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POWER PLANT - ADJUSTMENT/TEST

1. General

This section contains information for engine ground running and for checks and adjustment/test procedures to verify the integrity of installed/replaced items. Before making any control adjustments/checks, the engine should be run for ten minutes minimum and all parameters stabilized.

NOTE: Although generalized procedures for ground testing are described in the following paragraphs, the appropriate Aircraft Manufacturer's Manual must be consulted for detailed procedures, reference curves and/or tables required to do the tests.

A. Specific checks and the order in which they are to be done after installation or replacement of components are defined in Table 501.

TABLE 501, Checks after Component Installation/Replacement

Item Installed/Replaced	Check Req'd (Para. No.)
Compressor Bleed Valve	4.7.13.8. 9.
Engine on Airframe	3.5.6.4.7.8.9.11.A.14.11.C.10.13.
Scavenge Oil Tubes	4.7.8.9.
Starting Flow Control Unit/Flow Divider	6.5.4.7.8.9.
Fuel Control Unit	6.5.4.7.11.A.14.10.8.9.
Fuel Drain Valves (Front and Rear)	6.5.4.7.8.9.
Fuel Lines	6.5.4.7.8.9.
Fuel Manifold/Fuel Nozzles	6.5.4.7.8.9.13.
Fuel Pump	6.5.4.7.8.9.
Shaft Oil Seals	4.7.8.9.
Oil Filter Housing and Check Valve	5.6.4.7.8.9.
Oil Pressure Relief Valve	4.7.11.C.8.
Oil-to-Fuel Heater	6.5.4.7.8.9.
Pressure Oil System	4.7.11.C.8.9.
Propeller Governor	4.7.14.10.8.9.
P3 (Compressor) Air Filter (when fitted)	4.7.8.9.
Reversing Linkage	4.7.15.8.9.

B. Minimum checks to be done before fault isolation procedures are initiated and done on an engine are defined in Table 502.

TABLE 502, Minimum Checks Required before Troubleshooting

Check and Sequence	Para. No.
Engine Pre-operational Check	3.
Engine Pre-start Check	4.

TABLE 502, Minimum Checks Required before Troubleshooting (Cont'd)

Check and Sequence	Para. No.
Dry Motoring Run	5.
Wet Motoring Run	6.
Engine Start	7.
Engine Shutdown	8.

C. Engine operating limits are defined in Tables 503, 504 and 505.

TABLE 503, PT6A-21 Engine Operating Limits

Power Setting (2)	SHP	Torque (1)		Max. Observed ITT °C	Ng (9)		Np		Oil Press. psig (3)	Oil Temp. °C (4)
		lb. ft.	psig		RPM	%	RPM	%		
Takeoff and Max. Cont.	550 32.8°C (91°F)	1315	42.5	695	38100	101.5	2205	100	80 to 100	10 to 99°C (50 to 210°F)
Max. Climb/ Max.Cruise	550 47.2°C (117°F)	1315	42.5	695	38100		2205	100	80 to 100	0 to 99°C (32 to 210°F)
Idle				660 (5)					40 Min.	-40 to 99 °C (-40 to 210 °F)
Starting				1090 (6) (8)						-40 Min.
Acceleration		1500 (6)	48.5 (6)	825 (6)	38500	102.6	2420	110		0 to 99 °C (32 to 210 °F)
Max. Reverse	500 32.8°C (91°F)	1315 (7)	42.5 (7)	695	38100	101.5	2112 2068	96 94	80 to 100	0 to 99 °C (32 to 210 °F)
NOTE: 1. Maximum permissible sustained torque is 1315 lb.ft. (42.5 psig). Np must be set so as not to exceed power limitations.										
NOTE: 2. For every 10°C (18°F) below -30°C (-22°F) ambient temperature, reduce maximum allowable Ng by 2.2%.										
NOTE: 3. Minimum oil pressure above 28000 Ng is 80 psig.										
NOTE: 4. For increased service life of engine oil, and oil temperature below 80°C (176°F) is recommend. A minimum oil temperature of of 55 °C (130 °F) is recommended for fuel heater operation at take-off power.										
NOTE: 5. At 19000 rpm (Ng) minimu. Advance power lever to maintain this value.										
NOTE: 6. These values are time limited to 2 seconds.										
NOTE: 7. Reverse power operation is limited to one minute.										

TABLE 503, PT6A-21 Engine Operating Limits (Cont'd)

Power Setting (2)	SHP	Torque (1)		Max. Observed ITT °C	Ng (9)		Np		Oil Press. psig (3)	Oil Temp. °C (4)
		lb. ft.	psig		RPM	%	RPM	%		
NOTE: 8. Starting temperatures above 925 °C should be investigated for cause.										
NOTE: 9. All limits are based on sea level and ambient temperatures as specified.										

TABLE 504, PT6A-27 Engine Operating Limits

Power Setting (2)	SHP	Torque (1)		Max. Observed ITT °C	Ng (9)		Np		Oil Press. psig (3)	Oil Temp. °C (4)
		lb. ft.	psig		RPM	%	RPM	%		
Takeoff and Max. Cont.	680 21.7°C (71°F)	1628	53.3	725	38100	101.5	2205	100	80 to 100	10 to 99°C (50 to 210°F)
Max. Climb/ Max.Cruise	620 20.6°C (69°F)	1628	53.3	695	38100	101.5	2205	100	80 to 100	0 to 99°C (32 to 210°F)
Idle				660 (5)					40 Min.	-40 to 99 °C (-40 to 210 °F)
Starting				1090 (6) (8)						-40 Min.
Acceleration		2100 (6)	68.7 (6)	825 (6)	38500 (6)	102.6	2420 (10)	110		0 to 99 °C (32 to 210 °F)
Max. Reverse	620	1628 (7)	53.3 (7)	725	38100	101.5	2112 2068	96 94	80 to 100	0 to 99 °C (32 to 210 °F)
NOTE: 1. Maximum permissible sustained torque is 1628 lb.ft. (53.3 psig). Np must be set so as not to exceed power limitations.										
NOTE: 2. For every 10°C (18°F) below -30°C (-22°F) ambient temperature, reduce maximum allowable Ng by 2.2%.										
NOTE: 3. Minimum oil pressure above 28000 Ng is 80 psig.										
NOTE: 4. For increased service life of engine oil, and oil temperature below 80°C (176°F) is recommend. A minimum oil temperature of of 55 °C (130 °F) is recommended for fuel heater operation at take-off power.										
NOTE: 5. At 19000 rpm (Ng) minimu. Advance power lever to maintain this value.										
NOTE: 6. These values are time limited to 2 seconds.										
NOTE: 7. Reverse power operation is limited to one minute.										

TABLE 504, PT6A-27 Engine Operating Limits (Cont'd)

Power Setting (2)	SHP	Torque (1)		Max. Observed ITT °C	Ng (9)		Np		Oil Press. psig (3)	Oil Temp. °C (4)
		lb. ft.	psig		RPM	%	RPM	%		
NOTE: 8. Starting temperatures above 925 °C should be investigated for cause.										
NOTE: 9. All limits are based on sea level and ambient temperatures as specified.										
NOTE: 10. In the event of failure of the propeller governor toward overspeed, it is permissible to complete a flight with propeller control via the overspeed governor (on engines so equipped) providing this limit is not exceeded.										

TABLE 505, PT6A-28 Engine Operating Limits

Power Setting (2)	SHP	Torque (1)		Max. Observed ITT °C	Ng (9)		Np		Oil Press. psig (3)	Oil Temp. °C (4)
		lb. ft.	psig		RPM	%	RPM	%		
Takeoff and Max. Cont.	680 21.7 °C (71 °F)	1628	53.3	750	38100	101.5	2205	100	80 to 100	10 to 99°C (50 to 210°F)
Norm. Cruise	620 20.6 °C (69 °F)	1628	53.5	695	38100		2205	100	80 to 100	0 to 99 (32 to 210 °F)
Max. Climb/ Max.Cruise	620 32.8 °C (91 °F)	1628	53.3	750	38100	101.5	2205	100	80 to 100	0 to 99°C (32 to 210°F)
Idle				660 (5)					40 Min.	-40 to 99 °C (-40 to 210 °F)
Starting				1090 (6) (8)						-40 Min.
Acceleration		2100 (6)	68.7 (6)	850 (6)	38500 (6)	102.6	2420 (10)	110		0 to 99 °C (32 to 210 °F)
Max. Reverse	620	1628 (7)	53.3 (7)	750	38100	101.5	2090	95	80 to 100	0 to 99 °C (32 to 210 °F)
NOTE: 1. Maximum permissible sustained torque is 1628 lb.ft. (53.3 psig). Np must be set so as not to exceed power limitations.										
NOTE: 2. For every 10°C (18°F) below -30°C (-22°F) ambient temperature, reduce maximum allowable Ng by 2.2%.										
NOTE: 3. Minimum oil pressure above 28000 Ng is 80 psig.										

TABLE 505, PT6A-28 Engine Operating Limits (Cont'd)

Power Setting (2)	SHP	Torque (1)		Max. Observed ITT °C	Ng (9)		Np		Oil Press. psig (3)	Oil Temp. °C (4)
		lb. ft.	psig		RPM	%	RPM	%		
NOTE: 4. For increased service life of engine oil, and oil temperature below 80°C (176°F) is recommend. A minimum oil temperature of of 55 °C (130 °F) is recommended for fuel heater operation at take-off power.										
NOTE: 5. At 19000 rpm (Ng) minimu. Advance power lever to maintain this value.										
NOTE: 6. These values are time limited to 2 seconds.										
NOTE: 7. Reverse power operation is limited to one minute.										
NOTE: 8. Starting temperatures above 925 °C should be investigated for cause.										
NOTE: 9. All limits are based on sea level and ambient temperatures as specified.										
NOTE: 10. In the event of failure of the propeller governor toward overspeed, it is permissible to complete a flight with propeller control via the overspeed governor (on engines so equipped) providing this limit is not exceeded.										

2. Engine Overtorque and Overtemperature Limits

Refer to Figure 501 and Figure 502 for engine overtemperature limits and corresponding inspection requirements.

Refer to Figure 503 for engine inadvertent cut-off and relight during taxi and corresponding inspection requirements. For unscheduled inspection procedure, refer to Chap. 72-00-00, INSPECTION, Unscheduled Inspection.

Refer to Figure 504 for engine overtorque limits and corresponding maintenance actions.

3. Engine Pre-operational Check

A. Procedure

(1) Remove the air inlet and exhaust covers (if fitted). Do not permit the propeller to windmill if a restraining device is secured to the exhaust covers.

(2) Open engine cowlings (Ref. Aircraft Manufacturer's Manual) and inspect the engine mounts and air inlet screen, and spray ring, if fitted.

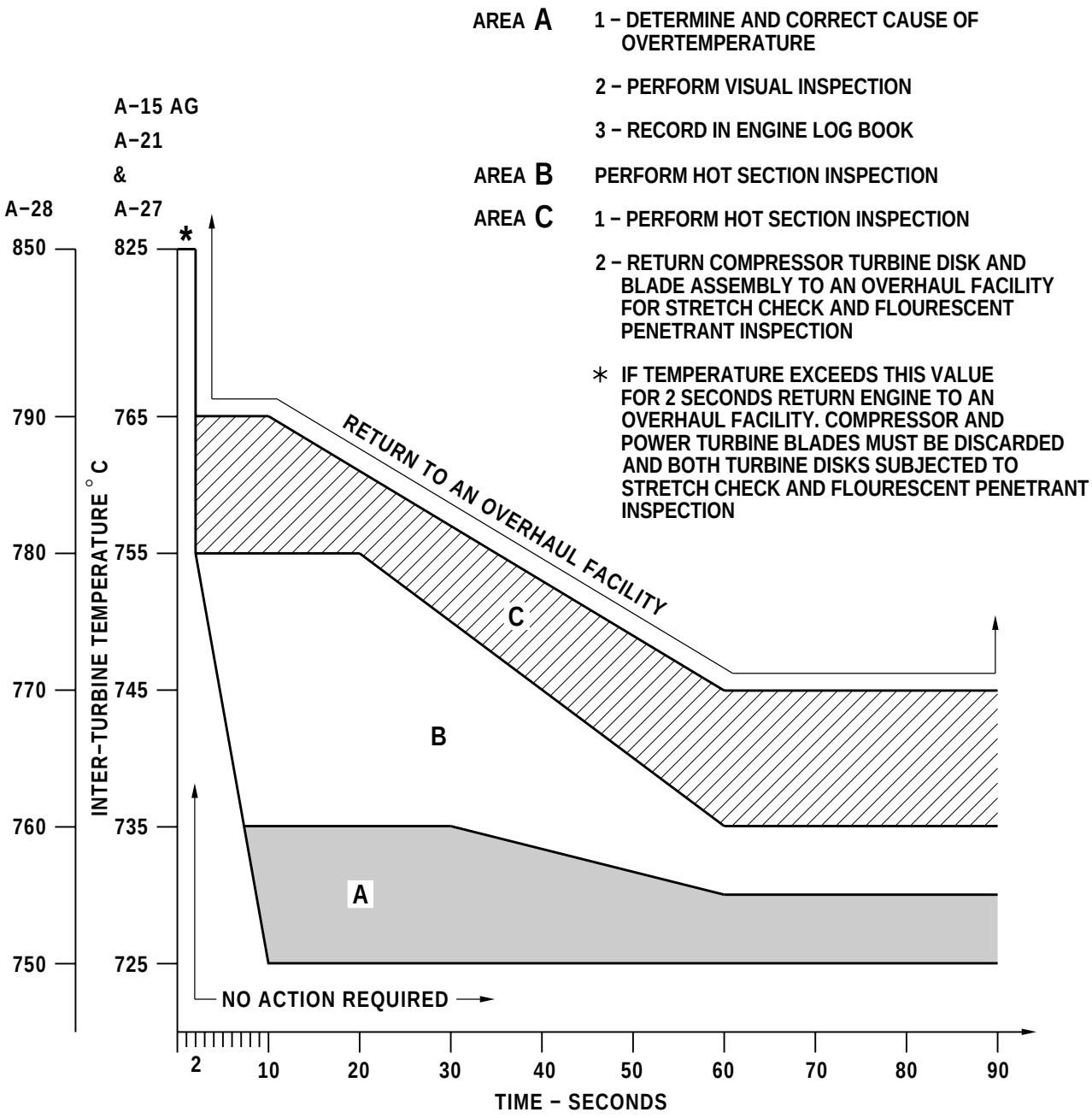
(3) Examine all linkages to the engine and to the accessories mounted on the engine, for attachment.

(4) Examine all fuel and oil tubes, lines and connections for security and for leaks. No leaks are permitted except at normal seepage drains.

(5) Examine all pneumatic line connections and filters for security.

WARNING: MAKE SURE THE ELECTRICAL POWER IS OFF.

(6) Examine all electrical connectors for proper installation.



C467H

Overtemperature Limits (All Conditions Except Starting)
Figure 501

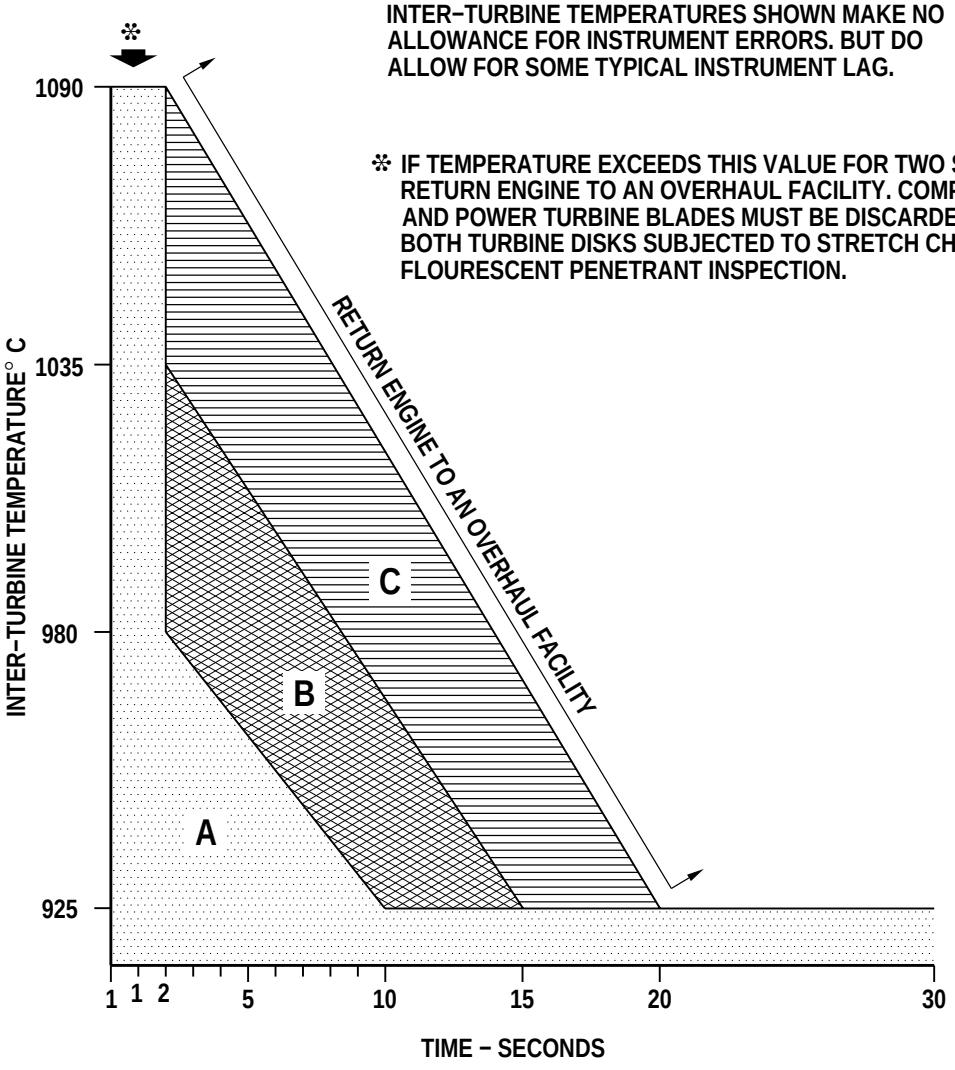
AREA A NO ACTION REQUIRED

AREA B VISUAL INSPECTION AND RECORD IN ENGINE LOG BOOK

AREA C 1. PERFORM HOT SECTION INSPECTION
2. RETURN COMPRESSOR TURBINE BLADE AND DISK ASSEMBLY TO AN OVERHAUL FACILITY FOR STRECTH CHECK AND FLOURESCENT PENETRANT INSPECTION.

