OIL LEAKAGE (SEE TABLE 3.3):

The Turbocharger system is a possible source of oil leaks because it is connected to the engine lubricating oil system for lubricant/coolant in the turbocharger directly, and for power fluid in the exhaust bypass valve and controller(s). "Pre-Troubleshooting Inspection" includes checks for oil leakage at oil supply and drain lines and connections, and eliminates several possible defects which can help to cause oil leakage from the turbocharger system components: a clogged air cleaner, loose connections on the duct from the compressor to the intake manifold, and leakage at the intake manifold. Some other possible causes and remedies are as follows:

A. If the engine idles too slowly, the turbocharger may not turn, allowing oil to leak past the compressor seal during idle and appear as blue smoke in the exhaust. Increase idle speed slightly to stop smoking. A new turbocharger may smoke for perhaps 30 minutes until factory oil coatings are consumed.

B. If the wrong type or viscosity of oil, or unauthorized oil additives, are being used in the engine lubrication system, service the system per the engine manufacturer maintenance publications.

C. If the engine crankcase is improperly vented, correct per engine manufacturer maintenance publications.

D. The "Pre-Troubleshooting Inspection" (page 3-60-01) procedure checks for air cleaner restriction, which can cause oil to be drawn past the turbocharger seal at the compressor end. Also remove any restriction in the duct between the air cleaner and the turbocharger, and replace damaged parts as needed.

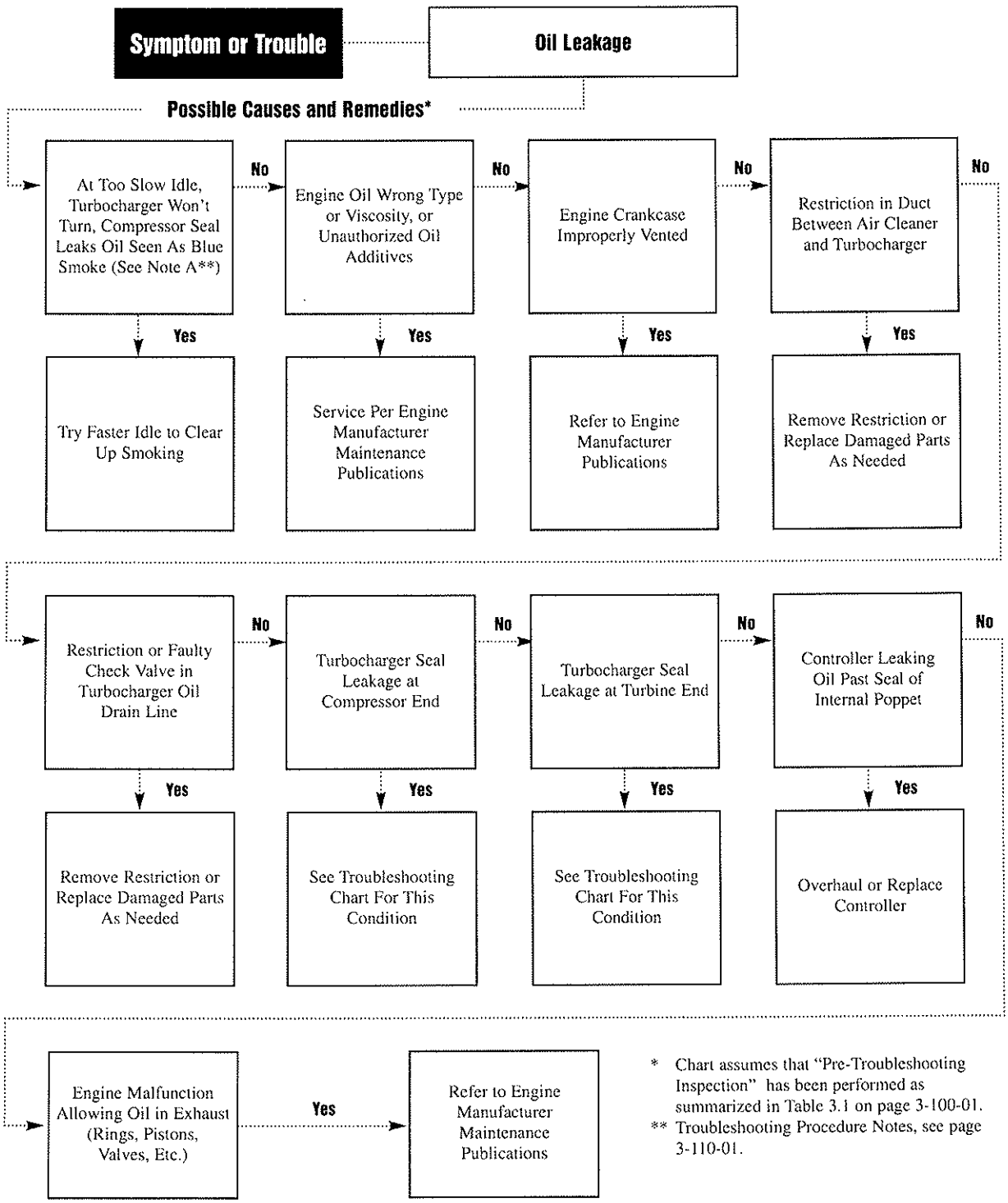
E. Restrictions in oil drainage may raise the oil level in the turbocharger center housing and cause seal leakage. As the troubleshooting chart suggests, check for a restriction or a faulty check valve in the turbocharger oil drain line. Remove such a restriction or replace damaged parts as needed.

