U.S. Department
of Transportation
Federal Aviation
Administration

Advisory Circular

Subject: Reciprocating Engine Power-Loss Accident Prevention and Trend Monitoring

Date: 12/18/23
Initiated by: AFS-300

AC No: 20-105C
Change:

1 **PURPOSE OF THIS ADVISORY CIRCULAR (AC).** This AC discusses the circumstances surrounding engine power-loss accidents. It provides recommendations on how, through individual effort and consideration, those accidents can be prevented. This AC provides generic data collection charts to assist with setting up a reciprocating engine trend monitoring program to improve and track both engine and related system reliability over the recommended operating life of the engine. The contents of this document do not have the force and effect of law and are not meant to bind the public in any way, and the document is intended only to provide information to the public regarding existing requirements under the law or agency policies.

2 **AUDIENCE.** This AC applies to aircraft owners, operators, manufacturers, and maintenance personnel seeking to establish an engine trend monitoring program.

3 **WHERE YOU CAN FIND THIS AC.** You can find this AC on the Federal Aviation Administration's (FAA) website at https://www.faa.gov/regulations_policies/advisory_circulars and the Dynamic Regulatory System (DRS) at https://drs.faa.gov.

4 **WHAT THIS AC CANCELS.** AC 20-105B, Reciprocating Engine Power-Loss Accident Prevention and Trend Monitoring, dated June 15, 1998, is canceled.

5 **SCOPE.** Reciprocating engines are the engine of choice for small single-engine and multiengine aircraft due to their reliability. Despite improvements in engine design and performance over the years, a review of the National Transportation Safety Board (NTSB) database shows that powerplant system malfunctions remain the defining event for personal flying accidents. The FAA believes many of these engine power-loss accidents can be avoided if the owner/operator institutes a comprehensive training program for pilots and mechanics and incorporates a trend monitoring program.

Note: This AC is divided into two major sections. The first section reviews operational causes and recommends corrective actions to be taken to prevent or reduce the chances for an engine failure. The second section presents and explains a sample program for an engine trend monitoring system.

6 **DISCUSSION OF OPERATIONAL ENGINE FAILURES.**

6.1 **Lack of Pilot Training.** Mismanagement of the engine control systems by the pilot continues to be a leading cause of engine failure. These types of failures result from improper preflight planning or improper fuel management procedures. Fuel starvation (fuel on board the aircraft but not supplied to the engine) and fuel exhaustion (no fuel on board the aircraft) can be attributed to more than half of all engine power-loss accidents. Pilots and operators should review their aircraft's fuel and engine system operating requirements to help ensure that:

1. The pilot is completely familiar with both the airframe and engine operating manuals, especially chapters concerning fuel management, engine power settings, use of carburetor heat, and each of the aircraft's systems' design, locations, and controls.
2. The pilot adheres to all of the manufacturer's operating instructions, placards, and other limitations and avoids overtemp, overboost, and overspeed operations.
3. The pilot uses the aircraft's checklist during normal and emergency operations.
4. Recurrent training is a continuing process. Both pilots and mechanics should keep abreast of technical information related to the aircraft's fuel, oil, and replacement parts. They should also keep informed of applicable Airworthiness Directives (AD) and manufacturer's technical publications.

6.2 Inadequate Preflight Inspection. Many engine power-loss accidents can be avoided if pilots take the time to plan the flight and perform a thorough preflight inspection. Each year, accident records show a high number of accidents caused by pilots running out of fuel. During flight planning, pilots should include at least the following information in the preflight checklist:

6.2.1 Check for the total usable fuel on board the aircraft before each flight. The safest course of action is to depart with each fuel tank filled to capacity. Keep in mind that fuel gauge accuracy varies widely, especially in smaller aircraft. When it is not practical to depart with full fuel tanks due to fuel unavailability, performance, or Weight and Balance (W&B) considerations, employ a method of measuring the amount of usable fuel on board the aircraft that does not rely entirely on the fuel gauge(s), such as a precalibrated fuel dipstick. The unusable fuel (fuel in the tanks that due to the design of the tank cannot be used by the engine(s)) should not be considered as usable fuel when planning a flight.

6.2.2 Check each fuel tank drain for operation. Check for water or debris in the fuel. Also check the color of the fuel to ensure that jet fuel has not been mixed with Aviation Gasoline (AVGAS).

