INSPECTION GUIDE

P210/ROLLS-ROYCE ENGINE CONVERSION

DATE:_____ WORK ORDER NO._____

REGISTRATION:_____ ENGINE S/N:_____

AIRCRAFT S/N:_____ ENGINE TT:_____

AIRFRAME TT:_____ HOBBS:_____

OWNER:_____

TYPE OF INSPECTION:_____

NOTE: WHEN DOING ANNUAL INSPECTION YOU MUST COMPLETE ALL INSPECTIONS THROUGH 300-HOUR INSPECTION

GENERAL

GENERAL

Airworthiness Directive Compliance _____

Placards required by Type Certificate data sheet _____

5O HOUR OR ANNUAL INSPECTION GUIDE

A. FUEL SYSTEM

Inspect:

1. Fuel strainer, drain valves, bay vents, main tank vents, caps, and placards _____

2. Fuel Selector Valve and placards _____

B. LANDING GEAR

Inspect:

1. Main gear wheels _____

2. Tires _____

3. Torque link lubrication _____

4. Nose gear strut and shimmy dampener (service as required) _____

5. Nose gear wheel _____

6. Park brake and toe brakes (operational test) _____

C. LANDING GEAR RETRACTION SYSTEM

1. Check landing gear doors for positive clearance with any part of the landing gear during operation, and for proper fit when closed. _____

D. AIRFRAME

1. Aircraft exterior _____

2. Windows, windshield, doors, and seal _____

3. Seat belts and shoulder harnesses _____

4. Instruments and markings _____

5. Defrosting, heating and ventilating systems and controls. _____

50 HOUR OR ANNUAL INSPECTION GUIDE

D. AIRFRAME (Cont.)

6. Lights, switches, circuit breakers, fuses, and spare fuses _____

7. Exterior lights _____

8. Radios, radio controls, avionics, and flight instruments _____

9. Battery and battery cables. Check electrolyte level and clean battery each 50 hours or each 30 days _____

10. Oxygen supply - Inspect masks, hose and fittings for condition, routing and support _____

11. Seat Rails - inspect for cracks _____

12. Inspect rudder cable tension _____

E. CONTROL SYSTEMS

Always check for correct direction of movement, correct travel, and correct cable tension. Inspect:

1. Trim control wheels, indicators, actuator and bungee _____

2. Flap control switch, flap rollers, and flap position indicator _____

3. Elevators, trim tab, hinges, and push-pull tube _____

4. External skins of control surfaces and tabs _____

5. Ailerons, hinges, and control rods _____

F. POWERPLANT

1. FUEL NOZZLE – Remove fuel nozzle and clean per Rolls-Royce Maintenance Manual
CAUTION: Do not remove fuel nozzle and igniter plug at the same time.
After cleaning nozzle install fuel line and torque to 80-120 in.- lbs. _____

2. IGNITER PLUG - Remove igniter plug and inspect. **[74-20-01, para. 2.A].** _____

3. STARTER/GENERATOR - Remove rear cooling tube and starter-generator shroud. Check brush wear per Starter Generator Maintenance Manual, and clean all carbon dust from commentator and brush area with compressed air. Reinstall air cooling tube. _____

1OO HOUR OR ANNUAL INSPECTION GUIDE

50-HOUR INSPECTION PLUS:

A. OPERATIONAL INSPECTION

1. BATTERY SWITCH - Check for proper operation. Check instruments for serviceability _____

2. STARTER - Check for proper operation. Starter must be able to rotate engine up to 15% before supplying fuel to combustion section. _____

3. CONDITION LEVER - Check for proper operation _____

4. POWER LEVER - Check for proper operation _____

5. N1 INDICATOR - Check for proper operation, readings, and fluctuations _____

6. TURBINE OUTLET TEMPERATURE (TOT) - Check for proper operation, temperature, and fluctuations _____

100 HOUR OR ANNUAL INSPECTION GUIDE

A. OPERATIONAL INSPECTION (Cont.)

150 HOURS

NOTE

- **CALIBRATE THE ENGINE SUPPLIED THERMOCOUPLE ASSEMBLY [77-20-01, para 2].**
- **CALIBRATE THE TOT INDICATING SYSTEM IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.**

7. ENGINE OIL PRESSURE AND TEMPERATURE – Check for proper pressure, temperature limits, and unusual fluctuations _____

8. TORQUE PRESSURE - Check for normal readings and unusual fluctuations _____

9. AMMETER - Generator ON. Check for proper indication and unusual fluctuations _____

10. PROPELLER DE-ICE - Check for proper operation and amperage draw on ammeter _____

11. IDLE RPM - Check for proper RPM and any unusual fluctuations or instability _____

12. ALL ENGINE CONTROLS - Check for proper operational limits, engine, and propeller response and rigging. Check friction locks for proper operation _____