NOTE
INTER−TURBINE TEMPERATURES SHOWN MAKE NO ALLOWANCE FOR INSTRUMENT ERRORS. BUT DO ALLOW FOR SOME TYPICAL INSTRUMENT LAG.

✲ IF TEMPERATURE EXCEEDS THIS VALUE FOR TWO SECONDS RETURN ENGINE TO AN OVERHAUL FACILITY. COMPRESSOR AND POWER TURBINE BLADES MUST BE DISCARDED AND BOTH TURBINE DISKS SUBJECTED TO STRETCH CHECK AND FLOURESCENT PENETRANT INSPECTION.



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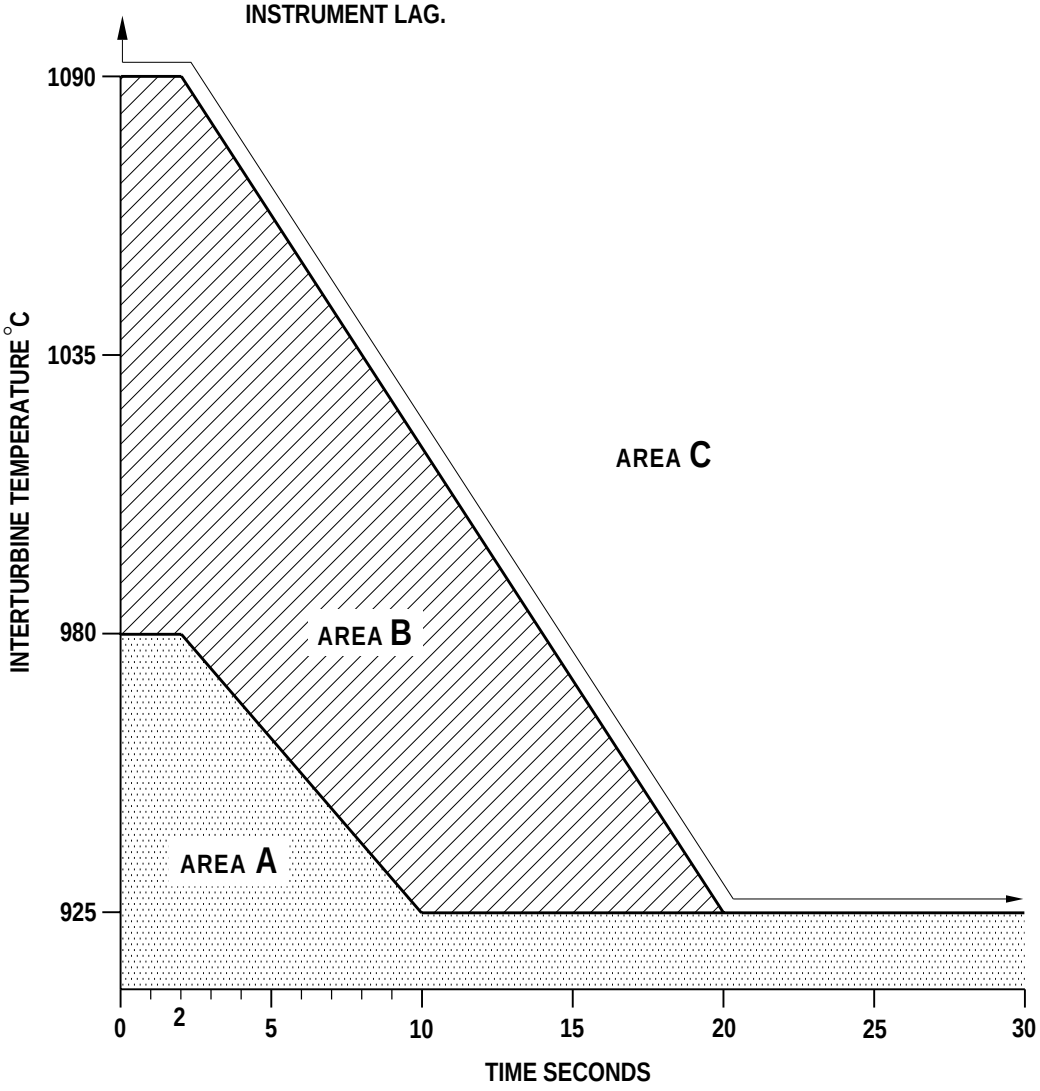
Overtemperature Limits (Starting Conditions Only)
Figure 502

AREA A RECORD OCCURRENCE IN ENGINE LOG BOOK.

AREA B
1. DO HOT SECTION INSPECTION.
2. RETURN COMPRESSOR TURBINE BLADE AND DISK ASSEMBLY TO AN OVERHAUL FACILITY FOR STRETCH CHECK, FLUORESCENT PENETRANT INSPECTION AND A METALLURGICAL ANALYSIS (CUT−UP) OF TWO BLADES.

AREA C RETURN ENGINE TO AN OVERHAUL FACILITY.

NOTE:
INTERTURBINE TEMPERATURES SHOWN MAKE NO ALLOWANCE FOR INSTRUMENT ERRORS. BUT DO ALLOW FOR SOME TYPICAL INSTRUMENT LAG.



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Inadvertent Cut-off and Relight During Taxi
Figure 503

CAUTION: DO NOT MOVE THE COCKPIT POWER CONTROL LEVER INTO PROPELLER REVERSE POSITION, AS DAMAGE TO THE LINKAGE WILL RESULT. REVERSE MAY ONLY BE SELECTED WITH THE ENGINE RUNNING AND THE PROPELLER TURNING.

(7) Check the cockpit engine controls for freedom of movement and verify full travel of engine control linkages.

NOTE: Individual airframe installations may prevent full application of this check with the electrical power off and engine not running. Refer to individual aircraft operating instructions.

(8) Check engine oil level and that oil system has been properly serviced (Ref. 72-00-00, SERVICING). Check locking of the filler cap after servicing.

(9) Close engine cowlings (Ref. Aircraft Manufacturer's Manual).

(10) Make sure that fuel system has been serviced with proper fuel (Ref. Service Bulletin SB1244, Approved Listing of Engine Fuel and Additives).

(11) If the engine is not to be started immediately, refit the air inlet and exhaust covers. If the engine is to be started, remove the propeller restraining device. Check that the area is clear for engine motoring.

4. Pre-start Checks

A. Engine Control and Switch Position

NOTE: Cockpit labels and names of controls tend to differ according to the airframe manufacturer. The terminology used in this and subsequent paragraphs is that of Pratt & Whitney Canada.

(1) Power Control Lever - GROUND IDLE.

(2) Propeller Control Lever - Anywhere in operating range.

(3) Fuel Condition Lever - OFF (PT6A-21); Starting Control Lever - CUT-OFF (PT6A-27 and PT6A-28).

WARNING: MAKE SURE PERSONNEL, EQUIPMENT AND OTHER AIRCRAFT ARE CLEAR OF DANGER ZONE NEAR ENGINE.

(4) If proceeding to a start:

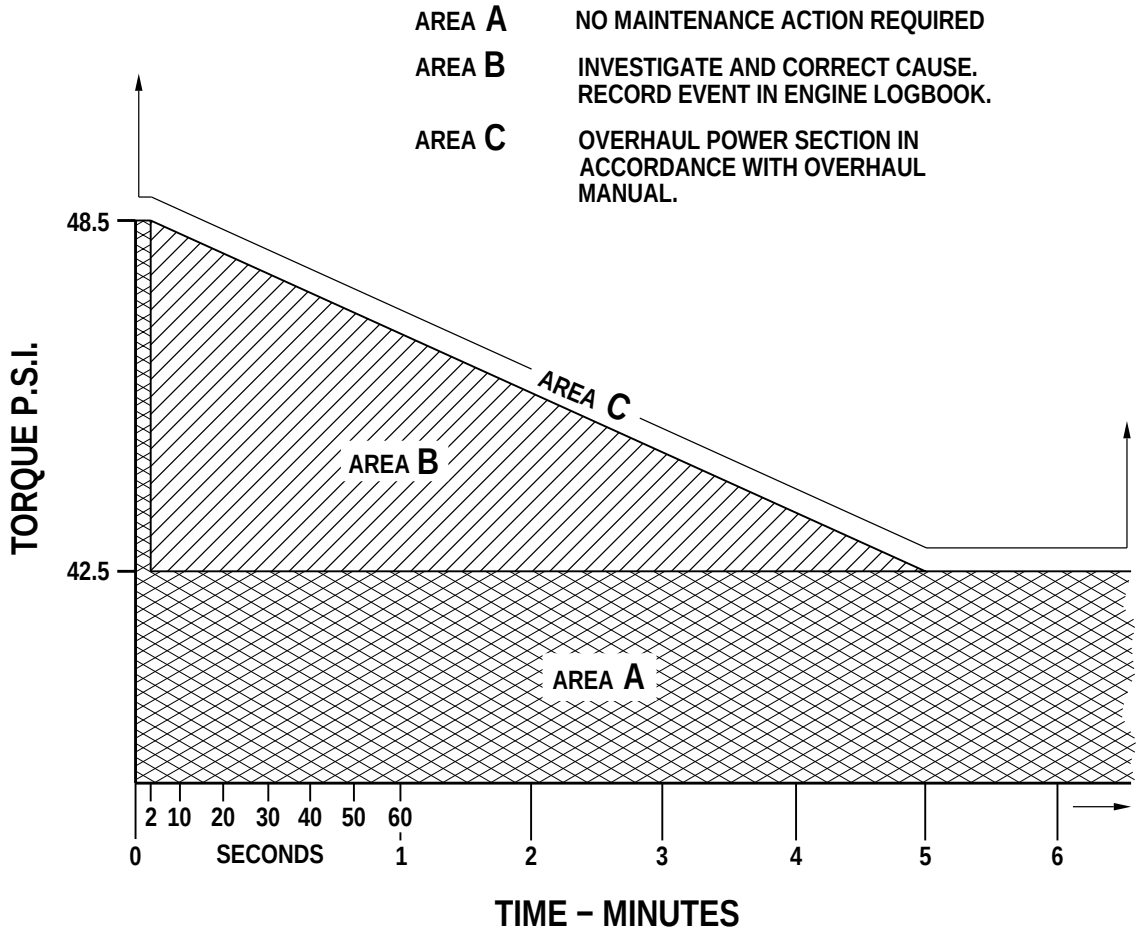
(a) Engine Master Switch - ON.

(b) Fuel System Shut-off Valve - OPEN.

(c) Fuel Boost Pump Switch - ON.

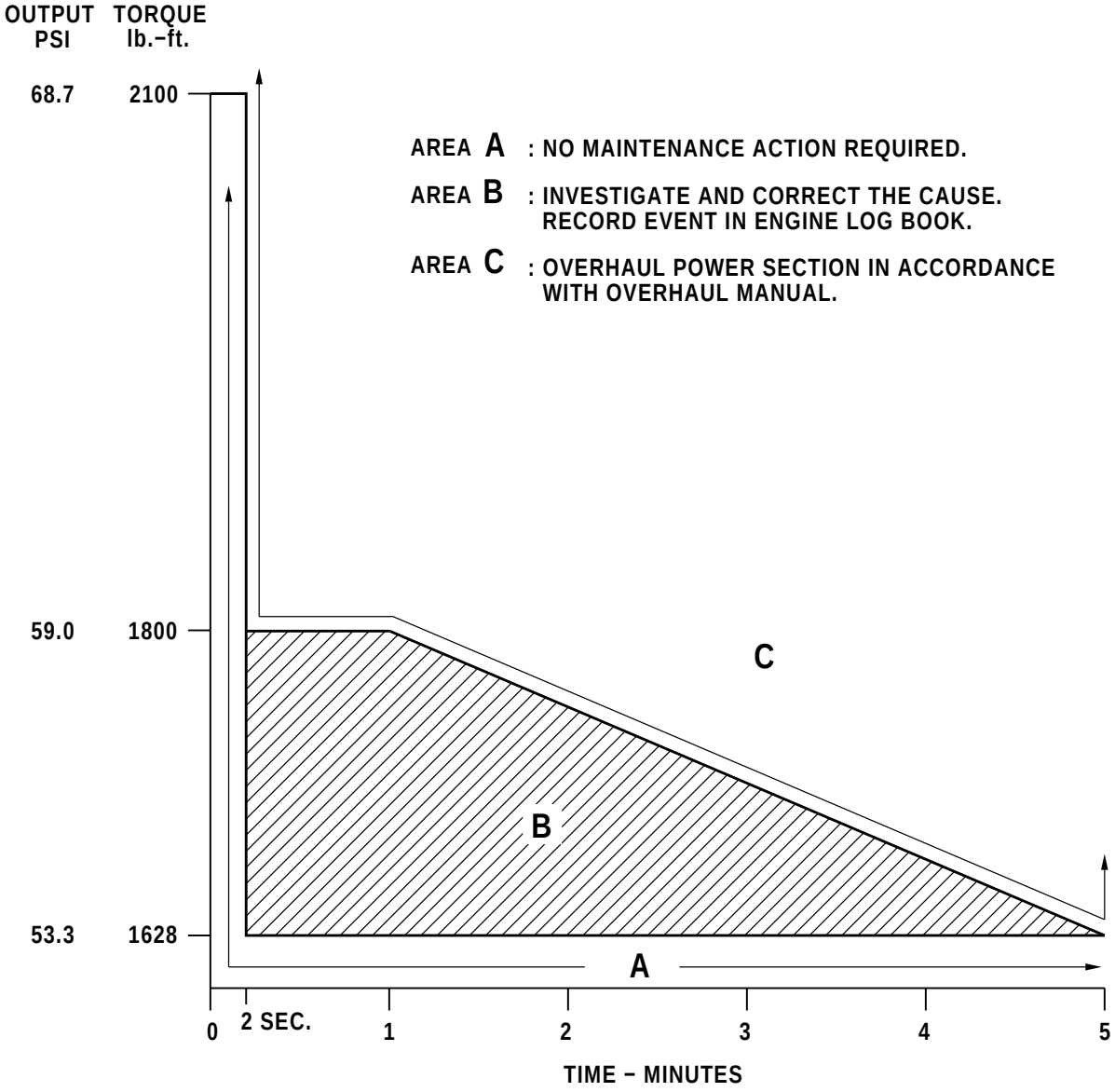
(d) Fuel Inlet Pressure Indicator - Check 5 psig minimum .

(e) Bleed Air - OFF.



PT6A-21 C3865E

Overtorque Limits (All Conditions)
Figure 504 (Sheet 1 of 2)



PT6A-27 and PT6A-28 C513F

Overtorque Limits (All Conditions)
Figure 504 (Sheet 2)

5. Dry Motoring Run

A. Procedure

NOTE: This procedure is used at any time it is deemed necessary to remove internally trapped fuel and vapor, or if there is evidence of a fire within the engine gas path. Air passing through the engine serves to purge fuel, vapor or fire from the combustion section, compressor turbine, power turbines, and exhaust system.

(1) Fuel Condition Lever - OFF (PT6A-21); Starting Control Lever - CUTOFF (PT6A-27 and PT6A-28).

(2) Ignition Switch - OFF.

(3) Engine Master Switch - ON.

(4) Fuel System Shut-off Valve - OPEN.

(5) Fuel Boost Pump Switch - ON.

(6) Engine Starter Switch - ON.

WARNING: SHOULD THE FIRE PERSIST, AS INDICATED BY SUSTAINED T5, CLOSE THE FUEL SYSTEM SHUT-OFF VALVE AT THIS TIME AND CONTINUE MOTORING.

(7) Maintain the starter ON for ten (10) seconds, observing appropriate starter limits (Ref. Starter Manufacturer's Manual).

(8) Engine Starter Switch - OFF

(9) Fuel Boost Pump Switch - OFF.

(10) Fuel System Shut-off Valve - CLOSED.

(11) Engine Master Switch - OFF.

(12) Check all oil and fuel lines and connections for leaks. None are allowed.

(13) Check engine oil level and service as necessary (Ref. 72-00-00, SERVICING).

6. Wet Motoring Run

CAUTION: THIS PROCEDURE IS USED STRICTLY FOR MAINTENANCE PURPOSES AND IS NOT PART OF THE NORMAL START PROCEDURE. AFTER A WET MOTORING RUN, A DRY MOTORING RUN (REF. PARA. 5.) MUST BE ACCOMPLISHED BEFORE ANY START IS ATTEMPTED.

A. Procedure

(1) Fuel Condition Lever - OFF (PT6A-21); Starting Control Lever - CUTOFF (PT6A-27 and PT6A-28).

(2) Ignition Switch - OFF.

(3) Engine Master Switch - ON.

(4) Fuel System Shut-off Valve - OPEN.

(5) Fuel Boost Pump Switch - ON.

(6) Engine Starter Switch - ON.

(7) After the gas generator has reached stabilized speed, Fuel Condition Lever or Staring Control Lever to GROUND-IDLE for 10 seconds.

(8) Fuel Condition Lever - OFF (PT6A-21); Starting Control Lever - CUTOFF (PT6A-27 and PT6A-28).

(9) Engine Starter Switch - OFF.

