# ENGINE - TROUBLESHOOTING

Troubleshooting table 101 has been prepared to assist in correction of malfunctions which could occur.

When troubleshooting the propeller power turbine governor check the appropriate Aircraft Maintenance Manual for adjustments. This troubleshooting guide is based on a Rolls-Royce approved propeller power turbine governor.

Consideration should also be made for tolerances on the accuracy of aircraft installed instruments. Instrument error could affect measured performance by approximately:

- 4% below actual power available for every +5°C error in outside air temperature (OAT).
  (Use a precision mercury type thermometer in the immediate vicinity of the OAT probe. Shade both thermometers for a minimum of 15 minutes before taking a reading. Compare accuracy of installed OAT gauge).
- 1% below actual power available for every 300 feet error in pressure altitude.
  (Determine pressure altitude by averaging the readings of the altimeters of known accuracy on the flight deck.)
- 2% below actual power available for every +6°C error in TOT.
  (Check calibrate the TOT system and gauge).
- 2% below actual power available for every +2% error in torquemeter.
  (Check accuracy of torquemeter).

Table 101
Troubleshooting

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 1 | Engine fails to reach 15% cranking speed. | Inadequate torque at starter pad. | Check output of starter and battery. |
| | | Binding $N_1$. | Check inlet for foreign object damage. Rotate $N_1$ by hand and listen for abnormal noise. |
| 2 | Engine fails to light off. | Preservation oil fouling the spark igniter. | Try a second start. |
| | | Air in the gas producer fuel control and lines. | Purge air from the system. (Refer to para 2.D, 73-00-00.) |
| | | Faulty circuit to ignition unit. | Listen for ignition operation. Observe for fuel vapor coming out of the exhaust. Check input power to ignition unit. Isolate and replace defective part. |
| | | Faulty ignition exciter. | Listen for igniter operation. Observe for fuel vapor coming out of exhaust. Replace with known satisfactory unit. (Refer to para 1., 74-10-01.) |
| | | Faulty spark igniter. | Listen for igniter operation. Observe for fuel vapor coming out of exhaust. Replace with known satisfactory unit. (Refer to para 1., 74-20-01.) |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 2 (cont) | Engine fails to light off (cont) | Insufficient fuel in tanks. | Fill tanks with fuel. |
| | | Gas producer fuel control remains in cutoff. | Check linkage. |
| | | Lightoff adjustment too low. (CECO control system only.) | Make lightoff adjustment. (Refer to para 3.F., 73-20-04.) |
| | | Insufficient fuel pressure to fuel pump. | Turn on aircraft boost pump. |
| | | Spark igniter firing intermittently | Check input voltage to exciter. Check ignition exciter by replacing temporarily with a known satisfactory unit. |
| | | Fuel nozzle valve stuck | Replace fuel nozzle. |
| | | Fuel pump inoperative (Fuel vapor will not be observed leaving the exhaust.) | Check pump for sheared drives or internal damage. Check for air leaks at inlet or fluid leaks at outlet. |
| | | Water or other contaminant in fuel | Check a sample of fuel from the bottom of the tank, if contaminated, disconnect the fuel line at the fuel nozzle, drain all fuel then flush the system with clean fuel. |
| | | Fuel nozzle orifice clogged | Check fuel pump filter, replace nozzle. (Refer to Filter Element Replacement, para 2.C., 73-10-01 or para 2., 73-10-05 and Fuel Nozzle, para 1., 73-10-03.) |
| | | In-line fuel check valve fails to open | Replace in-line fuel check valve. |
| 3 | Early lightoff | Fuel control cutoff valve not closed | Make a fuel control cutoff valve operational check. (Refer to Cutoff Valve Operational Check-Bendix Fuel System, para 3.D., 73-20-02 or para 3.E., 73-20-03, or Cutoff Valve Operational Check-CECO Fuel System, para 3.D., 73-20-04.) |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 4 | Engine lights off but will not accelerate to idle speed at a normal rate | Loose pneumatic fitting, cracked accumulator, or cracked pneumatic line causing air leak in control system (Bendix control system only) | Pressurize the system to check for leaks. (Refer to Bendix Fuel Control System Pneumatic Leak Check, para 2.B., 73-00-00.) |
| | | | Check for crack in air tubes or outer combustion case. Check for air seal leaks. |
| | | Dirty $P_c$ filter (Bendix control system only) | Clean $P_c$ filter. (Refer to Cleaning $P_c$ Filter, para 3., 73-20-06.) |
| | | Cracked accumulator. (Bendix control system only) | Replace accumulator. |
| | | Fuel leak at the fuel control or governor split lines or from overboard drains. (CECO control system only) | Replace component. |
| | | Inadequate torque at starter pad | Check condition of battery and starter to determine if sufficient $N_1$ cranking speed is attainable. |
| | | Dirty compressor | Clean compressor and bleed valve. (Refer to Compressor Cleaning para 6.B., 72-30-00 and Cleaning Bleed Valve, para 2.C., 75-10-02.) |
| | | Insufficient fuel supply to gas producer fuel control | Check fuel system to ensure all valves are open and pumps are operative. |
| | | Insufficient fuel pressure to fuel pump | Turn on aircraft boost pump. |
| | | Gas producer fuel control bypass valve stuck open | Disconnect the fuel line at the fuel nozzle, flush system with clean fuel; then replace control. |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 4 (cont) | Engine lights off but will not accelerate to idle speed at a normal rate (cont) | Fuel nozzle partially clogged with carbon | Clean fuel nozzle. (Refer to Fuel Nozzle Inspection/Cleaning, para 2., 73-10-03.) |
| | | Fuel nozzle check valve stuck partially open | Replace fuel nozzle. |
| | | Start derichment adjustment too low | Make start derichment adjustment. (Refer to Engine Starting Characteristics Adjustment, para 3.H., 73-20-02; para 3.G., 73-20-03; or Start Derichment Adjustment, para 3.G., 73-20-04.) |
| | | Gas producer fuel control incorrectly adjusted or calibration has shifted | Replace control. |
| | | Anti-icing valve open and cabin heat on | Close anti-icing valve and turn off cabin heat. |
| | | Foreign object damage (FOD), eroded blades, vanes and/or plastic coating | Replace the case or compressor assembly if damage or erosion exceeds acceptable limits. (Refer to Blade Damage, Vane Damage and Case Plastic Coating Inspection, para 5.C. through 5.F., 72-30-00.) |
| | | Faulty power turbine governor | Replace governor. |
| 5 | Slow starts or low turbine temperature in the 35-50% $N_1$ speed range. | Control schedule has shifted lean (6899262, Bendix 2524644-9, or later fuel controls) | Turn the start/acceleration adjuster cw to increase turbine temperature and decrease start time. Make a one detent adjustment; then observe starting temperature. One detent changes temperature 30-40°C (86-104°F). Make an additional one detent adjustment if necessary. (Refer to Start/Acceleration Fuel Flow Adjustment, para 3.H.(2), 73-20-02; para 3.G.(2), 73-20-03.) |







