

ROUGH IDLE (CONT.)

CAUSE	SOLUTION	PROCEDURE FOR SOLUTION
8. Nozzle screen and shroud deformed to extent it blocks or partially blocks air bleed hole.	8. Replace nozzle.	8. Remove nozzles from cylinder so that they may be adequately inspected.
9. Sticking valve in fuel flow divider.	9. Disassemble and clean.	9. Remove divider from engine. Disassemble and flush out dirt. Also divider valve may be hand lapped in seat to remove any burrs that may be present. <i>NOTE:</i> Never interchange fuel flow divider parts and do not damage diaphragm.
10. Uneven cylinder compression.	10. Differential check cylinders to determine if further disassembly and repairs are necessary.	10. Differential compression check is accomplished by rotating cylinder to be checked to T.D.C. on compression stroke and introducing 80 psi air into cylinder and observing how much is retained. Step-by-step procedures and equipment requirements will be found in the latest revision of Service Instruction No. 1191.
11. Improper fuel pressure.	11. Adjust as necessary.	11. Minimum and maximum limits are found in engine and airframe manufacturer's Operator's Manual.
12. Faulty ignition system.	12. Check magneto drop and condition of plugs and leads.	12. Set engine to produce 50-65% power with propeller at minimum angle. Check both magnetos for excessive drop off. <i>NOTE:</i> Smooth drop off that exceeds limits may indicate a lean or rich injector or carburetor. Leads must be checked by removing distributor block from magneto and using a Bendix high tension lead tester, #11-8880 or 11-8880-1 or equivalent type equipment to determine lead condition. A visual check is also helpful. <i>NOTE:</i> The difference in drop between magnetos is just as important as the total magneto drop (not more than 50 RPM difference between magnetos).
13. Fuel pressure too low.	13. Adjust to at least minimum pressure as found in Operator's Manual.	13. <i>NOTE:</i> If unable to adjust pressure, replace pump.
14. Primer not locked or leaking.	14. Lock securely or replace primer if leaking.	14. Solution is self-explanatory.

ENGINE WILL NOT IDLE UNLESS BOOST PUMP IS ON

CAUSE	SOLUTION	PROCEDURE FOR SOLUTION
1. Idle mixture extremely lean.	1. Enrich idle mixture at injector.	1. Turn scalloped wheel at side of injector toward rich condition. <i>NOTE:</i> Arrow on linkage indicates rich and lean. Idle speed will have to be adjusted.
2. Engine fuel pump failed, or pressure too low at idle speed.	2. Replace fuel pump, or adjust pressure as necessary.	2. Solution is self-explanatory.

ENGINE WON'T IDLE UNLESS BOOST PUMP ON (CONT.)

CAUSE	SOLUTION	PROCEDURE FOR SOLUTION
3. Fuel pump bypassing fuel internally. (<i>NOTE:</i> AN type pump.)	3. Replace fuel pump.	3. Solution is self-explanatory.
4. If engine has diaphragm type fuel pump consider either a loose fuel in fitting or a missing or defective "O" ring. <i>NOTE:</i> Check "O" ring seat machined in fuel pump to be sure seat is smooth.	4. Tighten fitting or replace "O" ring as required. If "O" ring seat is damaged, pump may have to be replaced.	4. <i>NOTE:</i> Engine may also lose fuel pressure as aircraft climbs to altitude. See latest revision of Service Bulletin No. 374.
5. Fuel vaporizing in fuel lines.	5. Keep engine nacelle as cool as possible.	5. Solution is self-explanatory.

ENGINE WILL NOT IDLE UNLESS BOOST PUMP IS OFF

CAUSE	SOLUTION	PROCEDURE FOR SOLUTION
1. Idle mixture extremely rich.	1. Lean idle mixture at injector.	1. Turn scalloped wheel at side of injector toward lean condition. <i>NOTE:</i> Arrow on linkage indicates rich and lean. Idle speed will have to be adjusted. Condition indicated by excessive black smoke.
2. Engine pump fuel pressure set too high.	2. Adjust fuel pressure at pump if AN type. Replace fuel pump if diaphragm type.	2. Solution is self-explanatory.
3. Booster pump pressure too high.	3. Adjust pressure or replace pump.	3. Solution is self-explanatory.

POOR IDLE CUT-OFF

CAUSE	SOLUTION	PROCEDURE FOR SOLUTION
1. Improper rigging of mixture control linkage.	1. Adjust same.	1. Solution is self-explanatory.
2. Mixture control valve scored or not seating properly, or "O" ring on mixture jet broken or deformed.	2. Disassemble and remove scratches and burrs. Replace "O" ring, if necessary.	2. Remove mixture control assembly from injector lap idle cut-off jet and valve assembly on a good lap plate using a mild abrasive until all scores and burrs are removed. Clean thoroughly and reassemble. Also observe the condition of the "O" ring on mixture control jet. <i>NOTE:</i> Check for a leak by disconnecting fuel line at entrance to flow divider. Keep throttle and mix off and boost pump on. There should be no fuel flow.
3. Vapor in lines.	3. Avoid prolonged ground operation at low RPM and idle. Keep nacelle as cool as possible. <i>NOTE:</i> Use boost pump, if necessary.	3. Solution is self-explanatory.
4. Dirt in air bleed hole of nozzle.	4. Remove and clean.	4. Wash in acetone or MEK and blow out with compressed air.
5. Fuel jets in nozzle improperly located.	5. Replace nozzles.	5. Nozzles may be tested by fabricating a test rig as explained in latest revision of Service Instruction No. 1275. <i>NOTE:</i> No visual check of jets is possible.

