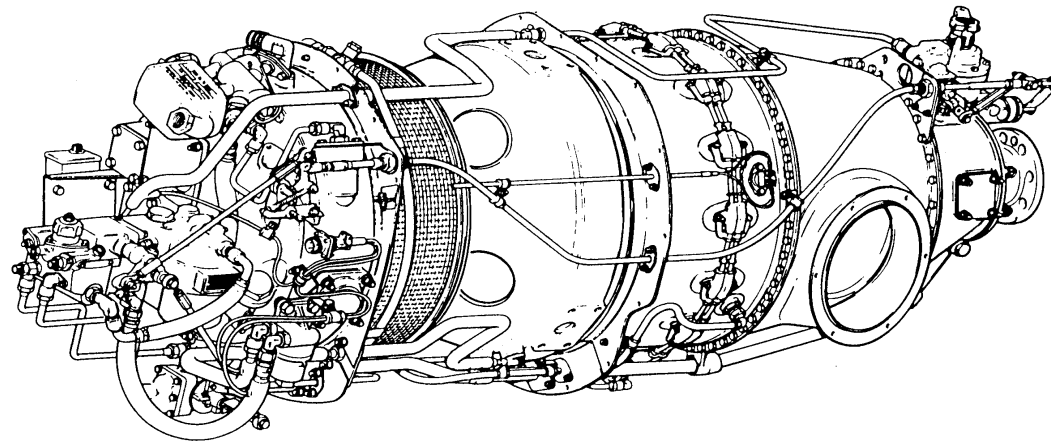




PT6A – DHC-6 Engine Refresher Course

Troubleshooting Guide for the PT6A – 27 Engine



**T5 (ITT) System Troubleshooting**

Symptoms	Possible Cause	Corrective Action
Lower T5 indication than normal	Dirt or corrosion on connections to cockpit gage	Clean or replace as required
	Burnt or broken T5 probes	Do a continuity or a heat response test
		Replace defective T5 probes
	Grounded system	Do insulation check
	Cockpit gage calibration	Calibrate or change cockpit gage
	Airframe loop resistance too high	Adjust (ref. Aircraft Manual)
Wrong class trim stick / Adjustments	Replace with proper trim stick class	
Higher T5 indication than normal	Broken or wrong class trim stick (high class)	Replace with proper trim stick class
	Dirt or corrosion on trim stick terminals	Clean or replace as required
	Burnt or broken T5 probes	Do a continuity or a heat response test
		Replace defective T5 probes
	Cockpit gage calibration	Calibrate or change cockpit gage
	Airframe loop resistance too low	Adjust (ref. Aircraft Manual)
No T5 indication	Open circuit between T5 probes and cockpit gage	Replace affected part



T5 (ITT) System Troubleshooting

Symptoms	Possible Cause	Corrective Action
Erratic T5 / T5 fluctuations	Loose, corroded or dirty connectors on terminals System grounded Broken / chafed wires	Verify / clean / replace or tighten to specification Verify ceramic insulation, ensure wires are not grounded to case
Note: In all cases, ensure the problem is T5 related only, if other parameters are also off, refer to engine performance troubleshooting		





Oil System Troubleshooting

Symptoms	Possible Cause and Fix
Low oil pressure (indication may follow power lever setting)	Check oil level Check / Replace oil filter Check indicating system / Aircraft 28V Check / Adjust pressure regulating valve Check pump housing for cracks
High oil pressure	Check indicating system Adjust/verify pressure regulating valve
Oil pressure fluctuation	Check oil level Check / Replace oil filter Check indicating system Check / Replace or clean pressure regulating valve
High oil temperature	Check oil level Excessive operation with propeller feathered Check oil temperature indicating system Check airframe oil cooler AGB scavenge pump inlet screen blockage