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Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 6 | Engine lights off but flames out during ground starts at high altitude, especially above 5000 feet (1524 meters), during cold ambient conditions. | Fuel nozzle partially clogged. | Inspect fuel nozzle for carbon buildup. Clean or replace as necessary. |
| | | Start derichment adjustment too low. | Make start derichment adjustment. (Refer to Start Derichment Adjustment, para 3.H.(1), 73-20-02; para 3.G.(1), 73-20-03; or para 3.H., 73-20-04.) |
| | | Temporary fluctuation of fuel pressure. (CECO control system only). | Make the start with the aircraft boost pump off. When idle speed is reached, turn on boost pumps if required by the Flight Manual. Do not disregard the requirements of the Flight Manual pertaining to operation of the boost pumps. If starts are not improved, adjust the start derichment (turn clockwise to enrich fuel flow). If there still is no improvement, inspect the fuel nozzle for carbon buildup. Clean or replace the fuel nozzle as necessary. |
| 7 | Low power and high TOT | Contaminated bleed valve jet | Clean bleed valve (Refer to Cleaning Bleed Valve, para 2.C., 75-10-02.) |
| 8 | Hot starts or high turbine temperature | Control schedule has shifted rich (6899262, Bendix 2524644-9, or later fuel controls). | Turn the start/acceleration adjuster ccw to decrease turbine temperature and to prevent hot starts. Make a one detent adjustment; then observe starting temperature. One detent changes temperature 30-40°C (86-104°F). Make an additional one detent adjustment if necessary. (Refer to Start/Acceleration Fuel Flow Adjustment, para 3.H.(2), 73-20-02 or para 3.G.(2), 73-20-03.) |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 9 | Acceleration temperature too high during start | Insufficient time allowed for draining after an unsuccessful starting attempt | Purge the engine by motoring with the gas producer lever and ignition switch in OFF for approximately 10 sec. before attempting a second start. |
| | | Reduced battery capacity (This can produce low cranking speed.) | Recharge or replace battery. |
| | | High residual TOT in excess of 150°C (302°F) | Motor engine with starter leaving gas producer lever and ignition OFF. |
| | | Depreciated starter which is not capable of dry motoring gas producer ($N_1$) above 15 percent | Replace starter. |
| | | Gas producer lever (twist grip) or Fuel Cutoff Lever in ground idle (start) or ON position prior to and during starter engagement | Review starting procedure. |
| | | Dirty compressor | Clean compressor and bleed valve. (Refer to Compressor Cleaning, para 6., 72-30-00 and Bleed Valve Cleaning, para 2.C., 75-10-02.) |
| | | Fuel nozzle valve stuck full open | Replace fuel nozzle. |
| | | Excessive compressor air leaking | Check for leaks. Be sure that anti-ice valve is fully closed. |
| | | Bleed control valve stuck closed | Replace bleed control valve. |
| | | Gas producer fuel control incorrectly adjusted or calibration has shifted | Replace faulty control if start temperature exceeds 927°C (1700°F). |
| | | Gas producer fuel control start derichment too rich | Adjust start derichment. (Refer to start Derichment Adjustment, para 3.H.(1), 73-20-02; para 3.G.(1), 73-20-03 or para 3.G., 73-20-04.) |