10.140 Tail Rotor Rigging (cont'd)

- 3) To decrease the total travel, shorten the C121-9 push-pull tube for right pedal travel and increase the length of C343-3 or C343-9 push-pull tube for left pedal travel.
- 4) Recheck the tail rotor blade angles per steps e) through h) above.
- j) Ensure all rod ends are installed properly by checking the push-pull tube witness holes. Tighten all rod end palnuts and jam nuts. Torque stripe all nuts.
- k) Balance tail rotor per Section 10.240.

10.150 Throttle Correlation Rigging (see Figure 10-8)

For in-service check and adjustment:

1. Verify idle rpm is correct with engine warm, clutch fully engaged, and throttle closed. Adjust O-540 idle to 53-57% and IO-540 idle to 58-62%.
2. Shut down helicopter.
3. Rotate twist-grip throttle fully closed through overtravel spring pressure to positive stop. Holding throttle tight against stop, raise collective full up while observing throttle arm on carburetor or fuel control, as applicable. Throttle arm should move 0.010-0.030 inch off of idle stop screw when collective up-stop is reached.
4. If necessary, adjust length of throttle push-pull tube at carburetor or fuel control, as applicable.
5. Standard torque jam nut(s) per Section 1.320, check witness holes, and torque stripe per Figure 2-1.

10.160 Actuator Rigging

No field adjustment of actuator-engaged belt tension is permitted. Adjust actuator's down-limit stop screw so there is a delay of less than 5 seconds before rotor starts turning when actuator is engaged at start up.

10.200 TRACK AND BALANCE

The Chadwick-Helmuth Vibrex system, the TEC ACES system, the Dynamic Solutions Systems' MicroVib system, or equivalent equipment is required to perform dynamic rotor balancing and in-flight tracking checks.

6.495 Fuel Control Installation (continued)

22. Disconnect fuel control outlet hose, connect test hose if desired, and measure fuel flow rate at fuel control outlet with mixture full rich, throttle at idle, and electric fuel pump on (ignition key at PRIME position).
23. Adjust idle mixture as required to obtain 16–18 pounds/hour fuel flow (170–190 cc/minute). Clockwise rotation of idle mixture adjustment wheel (viewed from aircraft right side) enriches mixture. Re-check idle rpm after mixture adjustment and repeat as required until both rpm and mixture are within limits. With rpm and mixture set, verify smooth acceleration from idle to 102% rpm with no engine hesitation or smoke from tailpipe. Also verify smooth needle split from 102% to idle with no engine roughness or erratic rpm indications and acceptable idle quality. Note that 16–18 pounds/hour fuel flow should produce acceptable idle quality and off-idle throttle performance under sea-level standard conditions. Richer mixtures may be required for cold temperature operation and leaner mixtures may be required for hot/high altitude operation. Deviate from 16–18 pounds/hour recommendation as required for acceptable idle quality and off-idle throttle performance (smooth accelerations and needle splits).
24. Adjust throttle correlation rigging per § 10.150.
25. Install right cowling.

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SURPRISE THROTTLE CHOPS CAN BE DEADLY

Many flight instructors do not know how to give a student a simulated power failure safely. They may have learned how to respond to a throttle chop themselves, but they haven't learned how to prepare a student for a simulated power failure or how to handle a situation where the student's reactions are unexpected. The student may freeze on the controls, push the wrong pedal, raise instead of lower the collective, or just do nothing. The instructor must be prepared to handle any unexpected student reaction.

Before giving a simulated power failure, carefully prepare your student and be sure you have flown together enough to establish that critical understanding and communication between instructor and student. Go through the exercise together a number of times until the student's reactions are both correct and predictable. Never truly surprise the student. Tell him you are going to give him a simulated power failure a few minutes before, and when you roll off the throttle, loudly announce "power failure". The manifold pressure should be less than 21 inches and the throttle should be rolled off smoothly, never "chopped". Follow through on all controls and tighten the muscles in your right leg to prevent the student from pushing the wrong pedal if he becomes confused. And always assume that you will be required to complete the autorotation entry yourself. Never wait to see what the student does. Plan to initiate the recovery within one second, regardless of the student's reaction.

There have been instances when the engine has quit during simulated engine failures. As a precaution, always perform the simulated engine failure within glide distance of a smooth open area where you are certain you could complete a safe touch-down autorotation should it become necessary. Also, never practice simulated power failures until the engine is thoroughly warmed up. Wait until you have been flying for at least 15 to 20 minutes.

STARTING ENGINE AND RUN-UP (cont'd)

CAUTION

For aircraft which provide low RPM horn through the audio system, a headset for each pilot is required to hear the horn.

CAUTION

On slippery surfaces, be prepared to counter nose-right rotation with left pedal as governor increases RPM.

NOTE

For hydraulic system check, use small cyclic inputs. With hydraulics OFF, there should be approximately one half inch of freeplay before encountering control stiffness and feedback. With hydraulics ON, controls should be free with no feedback or uncommanded motion.

NOTE

Idle mixture and speed may require adjustment as conditions vary from sea level standard. Refer to R44 Maintenance Manual for idle adjustment procedure.