6.2.3 Check the underwing fuel tank vents to ensure that they are open. In the early spring and summer months, you might want to use a pipe cleaner as a probe to ensure that insects have not built a nest in the vent line. On unpressurized tanks, the fuel cap has a small vent built into it. Ensure that this vent is not covered over with dirt, wax, or polish.

6.2.4 Ensure that the fuel selector works properly. A number of engine power-loss accidents were caused because the pilot was unable to move a seized fuel tank selector handle from the empty tank to the full one or failed to lock the fuel tank selector into the proper detent. These mechanical problems are usually caused by a worn or galled fuel selector valve. If a worn or galled fuel selector is suspected, have an appropriately certificated mechanic or repair station check the fuel selector.

Note: To prevent fuel selector failure prior to taxi, exercise the selector valve by switching tanks and ensuring that there is fuel flow from each selected tank to the engine(s). Remember to allow sufficient time (3 to 4 minutes) for each check as the carburetor and fuel injector lines hold fuel from the previous selected tank. Don't forget to monitor the fuel pump pressure. At least once a month, or prior to the aircraft being operated, move the fuel selector to the fuel shut off position to ensure it will stop the fuel flow to the engine. Remember that it will take a few minutes at a low revolutions per minute (rpm) setting for the engine to drain the fuel from the fuel lines, carburetor, and fuel injector and cause the engine to quit. This check is very important because in case of an engine fire, the fuel shut off valve will stop fuel flow on the cabin side of the firewall, effectively preventing an engine fire from being fed from the aircraft fuel tanks. If a worn or galled fuel selector is suspected, have a mechanic lubricate or replace the valve, as needed.

6.3 Fuel Contamination. There are two basic kinds of fuel contamination: solid and water.

6.3.1 Solid Contaminates. Solid contaminates, such as sand, rust, and other debris, can be found by inspecting the low areas/sumps of each (empty and properly purged) fuel tank with a safety rated flashlight, and by inspecting the fuel system fillers and carburetor/injector in-line filter screen for solid particulate contamination. If solid particle contamination continues to occur frequently, the primary fuel supplier may be the source of the problem.

6.3.2 Water Contamination. Water contamination continues to be a major cause of fuel-related accidents. There are three ways water can enter a fuel system:

6.3.2.1 Condensation, or The Reduction Process in Which the Moisture in Warm Air is Reduced into Liquid Water. This phenomenon is exactly what causes windows in a warm house to "sweat" during the winter months. Condensation can happen inside a less-than-full fuel tank. When a temperature difference occurs between the walls of the fuel tank and the air in the tank (tank walls are colder than the air in the tank), water droplets will form on the inside top part of the fuel tank walls and drain down into the fuel. The effects of condensation can be reduced by keeping the fuel tanks full while the aircraft is parked.

6.3.2.2 Through the Fuel Filler Caps. The entry of rainwater or melting snow into the fuel system is made easier if the fuel filler caps have cracked or nicked "O" rings or scored and deformed filler necks. Many high-performance General Aviation (GA) aircraft have flush-mounted fuel caps that have at least two "O" rings. The most visible "O" ring is the one on the circumference of the fuel cap that provides the seal between the cap and the filler neck wall. The second "O" ring (one that is frequently overlooked by both mechanics and pilots) is the one located in the center of the fuel cap and seals the fuel cap lock assembly. Because of the design, the fuel cap lock sits in a well in the center of the fuel cap. The well provides a catch basin for water runoff. If the smaller "O" ring is defective, water will find a way into the tank. This potential hazard can be avoided by an aggressive filler neck/cap inspection and "O" ring replacement schedule.

6.3.2.3 During the Fueling Process. Careless fuel dispensing practices are generally the causal factors for water contamination of fuel. Fueling when it is raining; poor maintenance of the fuel truck or fuel farm, filters, water separators; or lack of adequate inspections or dispensing procedures contribute to the problem. To prevent dispensing contaminated fuel, Fixed-Base Operators (FBO) should ensure the following:

- Fuel handling personnel are adequately trained.
- Fuel dispensing equipment is functional and clean.
- The fuel, both in the storage tanks and fueling trucks, is checked at least once a day for overall quality and indications of water or other contaminates.
- Each inspection should be documented (refer to AC 20-125, Water in Aviation Fuels, for additional information).