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Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 9 (cont) | Acceleration temperature too high during start (cont) | Lightoff adjustment too high. (CECO control system only.) | Make lightoff adjustment. (Refer to Lightoff Adjustment, para 3.F., 73-20-04.) |
| 10 | Acceleration temperature too low during starting | Loose pneumatic fitting, cracked accumulator, or cracked pneumatic line causing air leak in control system (Bendix system only) | Pressurize the system to check for leaks. (Refer to Fuel Control System Pneumatic Leak Check, para 2.B., 73-00-00.) |
| | | Gas producer fuel control incorrectly adjusted or calibration has shifted | Replace control. |
| | | Gas producer fuel control start derichment too lean | Adjust start derichment. (Refer to Start Derichment Adjustment, para 3.H.(1), 73-20-02; para 3.G.(1), 73-20-03 or para 3.G., 73-20-04.) |
| 10 (cont) | Acceleration temperature too low during starting (cont) | Lightoff adjustment too low. (CECO control system only) | Make lightoff adjustment. (Refer to Lightoff Adjustment, para 3.F., 73-20-04.) |
| 11 | Engine speed cycles at idle | Gas producer fuel control bypass valve not operating freely | Disconnect the fuel line at the fuel nozzle; flush system with clean fuel. Inspect and clean the fuel control fuel filter. (Refer to Cleaning the Gas Producer Fuel Control Fuel Strainer Bendix Fuel Control, para 4.A., 73-20-02 or para 4.A., 73-20-03 or Cleaning Fuel Control Filter-CECO fuel control, para 4.A., 73-20-04.) If the same condition still exists, replace control. |
| 12 | Engine instability above idle speed | Double check valve (Bendix control system-not all installations) | Replace double check valve. |
| | | Contamination in the pneumatic section of the gas producer fuel control and power turbine governor | Remove air lines and check $P_g$ port in the governor and the $P_c$ port in both control and governor. Replace control or governor if contaminated. |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 13 | Engine instability in power range | Loose pneumatic fitting, cracked accumulator, or cracked pneumatic line causing air leak in control system (Bendix system only) | Pressurize the system to check for leaks. (Refer to Bendix Fuel Control System Pneumatic Leak Check, para 2.B., 73-00-00.) |
| | | Air in fuel system. | Bleed air from the fuel system. (Refer to Purging the Fuel System, para 2.D., 73-00-00.) |
| 14 | Idle speed too low | Incorrect gas producer lever setting | Check lever position and rigging. (Refer to Rigging Check, para 3.C., 73-20-02; 3.B., 73-20-03 or 3.C., 73-20-04.) |
| | | Malfunctioning tachometer | Replace tachometer. |
| | | Excessive generator load | Reduce electrical load requirement. |
| | | Dirty compressor | Clean compressor and bleed valve. (Refer to Compressor Cleaning, para 6., 72-30-00 and Cleaning Bleed Valve, para 2.C., 75-10-02.) |
| | | Gas producer fuel control idle adjustment incorrectly set | Correct the setting. (Refer to Idle Speed Setting, para 3.F., 73-20-02; 3.C., 73-20-03 or 3.E., 73-20-04.) |
| | | Loose pneumatic fitting, cracked accumulator, or cracked pneumatic line causing air leak in control system (Bendix system only) | Pressurize the system to check for leaks. (Refer to Fuel Control System Pneumatic Leak Check, para 2.B., 73-00-00.) |
| 15 | Idle speed too high | Incorrect gas producer lever setting | Check lever position and rigging. (Refer to Rigging Check, para 3.C., 73-20-02; 3.B., 73-20-03 or 3.C., 73-20-04.) |
| | | Malfunctioning tachometer | Replace tachometer. |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 15 | Idle speed too high (cont) | Gas producer fuel control idle adjustment incorrectly set | Correct the setting. (Refer to Idle Speed Setting, para 3.F., 73-20-02; 3.C., 73-20-03 or 3.E., 73-20-04.) |
| 16 | Oil pressure drops off severely | Oil supply low | Check oil supply and refill as necessary. |
| | | Oil pressure transmitter or indicator giving false indication | Check transmitter or indicator and repair or replace if necessary. |
| | | Regulator valve sticking or broken spring | Clean or replace spring. |
| | | Defective oil pump | Replace pump or send power and accessories gearbox to an overhaul facility. (Refer to applicable part of Gearbox Disassembly and Assembly, para 2., 72-60-00.) |
| 17 | Engine operated more than 30 seconds without oil pressure. | Low oil quantity. | Remove engine and send to a Rolls-Royce Authorized Maintenance Center (AMC) for investigation (Refer to Engine Operated With No Oil Pressure, para 11.E., Engine-Servicing, 72-00-00.) |
| | | Improper servicing after oil change. | Same as above. |
| | | Oil pump failure. | Same as above. |
| 18 | Excessive oil pressure fluctuation | Air in sensing line | Bleed line. |
| | | Gage records inaccurately | Check gage and transmitter. |
| | | Faulty pressure regulating valve | Replace the valve. |
| | | Oil contamination | Drain and replace filter. Inspect magnetic chip detectors for metallic particles. Thoroughly flush with engine oil while motoring engine. Drain and refill with engine oil. |
| | | Low oil quantity | Check for excessive consumption. |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 18 (cont) | Excessive oil pressure fluctuation (cont) | Wear of filter housing due to vibration of filter inlet and filter bypass tubes | Replace packings on the inlet and bypass tubes and/or replace the filter housing (as required). |
| | | Oil filter inlet tube assembly too short | Dimensionally inspect tube length. (Refer to para 4.G., 72-60-00.) |
| 19 | Low oil pressure | Lack of oil in reservoir | Fill reservoir with correct oil. |
| | | Gage records inaccurately | Check gage and transmitter. |
| | | Oil leaks | Check all piping connections and the gearbox splitline. (Refer to Gearbox Cover-to-Housing Assembly, para 2.I., 72-60-00 for assembly technique to prevent splitline leakage.) |
| | | Clogged oil filter | Clean or replace oil filter. If filter is clogged with carbon, inspect and clean the power turbine support pressure oil nozzle, the power turbine support scavenge oil strut and the external scavenge oil sump. (Refer to para 7.E. and 7.G., 72-50-00.) |
| | | Oil contamination | Drain and replace filter. Inspect magnetic chip detectors for metallic particles. Thoroughly flush with engine oil while motoring engine. |
| | | | If carbon and sludge deposits are found, inspect the oil tank for similar deposits. If deposits are found, remove and clean the airframe oil tank and flush the airframe engine oil system in accordance with the applicable airframe manufacturer's manuals. |
| | | | Drain and refill with engine oil. |

CAUTION: DO NOT MAKE A PRESSURE REGULATING VALVE ADJUSTMENT TO CORRECT FOR A RAPID CHANGE IN OIL PRESSURE. THESE CONDITIONS ARE CAUSE TO SUSPECT OTHER OIL SYSTEM PROBLEMS HAVE DEVELOPED.