(10) During rundown, check that the starting control dump connection (PT6A-27 and PT6A-28) or flow divider and dump valve (PT6A-21) are draining and that both gas generator case drain valves are draining.

(11) Fuel Boost Pump Switch - OFF.

(12) Fuel System Shut-off Switch - CLOSED.

(13) Engine Master Switch - OFF.

(14) Check all engine fuel lines and connections for leaks. None are allowed.

7. Engine Starting

A. Procedure

(1) Engine Starter Switch - ON.

(2) Engine Oil Pressure - check for indication.

(3) Ignition Switch - ON.

NOTE: The minimum gas generator rpm to obtain a satisfactory light is 4500 rpm (12% Ng).

(4) For engines equipped with glow-plug ignition, after the gas generator speed passes through, or has stabilized above, the minimum light-off speed, wait for an additional five seconds (approximately) before advancing the Starting Control (Fuel Condition) lever to GROUND-IDLE.

(5) For engines equipped with spark ignition, after the gas generator speed passes through or has stabilized above the minimum light-off speed, advance Fuel Condition or Starting Control Lever to GROUND-IDLE.

(6) Make sure that engine accelerates normally to GROUND-IDLE rpm and that maximum allowable ITT starting limit is not exceeded.

CAUTION: WHENEVER GAS GENERATOR FAILS TO LIGHT UP WITHIN 10 SECONDS AFTER MOVING FUEL CONDITION OR STARTING CONTROL LEVER TO IDLE POSITION, SHUT OFF FUEL, STARTER, AND IGNITION. ALLOW A 30 SECOND FUEL DRAINING PERIOD, FOLLOWED BY DRY MOTORING RUN. REPEAT COMPLETE STARTING SEQUENCE; OBSERVE STARTER OPERATING LIMITS.

(7) When Idle is reached:

(a) Starter - OFF.

(b) Ignition - OFF.

(8) Do two feathering cycles to bleed propeller governor and propeller hub.

8. Engine Shutdown

A. Procedure

WARNING: IF THERE IS ANY EVIDENCE OF FIRE WITHIN THE ENGINE AFTER SHUTDOWN, PROCEED IMMEDIATELY AS DESCRIBED UNDER DRY MOTORING RUN (REF. PARA. 5.).

(1) Power Control Lever - IDLE.

NOTE: Allow engine to stabilize for a minimum of one minute at minimum obtainable inter-turbine temperature.

(2) Propeller Control Lever - FEATHER.

(3) Fuel Condition Lever - OFF (PT6A-21); Starting Control Lever - CUTOFF (PT6A-27 and PT6A-28).

(4) Fuel Boost Pump Switch - OFF.

(5) Fuel System Shut-off Switch - CLOSED.

(6) Engine Master Switch - OFF.

NOTE: Make sure that compressor decelerates freely. Note compressor rundown time.

9. Post-Shutdown Checks

A. Procedure

(1) Check all engine oil lines and connections for leaks. None are allowed, except at normal seepage drains as specified in Table 506.

TABLE 506, Engine Oil and Fuel Permissible Leakage

LOCATION OF DRAIN	MAXIMUM LEAKAGE DURING OPERATION
Engine Oil Breather	15 cc/hr
Fuel Control Unit	Zero
Fuel Pump	0.55 cc/min (seepage)
Gas Generator Drain Valves	Zero
Oil Consumption	0.2 lb/hr
Oil Filter Housing Check Valve	0.50 cc/hr
Start Control or Dump Valve (as applicable)	0.2 cc/min
Starter Oil Seal Cavity	3.0 cc/hr

NOTE: When a specific seal leakage is not specified, the seal leakage shall not exceed 3 cc per hour per individual seal. All seal leakages shall be included in total oil consumption (Ref. Chapter 72-00-00, Engine Description and Operation).

NOTE: DELETED.

(2) DELETED.

(3) Check engine oil level (within 10 minutes) and service as necessary (Ref. Chapter 72-00-00, SERVICING).

(4) Check all engine-mounted accessories and linkages for security for mounting.

(5) Check the oil-to-fuel heater within 15 min. after engine shutdown for a high operating temperature. A heater fuel outlet or a fuel pump filter cover having a temperature above 140°F. (60°C.) after shutdown shows a heater that does not correctly operate. To measure the temperature of the oil-to-fuel heater, do one of the following procedures:

WARNING: MAKE SURE PROTECTIVE CLOTHING IS PUT ON WHEN MANUALLY CHECKING THE TEMPERATURE OF THE HEATER FUEL OUTLET OR THE FUEL PUMP FILTER COVER. THE OIL-TO-FUEL HEATER CAN GET HOT. THIS WILL PREVENT POSSIBLE INJURY TO PERSONNEL.

(a) Carefully feel the heater fuel outlet or the fuel pump filter cover.

1 If the temperature of the heater fuel outlet or the fuel pump filter cover feels unusually hot, replace the oil-to-fuel heater.

2 If a high temperature is not felt, remove the protective clothing and carefully check the heater fuel outlet or the fuel pump filter cover again. If the oil-to-fuel heater is operating correctly, the heater fuel outlet and the fuel pump filter cover should be comfortable to touch.

CAUTION: A NEW TEMPERATURE RECORDER MUST BE USED FOR EACH INSPECTION.

(b) Put a temperature recorder on the heater fuel outlet or the fuel pump filter cover. If the temperature recorder shows a temperature above 140°F. (60°C.), replace the oil-to-fuel heater.

NOTE: A Temp-Plate Temperature Recorder (PWC05-329) or similar can be used.

10. Propeller Governor Checks (Ref. Fig. 505)

A. Procedure

CAUTION: MAKE SURE THAT THE Py TUBE IS BLANKED. BLANK THE FITTING ON THE GOVERNOR.

(1) With the engine shut down, disconnect and cap the governor Py air pressure tube at the governor (Ref. 73-10-08).

(2) Do the pre-start checks (Ref. Para. 4.).

(3) Start the engine and operate for five minutes at ground idle to permit warm-up of the engine oil to 60°C (155°F) minimum.

(4) Advance the power control lever to obtain 80% Ng, and perform two feathering cycles to purge air from the system and propeller hub.

NOTE: Reduce feathering time by turning the adjustment screw (2) in a counterclockwise direction. Two turns from the nominal is the maximum permissible adjustment.

(5) Set the propeller control lever to the full fine pitch position. Advance the power control lever sufficiently for the propeller to reach constant speed, and mark the position on the cockpit quadrant. Note and record the Ng.

(6) Adjust the governor maximum speed adjustment (1) to obtain the desired propeller speed (Np). An adjustment counterclockwise increases speed.

NOTE: Maximum Np may vary with different installations and according to the model. Consult the Aircraft Manufacturer's Manual for the correct setting.

(7) Reconnect the governor Py air pressure tube to governor (Ref. 73-10-08).

(8) Set the propeller control to a full fine pitch position, and the power control lever to the quadrant position marked in step (5).

(9) Note the Ng and compare it with value recorded in step (5). The maximum permissible Ng drop is 100 rpm. If exceeded, check the linkage to make sure the reset arm is in contact with the maximum stop. Adjust if necessary.

CAUTION: DO NOT, UNDER ANY CIRCUMSTANCES, DISTURB ADJUSTMENT (3) ON PROPELLER GOVERNOR.

(10) Repeat steps (8) and (9). If not satisfactory, change the propeller governor.

(11) Disconnect the linkage secured to the airbleed link reset lever (5), and secure the lever to the minimum rear position.

(12) With the propeller control lever in fine pitch, advance the power control lever to the maximum stop and record the propeller shaft speed (Np). Check that the Np is 95% ±1%. Adjust the pneumatic minimum adjustment (4), in increments, as necessary to meet the requirement.

11. Fuel Control Unit Checks

A. Minimum Governing

CAUTION: DO NOT PERFORM CHECKS AT BAROMETRIC PRESSURES BELOW 25.2 IN. Hg OR ALTITUDES IN EXCESS OF 3500 FT. CHECKS MUST BE DONE WITH ZERO POWER EXTRACTION.

(1) General

(a) At barometric pressures equivalent to altitudes less than 3500 feet above sea level, the fuel flow is metered to maintain idle speed at a constant value, and is referred to as the minimum governing speed. However, since the fuel flow required to maintain a constant idle speed decreases with increasing altitude, a point is reached where the fuel flow does not decrease further, this point being the minimum fuel flow setting. At altitudes higher than this point, the gas generator speed increases proportionally with altitude.

(b) Usually, the minimum fuel flow setting will be lower than the minimum governing speed. However, under marginal conditions, that is, when the altitude is close to or slightly higher than 3500 feet and/or barometric pressure is close to or slightly less than 25.2 in. Hg, the two speeds may coincide, or the Ng at minimum fuel flow may be higher than that at minimum governing.

(c) From the preceding, it will be seen that idle speed adjustments should only be done at conditions of low altitude and/or high barometric pressure.

CAUTION: IF INTERTURBINE TEMPERATURE (T5) RISES ABNORMALLY AT ANY TIME DURING IDLE SPEED, SHUT DOWN ENGINE IMMEDIATELY.

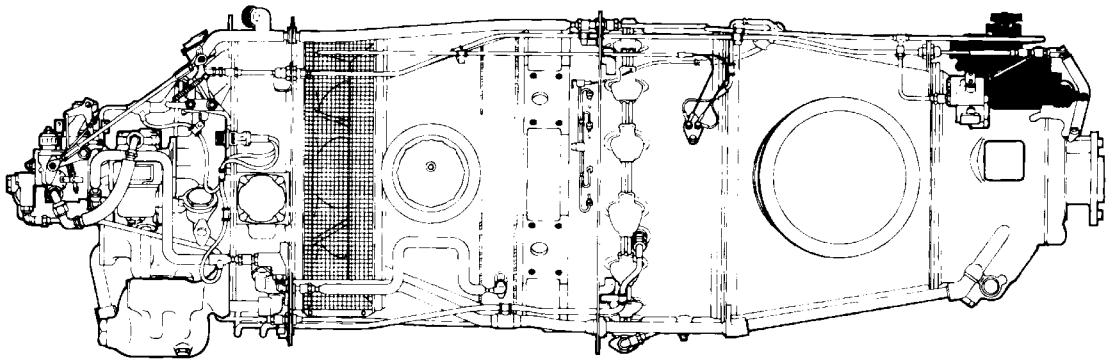
(2) Start engine (Ref. Para. 7.).

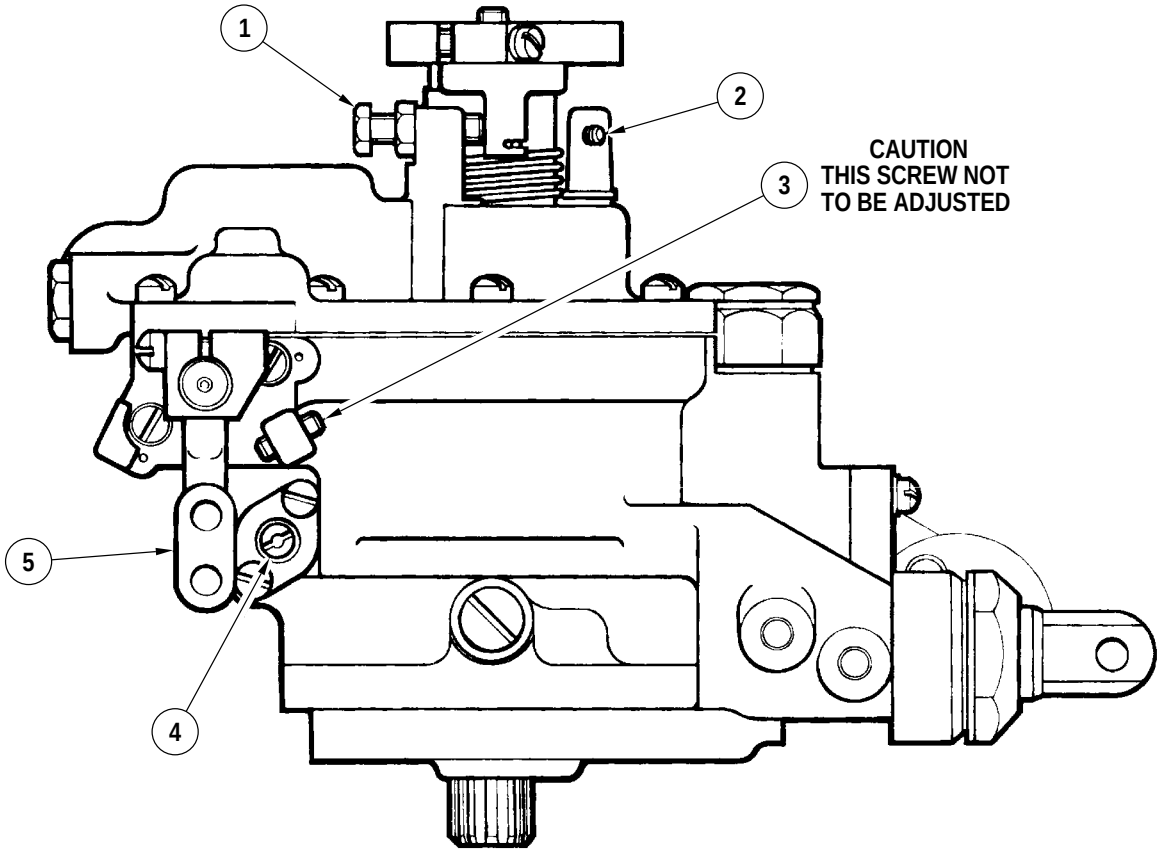
(3) Fuel Condition Lever - GROUND-IDLE (PT6A-21); Starting Control Lever - RUN (PT6A-27 and PT6A-28).

(4) Power Control Lever - GROUND-IDLE.

(5) Check that Ng is 52.0%. If not:

(a) Shut down engine (Ref. Para. 8.).





C930

Propeller Governor Adjustments
Figure 505

Key to Figure 505

1. Governor Maximum Speed Adjuster
2. Feathering Adjuster
3. Pneumatic Maximum Adjuster (Not for Field Use)
4. Pneumatic Minimum Adjuster
5. Airbleed Link (Reset Arm) - Pneumatic Section

(b) Remove lockwire on adjuster (2, Fig. 506 or 507, as appropriate).

(c) Prevent adjuster screw from turning, and loosen nut.

(d) Turn adjuster (2) in increments until Ng equals 52.0%.

NOTE: To increase speed, turn adjuster clockwise.

(6) Restart engine and repeat steps (3) through (5). If Ng remains offspeed repeat foregoing procedure until required speed is obtained.

(7) Tighten jam nut to lock adjuster (2), torque 20 to 25 lb.in. and secure adjuster with lockwire.

(8) Shut down engine (Ref. Para. 8.).

B. FLIGHT-IDLE Adjustment

(1) Start engine (Ref. Para. 4. and 7.).

(2) Fuel Condition Lever - FLIGHT-IDLE (PT6A-21); Starting Control Lever - FLIGHT-IDLE (PT6A-27 and PT6A-28).

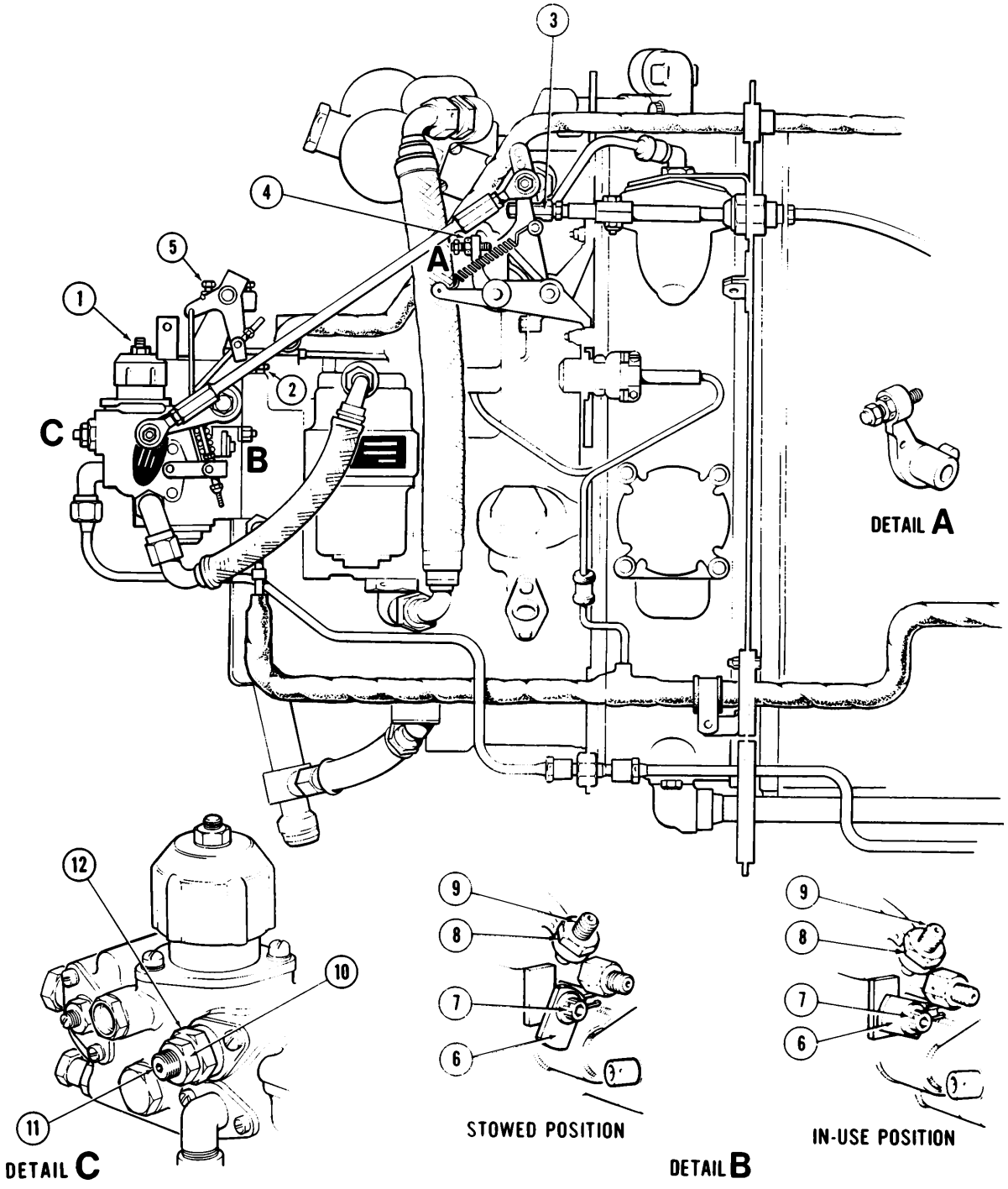
(3) Check that FLIGHT-IDLE linkage is on FLIGHT-IDLE stop (5, Fig. 506, PT6A-21), or (9, Fig. 507, PT6A-27 and PT6A-28).