6.4 Misfueling Accidents. This occurs when jet fuel is substituted for AVGAS. When jet fuel contaminates a reciprocating engine-powered aircraft's fuel system, the overall impact is not readily apparent. Depending on the amount of jet fuel pumped into the aircraft fuel tank, even a close inspection of a fuel sample may not always indicate misfueling has occurred. The engine start-up and taxi may appear to be normal because the AVGAS that is still in the fuel supply system line and filters from the last flight is not contaminated. It usually takes the engine a few minutes at relatively high-power settings to draw contaminated fuel from the selected tank. This is why a large number of misfueling accidents occur at high-power settings commonly during or shortly after takeoff.

6.4.1 Reciprocating engines that burn jet fuel at high-power settings may suffer detonations, rapid loss of power, and high Cylinder Head Temperatures (CHT). A complete engine failure can quickly follow these conditions. Switching to an uncontaminated fuel tank as soon as possible after the engine detonation occurs may relieve some of the major symptoms and the engine may develop enough power to safely land. Unfortunately, internal damage to the engine that occurs in the first 10 to 15 seconds is usually severe enough to require a teardown inspection and engine rebuild. In all cases, you should follow the engine manufacturer's instructions if the engine has been operated with the wrong fuel.

6.4.2 The potential for misfueling can be reduced if the pilot personally oversees the refueling operation. The pilot should carefully check the fueling receipt for both the quantity and type of fuel added. Check the fuel before and after refueling for clarity, color, and indication of water in the fuel. The aircraft's owner or operator should ensure that the fuel filler ports are properly marked with the correct type and octane of the fuel to be used and the capacity of the tank.

6.4.3 In addition, owners of turbo-charged, reciprocating engine aircraft should remove those decals from the cowling or fuselage that reference the words "Turbo" or "Turbo-Charged." Inexperienced fueling personnel have been known to misinterpret these decals to mean that the turbo-charged reciprocating engine is a turbine engine and fuel the aircraft with jet fuel. Refer to AC 20-116, Marking Aircraft Fuel Filler Openings with Color Coded Decals, for additional information.

6.5 Fuel Bladder Tanks. Bladder tanks or bag tanks are made of a heavy, rubberized material and installed in the section of the wing cavity designed to support the fuel tank. The bladder is secured inside the cavity by snap fastener buttons or cords and loops. Over time, the means used to secure the bladder into place may fail and the tank may collapse on itself. A partially collapsed tank limits the amount of fuel it can hold. The collapse may also interfere with fuel venting, fuel supply, and the fuel quantity indicating system. Mechanics should inspect all fuel bladder tanks for proper installation at each annual or 100-hour inspection or whenever it is suspected that the means used to secure the bladder into place has failed.

6.6 Exceeding Time Between Overhauls (TBO) Time. Another cause of engine failure is allowing the engine to run past the manufacturer's recommended TBO. TBO time is determined by the engine manufacturer and is a reliable estimate of the number of hours the engine should perform reliably within the established engine parameters and still not exceed the service wear limits for overhaul for major component parts, such as the crankshaft, cam shaft, cylinders, connecting rods, and pistons.

6.6.1 Running the engine past TBO time usually accelerates the overall wear of the engine due to larger bearing clearances; loss of protective materials such as plating or nitrating on the cylinder walls; and vibration caused by engine reciprocating parts that have worn unevenly and are now out of balance.

6.6.2 TBO times are make and model specific, and the recommended overhaul times are usually identified in an engine manufacturer's Service Bulletin (SB) or Service Letter (SL). For Title 14 of the Code of Federal Regulations (14 CFR) part 91 operations, TBO compliance is not a mandatory maintenance requirement, although overhaul at TBO will help safety and reliability. However, for engines operated under 14 CFR part 121 or 135 regulatory requirements, TBO compliance is mandatory. The FAA recommends TBO be observed by part 91 owners or operators for the following reasons:

- An overhaul at TBO will help ensure safety and reliability, and
- An engine overhaul at TBO is usually less expensive than an engine that has been run an additional 200 or 300 hours.

6.7 Poor Operating Technique. Reciprocating engine reliability depends on the engine operating within a narrow performance range. This operating range has specific limits such as rpm, fuel flow and mixture settings, manifold pressure, CHT, oil pressure, and temperature, none of which should be exceeded. All reciprocating engines are temperature sensitive. Engine cylinders and valves can be damaged by thermal shock if the engine is not properly warmed up prior to full-power applications. Cylinder heads can also crack by allowing the engine temperature to cool off too rapidly.