13. FUEL QUANTITY GAGES - Check for proper operation and unusual fluctuations _____

14. FUEL TOTALIZER - Check for correct setting and proper operation _____

100 HOUR OR ANNUAL INSPECTION GUIDE

A. OPERATIONAL INSPECTION (Cont.)

15. FUEL PUMPS -- Check fuel pumps 1 and 2 for proper operation, unusual noise, or fluctuations _____

16. FUEL TANK SELECTION - Check for proper operation and positive detents in BOTH, L, and R positions _____

17. ALL LIGHTS - Check for condition, attachment, cracked, or broken lenses. Check switches, knobs, and circuit breakers for looseness and operation _____

18. STALL WARNING SYSTEM - Check for proper operation and amperage draw on ammeter _____

19. HEATING & VENTILATING SYSTEMS - Check for proper operation, heat and air flow output. Check controls for freedom of operation _____

20. RADIO OPERATION - Check for proper operation and security and switches and knobs _____

21. FLAPS -- Check for noisy operation, full travel, and proper indication _____

22. PITOT HEAT - Check amperage draw on ammeter and for proper heating of unit _____

23. FLIGHT INSTRUMENTS - Check for condition and proper operation _____

24. BRAKES - Check for condition and wear, ease of operation, and proper release of the parking brake. Check for unusual brake chatter. _____

25. EMERGENCY LOCATER TRANSMITTER - Check for proper operation and assure that the ELT is armed when the airplane is returned to service _____

26. SWITCHES, CIRCUIT BREAKERS - Check for proper operation _____

100 HOUR OR ANNUAL INSPECTION GUIDE

A. OPERATIONAL INSPECTION (Cont.)

27. FLIGHT CONTROLS, TRIM CONTROLS, AND TRIM INDICATORS - Check freedom of movement and proper operation through full travel with and without flaps extended. Check electric trim controls for operation _____

28. ANTENNAS AND CABLES - Check for proper operation _____

B. POWERPLANT (*See Rolls-Royce 250-B17F Series Operation and Maintenance Manual for Referenced Sections

1. NACELLE SKIN - Check for deformation and obvious damage or cracks. Check for loose or missing parts _____

2. NACELLE STRUCTURE - Check for cracks and deformation. Check for loose or missing rivets or concealed damage _____

3. COWLING - Check for condition and security. Check camlocks and oil access door _____

4. COWL FLAP - Check for travel, deformation, and security. Inspect for cracks _____

5. BATTERY - Inspect for cleanliness, tight connections, and add distilled water to maintain a level 3/8 inch above the top of the separators. Inspect the vents and overflow tube for obstructions. Check for security and proper attachment. Check for corrosion. Make certain the battery is clean. Water or dirt on battery surfaces can cause the battery to discharge.

ANNUAL INSPECTION ONLY: Perform Battery Capacity Test (See Attachment A) _____

6. PLUMBING - Inspect plumbing and associated accessories for condition (such as cracks and fraying) and attachment. Check plumbing clearance and secure against possible chafing. _____

100 HOUR OR ANNUAL INSPECTION GUIDE

B. POWERPLANT (Cont.)

7. ENGINE OIL TANK - Check for cracks, leaks, proper fluid level, deformation, and security. _____

8. OIL COOLER - Check oil cooler, lines, and fittings for condition, security, chafing, and leaks. _____

9. PROPELLER AND MOUNTING BOLTS - Check for condition and security. Check the tip of the blades for evidence of lightning strikes. If there is evidence of lightning strikes, consult the propeller manufacturer, the engine manufacturer, and the airframe manufacturer. Inspect the blades for cracks, dents, nicks, scratches, erosion,corrosion, security, and movement in the hub _____

10. PROPELLER SPINNER - Check for deformation, security, and cracks _____

11. PROPELLER HUB - Check for cracks, excessively leaking seals, and condition _____

12. STARTER/GENERATOR - Remove rear cooling tube and starter-generator shroud. Check brush wear per Starter Generator Maintenance Manual, and clean all carbon dust from commentator and brush area with compressed air. Reinstall air cooling tube. _____

13. EXHAUST SYSTEM - Check for cracks, deformation, leaks and security of clamps _____

14. FIREWALL - Check for wrinkles, damage, or cracks. Check all electrical and control access holes for proper sealing. _____

15. HOSE AND DUCTS - Check all fuel, oil, and air hoses or ducts for leakage, cracks, deterioration and damage. Check fittings for security _____

100 HOUR OR ANNUAL INSPECTION GUIDE

B. POWERPLANT (Cont.)

16. ENGINE ACCESSORIES - Check for condition, security and leaks. Check wiring, hoses, and tubes, for chafing, security and leaks
    - Fuel Pump _____
    - Fuel Controls _____
    - N2 Governor _____
    - Propeller Tachometer _____
    - Tachometer Generators _____
    - Vacuum Pump _____

17. ENGINE MOUNT FRAME - Check for cracks, corrosion, and security. Check mount pad bolts for loose or missing bolts and safety _____