WARNING: SHUT DOWN ENGINE BEFORE MAKING ANY ADJUSTMENTS ON THE ENGINE MOUNTED EQUIPMENT. THIS IS ESSENTIAL DUE TO CLOSE PROXIMITY OF PROPELLER AND EXHAUST NOZZLES.

CAUTION: INDIVIDUAL AIRFRAME MANUFACTURER'S MAY USE NG PERCENTAGES OF DIFFERENT VALUES TO THOSE STATED BELOW. REFER TO AIRCRAFT MAINTENANCE MANUAL.

(4) Check that Ng is 69% to 71%. If not, adjust stop (5 or 9) as applicable, until requirement is met.

NOTE: It is permissible to adjust nut (4, Fig. 508) for certain installation (Ref. Aircraft Maintenance Manual).



PT6A-21 C3821B

Fuel Control Unit Adjustments
Figure 506

Key to Figure 506

1. Acceleration Adjustment Dome
2. Minimum Governing Speed Adjuster
3. Rear End Clevis
4. IDLE Deadband Adjuster
5. FLIGHT-IDLE Speed adjuster
6. Part Power Trim Stop
7. Attachment Screw
8. Nut
9. Maximum Governing Stop Screw
10. Nut
11. Minimum Fuel Flow Adjuster
12. Nut

C. Gas Generator Speed (Ng) Adjustment

CAUTION: DURING ADJUSTMENTS AND NORMAL OPERATION, MAKE SURE THAT ENGINE OPERATING LIMITS ARE NOT EXCEEDED (REF. TABLES 503, 504 AND 505).

CAUTION: AT CERTAIN AMBIENT CONDITIONS, PART POWER TRIM SPEED WILL NOT BE ACHIEVED WITHOUT EXCEEDING ENGINE LIMITATIONS. IN THESE CONDITIONS, MAKE SURE FCU MAXIMUM SPEED SETTING IS MAINTAINED AS BENCH SET.

NOTE: Fuel control units are calibrated for maximum speed during benchcheck (overhaul). On PT6A-21 engines, the maximum Ng speed set ting should not be adjusted unless required. On PT6A-27 and PT6A-28 engines, the maximum Ng speed should be adjusted after engine installation or component replacement. The part power trim stop is a movable spacer placed between the maximum Ng stop and the power lever anvil, and represents a 1,700 rpm Ng speed decrement. After adjustments have been completed, the part power trim stop is returned to the stowed position on the FCU.

(1) For PT6A-21 Engines (Ref. Fig. 506):

(a) Do prestart check (Ref. Para. 4.).

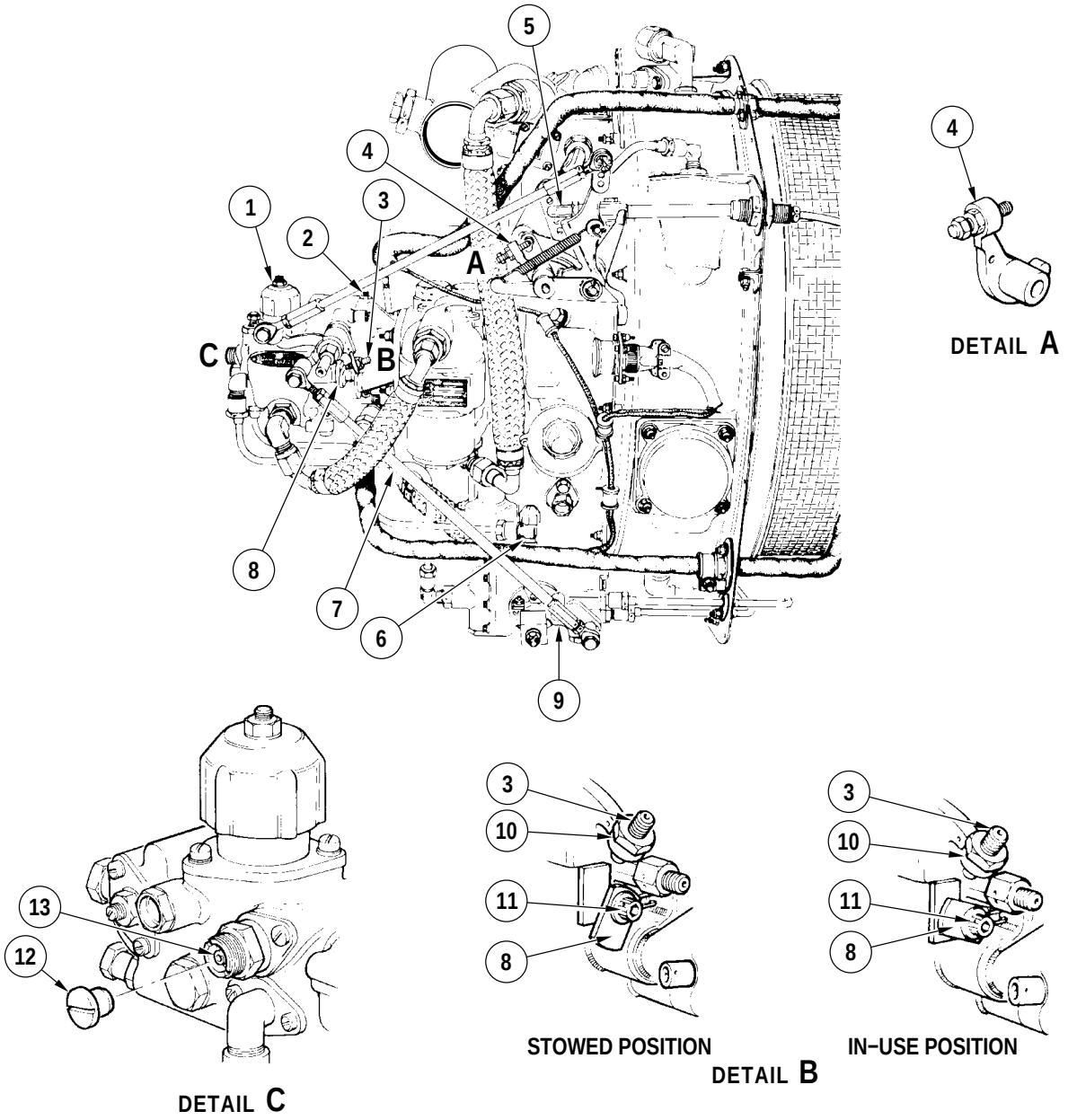
(b) Position part power trim stop (6) so as to limit power control lever travel.

(c) Do a satisfactory start (Ref. Para. 7.).

(d) Advance power control lever to part power trim stop. Allow engine to stabilize for minimum of two minutes.

(e) Check that maximum gas generator speed (Ng) is 97.1% and adjust gas generator speed stop (9) as required.

(f) Shut down engine (Ref. Paras. 8. and 9.).



PT6A-27 and PT6A-28 C41445

Fuel Control Unit Adjustments
Figure 507

Key to Figure 507

1. Acceleration Adjuster Dome
2. Minimum Governing Speed Adjuster
3. Maximum Ng Speed Adjuster
4. IDLE Deadband Adjuster
5. Rod End Clevis, Rear
6. Fuel Bypass Bleed to Tank
7. Interconnect Rod - Starting Control
8. Part Power Trim Stop (Set Block)
9. Starting Control FLIGHT-IDLE Max Stop
10. Locknut
11. Attachment Screw (Part Power Trim Stop)
12. Plug
13. Minimum Fuel Flow Adjuster

(g) Stow trim stop (6) and lockwire attachment screw (7).

(h) Lockwire maximum speed stop screw and locknut (9 and 8).

(2) For PT6A-27 and PT6A-28 Engines (Ref. Fig. 507):

CAUTION: THE MAXIMUM GOVERNING SPEED STOP IS PRESET ON ALL FUEL CONTROLS AND THE FOLLOWING PROCEDURE SHOULD NOT BE DONE UNLESS ABSOLUTELY NECESSARY. THIS PROCEDURE WILL ONLY BE POSSIBLE AT RELATIVELY HIGH AMBIENT TEMPERATURES.

CAUTION: DURING CHECKS AND ADJUSTMENTS, IT MAY BE NECESSARY TO EXCEED 97.1 % TO ACHIEVE MAXIMUM Ng AT ALTITUDE (101.5 % Ng).

(a) If FCU has been replaced, or fuel system lines disturbed, carry out a wet motoring run, followed immediately by a dry motoring run, to check fuel system for leakage.

(b) Unlock and slacken screw (11, Fig. 507). Move part power trim stop (8) to ‘‘in-use’’ position and secure by torquing screw (11) 25 to 30 lb.in.

(c) Start engine and warm up to operating temperature.

(d) Gradually advance power control lever as far as part power trim stop (8). Allow engine to stabilize at this setting for approximately five minutes with propeller in fine pitch.

NOTE: To reduce noise level, propeller pitch setting may be increased provided torque limit is not exceeded. Engine stabilization is essential to avoid erroneous instrument readings.

(e) Check that T5 limit is not exceeded, and that maximum Ng is 97.1 %. Adjust gas generator speed adjuster (3) as required, counterclockwise to increase speed, clockwise to decrease speed. One complete turn of adjuster changes Ng by approximately one percent.

(f) Shut down engine (Ref. Paras. 8. and 9.).

(g) Lockwire screw (3) and locknut (10).

(h) Slacken screw (11), and return part power trim stop (9) to its ‘‘stowed’’ position. Tighten screw, torque 25 to 30 lb.in., and lockwire.

D. Manual Override System Static Check (PT6A-27)

(1) As part of the periodic inspection (Ref. 72-00-00, INSPECTION, Periodic Inspection), check the static operation of the manual override system, with the engine shutdown:

(a) Set cockpit Manual Override Control lever - OFF. Make sure the Manual Override lever on the FCU is in the OFF position (hard against its internal stop).

(b) Set cockpit Manual Override Control lever to the maximum forward position. Make sure the cockpit Manual Override Control lever does not bind and the Manual Override Lever on the FCU contacts the stop at the MAXIMUM FLOW position.

NOTE: Some resistance to movement of the cockpit Manual Override Control lever is normal.

(c) If either stop is not reached, check/adjust the airframe rigging (Ref. Aircraft Maintenance Manual).

E. Manual Override System Operational Check (PT6A-27)

CAUTION: OTHER THAN THE FOLLOWING CHECK, USE OF THE MANUAL OVERRIDE SYSTEM IS RESTRICTED FOR EMERGENCIES ONLY.

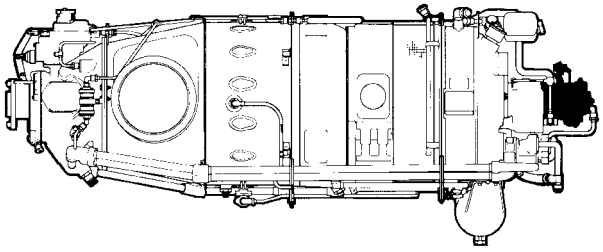
CAUTION: WHEN USING THE MANUAL OVERRIDE SYSTEM, THE ENGINE RESPONSE MAY BE MORE RAPID THAN WHEN USING THE POWER LEVER. A RAPID INCREASE IN MANUAL OVERRIDE LEVER POSITION TOWARDS MAXIMUM IS TO BE AVOIDED, AS THIS CAN CAUSE ENGINE SURGE, ENGINE OVER-TEMPERATURE, Ng OVER-SPEED OR OVER-TORQUE.

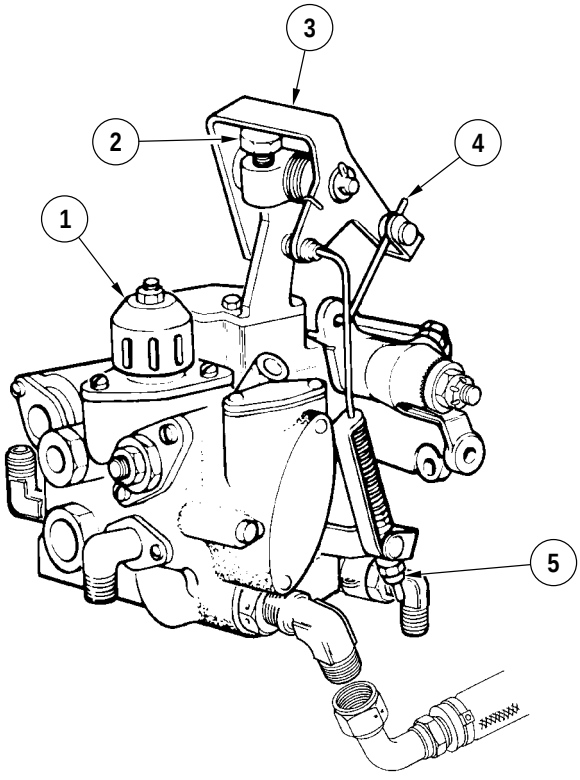
(1) Following an FCU or engine change (Ref. 71-00-00, ADJUSTMENT/TEST, Table 501) or as part of an annual airframe zone inspection (Ref. Aircraft Maintenance Manual), check the serviceability of the manual override system:

(a) Do the Manual Override System static check (Ref. Subpara. D.).

(b) Set Manual Override Control lever - OFF.

(c) Start the engine (Ref. Para. 4. and 7.).



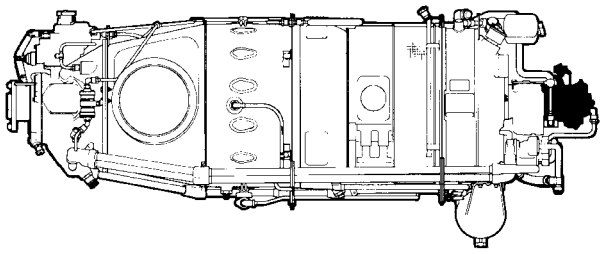


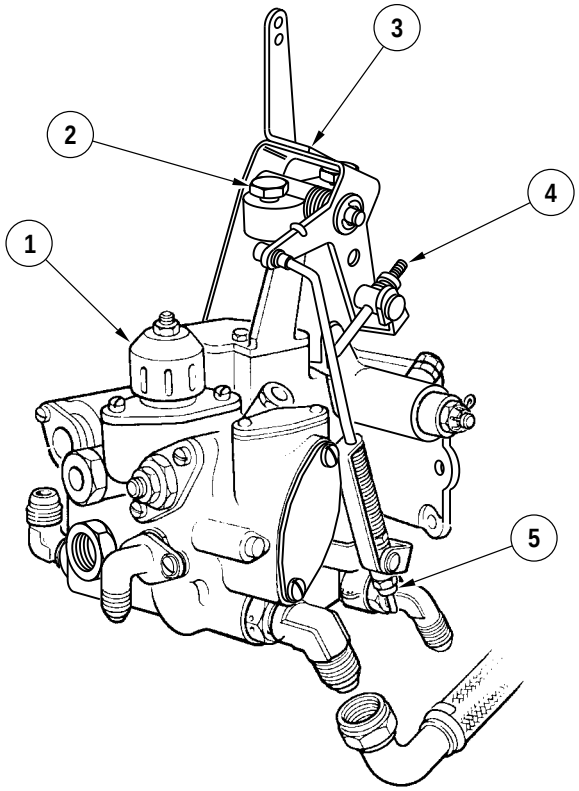
C71128

Fuel Control Unit Adjustment (Engines with Flow Divider Valve)
Figure 508 (Sheet 1 of 2)

Key to Figure 508

1. Acceleration Adjuster Dome
2. Flight-Idle Stop
3. Cut-off and Flight-Idle Linkage
4. Nut (ADJUSTABLE per Aircraft Maintenance Manual)
5. Nut (NOT ADJUSTABLE)





C80260

Fuel Control Unit Adjustment (Engines with Flow Divider Valve)
Figure 508 (Sheet 2)

(d) Fuel Condition lever - GROUND-IDLE.

(e) Power Control lever - GROUND-IDLE.

(f) Slowly advance Manual Override Control lever observing ITT, torque and Ng at all times. Keep Ng maximum increase under 4% per second.

NOTE: Some movement of the Manual Override Control lever, resulting in no increase in engine power, is normal.

(g) Slowly increase Ng until a 15% increase above ground-idle speed is obtained. This indicates proper functioning of the Manual Override System.

(h) Slowly reduce the Manual Override Control lever to OFF, keeping Ng decrease less than 4% Ng per second.

F. Fuel Control Unit (FCU) Minimum Fuel Flow Adjustment

NOTE: 1. Minimum fuel flow is preset on all FCUs to make sure sufficient fuel supply to sustain combustion.

NOTE: 2. Resultant gas generator speed (Ng) with a preset fuel control unit may be slightly lower than the Ng referenced in Figure 509 due to the tolerance band of the FCU setting at manufacture.

NOTE: 3. This procedure should only be done during troubleshooting of an individual engine starting problem where the minimum fuel flow setting is suspected.