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Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 19 (cont) | Low oil pressure (cont) | Oil pressure not adjusted | Adjust oil pressure regulating valve. (Refer to Pressure Regulating Valve, para 3.A., 72-60-00.) |
| NOTE: | Before attempting oil pressure regulator adjustment, make sure that minimum $N_1$ rpm of 94% is attained during periods of reported low oil pressure readings. | | |
| | | Increase in oil pump internal clearances or sheared drive | Replace pump or send power and accessories gearbox to an overhaul facility. (Refer to applicable part of Gearbox Disassembly and Assembly, para 2., 72-60-00.) |
| | | Wear of filter housing due to vibration of filter inlet and filter bypass tubes. | Replace packings on the inlet and bypass tubes and/or replace the filter housing (as required). |
| | | Oil filter inlet tube assembly too short | Dimensionally inspect tube length per para 4.G., 72-60-00.) |
| 20 | High oil pressure | Oil pressure gage and transmitter records inaccurately | Check gage and transmitter. |
| CAUTION: | EXCEPT FOR INITIAL ADJUSTMENT ON NEWLY INSTALLED ENGINES, DO NOT ADJUST THE PRESSURE REGULATING VALVE TO CORRECT FOR HIGH OIL PRESSURE. DO NOT MAKE A PRESSURE REGULATING VALVE ADJUSTMENT TO CORRECT FOR A SUDDEN INCREASE OR RAPID CHANGE IN OIL PRESSURE. THESE CONDITIONS ARE CAUSE TO SUSPECT OTHER OIL SYSTEM PROBLEMS HAVE DEVELOPED. | | |
| | | Pressure regulating valve improperly adjusted | Readjust oil pressure regulating valve. (Refer Pressure Regulating Valve, para 3.A., 72-60-00.) |
| 21 | Oil consumption exceeds 0.05 gal (0.19 liter) per hour [1 quart (0.9 liter) per 5 hours] | Loose fittings, connections, or splitlines | Check all fittings, connections, and splitlines for sealant and proper torque. Wash entire engine and coat with whitener in suspected area. Operate engine to locate source of leakage. (Refer to Gearbox Cover-to-Housing Assembly, para 2.I., 72-60-00 for assembly technique to prevent gearbox splitline leakage.) |
| | | Oil leakage from power turbine carbon face seal | Replace seal. (Refer to Oil Bellows Seal, para 6., 72-50-00.) |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 21 (cont) | Oil consumption exceeds 0.05 gal (0.19 liter) per hour [1 quart (0.9 liter) per 5 hours (cont) | Leaking accessory oil seals as evidenced by oil draining from weep hole (on gas producer fuel control and power turbine governor) or from drain on fuel pump | Replace defective seals. (Refer to Replacing Oil Seals, para 1.B., 72-60-00.) |
| NOTE: | Check the aircraft oil quantity within 15 minutes of engine shutdown to avoid a false indication of excessive oil consumption. If the 15 minutes has been exceeded, motor the engine for 30 seconds with the starter before checking tank quantity. Motoring normally scavenges oil from the gearbox back to the aircraft oil tank. Check the airframe flight manual; some installations can require engine to be operated for at least a minute at ground idle to assure proper scavenging of the engine gearbox. | | |
| NOTE: | Always refer to the airframe flight manual for proper oil servicing instructions; specific requirements can vary for different aircraft models. | | |
| 22 | Oil consumption in excess of 1 quart in 5 hours (0.05 gal/hr, 0.19 liter/hr). | Coking and carbon buildup in power turbine support | Clean power turbine support scavenge oil strut, power turbine support pressure oil nozzle and the external scavenge oil sump. (Refer to para 7.E. and 7.G., 72-50-00.) |
| | | Improper fit between the power turbine inner and outer shafts | Send engine to an overhaul facility for repair. |
| 23 | Oil blowing from gearbox vent. | Leaking accessory pad seal | Replace seal. (Refer to para 4.C.(5) and 1.B., 72-60-00.) |
| 24 | Oil spewing from diffuser vent orifice | Orifice improperly sized (smaller orifice needed) | Refer to Diffuser Vent Orifice Selection, para 1.B., Engine-Adjustment/Test, 72-00-00.) |
| 25 | Oil spewing at compressor bleed control valve | No. 1 bearing seal failure | Replace seal. (Refer to Compressor Front Bearing and/or Oil Seal Replacement, para 3. or 4., 72-30-00.) |
| 26 | Oil temperature exceeds 107°C (225°F) | Oil cooler air-flow restricted or oil cooler fan inoperative | Check cooler and fan; repair or replace. Inspect engine. (Refer to Oil Temperature Limit Exceeded, para 11.B., Engine-Servicing, 72-00-00.) |
| | | Oil cooler bypass valve inoperative | Check valve, repair or replace. Inspect engine. (Refer to Oil Temperature Limit Exceeded, para 11.B., Engine-Servicing, 72-00-00.) |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 27 | Oil temperature exceeds 107°C (225°F) remains less than 120°C (248°F) for a period not exceeding 10 minutes. | Contamination or carbon buildup in the turbine. | Inspect and clean oil system and passages. (Refer to Oil System Maintenance, para 7.F., 72-50-00.) |
| 28 | Low power with high TOT | Dirty compressor | Clean compressor (Refer to Compressor Cleaning, para 6., 72-30-00.) |
| | | Compressor foreign object damage | Replace compressor if damage exceeds limits. Inspect turbine assembly for secondary damage. |
| | | Engine air inlet blockage | Remove objects causing blockage. (Refer to Compressor Air Inlet Blockage, para 1.D.(12), Engine-Inspection/Check, 72-00-00.) |
| | | Eroded blades, vanes and/or plastic coating | Replace the case or compressor assembly if erosion exceeds the acceptable limits. (Refer to Blade Damage, Vane Damage and Case Plastic Coating Inspection, para 5.C., 5.D. and 5.E., 72-30-00.) |
| | | New compressor case misaligned at installation | If noise monitoring indicates rub, remove and reinstall the case. (Refer to Case Replacement, para 2., 72-30-00.) |
| | | Bleed control valve has failed to close. | Check compressor discharge pressure sensing line for leaks and for security. Clean valve nozzle, filter and jet. (Refer to Bleed Valve Cleaning, para 2.C. 75-10-02.) |
| | | Excessive compressor air leaks | Replace bleed control valve. Repair leaks. |
| | | Faulty TOT indicator | Check calibration of TOT system. Replace indicator as necessary. Also Refer to Item 30. |
| | Low power with high TOT (cont) | Anti-icing valve leaking | Check solenoid and tube fittings for leaks, replace valve as necessary. |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 28 (cont) | Low power with high TOT (cont) | Faulty torquemeter indicating system | Check calibration of torque sensing system. Replace gage or transmitter as necessary. Also refer to Item 48. |
| | | Compressor air discharge tubes leaking air at the piston ring split seals | Reposition the compressor air discharge tubes or replace the piston ring split seals. Inspect tubes for cracks. Check adapter for being out-of-round, or worn seal bore. Check outer combustion case flanges for warping. |
| | | Compressor rotor-to-shroud clearance excessive | Repair or replace the compressor. |
| | | Compressor impeller rub caused by dirt or No. 1 bearing failure | Clean or replace compressor. |
| | | Compressor scroll internal erosion distorted elbow vanes or air leaks at joints | Repair or replace compressor. |
| | | Outer combustion case cracked or distorted | Repair crack or replace outer combustion case. |
| | | Warped or cracked combustion liner | Repair or replace combustion liner. |
| | | 1st-stage gas turbine nozzle cracked | Replace 1st-stage nozzle. |