18. ENGINE MOUNTS - Inspect rubber cushions for cracks, splits, separation, and deterioration. Check through bolts and nuts for condition and Security _____

19. ENGINE CONTROLS - Check controls and associated equipment for condition, attachment, alignment, and rigging _____

20. FUEL CONTROL AND POWER TURBINE GOVERNOR LINKAGE - Check for freedom of operation, full travel, and proper rigging. Check security of linkage and for loose or worn linkage and linkage bolts. **[76-00-00, Par. 1A].** _____

21. ELECTRICAL WIRING AND EQUIPMENT - Inspect electrical wiring and associated equipment and accessories for fraying and attachment _____

22. ENGINE - Inspect the entire engine for loose or missing bolts, broken or loose connections, security of mounting accessories and broken or missing lockwire. Check accessible areas for obvious damage and evidence of fuel or oil leakage. _____

B. POWERPLANT - (Cont.)

23. ELECTRIC PROPELLER DE-ICE
a) Check for service damage to the de-ice heaters, brush blocks, springs, and brushes. Check for attachment and security. _____

b) Check the lead straps and all other clamps, connectors, and wiring for electrical soundness, security, and attachment. _____

c) Check the slip rings for roughness, cracks, burned or discolored areas and for deposits of oil, grease, or dirt. Check for security and attachment. **See BFGoodrich Prop Tips (Attachment B)** _____

d) Check de-ice boots for wrinkles, loose or torn areas. _____

24. AIR INLET – (If equipped with electrical Style)
Check inlet fairing for condition and security of attachment and element wiring for security. Remove all foreign material which might be drawn into the compressor inlet.
AIR INLET – (If equipped with Bleed-Air Heated Style)
Check rubber seal for condition and security of attachment. Remove all foreign material which might be drawn into Compressor inlet. _____

25. COMPRESSOR - Inspect compressor inlet guide vanes and visible blades and vanes for foreign object damage. _____

26. COMPRESSOR CLEANING - Clean compressor with chemical wash solution as required if operating in a smoggy area **[72-30-00, para 5-B]** _____

27. COMPRESSOR SCROLL - Inspect the compressor scroll for cracks or breaks at the anti-ice air valve and customer bleed ports. If cracks or breaks are found check engine for possible causes of vibration **[72-00-00, para. 1-C(2)].** _____

B. POWERPLANT (Cont.)

28. Inspect Pc filter for proper clamping and security **[73-20-03, para. 2-B].** _____

29. Using a 10x power glass, inspect the condition of the Pc filter and fitting for distress/cracks, and the elbow in the scroll for distress/cracks/proper alignment. No cracks are permissible in either the Pc filter or the Compressor Scroll _____

30. Remove the Scroll-to-Pc Filter Tube Assembly and inspect for cracks using a 10x power glass. Pay particular attention to the flared ends of the tube for cracks, and to the areas beneath the floating ferrules for fretting damage. Tubes found to contain cracks and/or excessive fretting damage are to be replaced by new parts of the same part number as removed. _____

NOTE

EXCESSIVE FRETTING IS PRESENT WHEN THE FERRULE HAS CHAFED THE TUBE SUFFICIENTLY TO WEAR A STEP THAT CAN BE FELT WITH A THUMBNAIL OR OTHER INSPECTION AID.

31. AIR DISCHARGE TUBES - Inspect for excessive looseness, inserts that are locked or backing out of the scroll. If locked or loose inserts are detected, check engine for possible causes of vibration. _____

32. ANTI-ICE VALVE - Check anti-ice valve for security, worn parts, and proper operation. Valve need not be removed unless a problem is detected **[75-10-01, para. 2].** _____

33. COMPRESSOR MOUNT INSERTS - Check inserts for looseness or oil leakage. Replace if loose and check engine for possible causes of vibration [**72-60-00, para. 4.E & F].** _____

B. POWERPLANT (Cont.)

34. TURBINE SUPPORTS - Inspect the turbine support assemblies and engine exhaust duct for condition of welded joints, for cracks, and buckling [**72-50-00, para. 8.A**]. _____

35. TURBINE OIL PRESSURE CHECK VALVE – Inspect and clean the check valve **[72-60-00, para. 2.J].** _____

36. TURBINE OIL PRESSURE TUBE SCREEN – Inspect and clean the tube screen. _____

37. SCAVENGE OIL FLOW - Measure the oil flow from scavenge passage and external sump of the power turbine support [**72-50-00, para. 6.D].** _____

FLOW AMOUNT P.T._____cc *(Min 90cc)*
G.P._____cc *(Min 75cc)*

38. MAGNETIC DRAIN PLUGS - Inspect, clean, and check magnetic drain plugs [**72-00-00, para. 10.H**]. _____

39. Inspect the start counter for proper operation (increase in count) and for loose, chafed, frayed, or broken wires and loose connectors. _____

40. Check the condition of the bleed valve gasket (without removing bleed valve). Replace gasket if air leaks (blowouts) can be detected. _____