(1) Obtain field pressure altitude in feet from the aircraft altimeter set to 29.92 in. Hg.

(2) Obtain ambient air temperature in degrees Celsius.

(3) Determine and record the gas generator speed (Ng) in percent (Ref. Fig. 509).

(4) For PT6A-21 Engines:

(a) Disconnect the Py tube from the FCU or Nf governor and leave open to the atmosphere. The tube coupling nut and component fitting must not be plugged or capped during this operation.

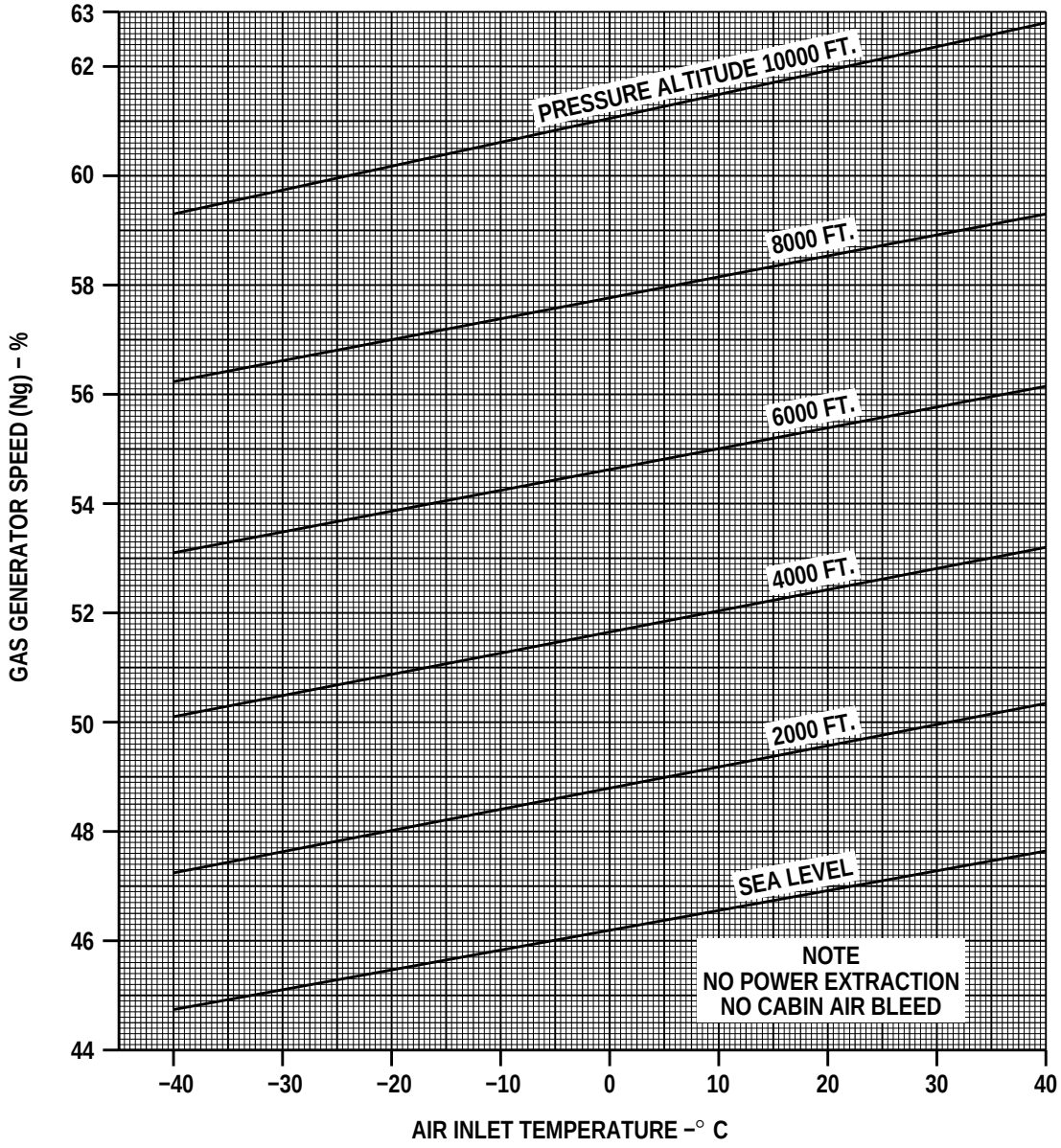
(b) Do pre-start check (Ref. Para. 4.).

CAUTION: CAREFULLY MONITOR THE T5 TO MAKE SURE THE LIMITS ARE NOT EXCEEDED.

(c) Start the engine (Ref. Para. 7.) and run at idle for five minutes to stabilize at the operating oil temperature.

(d) Check that the gas generator speed (Ng) is within +0.5/-0.0% for ambient conditions (Ref. Fig. 509).

(e) If adjustment is necessary (Ref. Fig. 506):



C13587

Idle Speed at Minimum Fuel Flow
Figure 509

1 Cut the lockwire from nuts (10 and 12) and screw (11).

CAUTION: MINIMUM FUEL FLOW ADJUSTMENT IS EXTREMELY SENSITIVE AND MUST BE MADE IN SMALL INCREMENTS.

2 Turn the adjusting screw (11) with a suitable Allen key, clockwise to increase Ng, counterclockwise to decrease.

3 When the correct Ng has been obtained, hold screw (12) and torque nut (10) 20 to 26 lb.in.

4 Shut down engine (Ref. Paras. 8. and 9.), and reconnect the Py tube to the FCU or Nf governor, as applicable; tighten the coupling nut 90 to 100 lb.in., and fasten with lockwire.

5 Lockwire screw (11) and nuts (12 and 10) to mounting plate attachment screw.

(f) Check engine acceleration.

(5) For PT6A-27 and PT6A-28 Engines:

(a) Disconnect the Py tube from the FCU or Nf governor and leave open to the atmosphere. The tube coupling nut and component fitting must not be plugged or capped during this operation.

(b) Do pre-start check (Ref. Para. 4.).

CAUTION: CAREFULLY MONITOR THE T5 TO MAKE SURE THE LIMITS ARE NOT EXCEEDED.

(c) Start the engine (Ref. Para. 7.) and run at idle for five minutes to stabilize at the operating oil temperature.

(d) Check that the gas generator speed (Ng) is within +0.5/-0.0% for ambient conditions (Ref. Fig. 509).

(e) If adjustment is necessary (Ref. Fig. 507):

1 Cut the lockwire from plug (12) and separate plug from fitting.

CAUTION: MINIMUM FUEL FLOW ADJUSTMENT IS EXTREMELY SENSITIVE AND MUST BE MADE IN SMALL INCREMENTS.

2 Turn the adjusting screw (13) with a suitable Allen key, clockwise to increase Ng, counterclockwise to decrease.

3 When the correct Ng has been obtained, shut down engine (Ref. Paras. 8. and 9.).

4 Reconnect the Py tube to the FCU or Nf governor, as applicable; tighten the coupling nut 90 to 100 lb.in., and fasten with lockwire.

5 Reinstall plug (12) on fitting and lockwire.

(f) Check engine acceleration.

12. Oil Pressure Check

A. Procedure

(1) Start engine (Ref. Para. 4. and 7.).

(2) Run engine at convenient gas generator speed above 72% to stabilize oil temperature within operating range.

(3) After instrument readings have stabilized, check that oil pressure is within limits specified in relevant engine operating limit table (Ref. Tables 503, 504 and 505). If not, change quantity of spacers in oil pressure relief valve (Ref. 72-60-00).

13. Engine Performance Check (Ref. Figs. 510, 511 and 512)

A. General

Data plate trim speed is gas generator speed (Ng) obtained with engine running at reference power on a standard day (15 °C; 59 °F). This value is determined from final acceptance test results, and is stamped or engraved on the engine data plate in rpm, and as a percentage of maximum Ng at a reference power of 544 SHP/DELRTH.

The engine power assurance/performance (Ref. Figs. 510 and 511) and data plate trim speed check curves (Ref. Fig. 512) enable engine performance to be checked over a wide range of ambient temperatures without exceeding torque and ITT limits.

All forms of engine deterioration are accompanied by an increase in ITT and Wf at a given power as indicated by the torquemeter gage. Compressor deterioration, generally due to a build-up of dirt deposits on compressor blades, is usually accompanied by an increase in ITT, Wf and Ng. In this condition, performance may be recovered by compressor washing (Ref. CLEANING). Deterioration of hot section components will also be accompanied by an increase in ITT and Wf, and may be accompanied by a decrease in Ng.

B. Procedure

(1) Determine engine performance check parameters:

(a) Obtain ambient air temperature (Ta) in degrees Celsius..

(b) Obtain field barometric pressure (Pa) (not corrected to sea level) in inches of mercury.

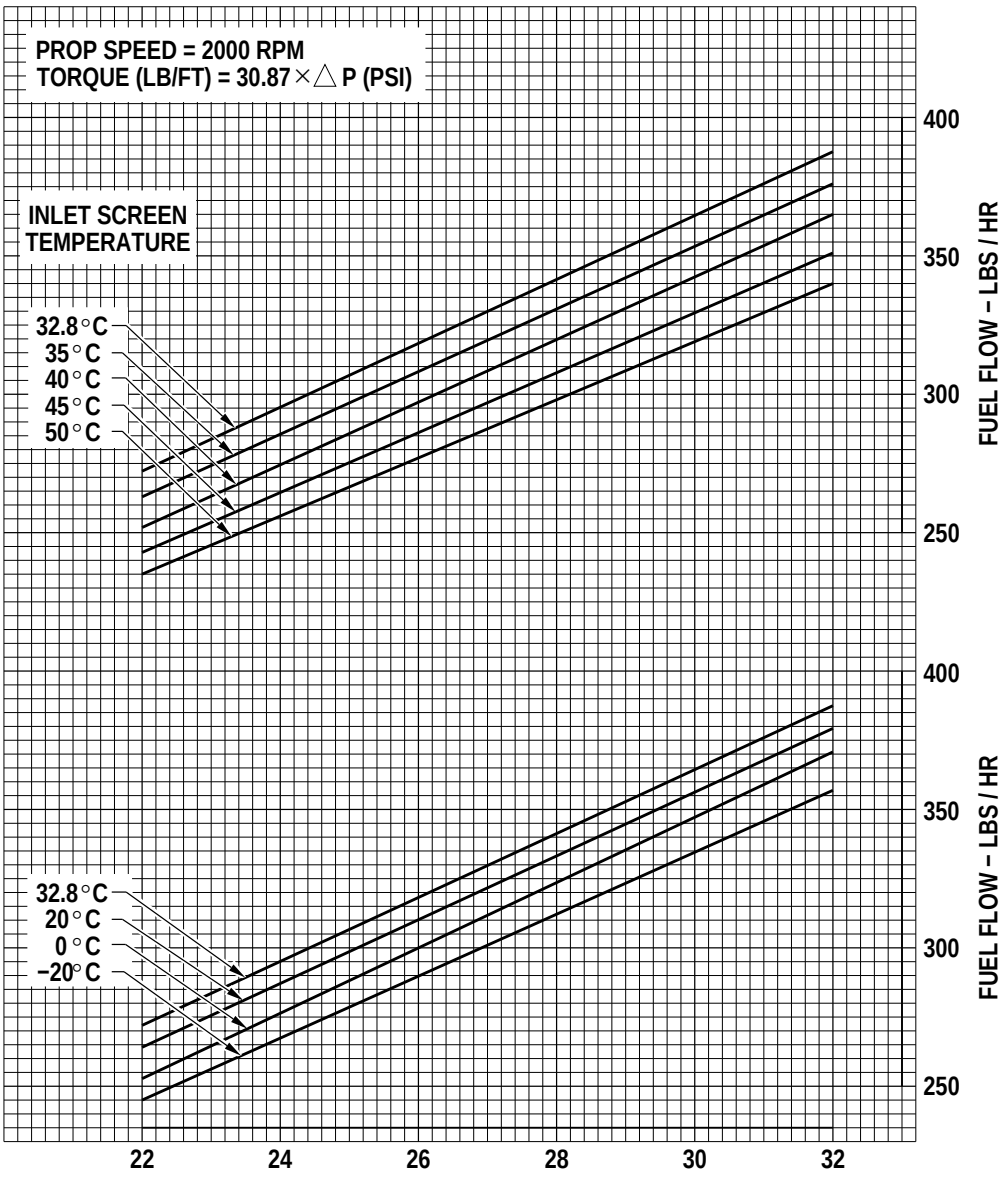
(c) From engine performance check curves (Ref. Figs. 510 and 511), determine and record torque pressure, fuel flow (Wf), Ng/data plate trim speed ratio and interturbine temperature (ITT).

(2) For PT6A-21 engines, do engine performance check:

(a) Close P3 air supply to airframe auxiliaries.

CAUTION:

**UNINSTALLED NO LOSS CONDITIONS.
UNDER NO CIRCUMSTANCES MUST
THE S.O.I. LIMITS BE EXCEEDED.**



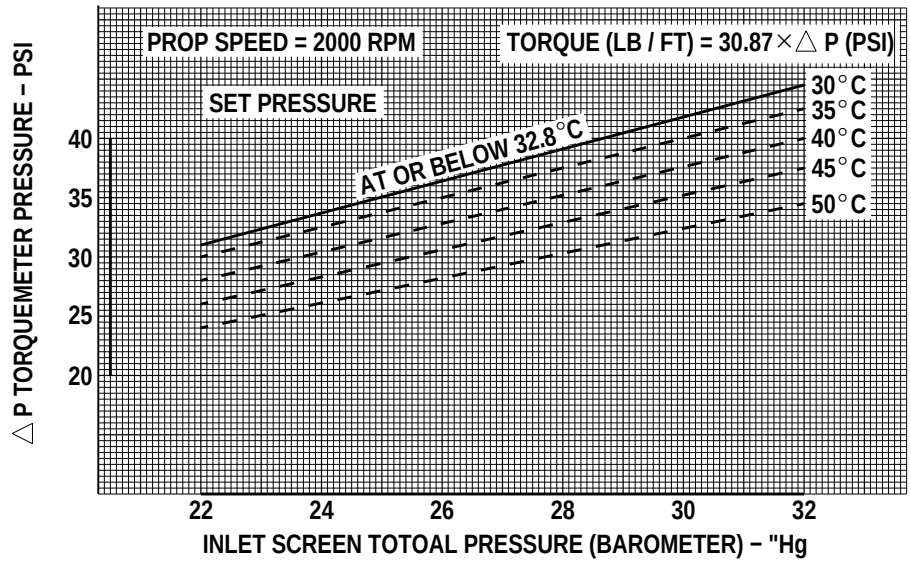
PT6A-21

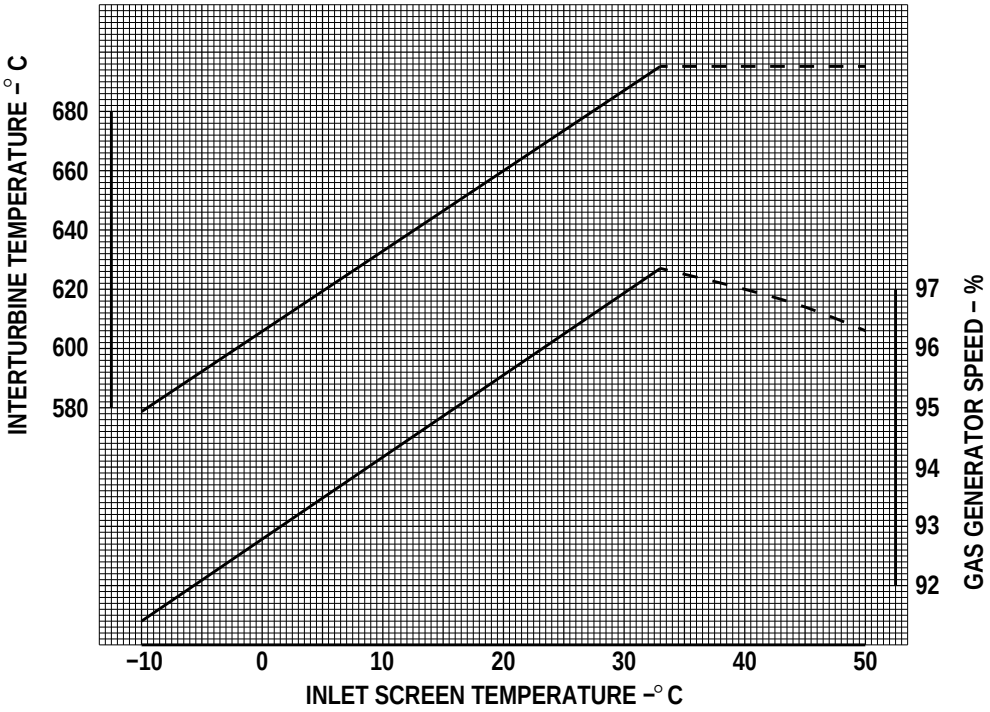
C2861C2

Engine Power Assurance Check Curve
Figure 510 (Sheet 1 of 2)

CAUTION:

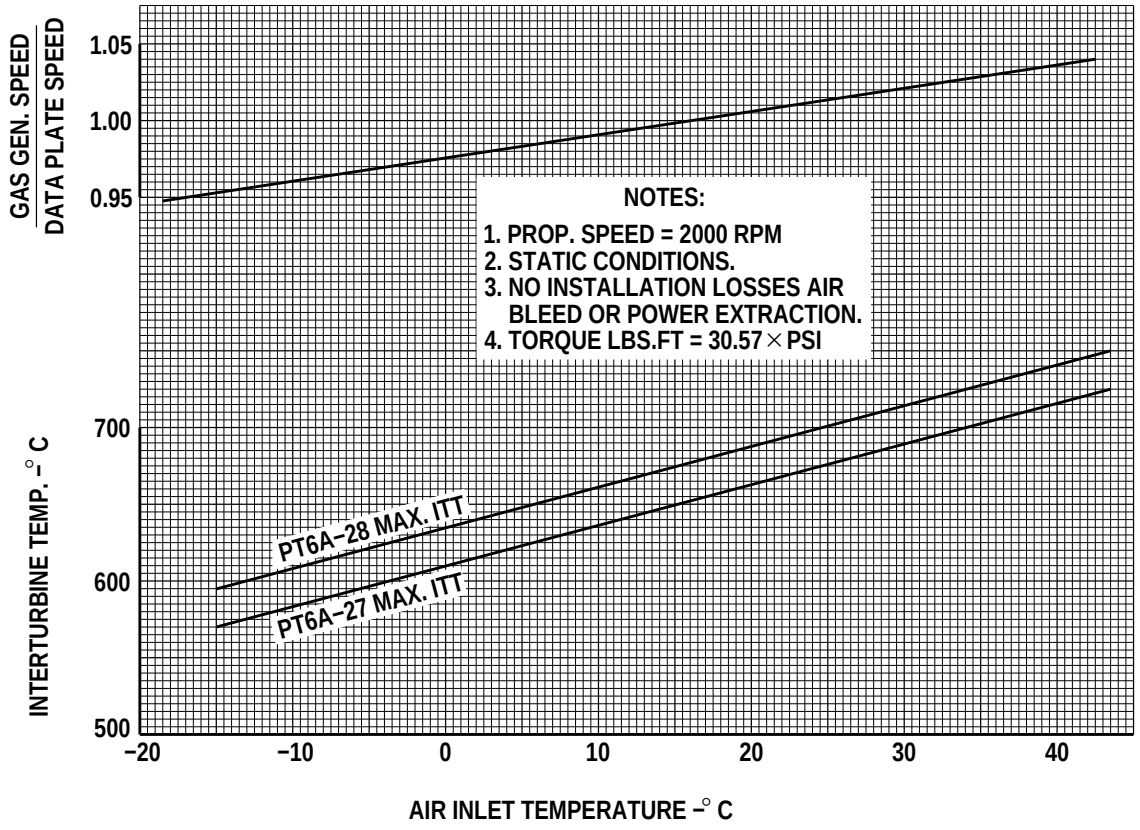
**UNINSTALLED NO LOSS CONDITIONS.
UNDER NO CIRCUMSTANCES MUST
THE S.O.I. LIMITS BE EXCEEDED.**





PT6A-21 C2861C1

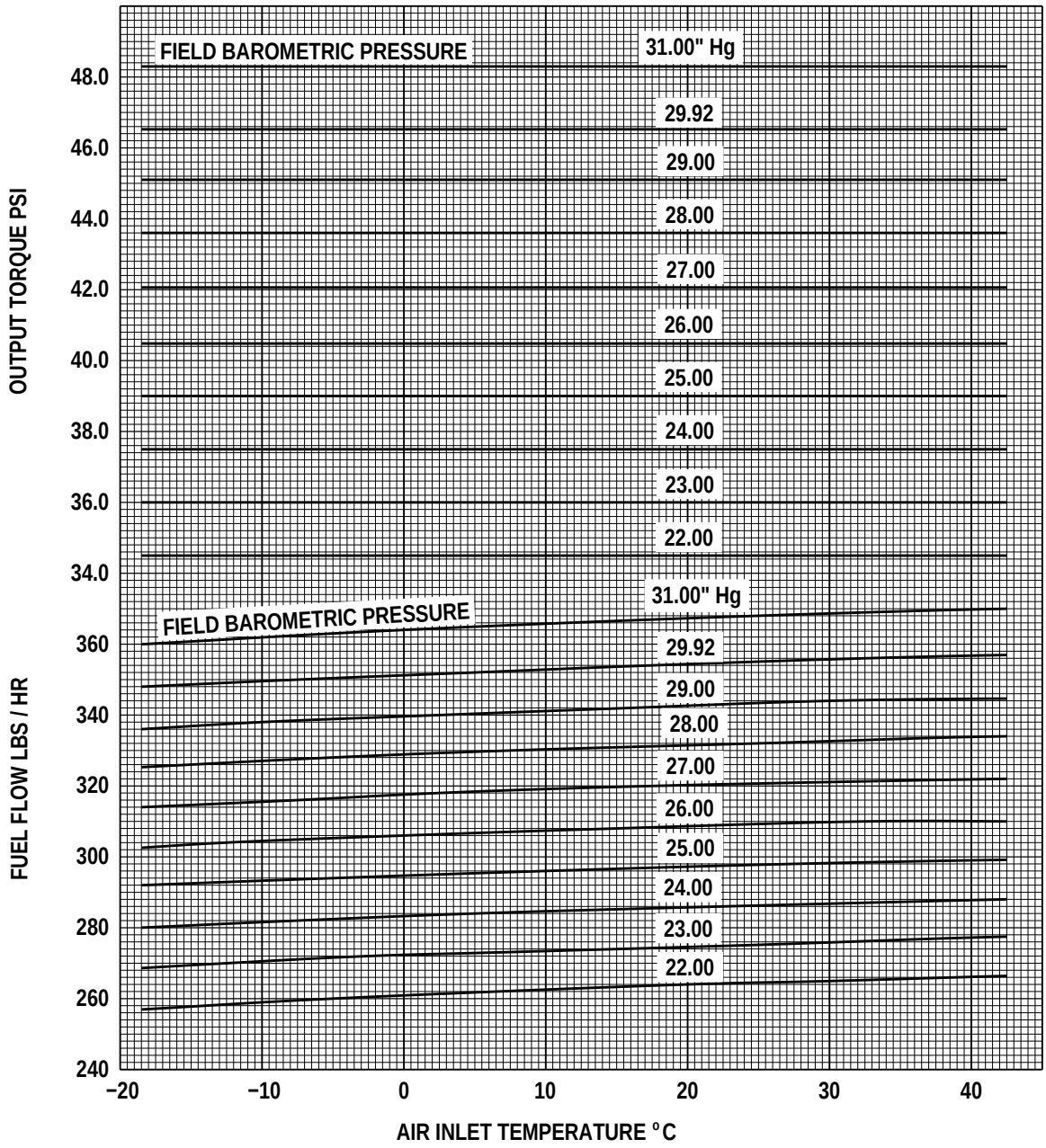
Engine Power Assurance Check Curve
Figure 510 (Sheet 2)



PT6A-27 and PT6A-28 C469D1

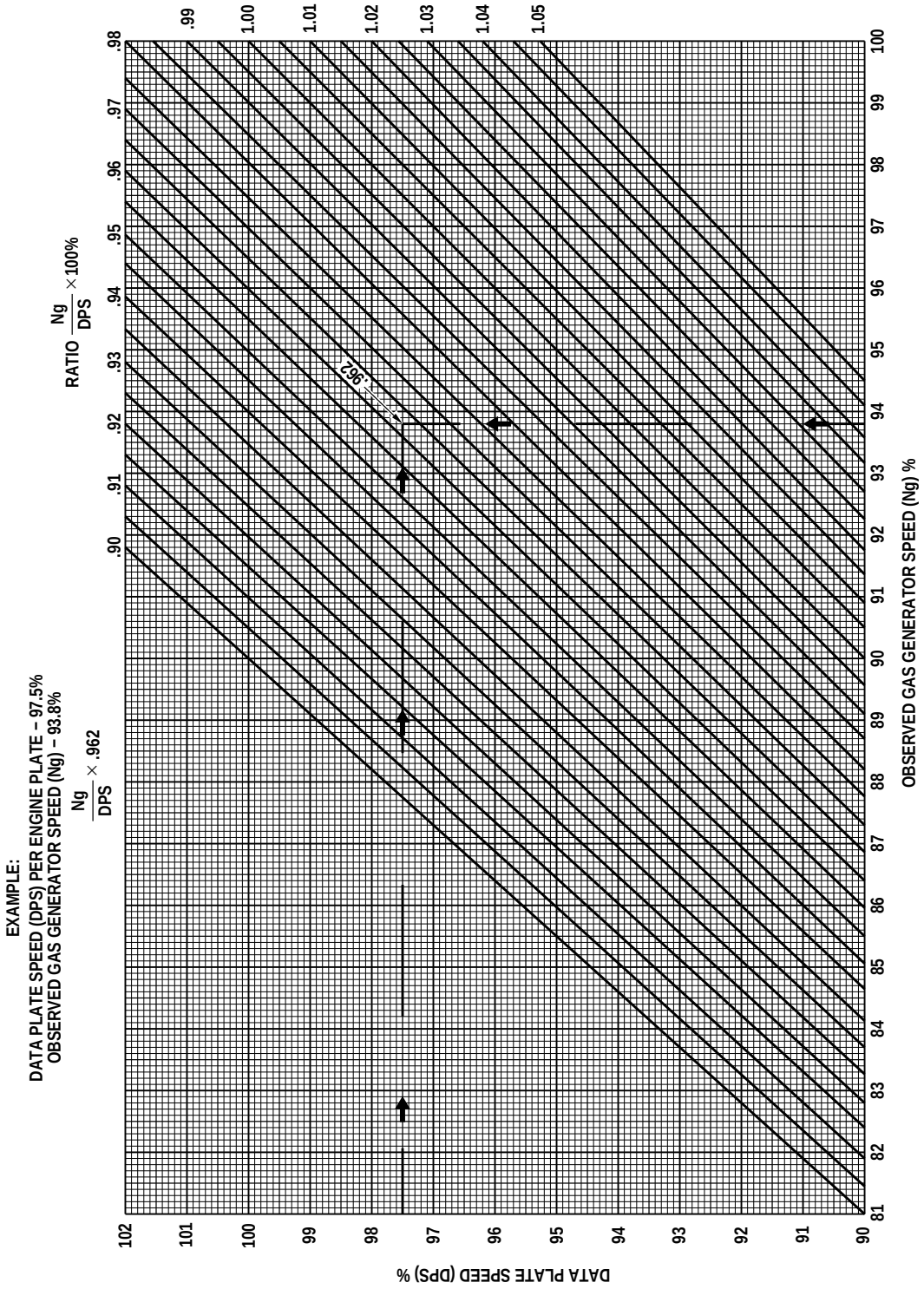
Engine Performance and Data Plate Trim Speed Curve
Figure 511 (Sheet 1 of 2)

NOTES:
1. PROP. SPEED = 2000 RPM
2. STATIC CONDITIONS
3. NO INSTALLATION LOSSES AIR BLEED OR POWER EXTRACTION.
4. TORQUE LBS.FT = 30.57 x PSI



PT6A-27 and PT6A-28 C469D2

Engine Performance and Data Plate Trim Speed Curve
Figure 511 (Sheet 2)



PT6A-27 and PT6A-28 C646B

Data Plate Speed Ratio Curve
Figure 512

(b) Start engine and run at IDLE for five minutes to stabilize operating temperatures.

(c) Set Propeller Control Lever to 100% Np (2000 rpm) and Power Control Lever to obtain previously determined torque setting. Let engine instrumentation stabilize.

(d) Record observed Wf, Ng and ITT and compare with previously recorded figures.

(e) Make sure the values observed during engine performance check are within the following limits:

1 + 15 lb/hr fuel flow. If fuel flow is more than 75 lb/hr below chart value, check instrumentation.

2 Maximum gas generator speed is not exceeded.

3 Maximum interturbine temperature line is not exceeded. If temperature is more than 75°C below target temperature, check instrumentation.

(f) Values outside the limits specified in step (e), preceding, are not necessarily cause for engine rejection until all relevant trouble shooting techniques have been exhausted (Ref. 72-00-00, FAULT ISOLATION). Replacement and/or repair of hot section parts can affect engine performance parameters. Any increase in speed should be recorded for future reference. The importance of monitoringtheperformance trend of an engine between overhauls, and during itslife, cannot be overemphasized.

(3) For PT6A-27 and PT6A-28 engines, do engine performance check:

(a) Close P3 air supply to airframe auxiliaries.

(b) Start engine and run at IDLE for five minutes to stabilize operating temperatures.

(c) Set Propeller Control Lever to 91% Np and Power Control Lever to obtain previously determined torque setting. Let engine instrumentation stabilize.

(d) Record observed Wf, Ng and ITT and compare with previously recorded figures.

(e) Make sure the values observed during engine performance check are within the following limits:

1 + 15 lb/hr fuel flow. If fuel flow is more than 75 lb/hr below chart value, check instrumentation.

2 ± 0.02 Ng/data plate trim speed ratio observed (gas generator speed/data plate trim speed). Refer to Fig. 512 to compute ratio.

3 ITT: Below maximum limits. If temperature is more than 75°C (167°F) below target temperature, check instrumentation

(f) Values outside the limits specified in step (e), preceding, are not necessarily cause for engine rejection until all relevant trouble shooting techniques have been exhausted (Ref. 72-00-00, FAULT ISOLATION). Replacement and/or repair of hot section parts can affect engine performance parameters. Any increase in speed should be recorded for future reference. The importance of monitoringtheperformance trend of an engine between overhauls, and during itslife, cannot be overemphasized.

14. Acceleration Adjustments

A. Procedure

(1) Start engine and operate at IDLE for five minutes to allow stabilization of temperatures.

(2) Slowly increase power to maximum (or max. allowable on ground; Ref. Aircraft Maintenance Manual). Note and record Ng. Mark position of power control lever on cockpit console.

(3) Reduce power and set Ng to 64%.

(4) Rapidly (in less than 1.0 second), move power control lever to position marked in step (2).

(5) Note and record time required for Ng to reach 95 % (PT6A-21) or 97.5% (PT6A-27, PT6A-28) of the value recorded in step (2) . Record ambient temperature.

(6) Acceleration time must fall within the range specified in figure 513. If not, rotate acceleration adjustment dome (1, Figs. 506 and 507) one click at a time until requirement is met. Rotate dome clockwise to reduce acceleration time (i.e. faster acceleration) or counterclockwise to increase acceleration time (slower acceleration). If requirement cannot be met within a maximum of three clicks, clockwise or counterclockwise, replace fuel control unit.

15. Torquemeter Function Test

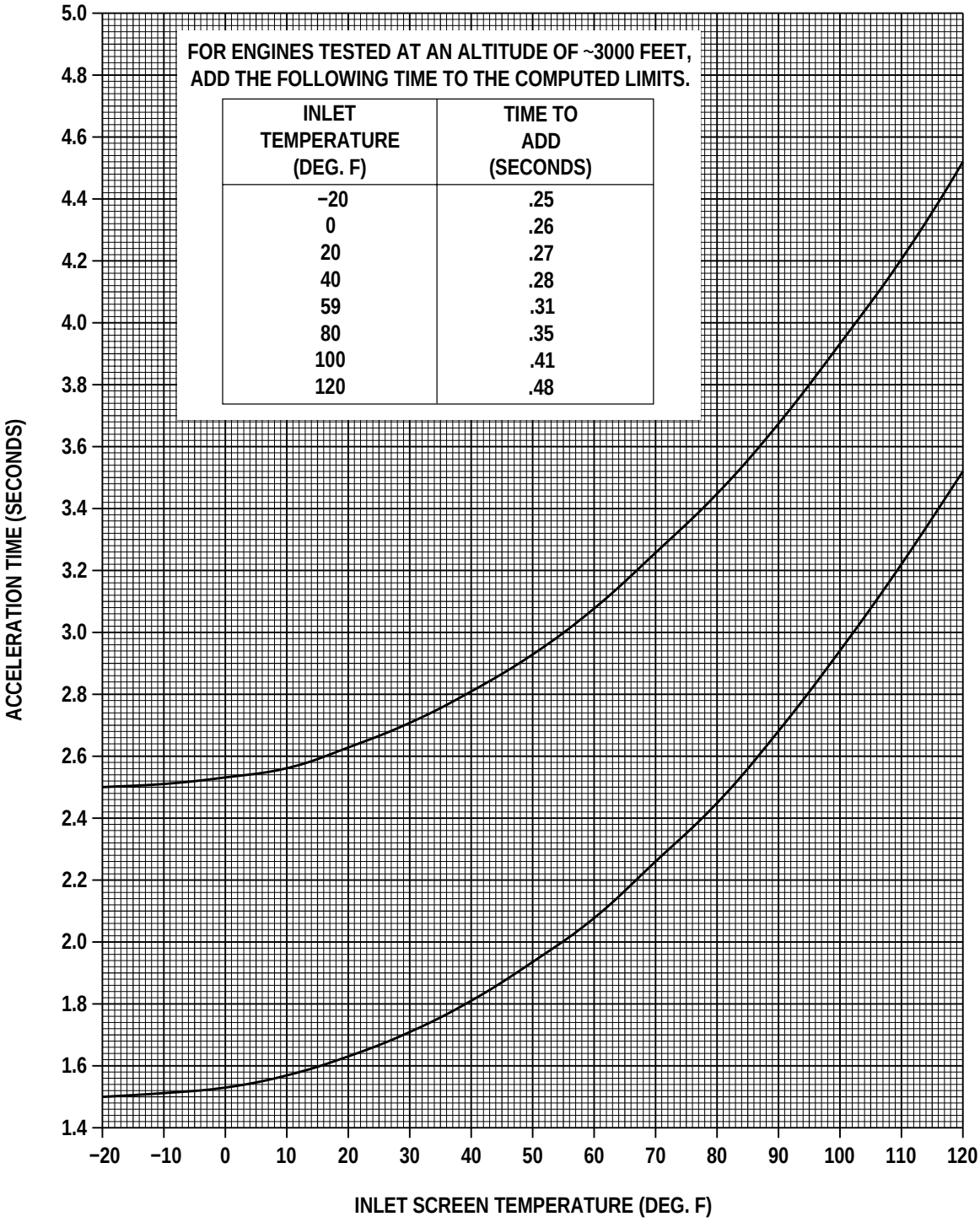
A. Procedure

(1) Determine and record field barometric pressure (pressure altitude (ft)).