Note: Pilots and operators are encouraged to familiarize themselves with guidance from manufacturers that is more restrictive than the operating limitations specified in the approved Airplane Flight Manual (AFM) or Rotorcraft Flight Manual (RFM), markings, and placards.

6.8 Maintenance. Maintenance performed on reciprocating engines should be of the highest quality and performed in accordance with the current manufacturer's instructions. Areas with the most significant impact on reliability and that need constant maintenance are oil/filter changes; timely replacement of air/fuel filters; inspecting engine baffling and seals for condition and operation; engine magneto timing; and condition of the spark plugs and ignition harness. Engine maintenance should be performed by appropriately FAA-certificated and rated maintenance technicians. Additional areas that require maintenance are:

6.8.1 Engine Primer. Pilots should always follow the procedures found in the appropriate pilot's operating handbook (POH). The primer is a simple system that draws fuel from the engine supply line and injects it into two or more of the engine's cylinders by means of a small, hand-operated pump. It is important to lock the primer pump handle in the closed position when not in use. If the knob is loose or not locked in place, it may vibrate out of the closed position in flight causing an excessively rich mixture. The engine will run rough at low rpm, mimicking magneto problems, but will smooth out above 1700 rpm. The exhaust at low rpm will be black and smoky, and the fuel/air mixture will be extremely rich in the affected cylinders. Leaning the engine manually may restore smoother operation, but excessive leaning will raise the CHT in the cylinders not equipped with engine primer lines. Another condition may occur if the "O" rings in the primer pump are nicked or cracked. This condition will allow fuel to bypass the "O" rings and enter into the cabin even if the primer pump handle is stowed and locked. If this condition is suspected, you should have a certificated mechanic check the primer system.

6.8.2 Engine Controls. Throttle, mixture, carburetor heat, and propeller rpm controls are simple in design and construction. Each control is basically a flexible metal wire inside stainless steel housing. Due to the inherent flexibility of the design, if the cable housing is not secured at least every 12 inches, the cable will bend in the middle, severely limiting the amount of control movement available at the carburetor or propeller governor. Mechanics should ensure that the controls are lubricated, smooth, and positive in operation and that the length of cable movement ensures full travel and hits the stops. Mechanics should ensure that controls with rod ends have large area washers on both ends of the attaching bolt to serve as a safety in case of failure of the rod end ball.

6.8.3 Propeller Ground Strikes. Any propeller ground strike is a very serious situation that requires immediate attention. Engines that have suffered a propeller ground strike should be inspected in accordance with the manufacturer's instructions. Propeller ground strikes have been known to cause crankshaft cracks, bent propeller flanges, and rod end bolts to fail.

6.8.4 Internal Failures of Mufflers. Engines can experience substantial power reductions and failure when the internal baffling of the muffler breaks loose and partially obstructs the muffler's exhaust pipe. Indications of this condition may be a large reduction in rpm, rich mixture indication, rough running, vibration, and after-firing. At each annual or 100-hour inspection, the muffler should be inspected internally for cracks and condition.

6.8.5 Propeller Maintenance. Propellers seem to get the least attention of type-certificated products, yet they handle high thrust and torsional loads on every flight and sometimes serve as a tow bar for parking the aircraft. A properly certificated maintenance technician should dress out propeller blade nicks, dents, and scratches as necessary to prevent fatigue cracks that could cause propeller blade failure and result in power loss. The dressing of propeller blades should be done following the propeller manufacturer's recommended procedures. Excessive dressing could alter the airfoil shape of the propeller blades to the point where propeller efficiency is lost, causing insufficient propeller thrust. In the case of multiengine aircraft, that loss of thrust could prevent the aircraft from maintaining flight with one engine inoperative. Pilots and other personnel should avoid pushing or pulling on the propeller in order to park the aircraft because the force used on the propeller to move the aircraft is not spread out over the length of the propeller but, instead, is focused on a single area. This could induce a stress riser (crack) on one of the propeller blades.

6.8.6 Sticking Valves. Engines that are hard to start or run rough for 3 to 5 minutes after starting and then smooth out may have one or more sticking valves. This condition may be caused by lead and carbon deposits in the valve guide. Over time, buildup can reduce the valve stem to guide clearance. This reduction can result in an interference fit, causing the valve to seize in the guide, causing the push rod to bend. A seized valve condition may split the push rod housing and leak oil, causing loss of power for the affected cylinder. To repair a sticking valve, the cylinder will need the valve guides reamed to remove the carbon and varnish deposits.