F. If there is turbocharger seal leakage at either the turbine end or compressor end even after other possible causes mentioned in steps a, b, and c have been eliminated, see the troubleshooting chart for the seal leakage condition.

G. If a controller is discovered to be constantly leaking oil past the seal of the internal poppet, overhaul or replace the controller, in accordance with the procedures outlined in the "overhaul manual for aircraft valves and controllers" (publication no. 400999-000). Detect such leakage at a compressor outlet sensing line to the controller, at a low-pressure sensing port, or, for a duct-mounted controller without a cover, by removing the controller and inspecting the bellows area.

H. Oil in the exhaust system upstream of the turbocharger indicates an engine malfunction such as problems with rings, pistons, or valves. Correct these conditions per the engine manufacturer maintenance publications.

TABLE 3.3 - TROUBLESHOOTING - OIL LEAKAGE



* Chart assumes that "Pre-Troubleshooting Inspection" has been performed as summarized in Table 3.1 on page 3-100-01.

** Troubleshooting Procedure Notes, see page 3-110-01.

TURBOCHARGER SEAL LEAKAGE AT COMPRESSOR END (SEE TABLE 3.9):

Several conditions can cause turbocharger seal leakage at the compressor end of the rotating assembly by drawing or forcing oil past this seal. They either contribute to a higher-than-normal pressure outside the housing, or raise the level of oil within the housing to encourage oil loss past the seal. Or a worn or damaged compressor wheel and/or worn turbocharger shaft bearings may cause motion and wear at the seal.

These are some possible causes and remedies:

A. If the engine air cleaner element is clogged, inspect and service the air cleaner per the engine manufacturer maintenance publications.

B. If there is a restriction or faulty check valve in the turbocharger oil drain line, remove the restriction or replace damaged parts as needed.

C. If there is a restriction in the duct between the air cleaner and the turbocharger compressor intake, remove the restriction or replace damaged parts as needed.

D. A malfunction in the oil scavenge pump or the drain sump may cause oil backup in the turbocharger center housing. Correct such conditions per the engine manufacturer maintenance publications.