41. COMBUSTION CASE - Inspect the outer combustion case for condition. Inspect the weld joints of cases that do not have the brazed screen reinforcement in the armpit area **[72-40-00, par 2.B].** _____

42. BURNER DRAIN VALVE - Clean the burner drain valve **[72-40-00, para. 3.A].**

_____

B. POWERPLANT (Cont.)

43. IGNITION LEAD - Inspect the ignition lead for burning, chafing, or cracking of conduit and loose connections and broken lockwire **[74-20-02, para. 02]**. _____

44. IGNITER PLUG - Remove igniter plug and inspect. **[74-20-01, para. 2.A].** _____

45. EXTERNAL SCAVENGE OIL FILTER - Check filter bypass warning indicator for bypass condition _____

46. FUEL NOZZLE – Remove fuel nozzle and clean per Rolls-Royce Maintenance Manual
CAUTION: Do not remove fuel nozzle and igniter plug at the same time.
After cleaning nozzle install fuel line and torque to 80-120 in.- lbs. _____

C. FUEL SYSTEM

Check fuel lines and check valve [Beginning with P21000390 and earlier aircraft modified by SK210-93, check that the fuel line insulation in the nose gear tunnel is in good condition.] _____

D. LANDING GEAR

1. MAIN GEAR STRUT-TO-PIVOT ATTACHMENT – Check _____

2. SPRINGS - check condition of all springs. _____

3. POWER PACK CHECK VALVE SCREEN - Clean. _____

E. ENGINE RECORDS

1. Review engine records for time or cycle limited parts, components, accessories, or modules _____

2. Review engine records for compliance with all mandatory bulletins, inspections, and airworthiness directives _____

100 HOUR OR ANNUAL INSPECTION GUIDE

B. POWERPLANT (Cont.)

3. Enter component changes, inspection compliance, etc. in log book as required _____

Note 1** REFER TO TABLE 602 AND TABLE III-9 of Rolls-Royce 250-B17 Series ***Operation and Maintenance Manual for details of this inspection procedure.

2OO HOUR INSPECTION GUIDE
OR
ANNUAL INSPECTION GUIDE

100-HOUR INSPECTION PLUS:

A. FUEL SYSTEM

1. Check fuel reservoirs for cracks and leaking _____

2. Check fuel drains and sump drains _____

[Compliance with Cessna Single Engine Customer Care, Service Information Letter SE82-36 _____

B. LANDING GEAR

1. Check brake fluid, lines, hoses, linings, disk _____

2. Check main gear springs _____

3. Inspect parking brake system _____

4. Inspect nose gear fork _____

5. Inspect nose gear steering system _____

C. LANDING GEAR RETRACTION SYSTEM

NOTE

WHEN PERFORMING AN INSPECTION OF THE LANDING GEAR RETRACTION SYSTEM, THE AIRCRAFT MUST BE PLACED ON JACKS AND AN EXTERNAL ELECTRICAL POWER SOURCE OF AT LEAST 60-A SHOULD BE USED TO PREVENT DRAIN ON THE AIRCRAFT BATTERY WHILE OPERATING THE SYSTEM.

1. Operate the landing gear through five fault-free cycles _____

2. Check all hydraulic system components for security, hydraulic leaks, and any apparent damage to components or mounting structure _____

200 HOUR OR ANNUAL INSPECTION

C. LANDING GEAR RETRACTION SYSTEM (Cont.)

3. Check doors, hinges, hinge pins and linkage for evidence of wear, other damage, and security of attachment. _____

4. Inspect internal wheel well and tunnel structure for cracks, dents, loose rivets, bolts, and nuts, corrosion and other damage. _____

5. Check electrical wiring and switches for security of connections, switch operation, and check gear position indicator lights for proper operation. Check wiring for proper routing and support. _____

6. Perform operational check and ensure proper rigging of all systems and components including downlocks, uplocks, doors, switches, actuators, and power pack (observing cycle time). _____

200 HOUR OR ANNUAL INSPECTION

D. AIRFRAME (Cont.)

Inspect:

1. Aircraft structure _____

2. Seat stops, seat rails, upholstery, structure and mounting _____

3. Control column bearings, sprockets, pulleys, cables, chains and turnbuckles _____

4. Control lock, control wheel, and control column mechanism _____

5. Gyros central air filter _____

6. Instrument wiring and plumbing _____

7. Instrument panel, shock mounts, ground straps, cover, decals and labeling _____

8. Cabin upholstery, trim, sun visors, and ashtrays _____

9. Area beneath floor, lines, hoses, wires and control cables _____

10. Pitot and static systems _____

11. Stall warning unit and pitot heater _____

12. Oxygen system _____

13. De-ice system plumbing _____

14. De-ice system components _____

15. De-ice system boots _____

E. CONTROL SYSTEMS

NOTE
IN ADDITION TO THE ITEMS LISTED BELOW, ALWAYS CHECK FOR CORRECT DIRECTION OF MOVEMENT, CORRECT TRAVEL, AND CORRECT CABLE TENSION