6.8.7 Spark Plug Fouling. Spark plugs that consistently foul can be an indication of worn rings; excessively rich mixture; improper spark plug heat range; shorted ignition harness; cracked spark plug insulators; wrong fuel; spark plug barrels that are dirty or wet with moisture; improper ignition timing; low-speed operation and idle; improper leaning procedures; rapid cool down of the engine; and long gliding descents at low-power settings. Frequent inspection, cleaning, gapping, and rotation of the spark plugs may help reduce fouling. Pilots should refer to the POH for approved engine operating procedures.

6.8.8 Low Cylinder Compression. A compression test is a procedure in which 80 pounds per square inch (psi) of air is introduced into a cylinder with its piston at top dead center to determine how tightly the cylinder holds the fuel/air mixture when it is compressed. The pressurized air is controlled with a differential pressure gauge that has two gauges. One gauge reads supply air, and the other gauge reads the air pressure in the cylinder. The ideal compression reading on the differentiation gauge should be 80/80 psi at top dead center. Each engine manufacturer has established procedures to be followed when performing this compression test. The procedures to perform the compression test, the allowable limitations, and recommend troubleshooting procedures are located in the appropriate maintenance manual.

6.8.9 Air Filters, Carburetor Heat Control, and Alternate Air. Unfiltered air, whether it comes from a dirty air cleaner, carburetor heat control, or an alternate air door left on/open during taxi, allows dirt, sand, and other debris to be ingested by the engine and will score the cylinder walls and increase piston ring damage, causing lower compression readings and increased oil consumption and blow-by. As a rule of thumb, air filters should be changed at least once a year, and carburetor heat and alternate air controls should be used sparingly on the ground.

7 TREND MONITORING PROGRAM.

7.1 Trend Monitoring. Trend monitoring is a data collection system in which a select number of engine readings and indications are periodically recorded and analyzed. The data analysis allows for an airworthiness decision to be made. The purpose of the trend monitoring program is to predict a failure mode before it happens. A trend monitoring program for reciprocating engines should address at least three engine areas for monitoring:

7.1.1 Area #1, Engine Case Components. Engine case components, such as the crankshaft, camshaft, cam followers, lifters, bearings, connecting rods, and accessory gears, are housed inside a split engine case. Because of their location, visual inspection for condition and measurement of wear of these components cannot be adequately accomplished without first disassembling the engine. The only procedures that have been proven effective for determining the condition of this area are an oil analysis program, oil filter, and oil screen inspection.

7.1.2 Area #2, Cylinder and Piston Assemblies. Cylinder assembly includes the cylinder, piston and pin, intake and exhaust valves, and valve seats. These components can be removed for an in-depth inspection, but normally an inspection of the spark plugs and a compression test will give a good overview of the cylinder’s condition. Spark plugs are checked for wear and fouling. Fouled spark plugs can indicate too rich a mixture or compression ring wear.

7.1.3 Area #3, Accessories. Accessories that operate the ignition system, electrical system, and vacuum system are easily inspected and tested. These components usually give the pilot an indication of their associated gauges in the cockpit.

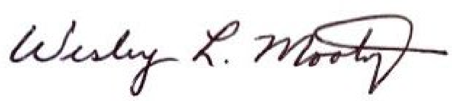
7.2 Generic Trend Monitoring Program. Appendix A, Sample Engine Trend Monitoring Data Form, and Appendix B, Sample Trend Monitoring Recording and Analysis Report, provide sample forms for a generic trend monitoring program. Appendix A is a sample data form that the mechanic and pilot will fill out. Appendix B is a sample tracking sheet in which all tracked items collected on the data form are listed together in sequence for easier comparison and analysis. The actual analysis of the airworthiness items should be accomplished by comparing the readings obtained and noting the trend as measured against the manufacturer's recommended reading. For example, if the engine manufacturer recommended a cruise oil pressure of 55 to 60 psi and the indicated reading in cruise was 48 psi, the mechanic should check oil viscosity, oil quantity, oil relief valve setting, oil filter, bearing wear, indications of blow-by/leaks, and the accuracy of the oil pressure gauge. The mechanic can also cross check with the results of the oil analysis, CHTs, oil temperatures, spark plug condition, and cylinder compression readings.