NOTE: Pressure altitude (PA) can be obtained by contacting local flight service for uncorrected pressure reading, or by setting altimeter to 29.92 Hg. Position of needle indicates pressure altitude in feet. Do not use sea level pressure.

(2) Determine and record indicated outside air temperature (IOAT) in degrees Celsius.

NOTE: To make sure result of torquemeter function test is accurate, determine and record IOAT immediately before engine start. Use IOAT value recorded to determine take-off torque (Ref. Step (3)).



C36753

Acceleration Time Vs. Ambient Temperature
Figure 513

(3) Use the flight manual chart to determine the take-off torque (target torque) at which to set the engine using pressure altitude (ft) and IOAT recorded at step (1) and step (2) respectively. Record the value.

(4) Start the engine.

(5) Switch off the generator, bleed air and the air conditioning.

(6) Check propeller control lever is in high rpm.

(7) Check oil temperature is above 60 °C.

(8) Set Ng 500 rpm above GROUND-IDLE (Ref. Operating Limitations).

(9) Record Ng, Np and engine torque (Tq).

(10) Accelerate engine slowly and uniformly at a rate of 2000 rpm per second until target torque recorded at step (3) is reached.

(11) Allow engine to stabilize for two minutes.

(12) Reduce Ng slowly and uniformly at a rate of 2000 rpm per second to Ng set at Step (8).

(13) Record Ng, Np and Tq.

(14) Repeat steps (10) to (13).

(15) Reduce Ng to GROUND-IDLE.

(16) Shutdown engine (Ref. Para. 8.).

(17) The engine torque indication system functions correctly when the difference between Tq recorded in steps (9), (13) and (14) is equal to or less than 200 lb.ft.

(18) If the difference between the torque readings is in excess of 150 lb.ft. , check the aircraft indication system. If the aircraft indicating system check is satisfactory, the power section is recommended to be removed and the torquemeter piston, cylinder and servo valve inspected at an authorized facility for excessive wear, scoring, fretting, etc.

POWER PLANT - CLEANING

1. General

   A. Engine cleaning procedures describe the compressor desalination wash, compressor performance recovery wash, compressor turbine desalination wash, fuel nozzle cleaning, and engine external wash.

2. Consumable Materials

   The consumable materials listed below are used in the following procedures.

Item No.	Name
PWC05-005A	Emulsifier
PWC05-073	Water, Demineralized
PWC11-001	Cleaning Alkaline
PWC11-003	Cleaner, Detergent
PWC11-003B	Cleaner, Detergent
PWC11-014	Alcohol, Isopropyl
PWC11-027	Solvent, Petroleum
PWC11-031	Cleaner, Engine

3. Special Tools

   The special tools listed below are used in the following procedures.

Tool No.	Name
PWC32271	Tube, Spray
PWC32677-100	Washcart, Compressor

4. Fixtures, Equipment and Supplier Tools

   The fixtures, equipment and supplier tools listed below are used in the following procedures.

Name
Shut off Valve
Pressure Gauge
Steel Tank
Steel Tubing
Nitrogen or Compressed Air
Pressure Gauge Adapter
Test Rig Adapter
Shut off Valve

5. Internal Washing

A. General

Depending on the operating environment and the types of deposits in the engine gas path, the following methods can be used to remove salt or dirt and other baked-on deposits that accumulate over a period of time and cause engine performance deterioration.

A compressor wash is done by injecting the applicable cleaning fluid into the engine intake using either an installed compressor wash ring or a hand held wash wand.

A compressor turbine wash is done by injecting the applicable cleaning fluid through a wash tube installed into the gas generator igniter boss.

B. Motoring Wash

A motoring wash is done at 10 to 25% Ng and the water or the cleaning solution depending on the requirement and ambient temperature (Ref. Table 702), is injected into the engine intake at a rate of 2 to 3 gal/minute (7.6 to 11.3 l/minute).

Washing during a motoring cycle makes sure emulsion fluid remains in liquid form.

C. Types of Internal Wash

A compressor desalination wash is essentially used to remove salt deposits, however light dirt deposits may also be removed. Wash medium is drinking quality water, provided minimum standards are met (Ref. Table 703).

A compressor turbine desalination wash is used to remove salt deposits from the blades. The wash medium is the same as for a compressor desalination wash. It is strongly recommended this procedure be done when operating in salt laden atmosphere.

When desalination washes are done in conjunction with each other it is essential the compressor desalination wash is done first.

A compressor performance recovery wash uses approved chemical additives to remove more stubborn deposits which cannot be removed during normal desalination washes. This method should only be done when engine performance loss is noticeable or trend monitoring dictates.

D. Wash Schedule Recommendations

Depending on the operating environment, the nature and frequency of compressor wash is recommended in accordance with Table 701.

TABLE 701, Wash Schedule Recommendations

Environment	Wash	Frequency	Remarks
Continuously salt laden	Desalination (Compressor and CT)	Daily	Strongly recommended after last flight of day.

TABLE 701, Wash Schedule Recommendations (Cont'd)

Environment	Wash	Frequency	Remarks
Occasionally salt laden	Desalination (Compressor and CT)	Weekly	Strongly recommended. Adjust interval to suit engine condition
All	Performance Recovery	As required	Strongly recommended. Performance recovery washes are required less frequently. Adjust frequency to suit engine operating conditions as indicated by ECTM. Motoring wash for light soiling and multiple motoring washes for heavy soiling is recommended.

NOTE: 1. Multiple motoring washes should be done to the extent permitted by starter operating limitations. Observe starter cooling period (Ref. Starter Manufacturer's Manual).

NOTE: 2. This Table covers the normal requirements of general aviation and does not specifically consider the peculiar frequency requirements of engines operating in an agricultural environment.

E. Preparation of Solutions

Five liters (1.33 U.S. gal.) of cleaning mixture and ten liters (2.66 U.S. gal.) of rinse solution are required. The solution formulation is dependent upon prevailing ambient temperature and must be prepared in accordance with Table 702 for cleaning, and Table 703 for rinsing .

TABLE 702, Cleaning Solution Formulation

Ambient Temperature		Cleaning Agent (NOTE 1)	Aviation Kerosene (NOTE 2)	Isopropyl Alcohol	Water (NOTE 3)
°C	°F	% by vol.	% by vol.	% by vol.	% by vol.
Typical mixture proportions using B & B 3100 (PWC11-001C) or TC-100 (PWC11-003E), at amb. temp. of -25°C to +2°C: (Similar proportions for Magnus 1214 (PWC11-001B), R-MCS (PWC11-001D), R-MC G21 (PWC11-001E), ALMON AL-333 (PWC11-001A), TURCO 5884 (PWC11-001G) and CLIX (PWC11-001).					
+2 Up	+36 Up	25	Nil	Nil	75
-25 to +2	-12 to +36	25	15	20	40
Below -25	Below -12	25	15	40	20

Example 1. (at +2°C):

TABLE 702, Cleaning Solution Formulation (Cont'd)

Ambient Temperature		Cleaning Agent (NOTE 1)	Aviation Kerosene (NOTE 2)	Isopropyl Alcohol	Water (NOTE 3)
°C	°F	% by vol.	% by vol.	% by vol.	% by vol.
B & B 3100 25% by vol. = 1250 ml in 5 liters (1.33 US Gallons)					
Kerosene 15% by vol. = 750 ml					
Isopropyl Alcohol 20% by vol. = 1000 ml					
Water 40% by vol. = 2000 ml					
Total 100% by vol. = 5000 ml or 5 liters (1.33 US Gallons)					
Typical mixture proportions using Turco 4217 (PWC11-001F) or Ardrox 624 (PWC11-001H).					
+2 Up	+36 Up	4	40	Nil	56
-25 to +2	-12 to +36	4	40	20	36
Below -25	Below -12	4	40	36	20
Example 2. (at +2°C):					
Turco 4217 4% by vol. = 200 ml in 5 liters (1.33 US Gallons)					
Kerosene 40% by vol. = 2000 ml					
Isopropyl Alcohol 0% by vol. = 0 ml					
Water 56% by vol. = 2800 ml					
Total 100% by vol. = 5000 ml or 5 liters (1.33 US Gallons)					
Typical mixture proportions using Ardrox 6345 (PWC11-003) or Ardrox 6367 (PWC11-003B), Turboclean 2 (PWC11-003C) and ZOK 27 (PWC11-003D)					
+5 Up	+41 Up	20	Nil	Nil	80
-5 to +5	+23 to +41	20	Nil	20	60
-21 to -5	-6 to +23	20	Nil	30	50
Below -21	Below -6	20	Nil	40	40
Example 3. (at +5°C):					
Zok 27 20% by vol. = 1000 ml in 5 liters (1.33 US Gallons)					
Isopropyl Alcohol 0% by vol. = 0 ml					
Water 80% by vol. = 4000 ml					
Total 100% by vol. = 5000 ml or 5 liters (1.33 US Gallons)					

NOTE: 1. Use any cleaning agent listed (Ref. CONSUMABLE MATERIALS). Solution strength must be in accordance with manufacturer/supplier's recommendations. Where no specific instructions are provided, proportion of cleaning agent should be as indicated.

TABLE 702, Cleaning Solution Formulation (Cont'd)

Ambient Temperature		Cleaning Agent (NOTE 1)	Aviation Kerosene (NOTE 2)	Isopropyl Alcohol	Water (NOTE 3)
°C	°F	% by vol.	% by vol.	% by vol.	% by vol.

NOTE: 2. Use of emulsifying agent (PWC05-005A), 3% by vol. or 150 ml in 5 liters is highly recommended to prevent possibility of kerosene separation.

NOTE: 3. Drinking quality water is permissible for motoring wash procedures.

TABLE 703, Rinse Solution Formulation

Ambient Temperature		Water (See NOTE)	Isopropyl Alcohol
°C	°F	% by vol.	% by vol.
+2 up	+36 up	100	-
−25 to +2	−12 to +36	50	50
Below −25	Below −12	40	60

NOTE: 1. Drinking quality water is permitted. Refer to Equipment Required for acceptance criteria.

F. Equipment Required (Ref. Figs. 701, 702 and 703)

CAUTION: DO NOT USE ANY RESTRICTOR WHEN THE MOTORING WASH IS DONE.

NOTE: Some engines have a built-in, 50-hole, deluge washing ring as standard installation feature.

(1) Wash wand (Ref. Fig. 702) or wash ring (Ref. Fig. 703). Flow rate 2 to 3 gpm (U.S.) (7.57 to 11.33 l/min).

(2) Modified 50-hole wash ring (Ref. Fig. 703) (if not original equipment). Flow rate 2 to 3 gpm (U.S.) (7.57 to 11.33 l/min).

(3) Wash cart (PWC32677-100), optional locally manufactured wash rig (Ref. Fig. 701) comprising the following:

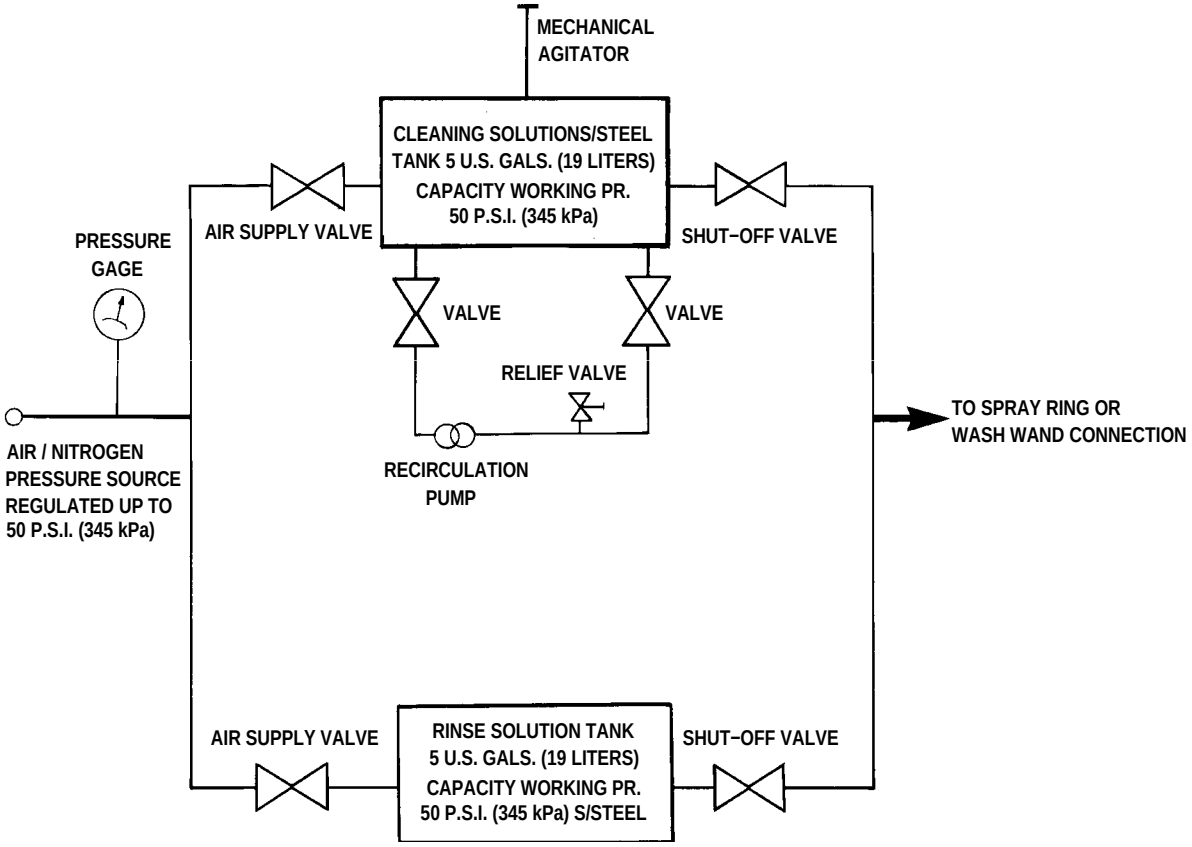
(a) Two stainless steel tanks, 5 gallon (U.S.) (19 liters) capacity, each capable of withstanding up to 50 psig (345 kPa) working pressure.

(b) Mechanical agitator, or recirculation pump with relief valve, for mixture agitation.

(c) Two flow control valves, for use with recirculation pump.

(d) Two air supply shut-off valves.

(e) Two fluid delivery shut-off valves.



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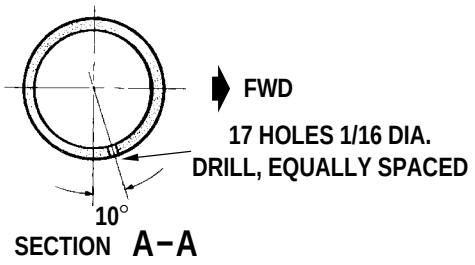
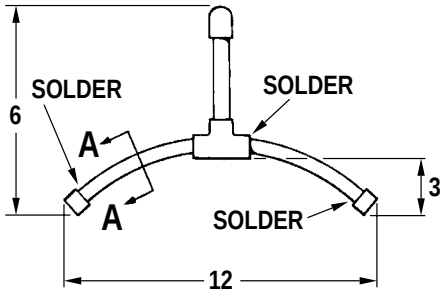
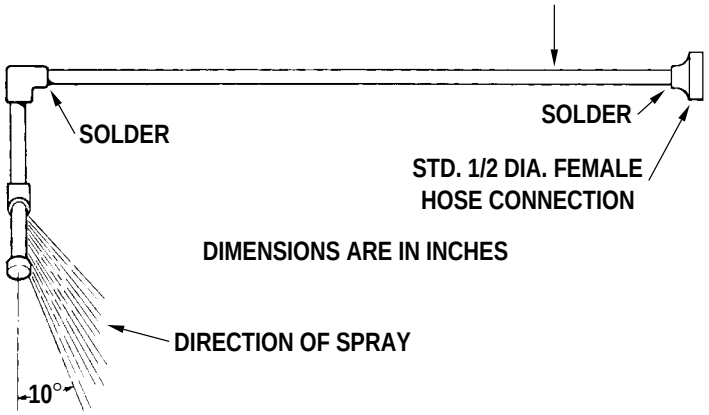
Compressor Wash Rig - Schematic
Figure 701