| | | Cracked first-stage turbine nozzle diaphragm | Replace the first-stage turbine nozzle diaphragm. (Refer to Replace the First-stage Turbine Nozzle or First-stage Turbine Nozzle Shield, para 2., 72-50-00.) |
| | | Burned or missing turbine rotor blades | Replace turbine assembly. |
| | | Turbine wheel or nozzle eroded excessively | Replace turbine. |
| | | Turbine wheel blade tip excessive clearance | Replace turbine. |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 28 (cont) | Low power with high TOT (cont) | Nos. 6 & 7 area labyrinth seals excessive clearance | Replace turbine. |
| | | Blocked or restricted exhaust outlet | Remove blockage or replace turbine (e.g., flowsplitter damage). |
| | | Leaking heating/environmental control bleed air system | Cap or blank off customer bleed pad on scroll to isolate cause. |
| 29 | Low power with TOT below max limit | Gas producer control lever not reaching maximum speed adjustment stop | Clean and adjust linkage to the gas producer fuel control. Correct any looseness, wear or lost travel. (Refer to Rigging Check, para 3.C., 73-20-02; 3.B., 73-20-03 or 3.C., 73-20-04.) |
| | | Gas producer control lever maximum speed adjustment stop not properly set | Correct the maximum speed adjustment setting. (Refer to Fuel Control Max Speed Stop, para 3.G., 73-20-02; 3.F., 73-20-03 or 3.I., 73-20-04.) |
| CAUTION: | THIS IS AN OVERSPEED PROTECTION SETTING; MOVE IN ONE TURN INCREMENTS. | | |
| | | Loose pneumatic fitting, cracked accumulator, or cracked pneumatic line causing an air leak in the control system (Bendix control system only) | Pressurize the system to check for leaks. (Refer to Bendix Fuel Control System Pneumatic Leak Check, para 2.B., 73-00-00.) |
| | | Contaminated fuel control air (Pneumatic) circuits (Bendix control system only) | Clean air circuit. (Refer to para 4.B., 73-20-02 or 4.B., 73-20-03.) |
| | | L.P. Fuel Filter Blocked | Check bypass indicator. Replace filter element. |
| | | Aircraft fuel system restriction, contamination or leakage | Refer to aircraft manual for corrective action. |
| | | Blocked fuel nozzle | Clean or replace fuel nozzle (Refer to para 1. through 5., 73-10-03.) |
| | | Faulty gas producer fuel control assembly | Replace gas producer fuel control assembly. |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 30 | Low measured TOT at normal or high power | Faulty TOT indicator | Check TOT system calibration. Replace indicator as necessary. |
| | | Faulty TOT thermocouple assembly | Check TOT system calibration. Replace thermocouple assembly as necessary (Refer to Thermocouple Replacement, para 1., 77-20-01.) |
| | | Same as Items 28 and 29 | Correct as in Items 28 and 29. |
| 31 | Unable to obtain specified power. | Improper max flow stop adjustment. (CECO control system only) | Check adjustment. (Refer to para 3.H., 73-20-04, for adjustment required by some installations.) |
| | | Foreign object damage (FOD) eroded blades, vanes and/or plastic coating. | Replace the case or compressor assembly if damage or erosion exceeds the acceptable limits. (Refer to Blade Damage, Vane Damage and Case Plastic Coating Inspection para 5.C. through 5.F., 72-30-00.) |
| | | New compressor case misaligned at installation. | If noise monitoring indicates rub, remove and reinstall the case. (Refer to Case Replacement para 2., 72-30-00.) |
| 32 | Abnormally high or low power. | Dirt in fuel system. (CECO control system only.) | Check condition of the fuel filters. (Refer to Fuel System Filter Maintenance, para 2.C., 73-00-00.) Return contaminated units for repair or overhaul. |
| | | | Review fuel handling techniques and facilities. |
| 33 | Unstable or erractic operation. | Air in fuel system causing loss of governing action. | Bleed the governor bypass $P_o$ port. (Refer to applicable part of Purging the Fuel System, para 2.D., 73-00-00.) |
| | | | Bleed air from the fuel system. (Refer to para 2.D.(3), 73-00-00, CECO system or 2.D.(2), 73-00-00, Bendix system.) |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 34 | Engine $N_1$ or $N_2$ overspeeds | Gas producer fuel control linkage not properly set | Check linkage for proper operation and adjustment. |
| | | Defective gas producer fuel control or power turbine fuel governor | Replace defective control or governor. |
| | | Faulty $N_1$ or $N_2$ tachometer | Replace tach-generator or indicator. |
| | NOTE: During ground run after overspeed incident, note the idle speed with the twist grip or throttle at the idle position. If idle speed is normal, suspect the governor. If idle speed is high, suspect the gas producer fuel control as the faulty component. | | |
| 35 | Excessive NR droop at takeoff, hover, or cruise | Air in fuel system. (CECO control system only.) | Bleed the governor bypass $P_o$ port if droop occurs following system maintenance or extended inactivity (overnight). (Refer to applicable part of Purging the Fuel System, para 2.D., 73-00-00.) |
| 36 | Fast decelerations | Dirty gas producer fuel control air circuit (Bendix control system only) | Clean circuit. (Refer to Cleaning the Gas Producer Fuel Control Air Circuit, para 4.B., 73-20-02 or para 4.B., 73-20-03.) |
| 37 | Auto decelerations | Dirty gas producer fuel control air circuit (Bendix control system only) | Clean circuit. (Refer to Cleaning the Gas Producer Fuel Control Air Circuit, para 4.B., 73-20-02 or para 4.B., 73-20-03.) |
| 38 | Excessive exhaust torching during transients | Fuel nozzle malfunction | Replace fuel nozzle. |
| | | Excessively rich gas producer fuel control | Replace control. |
| | | Leaking accessory bleed lines | Repair or replace lines. |
| 39 | Slow to accelerate from idle to power | Dirty compressor | Clean compressor and bleed valve. (Refer to Compressor Cleaning para 6., 72-30-00 and Bleed Valve Cleaning, para 2.C., 75-10-02.) |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 39 (cont) | Slow to accelerate from idle to power (cont) | Foreign object damage (FOD), eroded blades, vanes and/or plastic coating | Replace the case or compressor assembly if damage or erosion exceeds acceptable limits. (Refer to Blade Damage, Vane Damage, and Case Plastic Coating Inspection, para 5.C. through 5.F., 72-30-00.) |
| | | New compressor case misaligned at installation | If noise monitoring indicates rub, remove and reinstall the case. (Refer to Case Replacement, para 2., 72-30-00.) |
| | | Bleed control valve malfunctioning | Replace bleed control valve. |
| | | Loose pneumatic fitting, cracked accumulator, or cracked pneumatic line causing air leak in control system (Bendix system only) | Pressurize the system to check for leaks. (Refer to Fuel Control System Pneumatic Leak Check, para 2.B., 73-00-00.) |
| | | Excessive generator load | Reduce electrical load. |
| | | Excessive compressor air leakage | Check for leaks and repair. |
| | | Gas producer fuel control acceleration schedule too lean | Replace control. |
| | | Excessive bypass flow from power turbine governor. | Replace governor. |
| | | Dirty gas producer fuel control air circuit (Bendix control system only.) | Clean circuit. (Refer to Cleaning the Gas Producer Fuel Control Air Circuit, para 4.B., 73-20-02 or para 4.B., 73-20-03.) |
| 40 | Slow to accelerate to power while in flight | Same as in Item 39 trouble | Correct as in Item 39 trouble. |
| | | Governor linkage incorrectly rigged | Check rigging. Correct linkage as required. |
| 41 | TOT approx 30°C (54°F) lower than normal at idle | Bleed control valve stuck closed | Replace bleed control valve. |