Note 1: A trend monitoring program is only as good as the information that it collects and analyzes. Before incorporating an engine trend monitoring program, the aircraft's owner or operator should ensure that the following instruments and gauges have been tested for accuracy: rpm gauge, oil pressure, oil temperature, CHT, exhaust gas temperature (EGT), fuel gauges, and manifold gauge, if applicable.

Note 2: Under certain provisions of part 135, an engine trend monitoring program is required. The information provided in Appendices A and B can be incorporated into the policies and procedures that will need to be used to meet the engine trend monitoring program requirements of part 135, § 135.421(c).

8 **SUMMARY.** Through the individual and collective efforts of the aviation community, the FAA hopes to eliminate factors that have caused engine power-loss accidents. This AC is one of many efforts to try to reduce the "power-loss" type of accidents. The simple act of "keeping the engine running" could appreciably reduce the number of accidents.

9 **AC FEEDBACK FORM.** For your convenience, the AC Feedback Form is the last page of this AC. Note any deficiencies found, clarifications needed, or suggested improvements regarding the contents of this AC on the Feedback Form.



Wesley L. Mooty
Deputy Executive Director, Flight Standards Service

APPENDIX A. SAMPLE ENGINE TREND MONITORING DATA FORM

INSTRUCTIONS: This form should be filled out by both the pilot and mechanic prior to or during inspection interval. Single asterisk (*) items are pilot functions. Double asterisks (**) can be performed by either the pilot or the mechanic.

DATE:__________________ OPERATOR:____
"N" NUMBER:__________________________________ S/N:______________________________
ENGINE MODEL NUMBER:_____________________ MFG:______________________________
HOBBS/TACH TIME:___________________________ TYPE of OIL:______________________
ENGINE TOTAL TIME:_________________________
ENGINE TOTAL TIME SINCE OVERHAUL:____

AREA #1, ENGINE CASE COMPONENTS:

OIL ANALYSIS:

DATE TAKEN	
LABORATORY	
ALUMINUM	
CHROMIUM	
COPPER	
IRON	
SILICON	
TIN	

*OIL PRESSURE @ CRUISE RPM_____________________
*OIL TEMPERATURE @ CRUISE RPM______________
*STATIC RPM (FIXED PITCH)_________ TAKE OFF RPM (CONT. PITCH)_______
*MANIFOLD PRESSURE @ TAKEOFF______________

OIL FILTER CONDITION:
OK_________
MAGNETIC PARTICLES___________________________ QUANTITY______________
NONMAGNETIC PARTICLES______________________

OIL SCREEN CONDITION:
OK_________
MAGNETIC PARTICLES___________________________ QUANTITY______________
NONMAGNETIC PARTICLES______________________ QUANTITY______________

OIL CONSUMPTION___________________ QTS PER________ HOUR(S)

AREA #2, CYLINDER/PISTON ASSEMBLIES:

*CYLINDER HEAD TEMP @ CRUISE______________________ ALT______________
*EGT @ CRUISE____ ALT______________

ENGINE COMPRESSION RESULTS:
#1______________ #5__________
#2______________ #6__________
#3______________ #7__________
#4______________ #8__________

SPARK PLUG CONDITION:

1 = Good 2 = Worn 3 = Oil Fouled 4 = Carbon Fouled 5 = Lead Fouled 6 = Damaged

#1 CYLINDER - TOP	
BOTTOM	
#2 CYLINDER - TOP	
BOTTOM	
#3 CYLINDER - TOP	
BOTTOM	
#4 CYLINDER - TOP	
BOTTOM	
#5 CYLINDER - TOP	
BOTTOM	
#6 CYLINDER - TOP	
BOTTOM	
#7 CYLINDER - TOP	
BOTTOM	
#8 CYLINDER - TOP	
BOTTOM	

*FUEL CONSUMPTION GALLONS PER HOUR @ CRUISE________________

*OUTSIDE AIR TEMPERATURE__________

AREA #3, ACCESSORIES:

**MAGNETO DROP @ 1500/1700 RPM ______________RT ___________LT
**VACUUM GAUGE____________________ @ 2100 RPM
**ELECTRICAL GAUGE_______________ AMPS/VOLTS @ 2100 RPM
AIR FILTER CONDITION (1 = OK 2 = DIRTY)______________