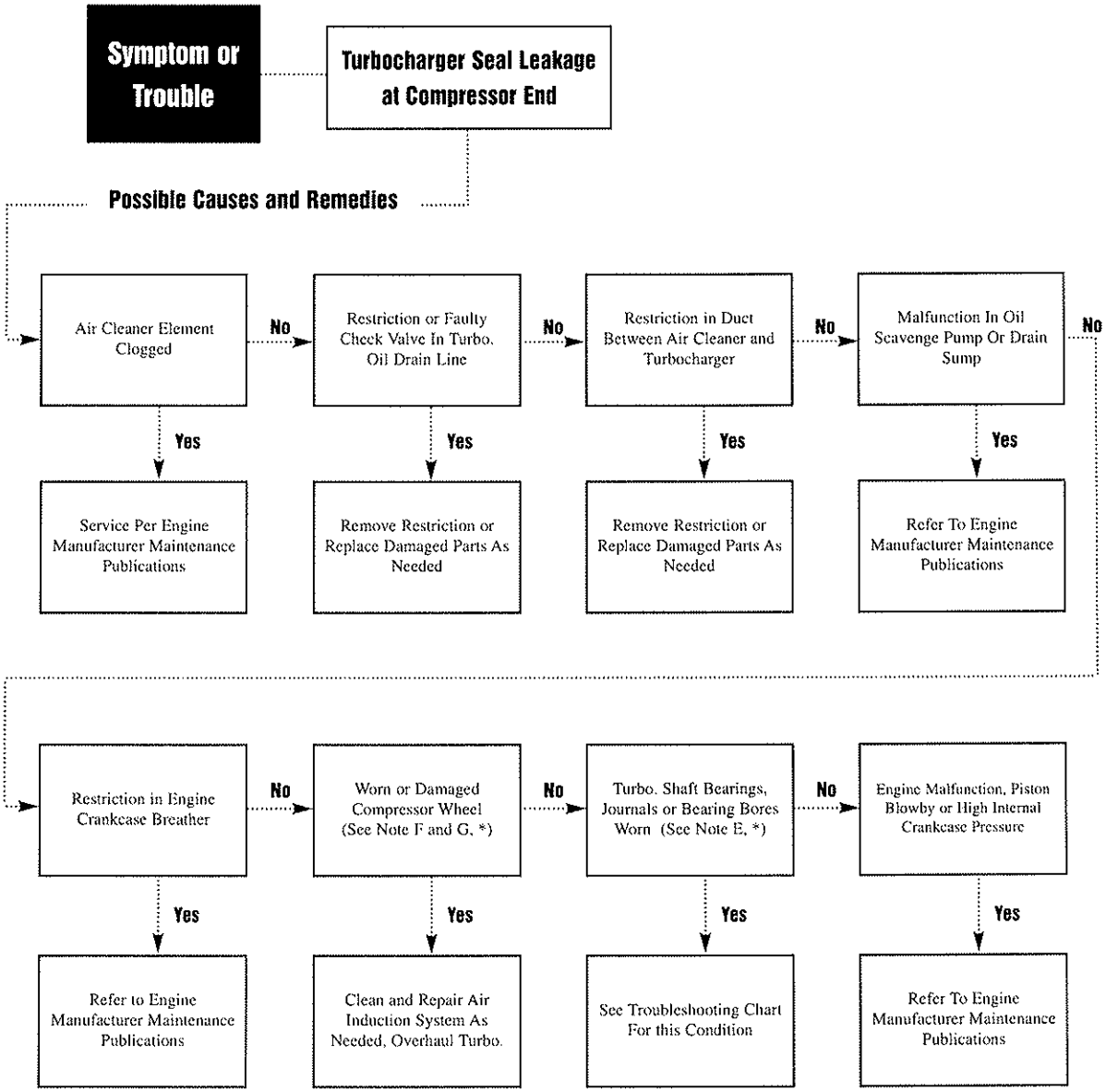
E. If there is a restriction in the engine crankcase breather, detect and eliminate the condition per the engine manufacturer maintenance publications.

F. If compressor wheel damage or wear is present to contribute to seal leakage, clean and repair the air induction system, as needed, and overhaul or replace the turbocharger.

G. If the turbocharger shaft bearings, journals, or bearing bores are worn (to the extent of not passing the "Bearing Clearance Inspection" in Chapter 2 of this Manual), determine the cause of wear by troubleshooting this condition before overhauling or replacing the turbocharger.

H. If there is an engine malfunction such as piston blow-by or too high internal crankcase pressure, correct the condition per the engine manufacturer maintenance publications.

Table 3.9 - Troubleshooting - Turbocharger Seal Leakage, Leakage at Compressor End



* Troubleshooting Procedure Notes, see page 3-110-01.

TURBOCHARGER SEAL LEAKAGE AT TURBINE END (SEE TABLE 3.10):

Most of the possible causes considered here for turbocharger seal leakage at the turbine end of the rotating assembly tend to raise the level of the oil within the turbocharger center housing, or to affect the relative pressures on the internal and external sides of the seal. There is also the possibility of seal damage or wear if the turbine wheel is worn or damaged, or shaft bearings have worn abnormally. These are some possible causes and remedies:

A. Check whether the turbocharger was pre-lubricated excessively, and follow the instructions for "Pre-lubricating Turbocharger on Engine" in Chapter 2, page 2-130-01 of this Manual.

B. If there is a restriction in the engine crankcase breather, detect and eliminate the condition per the engine manufacturer maintenance publications.

C. If there is a restriction or faulty check valve in the turbocharger oil drain line, remove the restriction or replace damaged parts as needed.

D. A malfunction in the oil scavenge pump or the drain sump may cause oil backup in the turbocharger center housing; correct such conditions per the engine manufacturer maintenance publications.