Oil System Troubleshooting

Symptoms	Possible Cause and Fix
Excessive oil consumption	Oil level kept too high Internal static leakage problem Oil venting out from AGB breather Check for oil leaks Check exhaust, bleed valve and inlet case for oil Fuel heater internal leakage
Oil venting out from AGB breather	Oil level kept too high Internal static leakage problem Verify/replace breather carbon seal AGB scavenge pump inlet screen blockage
Static oil leakage Oil level is found low after a period of engine inactivity. (Static internal oil leak, oil might leak out from compressor inlet)	Oil filter check valve, lap valve seat or replace o-ring (depending on configuration) O-ring and plastic ring on oil filter housing, replace O-rings in oil tank Oil pressure pump shaft seal





Fuel Control Unit Troubleshooting

Observed Problem	Possible Cause
Engine does not lightup	Aircraft fuel supply problem Improper starting procedures Start flow control or flow divider problem Internal FCU problem
Hotter start temperature than normal	Improper starting procedures Start flow control or flow divider problem Internal FCU problem
Hung start	Improper starting procedures Start flow control or flow divider problem Internal FCU problem Internal fuel pump problem Fuel pump filter blockage
Engine is slow to accelerate or limited in power range	Restricted P3 line to the FCU or P3 filter Small leakage at P3 line to FCU Small leakage from Py line or propeller Nf governor Faulty rigging, lever not reaching max stop Fuel pump filters blocked Aircraft fuel supply problem Start flow control or low divider problem Internal FCU problem





Fuel Control Unit Troubleshooting

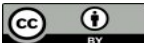
Observed Problem	Possible Cause
Engine remains at minimum fuel flow Ng speed and does not accelerate	Blocked P3 line to the FCU or P3 filter Heavy leakage at Py line and propeller governor Aircraft fuel supply problem Internal FCU problem
Engine surges during acceleration	Bleed valve problem “Pa” bleeding blocked (Px bleed to atmosphere). Call help desk for assistance “Px” restrictor at the left side of FCU (it should be at the right side)
Fluctuations of Ng, Tq, ITT, Wf and Np	FCU Ng governor bearing problem Air leakage from Py line or propeller Nf governor
Uncontrolled Ng accel	FCU Ng governor bearing seized Absence of FCU to pump coupling
White smoke at shut down from exhaust	Improper function of fuel cutoff
Rust out of fuel pump splines and drain	Replace fuel pump, ensure that the lubricating hole in AGB fuel pump drive is free from contamination
Blue stain between FCU and fuel pump or out of fuel pump drain	Replace FCU and fuel pump





Cold Section Troubleshooting

Problem	Symptoms At Constant Power			Action Required
	Ng	T5	Wf	
Restricted inlet screen	up	up	up	Clean and/or remove obstruction
Dirty compressor	up	up	up	Perform compressor wash /revise schedule
Damaged compressor blades	up	up	up	Return to an authorized overhaul facility if damage is beyond limit
Bleed valve stuck open	up	up	up	Ensure P3 is not leaking between bleed valve and gas governor case. Replace bleed valve
External P3 air leaks	same or up	up	up	Check for external leaks on gas generator Verify sealing surfaces at next HSI
Inertial separator in bypass position	up	up	up	Return separator vanes to normal position
Bleed valve closing point out of limit	Compressor stalls Possible hooting noise			Replace bleed valve if found defective
Bleed valve stuck closed	Compressor stalls			Replace bleed valve
Compressor unbalance	Vibration or humming noise			Inspect first stage compressor blades for FOD
Note: Cold section problems are always characterized by higher T5 and Wf. Ng usually goes up.				





Hot Section Troubleshooting

Problem	Symptoms At Constant Power			Action Required
	Ng	T5	Wf	
Seal ring leak	same	up	up	Reposition or replace seal ring. Verify seal ring groove and replace shroud housing if necessary
Gas leakage at junction between small exit duct and vane ring	same	up	up	Lap sealing faces. Replace parts if distorted
Burnt vane ring (larger throat area)	down	up	up	Replace vane ring
High CT tip clearance	down	up	up	Replace shroud segments to restore clearance. Replace turbine if blades are worn out
Eroded compressor turbine blades	down	up	up	Send assembly to an authorized facility for blade replacement

Note: Hot section problems are always characterized by a higher T5 and Wf. Ng usually goes down or remains constant.