APPENDIX B. SAMPLE TREND MONITORING RECORDING AND ANALYSIS REPORT

DATE:__________________ OPERATOR:____
"N" NUMBER:___________________________________ S/N:___________________________
ENGINE MODEL NUMBER:_______________________ MFG:___________________________
HOBBS/TACH TIME:_____________________________ TYPE OF OIL:__________________
ENGINE TOTAL TIME:___________________________
ENGINE TOTAL TIME SINCE OVERHAUL:____
INSPECTION INTERVAL (50/100/ANNUAL):_______________________________________

<u>AREA #1, ENGINE CASE COMPONENTS</u>:

OIL ANALYSIS	**INSP. 1**	**INSP. 2**	**INSP. 3**	**INSP. 4**	**INSP. 5**	**INSP. 6**	**INSP. 7**	**INSP. 8**
ALUMINUM								
CHROMIUM								
COPPER								
IRON								
SILICON								
TIN								
OIL PRESSURE								
OIL TEMPERATURE								
OIL FILTER								
OIL SCREEN								
OIL CONSUMPTION								

<u>AREA #2, CYLINDER/PISTON ASSEMBLIES</u>:

	INSP. 1	INSP. 2	INSP. 3	INSP. 4	INSP. 5	INSP. 6	INSP. 7	INSP. 8
CHT								
EGT#2								

<u>COMPRESSION</u>:

	INSP. 1	INSP. 2	INSP. 3	INSP. 4	INSP. 5	INSP. 6	INSP. 7	INSP. 8
#1								
#2								
#3								
#4								
#5								
#6								
#7								
#8								

DATE SPARK PLUG REPLACED____________________ @ ENGINE HOURS___________________

SPARK PLUG CONDITION:

1 = Good 2 = Worn 3 = Oil Fouled 4 = Carbon Fouled 5 = Lead Fouled 6 = Damaged

	INSP. 1	**INSP. 2**	**INSP. 3**	**INSP. 4**	**INSP. 5**	**INSP.6**	**INSP.7**	**INSP. 8**
#1 CYLINDER - TOP								
BOTTOM								
#2 CYLINDER - TOP								
BOTTOM								
#3 CYLINDER - TOP								
BOTTOM								
#4 CYLINDER - TOP								
BOTTOM								
#5 CYLINDER - TOP								
BOTTOM								
#6 CYLINDER - TOP								
BOTTOM								
#7 CYLINDER - TOP								
BOTTOM								
#8 CYLINDER - TOP								
BOTTOM								

<u>AREA #3, ACCESSORIES</u>:

	INSP. 1	INSP. 2	INSP. 3	INSP. 4	INSP. 5	INSP. 6	INSP. 7	INSP. 8
FUEL CONSUMPTION								
GALLONS PER HOUR @ CRUISE								

	INSP. 1		INSP. 2		INSP. 3		INSP. 4		INSP. 5		INSP. 6		INSP. 7		INSP. 8	
	RT	LT	RT	LT	RT	LT	RT	LT	RT	LT	RT	LT	RT	LT	RT	LT
MAGNETO DROP																

	INSP. 1	INSP. 2	INSP. 3	INSP. 4	INSP. 5	INSP. 6	INSP. 7	INSP. 8
VACUUM GAUGE @ 1500/1700 RPM								
ELECTRICAL VOLT/AMP @ 2100 RPM								

	INSP. 1	INSP. 2	INSP. 3	INSP. 4	INSP. 5	INSP. 6	INSP. 7	INSP. 8
AIR FILTER CONDITION								

DATE AIR FILTER REPLACED________________________________

Advisory Circular Feedback Form

If you find an error in this AC, have recommendations for improving it, or have suggestions for new items/subjects to be added, you may let us know by contacting the Flight Standards Directives Management Officer at 9-AWA-AFB-120-Directives@faa.gov.

Subject: AC-20-105C, Reciprocating Engine Power-Loss Accident Prevention and Trend Monitoring

Date: ____________________

Please check all appropriate line items:

☐ An error (procedural or typographical) has been noted in paragraph ____________ on page _______.

☐ Recommend paragraph _____________ on page __________ be changed as follows:

____

____

☐ In a future change to this AC, please cover the following subject: *(Briefly describe what you want added.)*

____

____

☐ Other comments:

____

____

☐ I would like to discuss the above. Please contact me.

Submitted by: ______________________________ Date: _____________________