Inspect:

1. Cables, terminals, pulleys, pulley brackets, cable guards, turnbuckles, and fairleads _____

2. Chains, terminals, sprockets, and chain guards _____

3. Travel stops _____

4. Decals and labeling _____

5. Flap motor, transmission, limit switches, structure, linkage, bellcranks, etc _____

6. Rudder pedal assemblies and linkage _____

7. Internal structure of control surfaces _____

300 HOUR OR ANNUAL INSPECTION

1OO-HOUR AND 2OO-HOUR INSPECTIONS PLUS:

A. ENGINE

CAUTION: If Firewall Shutoff is pulled to accomplish fuel Filter change, you must loosen line on engine driven pump Within 10 minutes or fuel pressure gauge in cockpit will Be damaged.

1. OIL SYSTEM - Drain oil system and refill. Remove, clean, and reinstall the oil filter and magnetic drain plugs. Drain oil cooler and reinstall plug. _____

2. SCAVENGE FILTER - Install new filter (FACET P/N 038088-08) _____

300 HOUR OR ANNUAL INSPECTION

A. ENGINE (Cont.)

3. COMPRESSOR CASE - Inspect the compressor Case when operating in an erosive or corrosive environment _____

EVERY 300 HOURS: Perform Compressor Half Removal And Inspection [72-30-00] _____

4. FUEL FILTER - If the aircraft is equipped with an engine fuel filter differential pressure warning system, replace the throw-away filter only when an indication of contamination is obtained or every 300 hours, whichever occurs first. _____

NOTE

WHEN THERE IS EVIDENCE THAT THE FUEL PUMP FILTER HAS BYPASSED, THE GAS PRODUCER FUEL CONTROL STRAINER ASSEMBLY MUST BE CLEANED.

5. FUEL FILTER BYPASS VALVE -- Perform a bypass valve operational check whenever a fuel filter is replaced. _____

6. FUEL FILTER ELEMENT - Replace the airframe mounted fuel filter element (Facet P/N 1737800) _____

7. TURBINE SCAVENGE OIL SYSTEM - **[72-50-00]**

a) Visually inspect external sump. Clean internal carbonaceous deposits from sump _____

b) Inspect the power turbine support scavenge strut. Clean internal carbonaceous deposits from strut. _____

8. FUEL FILTER BOWL - Purge air from bowl area after filter inspection or replacement. Remove line on engine fuel pump and drain until there are no bubbles coming from the line; squeeze line on pump when completed _____

SPECIAL INSPECTION ITEMS

500 HOURS

WHEEL BEARINGS -- inspect each 500 hours

600 HOURS

1. BALANCE CHECK - Make an installation rotating balance of the engine and propeller assembly at every other 100 hours inspection or at intervals not to exceed 600 hours

1000 HOURS

1. FUEL SYSTEM - Drain fuel and check bay interior, attachment, and outlet screens

2. INSTRUMENT WIRING & PLUMBING - Inspect

3. ELEVATOR TRIM TAB ACTUATOR LUBRICATION AND TAB FREE PLAY INSPECTION - Lubrication of the actuator is required each 1000 hours or three years, whichever comes first. Refer to Section 2-5 of Cessna Maintenance Manual for grease specifications. Refer to Section 9 of Cessna Maintenance Manual for free-play limits, inspection, and replacement.

4. FUEL CONTROL STRAINER ASSEMBLY -- Replace

1750 HOURS

1. COMPRESSOR CASE - Inspect the compressor case. Inspection frequency shall be made as necessary by operating environment. In erosive environment, do not exceed 1750 hours without case inspection.

5 YEARS

1. LANDING GEAR (1978 Models Only) -
Replace all rubber packings, back-ups, and hydraulic hoses in both the retraction and brake systems. Overhaul all retraction and brake system components.

2. LANDING GEAR (1979+ Later Models)
Replacement of rubber packings, back-ups, and hydraulic hoses in both the retraction and brake system is to be done at "On Condition" intervals, whenever evidence indicates a problem or potential problem.