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Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 42 | Compressor surge during starting or near the idle speed | Dirty compressor | Clean compressor and bleed valve. (Refer to Compressor Cleaning para 6., 72-30-00 and Bleed Valve Cleaning, para 2.C., 75-10-02.) |
| | | Foreign object damage (FOD), eroded blades, vanes and/or plastic coating | Replace the case or compressor assembly if damaged or erosion exceeds the acceptable limits. (Refer to Blade Damage, Vane Damage and Case Plastic Coating Inspection, para 5.C. through 5.E., 72-30-00.) |
| | | New compressor case misaligned at installation | If noise monitoring indicates rub, remove and reinstall the case. (Refer to Case Replacement, para 2., 72-30-00.) |
| | | Excessively rich gas producer fuel control | Replace gas producer fuel control. |
| | | Bleed control valve stuck closed | Replace bleed control valve. |
| 43 | Compressor surge during starting | Bleed control valve stuck closed | Replace bleed control valve. |
| | | Foreign object damage (FOD), eroded blades, vanes and/or plastic coating | Replace the case or compressor assembly if damage or erosion exceeds acceptable limits. (Refer to Blade Damage, Vane Damage and Case Plastic Coating Inspection, para 5.C. through 5.E., 72-30-00.) |
| | | Excessively rich gas producer fuel control | Adjust start/acceleration adjuster CCW one detent. Monitor start to make sure proper start temperatures are maintained. A second one detent adjustment may be made if proper start temperatures can be maintained. If surge continues after adjustment or acceptable start time start temperatures cannot be maintained, then replace gas producer fuel control. |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 44 | Compressor surge during acceleration | Bleed control valve failed to open | Replace bleed control valve. |
| | | Excessively rich gas producer fuel control | Adjust start/acceleration adjuster CCW one detent. Monitor start to make sure proper start temperatures are maintained. A second one detent adjustment may be made if proper start temperatures can be maintained. If surge continues after adjustment or acceptable start time start temperatures cannot be maintained, then replace gas producer fuel control. |
| | | Foreign object damage (FOD), eroded blades, vanes and/or plastic coating | Replace the case or compressor assembly if damage or erosion exceeds the acceptable limits. (Refer to Blade Damage, Vane Damage and Case Plastic Coating Inspection, para 5.C. through 5.E., 72-30-00.) |
| | | New compressor case misaligned at installation | If noise monitoring indicates rub, remove and reinstall the case. (Refer to Case Replacement, para 2., 72-30-00.) |
| 45 | Compressor surge during low power operation | Bleed control valve failed to open | Clean bleed valve filter, jet and strainer. If condition still exists, replace bleed control valve. (Refer to Bleed Valve Cleaning, para 2.C., 75-10-02.) |
| | | Foreign object damage (FOD), eroded blades, vanes and/or plastic coating | Replace the case or compressor assembly if damage or erosion exceeds the acceptable limits. (Refer to Blade Damage, Vane Damage and Case Plastic Coating Inspection, para 5.C. through 5.E., 72-30-00.) |
| | | New compressor case misaligned at installation | If noise monitoring indicates rub, remove and reinstall the case. (Refer to Case Replacement, para 2., 72-30-00.) |