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Notes:



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Torque System Troubleshooting

Symptoms	Possible Cause	Corrective Action
Lower Tq indication than normal (engine parameters indicate higher than normal)	Low main engine oil pressure Indicating system problem Torque piston is stuck	Increase oil pressure within limits Check or calibrate transducer or gage Return power section to overhaul shop
Higher Tq indication than normal (engine parameters indicate lower than normal)	RGB static line leaking Indicating system problem Control valve stuck	Check and fix RGB static pressure line Check or calibrate transducer or gage Contact your PWC Representative
Torque takes longer time than normal to indicate	Piston seals could be worn Excessive internal oil leakage	Increase oil pressure within limits Return power section to overhaul shop
High Torque indication at idle	Control valve stuck open	Contact your PWC Representative
Tq indication fluctuations (Tq only)	Torque pressure transmitter Indicating system problem RGB static line loose	Test wiring Test and/or replace transmitter





Propeller System Troubleshooting

Observed Problem		Action Required
Np and torque fluctuations (no Ng, ITT or Wf fluctuations)	At high power	Overspeed governor interferes with propeller governor Propeller governor problem. Replace unit if necessary Reduce Ng during hi power operation - See if problem clears
	At low power (in beta)	Verify if slip ring is not distorted Ensure the beta nuts are evenly adjusted Verify operation of lock pitch solenoid
Propeller slow to unfeather		Carbon block worn out or beta valve rigged too far out Air in the propeller dome (first start of the day)
Np, Tq, ITT and Ng fluctuation		Ensure reset arm is positively sitting against forward stop Verify Py line for leaks. Replace FCU if problem is still present
Propeller RPM too high		Adjust governor. Replace governor if adjustment is not effective Check accuracy of propellor speed indicating system
Propellor RPM too low		Adjust governor. Ensure Ng is not limited by any P3 or Py leak Check accuracy of propellor speed indicating system Replace governor





Post Run-up Adjustments

Symptoms	Fix
Idle Ng too high	<ul style="list-style-type: none">- Ensure minimum flow is not too high- Ensure FCU control rod is not rigged too short- Adjust
Idle Ng too low	<ul style="list-style-type: none">- Ensure that there are no P3 or Py leaks- Adjust
Ng pick-up point is different on the two engines	<ul style="list-style-type: none">- Before adjusting make sure that:- The deadband is the same on the two engines- The power lever travel movement from idle to take off is the same on the two engines (stagger is constant)- To move the pick-up point forward on the quadrant, turn the serrated washer clockwise. (Do not change the rod length) NB:2 teeth change on serrated washer = .040" movement on the cockpit quadrant
Unequal power lever travel movement from idle to take off between the two engines (progressive stagger)	<ul style="list-style-type: none">- Before adjusting, ensure that:- Low and high idles are the same on both engines and Ng pick-up point is the same on both engines- To shorten the power lever travel, (PLA ahead) lengthen the FCU control rod. This will displace the Ng pick-up point- Reposition the pick-up point by adjusting the serrated washer (counterclockwise in this case)



Post Run-up Adjustments

Symptoms	Fix
Primary blade angle check shows a difference between the two engines	<ul style="list-style-type: none">- Verify position of the beta valve is identical on the two engines when the cockpit power lever is advanced halfway between idle and maximum power- Adjust beta valve position if adjustment required is small, otherwise adjust beta nuts
Propeller zero pitch position (Ng increase in rearward deadband) is staggered on the two engines	<ul style="list-style-type: none">- Confirm the beta valve position is flush with the beta valve cap nut- Ensure the reverse cable clevis is connected to the specified reverse cam hole- Ensure Ng is in deadband zone (no increase yet)- Perform primary blade angle check (Calibrate torque transducer). Adjust PBA as required



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