FIRST 4000 HOURS AND EACH 200 HOURS THEREAFTER

1. INSTRUMENT PANEL AND BULKHEAD 18.00 –
Check for cracking and rivet failure

FIRST 10,000 HOURS AND EACH 500 HOURS THEREAFTER

1. MAIN LANDING GEAR BULKHEADS AND REAR DOOR POST - check for cracking.

2. BELLY SKINS - Check for cracking and rivet failure

3. FRONT CARRY-THRU SPAR AND FRONT DOOR POST INTERSECTION - Check for rivet failure

4. BULKHEADS; 55.625, 80.5 and 90.0 – Check for cracks

5. MAIN CABIN DOOR AND HINGE SCREWS - Check for failure of screws

6. EMERGENCY EXIT DOOR JAMB - Check for cracks

FIRST 12,000 HOURS AND EACH 1000 HOURS THEREAFTER

1. CABIN SKINS - Check cabin skin adjacent to cabin windows, emergency exit door, and main cabin door

2. BULKHEADS; 8.125, 27, 35, 103 and aft pressure - Check for cracks

3. EMERGENCY EXIT DOOR ASSY - Check for cracking

4. DE-ICE LIGHT LENS - Check for cracking

OVERHAUL AND REPLACEMENT SCHEDULE

POWERPLANT

MODULAR OVERHAUL

Component	TBO (Hr)	HMI (Hr)
Compressor	3500	None
Gearbox	On condition	None
Turbine	3500	1750[1]
Propeller Reduction Gearbox, P/N 23050802	On condition	None
Propeller Reduction Gearbox, P/N 23033880	2200	None

SECTIONALIZED OVERHAUL – ACCESSORIES

Accessories Recommended Time Between Overhauls (Hours)

Component	Recommended TBO
Fuel Pump - Sundstrand	2250
Fuel Pump – Argo-Tech (TRW)	
P/N 386500-5	4000
P/N 386500-1 -2 -3 -4	3500
CECO (RR P/N 23070459)	3500
P/N 113300-03A1 (CECO P/N0	
Fuel Control	2500
Woodward Combined Governor	2000
Woodward Propeller Overspeed Governor	1750
Fuel Nozzle	2500
Bleed Valve	1500

[1]) Refer to Chapter 05 [Rolls-Royce Operation & Maintenance Manual] for life limits of certain rotating parts. It is the responsibility of the operator to assure that the life limits are never exceeded.

LIFE LIMITS OF COMPRESSOR ROTOR ASSEMBLY

Nomenclature	Part #	Max. Operating Hrs	Max Cycles
Impeller	23034785	4575	9150
Impeller	23039065	7500	15,000
Wheel, 1st	23079008	7500	15,000
Wheel, 2nd	23032622	7500	15,000
Wheel, 2nd	23035252	7500	15,000
Wheel, 2nd	23079007	7500	15,000
Wheel, 3rd	23032623	7500	15,000
Wheel, 4th	23032624	7500	15,000
Wheel, 4th	23032654	7500	15,000
Wheel, 4th	23078987	7500	15,000

LIFE LIMITS OF GAS GENERATOR TURBINE ROTOR (N_1) ASSEMBLY

Nomenclature	Part #	Max. Operating Hrs	Max Cycles
1st Stage Wheel	6886407		
	23073853		
	23073813	1775	3000
2nd Stage Wheel	6898782		
	23073854		
	23073814	1775	3000
Gas Producer Turbine Tie-Bolt	23068265	------	9000

LIFE LIMITS OF POWER TURBINE ROTOR (N_2) ASSEMBLY

Nomenclature	Part #	Max. Operating Hrs	Max Cycles
3rd Stage Wheel	23001967	4550	6000
4th Stage Wheel	6853279	4550	6000

Attachment A
Battery Capacity Test

- Check for proper battery installation per STC Installation Instructions when performing annual and 100 hour inspections and when replacing battery after capacity test.
- Remove the battery from the aircraft and charge it in compliance with Manufacturer's charging instructions for sealed batteries. Allow battery to stand on open circuit for one (1) hour.
- Connect a fully charged battery to a capacity tester that incorporates a load resistance, amp meter, voltmeter, and a time clock (timer).
- Discharge the battery at the 30-minute capacity rate to 1.75 volts per cell (10.5 volts for a 12 volt battery and 21.0 volts for a 24 volt battery). Note the discharge time to the end voltage
- The battery is considered airworthy if it meets 80 percent of the 30-minute emergency capacity rating (minimum of 24 minutes to the cut off voltage)
- If the battery fails to meet the minimum run time, recharge using the constant potential method until charge current stabilizes (this could take 10 to 24 hours). Allow the battery to stand on open circuit for one (1) hour after recharging. Repeat the above capacity test. If the failure persists, replace the battery.
- If the battery is found to be airworthy as noted above, recharge the battery prior to re-installing it in the aircraft.

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If the battery passes the capacity test it must be recharged before installation in the aircraft.

Attachment B
Propeller De-Icing Tips

BFGoodrich

The Leading Edge

This is the first issue of the BFGoodrich De-Icing Systems newsletter, *The Leading Edge.*

This will be a bi-monthly publication that will contain information to help you better understand, use and maintain your BFGoodrich De-icing System. Regular features of our newsletter will include maintenance tips for electrical and pneumatic de-icing systems; "HOTLINE," a question and answer column addressing questions submitted by our readers as well as frequently asked questions from our toll free Technical Hotline (1-800-DE-ICERS), and articles of general interest and information such as this month's article "Pneumatic De-Icers by the Numbers" explaining what the numerical prefixes to our pneumatic de-icer part numbering system can tell you. There will also be product and service updates, marketing announcements of new products, plus any other news that will keep you current with BFGoodrich De-Icing Systems.