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Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 46 | More than 20 drops per minute fuel leaking from fuel pump overboard drain ports | Fuel pump drive shaft seal leaking | Replace fuel pump. |
| | | Gearbox seal leaking | If leakage is fuel, replace pump; if leakage is oil, replace seal. |
| 47 | More than 5 drops per min fuel leakage from either the fuel control or the governor overboard drain line. | Gas producer fuel control failure. | Replace fuel control. |
| | | Power turbine governor failure. | Replace governor |
| 48 | Faulty torquemeter indication | Faulty airframe installed transmitter | Replace transmitter. |
| | | Clogged torquemeter pressure sensing oil line | Disassemble power and accessory gearbox and clean or send gearbox to an overhaul facility. (Refer to applicable part of Gearbox Disassembly and Assembly, para 2., 72-60-00.) |
| | | Clogged fixed area torquemeter piston bleed orifice | Disassemble power and accessory gearbox and clean bleed orifice or send gearbox to an overhaul facility. (Refer to applicable part of Gearbox Disassembly and Assembly, para 2., 72-60-00.) |
| | | Torquemeter supporting bearing failure | Replace bearing or send power and accessory gearbox to an overhaul facility. (Refer to applicable part of Gearbox Disassembly and Assembly, para 2., 72-60-00.) |
| 49 | Loss of power sharing during acceleration or torque split on multi-engine applications. | Incorrect aircraft rigging. | Check rigging and adjust in accordance with aircraft manufacturer's instructions. |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 49 (cont) | Loss of power sharing during acceleration or torque split on multi-engine applications. (cont) | Excessive collective/ P.T. Governor control system looseness, wear or lost travel | Correct looseness, wear or lost travel. Refer to aircraft manufacturer's instructions for corrective action. |
| 50 | Severe $N_1$ oscillation (Bendix control system) at approximately the 40° throttle lever position. | PrPg reset dump valve cycling. | Move throttle out of affected throttle range. |
| 51 | Lack of anti-icing air | Defective anti-ice air lines | Check lines. |
| | | Anti-icing valve stuck closed | Replace valve. |
| | | Dirt collected in vane trailing slot | Remove anti-icing air lines at the compressor front support, cap the bullet nose outlet holes and blow through struts and out slots at 40 psig (276 kPag) maximum. |
| 52 | Continuous exhaust smoking | Oil leakage from forward compressor bearing oil seal or power turbine carbon face seal | If oil consumption exceeds limits, replace faulty component(s) as necessary. |
| NOTE: | Remove external sump and measure oil flow. (Refer to para 7.D., 72-50-00.) | | |
| 53 | Heavy smoking out exhaust. | Contamination or carbon buildup in the turbine. | Inspect and clean oil system and passages. (Refer to Oil System Maintenance, para 7.F., 72-50-00.) |
| 54 | Compressor rear bearing labyrinth seal vent smoking | Seal vent orifice improperly sized or improperly seated | Replace or repair vent orifice. (Refer to Diffuser Vent Orifice Selection, para 1.B., Engine-Adjustment/ Test, 72-00-00.) |
| 55 | Engine power reset to the takeoff setting | Aircraft gas producer linkage broken or disengaged | Replace linkage or reconnect. |
| 56 | Exhaust duct emitting sparks | Combustion liner damage | Inspect combustion liner and repair or replace. (Refer to Combustion Liner Inspection, para 1.C., 72-40-00.) |