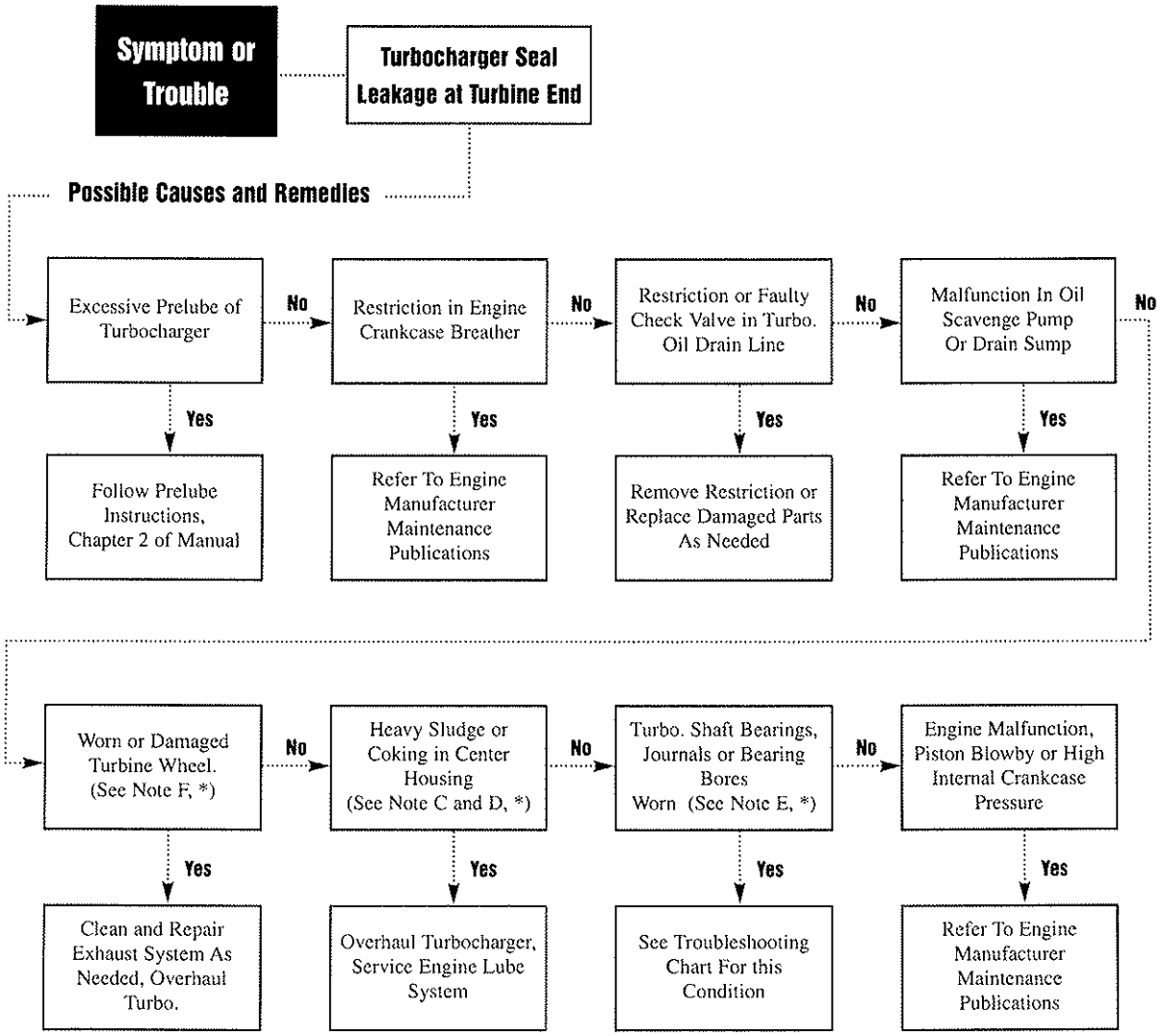
E. If turbine wheel damage or wear is present to contribute to seal leakage, clean and repair the exhaust system, as needed, and overhaul or replace the turbocharger.

F. To detect heavy sludge or coking in the turbocharger, remove the oil drain from the center housing and look in through the oil drain opening. Remove the turbocharger if necessary. When a sludge or coked condition exists, sludge builds up heavily on the shaft, between the bearing journals, on the walls of the housing from the oil drain opening back to the turbine end, and on the turbine-end piston ring seal. For this condition, overhaul the turbocharger and completely service the engine lubricating oil system. Also review engine operation and maintenance procedures for departures from accepted practices and standards.

G. If the turbocharger shaft bearings, journals, or bearings bores are worn (to the extent of the not passing the "Bearing Clearance Inspection" of Chapter 2, page 2-190-01, determine the cause of wear by troubleshooting this condition before overhauling or replacing the turbocharger.

H. If there is an engine malfunction such as piston blow-by or too high internal crankcase pressure, correct the condition per the engine manufacturer maintenance publications.

Table 3.10 - Turbocharger Seal Leakage At Turbine End



* Troubleshooting Procedure Notes, page 3-110-01.