Turbocharger Troubleshooting

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INTRODUCTION TO TROUBLESHOOTING:

Too often, in the event of malfunction of a turbocharged engine, the turbocharger is immediately assumed to be at fault, and is replaced. Frequently the replacement unit soon fails, finally prompting an investigation into the real cause of the initial failure. Such a sequence of events is both frustrating and expensive. Hartzell Engine Technologies's (HET) stringent quality controls make it highly unlikely that a turbocharger could leave the factory incorrectly assembled, or not up to specifications. A "suspect" turbocharger would perform poorly almost from the moment of installation. But a turbocharger that has operated successfully for a period of time, and then fails, almost invariably fails due to a deficiency in the operation of the associated engine systems. Years of actual experience with service failures demonstrate the major cause of turbocharger failures to be faulty lubrication systems. Abnormal wear in the bearings or seals results from abrasives in the oil, or an insufficient supply of oil. Faulty or uncalibrated indication systems also play a significant factor in the life of the turbocharger. Oil pressure, oil temperature, turbine inlet temperature (TIT) and exhaust gas temperature (EGT) indicators and probes must be checked routinely and serviced to assure that the turbocharger is properly working. Other systems, such as fuel and ignition, can also play a part in causing engine troubles in which turbocharger system malfunction is originally suspected. The overall objective of troubleshooting is to find the cause of trouble and take corrective action to prevent a recurrence. Keep this objective in mind when determining whether anything is actually wrong with the turbocharger system components, and just what is wrong, to enable repairs. Even perfectly operational turbocharger system components cannot compensate for incorrect engine operating procedures, for deficiencies in the engine oil supply, oil drain, ignition, air induction, fuel, or exhaust systems, or for damaged engine internal components.



WARNING: TURBOCHARGERS OPERATE AT HIGH SPEED AND HIGH TEMPERATURES. CAUTION SHOULD BE USED AT ALL TIMES WHEN OPERATING TURBOCHARGERS TO AVOID INJURY AND DAMAGE BY KEEPING FINGERS AND FOREIGN OBJECTS AWAY FROM OPENINGS AND AVOIDING CONTACT WITH ITS HOT SURFACES AND OTHER HOT CONNECTING PARTS.USE OF OSHA STANDARD SAFETY GLASSES, SHIELDS AND PROTECTIVE CLOTHING IS REQUIRED.



Table 3.1 - Summary of Pre-Troubleshooting Inspection	
System / Location	Problem to be Found and Corrected
Air Induction System	Air leaks, loose connections, damage, deterioration.
Engine Air Cleaner	Clogging.
Alternate Air Device	Leaking air, door not fully closed.
Crankcase Breather	Restriction, position, angle, and scarf of breather.
Exhaust System	Leaks, especially at exhaust manifold connections to turbocharger and to engine (gasket).
Turbocharger Oil	Oil leaks, loose connections, bad gaskets, fittings, check valves.
Bypass Valve and Controller Oil Lines, Sensing Lines, and Their Brackets	Leaks, vibrations.
Bypass Valve Actuator	Oil leakage due to twisted or damaged piston packing due to cylinder scoring or dirt.
Controller	a. Oil leakage past seal of internal poppet.b. Air leaks at any place in signal lines.c. Oil pressure variations.
Exterior of Bypass Valve or Controller	Accumulated debris on cooling fins of poppet-type bypass valve, or on linkage of butterfly-type bypass valve, or on any external controller linkage.
Turbocharger	With engine running, shrill whine above normal whine - shut engine down and check turbocharger bearing clearance.
Compressor Wheel or Turbine Wheel.	Indication of seal leakage, wheel damage or rubbing, binding, or dragging. (For any of these defects, check turbocharger bearing clearance and troubleshoot as applicable. For foreign object damage, also clean and repair air system or exhaust system).

