continue to as much as 100 hours depending on the cylinder bore material used). The oil should be changed as soon as oil consumption stabilizes, but no later than the first twenty-five hours of operation. At that time, oil should be changed to an Ashless Dispersant (AD) Mineral Based Oil.

## Lycoming SI 1014M

Don't use Ashless Dispersant Oil. (pg 2)

1. Do not add ashless dispersant oil to straight mineral oil. Drain the straight mineral oil from the engine and fill with ashless dispersant oil.
2. Do not operate the engine longer than five hours before the first oil change.
3. Check all oil filters and screens for evidence of sludge or plugging. Change oil every ten hours if sludge conditions are evident. Repeat 10 hour checks until clean screen is noted, then change oil at recommended time intervals.

## Lycoming Flyer Key Reprints

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Full power for takeoff and climb during the break-in period is not harmful: it is beneficial, although engine temperatures should be monitored closely to insure that overheating does not occur. Cruise power settings above 65%, and preferably in the 70% to 75% of rated power range should be used to achieve a good engine break-in.

## Lycoming Break-in SI-1427b

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3. As soon as possible, reduce to climb power. Assume a shallow climb angle to a suitable cruise altitude. Adjust mixture.
4. After establishing cruise altitude, reduce power to approximately 75% and continue flight for 2 hours. For the second hour, alternate power settings between 65% and 75% power.
5. Increase engine power to maximum airframe recommendations and maintain for 30 minutes, provided engine and aircraft are performing within operating manual specifications.

Avoid low-MP during high engine speeds (under 15")

Descent at low cruise power.

Avoid any closed throttle descents.

Use 65%-75% power until oil consumption stabilizes.

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## ECi Service Instruction

### [Break-in Instructions for Engine Overhaul](#)

ECi confidently recommends Phillips 66 X/C Aviation Multiviscosity Oil SAE20W-50.

10. On take-off, use minimum power to reach 40 MPH (IAS) before applying required take-off power.

11. Use take-off power only as long as necessary to get to **BEST CLIMB SPEED**. Reduce manifold pressure to minimum required for clean in-flight attitude. Leave propeller in flat pitch for at least 5 minutes after take-off. For aircraft not equipped with a variable pitch propeller or manifold pressure gauge, reduce power to 75%. Use minimum rate of climb with maximum air speed consistent with terrain.

12. When desired altitude is reached and cylinder head and oil temperatures are satisfactory, aircraft should be operated at 75% power until 20 - 30 minutes of flight time have elapsed. The engine should then be operated at various power settings and engine operating parameters observed until at least 45 minutes of flight time have elapsed. All power changes should be made very gradually, especially power reductions.

13. During the test flight, any time that a persistent high oil or cylinder head temperature is noted, a precautionary landing and inspection should be made to determine the cause.

14. On initial flight after at least 30 minutes of satisfactory flight time have been accumulated, the aircraft should be landed and the engine be reinspected. Oil consumption should be noted; and, if excessive, should be investigated before further flight.

4. Start engine, run up normally, taxi and take off immediately. (Minimize ground time.) Reduce manifold pressure as soon as practical. Slowly reduce engine speed to maximum continuous RPM (top of green) for fixed pitch propellers, reduce power to 75%.

5. Cycle the propeller only enough to verify control. This will ensure the propeller hub has oil pressure prior to take-off.

6. Maintain a shallow climb to keep cylinder head temperatures as low as possible.

7. Level off at altitude and maintain 75% power for at least 30 minutes. During the first 50 hours of the break-in period, piston rings will seat best if cruise is maintained at 65% to 75% power. Oil consumption will also be optimized under these operating conditions. Normal ground idle may be used after the engine temperatures and oil consumption have satisfactorily stabilized.

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8. Keep flying weight to a minimum to reduce power requirements during take off.
9. Follow break-in lubrication procedures (Section 5)

[More on ECI – Engine Break-In Instructions and oil management](#)

## Poplar Grove Airmotive Break-in Procedures

- When possible, reduce power to the climb power setting specified in the operator's manual.
- Establish a shallow climb angle to insure good air speed for proper cooling.
- Make every effort to keep your operating temperature well into the green arc.
- Do not run the engine above 75% power in a cruise setting.
- Your ability to keep the engine temperature well in the green arc and within a power range of 65% to 75% power will be the key to a successful break in.
- Keep MP > 15"

## EAA – Bits and Pieces Engine Break-in

MP high

Minimize ground time

Minimum power to 40 KIAS then takeoff power

Shallow climb for CHTs

75% power for at least 30 minutes

Vary power between 65% and 75% for at least 45 minutes of total flight time

Reduce MP in climb & RPM to max continuous and 75% power

[http://www.eaa.org/bitsandpieces/articles/2012-08\\_test-flying-my-new-homebuilt.asp](http://www.eaa.org/bitsandpieces/articles/2012-08_test-flying-my-new-homebuilt.asp)

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