In addition to our Product Support and Services Group and our toll free Technical Hotline, *The Leading Edge* represents another example of BFGoodrich's commitment to provide the information and services to fully support our de-icing system products. We trust you will find the articles in this issue and future issues both informative and useful. If you have any suggestions for articles you would like to see, comments on articles that have appeared, or even any de-icing system maintenance tips you have that you would like to share, we would like to hear from you. Send any suggestions, comments, questions or tips to:

The BFGoodrich Company
500 South Main Street
Akron, Ohio 44318
Attn: Product Support Group
D/1832 B/17F

Prop Tips

by Gary Garcia,
Product Support Supervisor

Longer life for your Propeller De-Icing System brushes

It is a fact: "Brushes are the most frequently replaced item in a BFGoodrich Propeller De-Icing System." Brushes are continually in contact with the slip rings, consequently they are under constant wear in all aspects of flight—regardless if the de-icing system is energized or not. A few basic tips, if followed, can increase your brush life by reducing the rate of wear.

We have found that the major causes of premature brush wear are:

A) Improper alignment of brushes to slip rings;
B) Contaminants in the prop/engine attachment area where the brush assembly is located.

To assure proper brush contact, attention should be given to "Radial Alignment" and "Fore and Aft" positioning.

Radial Alignment

Radial alignment is critical to both the brush and the slip ring assembly. The brushes must be radially positioned on the ring so no portion of the brush surface is permitted to ride off the ring through the full 360° rotation of the slip ring assembly.

If not properly positioned, a lip can form on the brush face which can lead to direct contact of the brush with the potting compound that separates the slip rings (see Fig. 1 on page 2). The potting compound of the slip ring assembly serves two purposes. It provides dielectric protection isolating the rings from each other and the slip ring holder. If the brushes are allowed to register against this compound it will eventually weaken the bonding strength and allow the rings to come loose.

If you look at the brand on your BFGoodrich Pneumatic De-Icer you will notice that the BFGoodrich part number has a two- or three-place prefix. This prefix to our part number can tell you quite a bit about your BFGoodrich de-icer.

Typical BFGoodrich Pneumatic De-Icer Brand.

Some of you can remember the early BFGoodrich de-icers installed on aircraft such as the DC-3, DC-4, Beech 18 or Curtis C-46. These de-icers had a part number prefix of 11 or 12. These type 11 or 12 de-icers, as they are referred to, had large tubes and operated at 8 PSIG. They were fastened to the aircraft with screws and Rivnuts®.

In the late 1940s, with aircraft flying at higher speeds, BFGoodrich engineers saw the need for a de-icer with smaller tubes that would decrease drag and allow for a smoother airflow than the earlier de-icers with large tubes. Thus, BFGoodrich developed a type 21 and 22 de-icer. A number of firsts occurred with the development of this de-icer. These were the first de-icers to be fully cemented to the wing without mechanical attachment. They were also the original high pressure de-icers operating at 18 PSIG as opposed to earlier systems which operated at 8 PSIG. This higher pressure was necessary to achieve the same de-icing characteristics from the smaller tubes.

The next improvement in pneumatic de-icers came with the development of type 23 and 24 de-icers. These were referred to as lightweight de-icers because improvements in materials and construction methods reduced the weight from the 0.76 pounds per square foot of the type 21 and 22 to 0.65 pounds per square foot.

A major change in pneumatic de-icers came with the development of the type 25, 26, 27 and 28 de-icers. These are known as sewn type de-icers. Earlier boots had individual tubes under the surface ply. Sewn de-icers have inner plies stitched together to form the inflation tubes. This construction method dropped the weight of the de-icers to 0.43 pounds per square foot without sacrificing service life. Type 25 and 26 de-icers operate at 18 PSIG while the type 27 and 28 de-icers were designed with larger tubes and operate at 10 PSIG.

In the 1970s BFGoodrich engineers developed type 29 and 30 de-icers. These types are similar to the type 25 and 26 in that they are sewn construction and operate at 18 PSIG. The difference is they have been designed and manufactured to meet the stringent demands of airline service.

Let's define some characteristics that are common among these types of new de-icers. De-icers that have an odd-numbered prefix (21, 23, 25, etc.) have spanwise inflation tubes while de-icers with an even-numbered prefix (22, 24, 26, etc.) have chordwise inflation. De-icers which have an "S" designation in the prefix (21S, 22S, 25S, etc.) have simultaneous inflation of all tubes through a single air connection. Those without the "S" designation (21, 22, 25, etc.) have tubes that inflate alternately through two air connections.

Look at your pneumatic de-icers. If the prefix to the BFGoodrich part number is 22, you know you have a de-icer of tube-type construction designed to operate at 18 PSIG, having chordwise tubes and alternate inflation. If your de-icer has a 27S prefix, you have a sewn-type de-icer operating at 10 PSIG, spanwise tubes and simultaneous inflation.

As explained, this two- or three-place prefix can provide you with much needed information about your BFGoodrich Pneumatic De-Icers.