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Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 56 (cont) | Exhaust duct emitting sparks (cont) | Turbine or compressor blade, vane or seal damaged | Replace faulty component. |
| 57 | Excessive vibration | Loose engine mounts | Inspect for security and condition of mounts. |
| | | Turbine wheel blade failure | Inspect the turbine wheel blades. (Refer to Blade and Vane Inspection, para 7.A., 72-50-00.) |
| | | Compressor foreign object damage (FOD), eroded blades, vanes and/or plastic coating | Replace the case or compressor assembly if damage or erosion exceeds the acceptable limits. (Refer to Blade Damage, Vane Damage and Case Plastic Coating Inspection, para 5.C. through 5.F., 72-30-00.) |
| | | Bearing failure or accessories section internal failure | Check the magnetic inspection plugs for particles. If accumulated particles are found, send engine to overhaul. |
| | | Cause uncertain | Refer to Vibration Test Procedure, Engine-Adjustment/Test, para 2., 72-00-00 to analyze vibration level and identify vibration source. Install engine in another aircraft or in test stand for comparison. Send engine to overhaul if excessive vibration persists. |
| 58 | Unable to stop engine | Gas producer fuel control fuel cutoff valve not closed | Close the aircraft fuel shutoff valve to stop the engine. Then check control linkage rigging or replace gas producer fuel control if faulty. |
| 59 | Afterfire | Oil leak | See trouble condition, static oil leakage, item 64. |
| | | Burner drain valve line obstruction | Check the drain lines. Clean or replace as necessary. |
| | | Sticking burner drain valve | Replace valve. |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 59 (cont) | Afterfire (cont) | Fuel nozzle valve stuck open | Replace fuel nozzle. |
| | | Fuel control not in cutoff. | Make a fuel control cut-off valve operational check. (Refer to Cutoff Valve Operational Check-Bendix Fuel System, para 3.D., 73-20-02 or 3.E., 73-20-03 or Cutoff Valve Operational Check-CECO Fuel System, para 3.D., 73-20-04.) |
| | | Inline check valve stuck open | Replace inline check valve. |
| 60 | Heavy smoking out exhaust following engine shutdown (light wisps of smoke are normal and not cause for engine rejection unless oil consumption limits are exceeded) | Oil seepage past No. 5 bearing oil bellows seal into hot exhaust and collector | If suspected, visually inspect for evidence of puddling in bottom of exhaust collector after engine has been inoperative. If leakage is present, replace No. 5 bearing oil bellows seal (Refer to replacement para 6., 72-50-00.) |
| | | Oil seepage past turbine oil check valve onto hot turbine | Remove and inspect turbine check valve. (Refer to Turbine Pressure Oil System Check Valve, para 7.K., 72-50-00.) |
| | | Residual oil in No. 6 and 7 bearing area, depositing on hot turbine parts | Remove external sump; inspect and clean strut. (Refer to Inspection and Cleaning of Power Turbine Support Scavenge Oil Strut, para 7.E., 72-50-00.) |
| | | Excessive clearance of rotating knife seals located in No. 6 and 7 bearing area | This is usually accompanied by low power. If suspected, replace turbine. |
| | | Oil leakage in aircraft scavenge oil check valve (Hughes H500) | Oil can be found leaking from the outer combustion case after the engine has been inoperative for an extended period. |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 61 | Heavy smoking out exhaust | Contamination or carbon buildup in the turbine | Inspect and clean oil system and passages. (Refer to Inspection and Cleaning of Power Turbine Support Scavenge Oil Strut, para 7.E., 72-50-00.) |
| 62 | Continuous exhaust smoking | Oil leakage from forward compressor bearing oil seal or power turbine carbon face seal | If oil consumption exceeds limits, replace faulty component(s) as necessary. |
| 63 | Oil leakage at compressor attachment insert in the Gearbox housing. (At insert adjacent to compressor oil supply fitting.) | Insert loose | Replace insert. (Refer to Insert Inspection, para 4.D., 72-60-00.) |
| 64 | Static oil leakage from power and accessories gearbox breather | Internal check valve stuck open | Clean or replace the internal check valve. (Refer to Lube Oil Filter Housing Replacement, para 1.D., 72-60-00.)<br>Remove filter housing and inspect housing and transfer tubes (2) mating surfaces. Check packings on housing end of transfer tubes. Replace defective items. |
| 65 | Oil leaking from weep holes at power turbine governor. Oil leakage may be blue in color. | Check engine oil seal | Replace leaking seal. If oil leakage is blue in color, this is an indication of governor drive bearing grease washout, therefore replace the power turbine governor. |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 66 | Oil or fuel leaking from the fuel control weep holes. Leakage may be blue in color. | Oil seal leaking at gearbox. | Identify if the leakage is fuel or oil. Oil leaks require replacement of the gearbox seal and/or the fuel pump drive O-ring. Fuel leaks require replacement of the fuel pump. If the fuel or oil leakage is blue in color this is an indication of fuel control drive bearing grease washout, therefore replace the fuel control. |
| 67 | Starter unable to rotate engine immediately after shutdown | Turbine blade tip clearance | If engine will rotate after cooldown, no corrective action required. If unable to rotate engine after cooldown, remove turbine for further examination. |
| | | Binding at the rear diffuser seal | Replace compressor. |
| 68 | Starter unable to rotate engine | Binding of compressor, turbine or gearbox | Determine which major component is binding; replace component or engine. |
| 69 | $N_2$ does not rotate by 25% $N_1$ speed during start | Turbine blade tip ($N_2$) rub. | Shut down. Repeat start procedure. If not rotating after second attempt, walk the main rotor or propeller backwards before again repeating the start procedure. ing the start procedure. (Refer to Item 69 NOTE.) Replace turbine if condition persists. |
| | | Carbon formation around rotating labyrinth seals | Ensure that the oil being used is approved (MIL-L-7808G and subsequent or MIL-L-23699). Shut down. Repeat start procedure. If not rotating after second attempt, walk the main rotor or propeller backwards before again repeating |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 69 (cont) | $N_2$ does not rotate by 25% $N_1$ speed during start (cont) | | the start procedure. (Refer to Item 69 NOTE.) If repeated walk-through does not free $N_2$, clean carbon from rotating labyrinth seals. (Refer to Cleaning Power Turbine Labyrinth Seals, para 7.J., 72-50-00.) |
| | NOTE: To help alleviate turbine rub or carbon conditions which prevent the $N_2$ rotor from turning by 25% $N_1$ speed, walk the main rotor backwards after a start attempt and/or while the engine is cooling down. If chatter is encountered, stop the walk-through. Repeat the procedure at the next convenient shutdown. | | |
| | | Aircraft power train seizure | Refer to aircraft maintenance manual. |
| 70 | Engine tubing cracked or broken at the flare | Excessive vibration | Check the engine for possible vibration causes. (Refer to Vibration Inspection, para 1.D.(2), Engine-Inspection/Check, 72-00-00.) |
| 71 | Bearing noise at compressor which may be accompanied by looseness of the impeller | Bearing failure | Inspect and/or replace compressor No. 1 and No. 2 bearings as required. |
| | NOTE: Inspect magnetic drain plugs to determine extent of contamination due to bearing failure. (Refer to Magnetic Plug Inspection, para 11.G., Engine-Servicing, 72-00-00.) | | |
| 72 | Magnetic plug warning light illuminated | Engine metal generation | Refer to Magnetic Plug Inspection, para 11.G., Engine-Servicing, 72-00-00.) |
| 73 | Engine undershoots ground idle setting during practice autorotation | Dirty fuel control $P_r$ -$P_g$ valve. (Bendix control system only) | Clean valve. (Refer to Cleaning the Bendix Fuel Control $P_r$-$P_g$ Valve, para 4.C. 73-20-02.) |
| 74 | High throttle shaft torque | Binding of fuel control or governor shaft due to corrosion build-up between shaft and bushing. | Spray lubrication (WD-40 or equivalent) on the shaft and bushing of the control and governor. Rotate throttle to assure penetration. Repeat spray application if necessary. |
| 75 | Loss of power sharing during acceleration or torque split on multi-engine applications. | Incorrect aircraft rigging. | Check rigging and adjust in accordance with aircraft manufacturer's instructions. |

Table 101
Troubleshooting (cont)

| Item | Trouble | Probable Cause | Remedy |
|---|---|---|---|
| 75 (cont) | Loss of power sharing during acceleration or torque split on multi-engine applications. (cont) | Excessive collective/P.T. Governor control system looseness, wear or lost travel. | Correct looseness, wear or lost travel. Refer to aircraft manufacturer's instructions for corrective action. |
| | | Contaminated fuel control air (pneumatic) circuits. | Clean air circuits. (Refer to para 4.B. and 4.C., 73-20-02 or para 4.B., 73-20-03.) |