Fore and Aft Positioning

The brush housings are designed so the brush can move freely and not bind within the housing. Consequently, positioning the brushes with respect to the rings is very critical. We recommend that the brush housing be slightly cocked (see Fig. 2). This eliminates chatter and allows the brush to seat to the ring. On new assemblies it takes approximately 5 to 10 hours for the brushes to become fully seated. If the cocking is excessively greater than that shown in Figure 2, a side loading on the brush can exist. This causes erratic wear on the side of the brush and can eventually cause brush breakage. If the distance of the brush housing from the ring is greater than recommended, the same effect can be created. These cases also cause rapid wear, thus allowing for carbon deposits to build. If these deposits become excessive it can cause a slow short or arcing between brushes. If the correct alignment as shown in Figures 1 and 2 is followed, you should obtain maximum service life for the brushes.

Maintenance

The area where the brush assemblies are located leave them susceptible to collecting various contaminants such as oil, grease, dirt, fuel, etc. It is important that the brush assemblies be kept relatively clean. As contaminants collect around the brushes they can mix with carbon deposits creating an abrasive mixture that will cause rapid wear to both the brushes and the slip rings.

During normal aircraft inspection periods a visual inspection of the brushes should be made to see if this area is relatively clean. If deposits of foreign material are present, clean it. A cotton-tipped swab can be used to clean in between the brushes. In difficult cases, a cleaning solvent such as MEK can be used followed by wiping with a dry cloth. To clean the slip rings, normally just wiping the rings clean with a soft rag is adequate. Like the brushes, a cleaning solvent can be used followed by wiping with a dry cloth. It is not necessary to use an abrasive material to clean the rings. The brush leaves a film over the ring that acts as a natural lubricant and allows the brush to ride on the ring with less friction. If the rings are stripped clean, the brushes will witness a more rapid wear until this lubricant film is again obtained.

To aid you in your brush alignment, BFGoodrich De-Icing Systems will send you a free Brush Alignment Template. This template will help you obtain more accurate and consistent fore and aft alignment of your brushes. By using this template and following the above recommendations, you should obtain the maximum service life of both the brushes and slip rings.

To obtain your free Brush Alignment Template, write to:

The BFGoodrich Company
500 South Main Street
Akron, Ohio 44318
Attn: Product Support Group
D/1832 B/17F

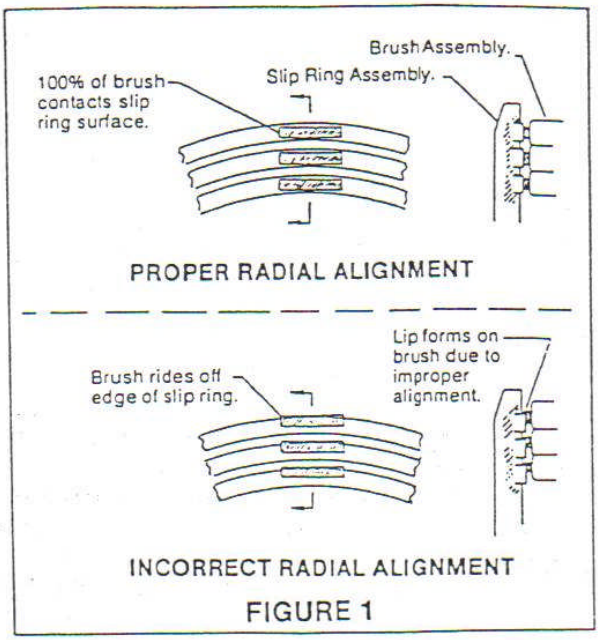

FIGURE 1

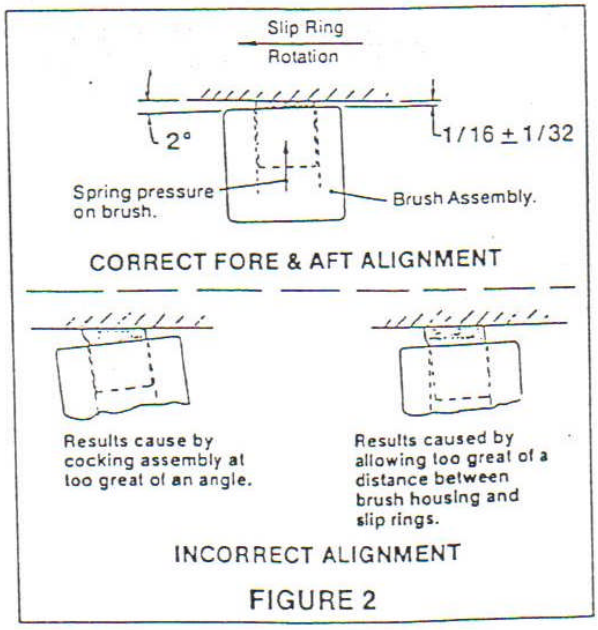

FIGURE 2