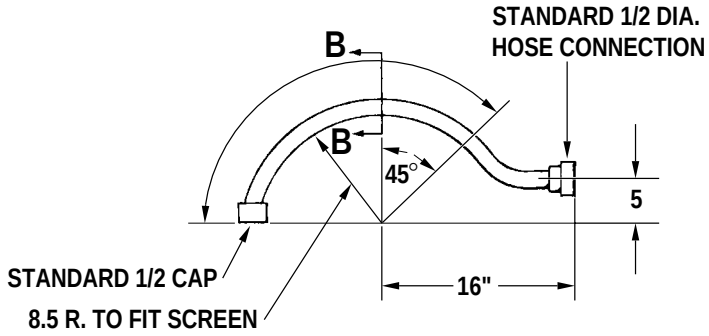


SECTION A–A

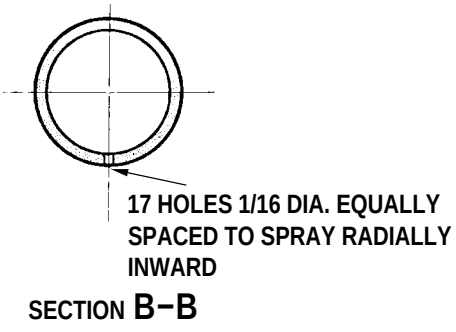




ALL FITTINGS ARE STD. 1/2 DIA. TEES, ELBOWS & CAPS
MATERIAL 1/2 DIA. HARD DRAWN COPPER PIPE



ALTERNATE CONFIGURATION



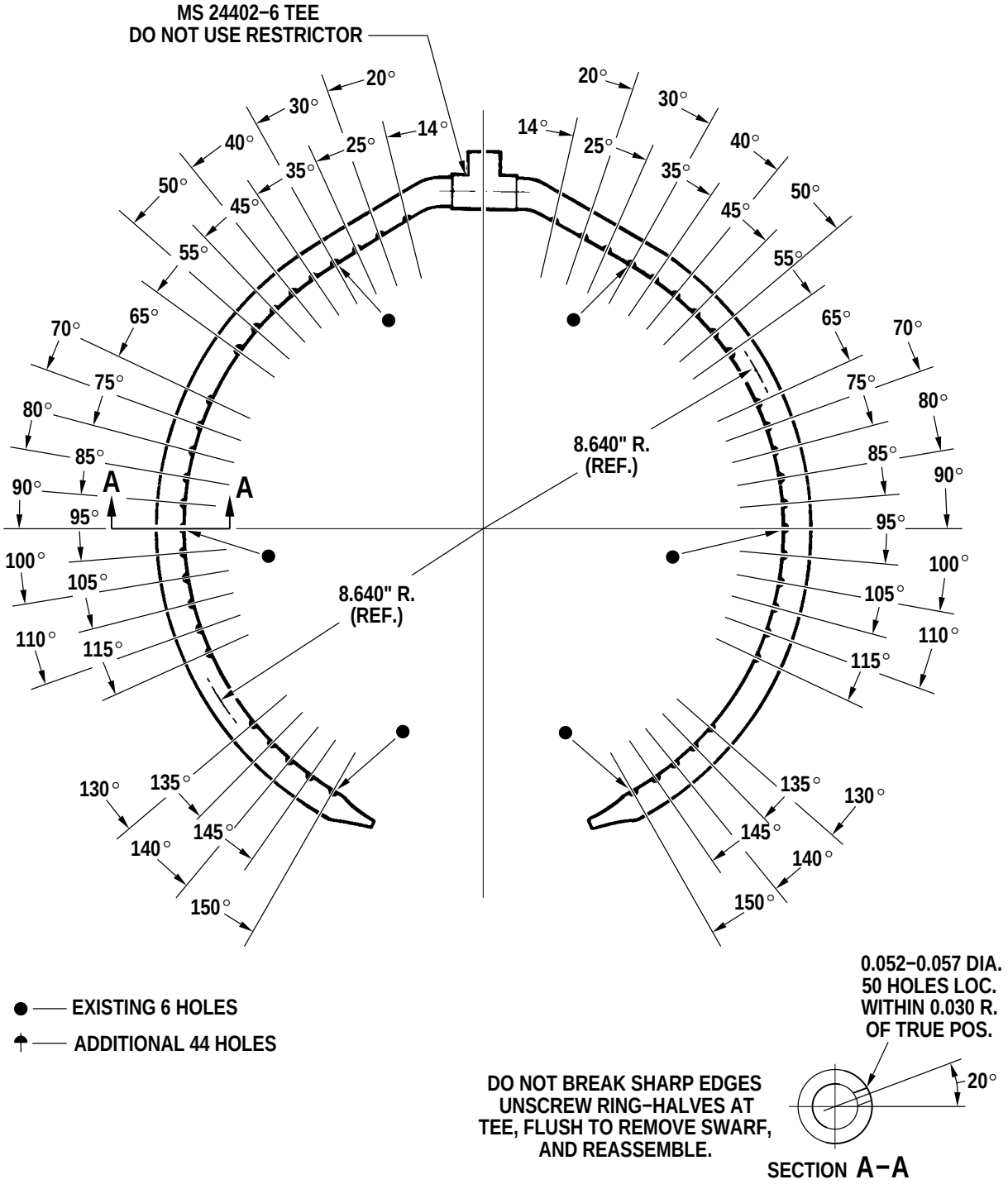
SECTION B–B

DIMENSIONS ARE IN INCHES
MATERIAL: 1/2 DIA. SOFT COPPER WATER PIPE

NOTE : THIS SKETCH IS INTENDED AS A GUIDE ONLY.
ALL DIMENSIONS ARE APPROXIMATE AND
ALTERNATE MATERIALS MAY BE USED AS AVAILABLE.

C3972

Water Wash Wand
Figure 702



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Modification of Standard - 6-Hole Wash Ring to 50-Hole
Figure 703

(f) One pressure gage located in air delivery line.

(g) Suitable tubing to interconnect components.

NOTE: Valve and tubing connections are to be 5/16-inch (8 mm) ID minimum (Ref. TOOLS/FIX/EQUIP).

(4) Compressed air or nitrogen supply, regulated up to 50 psig (345 kPa).

(5) A source of demineralized water (PWC05-073) to the following specifications:

(a) Appearance: free of suspended solids.

(b) Total solids: 10 ppm (mg/l) Max.

(c) Specific conductance: 11 micro-mho/cm Max.

(d) Silica content: 3 ppm (mg/l) Max.

(e) pH value: 5.0 to 7.5 inclusive.

(f) Intake filter not coarser than 10 microns.

(6) Drinking quality water criteria:

(a) Appearance: free of visible extraneous impurities.

(b) Total solids: 175 ppm (mg/l) Max.

(c) pH value: 6.0 to 8.0 inclusive.

(d) Chlorides: 15 ppm (mg/l) Max.

(e) Sulfates: 10 ppm (mg/l) Max.

NOTE: Drinking water quality varies according to location and season; these specifications are provided as a guide only.

6. Engine Motoring Washes

A. Compressor Desalination Wash

(1) Depending on the ambient temperature, fill wash tanks with the appropriate solution (Ref. Table 702). Alternatively, connect suitable hose to drinking water tap for ambient temperature above +2°C (+36°F).

(2) Connect compressed air regulated to 30 to 50 psig (207 to 345 kPa) to wash tanks. If tap water is used, connect through centrifugal pump if water pressure is below 30 psig (207 kPa).

(3) Remove or open engine cowlings, as applicable, to expose the engine inlet screen and install the wash wand or modified wash ring (Ref. Figs. 702 and 703).

(4) Connect the wash ring or wand to the pressurized tanks, or to the drinking water tap as applicable.

NOTE: To prevent the precipitation of deposits due to the use of ''hard'' water, allow the engine to cool below 65°C (150°F). The minimum duration for engine cooling is 40 minutes since the last operation.

CAUTION: CONTAMINATION/BLOCKAGE OF THE FCU PNEUMATIC SECTION, OR THE P3 FILTER WILL AFFECT ENGINE HANDLING. REMOVE THE AIR TUBE FROM THE ENGINE BEFORE PERFORMING A MOTORING WASH IF SB1495 IS NOT INSTALLED.

CAUTION: FOR PRE-SB1495 ENGINES: SPECIAL CARE SHOULD BE TAKEN WHEN A COMPRESSOR WASH IS DONE TO MAKE SURE THAT THE P3 LINE IS COMPLETELY REMOVED TO AVOID BENDING STRESS OF ONE COUPLING.

(5) For Pre-SB1495 Engines: Remove forward P3 air tube (Ref. 73-10-07) from engine to prevent distortion of tube.

NOTE: For Post-SB1495 Engines: Removal of the forward P3 air tube is not required as the drain valve installed in the P3 filter cover will drain remaining fluids.

(6) Make sure the ignition switch and aircraft bleed air are OFF.

CAUTION: DO NOT MOTOR FOR MORE THAN 30 SECONDS; OBSERVE THE STARTER COOLING PERIOD (REF. STARTER MANUFACTURERS MANUAL). WHEN USING A WATER/ALCOHOL SOLUTION, PERFORM AN ADDITIONAL 30-SECOND DRY MOTORING RUN BETWEEN STEPS (10) AND (11) FOLLOWING, TO PURGE THE ENGINE OF VOLATILE FUMES. MAKE SURE THE PRESCRIBED STARTER COOLING PERIOD IS ALLOWED FOLLOWING THIS ADDITIONAL STEP.

(7) Motor engine (starter only).

(8) When the Ng reaches 5% minimum, inject the wash mixture or water into the engine, as applicable.

(9) Stop motoring after 30 seconds.

(10) Shut off the cleaning solution supply as soon as the Ng falls to 5%.

(11) Observe the starter cooling period (Ref. Starter Manufacturers Manual).

(12) Remove the wash wand or ring from the inlet screen. Reinstall or close the engine cowlings.

(13) For Pre-SB1495 Engines: Install the front air tube (Ref. 73-10-07).

NOTE: It is important to make sure all solid P3 lines are properly and correctly fitted before the coupling nuts are tightened. The coupling nuts should be seated without the use of tools (finger tight) before torquing. The installation of any pipe brackets should not distort the pipe in any way.

(14) Start the engine (Ref. ADJUSTMENT/TEST). Run the engine at 80% Ng for one minute or more to completely dry the engine. Check engine acceleration (Ref. ADJUSTMENT/TEST).

(15) Shut down the engine (Ref. ADJUSTMENT/TEST).

B. Compressor Turbine Desalination

CAUTION: IF TURBINE WASH IS TO BE DONE IN CONJUNCTION WITH COMPRESSOR WASH, WASH THE COMPRESSOR FIRST.

(1) Depending on the ambient temperature, fill the wash tanks with the appropriate cleaning solution (Ref. Table 702).

(2) Connect the compressed air supply or nitrogen supply, regulated 30 to 50 psig (207 to 345 kPa) to wash tanks.

(3) Remove or open the engine cowlings, as applicable (Ref. Aircraft Maintenance Manual), to expose engine exciter box and igniters.

CAUTION: RESIDUAL VOLTAGE IN IGNITION EXCITER MAY BE DANGEROUSLY HIGH. MAKE SURE THAT IGNITION HAS BEEN SWITCHED OFF FOR A MINIMUM OF 6 MINUTES. ALWAYS DISCONNECT COUPLING NUTS AT IGNITION EXCITER FIRST AND USE INSULATED TOOLS TO REMOVE SAME. DO NOT TOUCH OUTPUT CONNECTORS OR COUPLING NUTS WITH BARE HANDS.

(4) Remove most accessible igniter and gasket. Discard gasket.

CAUTION: SUPPORT DELIVERY HOSE TO PREVENT DAMAGE TO WASH TUBE.

(5) Install turbine wash tube (PWC32271) in igniter boss, with RGB arrow inscribed on tang pointing toward reduction gearbox. Tighten fingertight.

(6) With tube connection installed, connect to pressurized tank or drinking water supply. Delivery hose must be supported to avoid damage to wash tube.

NOTE: Engine temperature must be below 65 °C (150 °F) to make sure inadvertent use of hard water does not result in precipitation of deposits. Minimum cooling off period is 40 minutes since engine last operated.

CAUTION: CONTAMINATION/BLOCKAGE OF THE FCU PNEUMATIC SECTION, OR THE P3 FILTER WILL AFFECT ENGINE HANDLING. REMOVE THE AIR TUBE FROM THE ENGINE BEFORE PERFORMING A MOTORING WASH IF SB1495 IS NOT INSTALLED.

CAUTION: FOR PRE-SB1495 ENGINES: SPECIAL CARE SHOULD BE TAKEN WHEN A COMPRESSOR WASH IS DONE TO MAKE SURE THAT THE P3 LINE IS COMPLETELY REMOVED TO AVOID BENDING STRESS OF ONE COUPLING.

(7) For Pre-SB1495 Engines: Remove forward P3 air tube (Ref. 73-10-07) from engine to prevent distortion of tube.

NOTE: For Post-SB1495 Engines: Removal of the forward P3 air tube is not required as the drain valve installed in the P3 filter cover will drain remaining fluids.

(8) Make sure the ignition and aircraft bleed air are OFF.

(9) Make sure propeller is not tethered and is free to turn.

CAUTION: DO NOT MOTOR FOR MORE THAN 30 SECONDS. OBSERVE STARTER COOLING PERIOD (REF. STARTER MANUFACTURERS MANUAL).

(10) Motor the engine (starter only).

(11) When the Ng reaches 5%, inject the cleaning solution into the engine.

(12) Stop motoring after 30 seconds.

(13) Shut off the cleaning solution supply as soon as the Ng falls to 5%.

(14) If water/alcohol solution is used, observe starter cooling period and then motor the engine for 30 seconds.

(15) Disconnect and remove the cleaning solution equipment, and remove wash tube from igniter boss.

(16) Install igniter with new gasket (Ref. 74-20-04).

(17) For Pre-SB1495 Engines: Install the front air tube (Ref. 73-10-07).

NOTE: It is important to make sure all solid P3 lines are properly and correctly fitted before the coupling nuts are tightened. The coupling nuts should be seated without the use of tools (finger tight) before torquing. The installation of any pipe brackets should not distort the pipe in any way.

(18) Check for zero leakage during engine drying cycle. If satisfactory, lockwire all coupling nut (Ref. Step (16)).

C. Performance Recovery Wash (Ref. Fig. 701)

(1) Depending on the ambient temperature, fill the wash tanks with the appropriate cleaning solution (Ref. Table 702) and rinse solution (Ref. Table 703) in separate tanks.

(2) Connect the compressed air supply, 30 to 50 psig (207 to 345 kPa), to wash tanks.

(3) Remove or open the engine cowlings, as applicable, to expose the engine inlet screen and install the wash ring or wand.

(4) Connect the wash ring or wand, as applicable, to the pressure tanks.

NOTE: To prevent the precipitation of deposits due to the use of ‘‘hard’’ water, allow the engine to cool below 65 °C (150 °F). The minimum duration for engine cooling is 40 minutes since the last operation.

CAUTION: CONTAMINATION/BLOCKAGE OF THE FCU PNEUMATIC SECTION, OR THE P3 FILTER WILL AFFECT ENGINE HANDLING. REMOVE THE AIR TUBE FROM THE ENGINE BEFORE PERFORMING A MOTORING WASH IF SB1495 IS NOT INSTALLED.

CAUTION: FOR PRE-SB1495 ENGINES: SPECIAL CARE SHOULD BE TAKEN WHEN A COMPRESSOR WASH IS DONE TO MAKE SURE THAT THE P3 LINE IS COMPLETELY REMOVED TO AVOID BENDING STRESS OF ONE COUPLING.

(5) For Pre-SB1495 Engines: Remove forward P3 air tube (Ref. 73-10-07) from engine to prevent distortion of tube.

NOTE: For Post-SB1495 Engines: Removal of the forward P3 air tube is not required as the drain valve installed in the P3 filter cover will drain remaining fluids.

(6) Make sure the ignition and aircraft bleed air are OFF.

CAUTION: DO NOT MOTOR FOR MORE THAN 30 SECONDS; OBSERVE THE STARTER COOLING PERIOD (REF. STARTER MANUFACTURERS MANUAL). WHEN USING A WATER/ALCOHOL SOLUTION, PERFORM AN ADDITIONAL 30-SECOND DRY MOTORING RUN BETWEEN STEPS (13) AND (14) FOLLOWING, TO PURGE THE ENGINE OF VOLATILE FUMES. MAKE SURE THE PRESCRIBED STARTER COOLING PERIOD IS ALLOWED FOLLOWING THIS ADDITIONAL STEP.

(7) Motor the engine (starter only).

(8) When the Ng reaches 5%, inject the cleaning solution into the engine.

(9) Stop motoring after 30 seconds.

(10) Shut off the cleaning solution supply as soon as the Ng falls to 5%.

(11) Allow the cleaning solution to soak for 15 to 30 minutes.

(12) Motor the engine. When the Ng reaches 5%, inject the rinse solution into the engine (half quantity only).

(13) Observe the starter cooling period. (Ref. Starter Manufacturers Manual).

(14) Repeat step (12) observing the starter limitations.

(15) Remove the wash ring or wand from the inlet screen.

(16) For Pre-SB1495 Engines: Install the front air tube (Ref. 73-10-07).

NOTE: It is important to make sure all solid P3 lines are properly and correctly fitted before the coupling nuts are tightened. The coupling nuts should be seated without the use of tools (finger tight) before torquing. The installation of any pipe brackets should not distort the pipe in any way.

(17) Switch the ignition ON and start the engine (Ref. ADJUSTMENT/TEST). Run the engine at 80% Ng for one minute or more to completely dry the engine. Check for zero air leakage during the drying cycle. Check engine acceleration.

(18) Shut down the engine (Ref. ADJUSTMENT/TEST).

(19) Install or close the cowling (Ref. Aircraft Maintenance Manual).

7. Engine External Wash

A. General

Do not use gasoline or similar toxic substances for external engine cleaning. Do not attempt to wash an engine that is still hot or running. Let engine cool for a minimum of 40 minutes after shutdown.

Fresh water external washing is very effective in tracing possible origin of external oil leakage, and is recommended when the engine is contaminated with salt or corrosive chemicals such as those found in industrial smog. Demineralized water is not necessary. The engine should never be left in a contaminated condition overnight, or longer.

If water wash is ineffective, a petroleum solvent (varsol/water emulsion), (PWC11-027) or (PWC11-031), may be used to remove oil and grime. Thoroughly rinse with water to remove all traces of cleaning fluid. Completely dry the engine using clean, dry compressed air.

8. Compressor Turbine Wash

A. General

This is a method for washing compressor turbine blades, while installed in the engine, to alleviate sulphidation attack and salt deposits.

Water or water/alcohol, depending upon ambient temperatures (Ref. Table 702), is used to wash the compressor turbines.

Depending on the operating environment, the nature and frequency of wash carried out are recommended to be in accordance with Table 701.

Approximately 1.90 liters (0.5 U.S. gallon) will pass through the compressor turbine during a 30-second motoring wash cycle.

B. Equipment

For equipment required for a motoring wash, reference Para. F..

The wash tube assembly (PWC32271) is designed to introduce the wash solution directly to the compressor turbine blades.

C. Compressor Turbine Wash Method

(1) Depending on the ambient temperature, fill the wash tank with the appropriate mixture (Ref. Table 702). Alternatively, at temperatures above 2°C (36°F) use a suitable hose connected to a drinking water supply.

(2) Connect the compressed air or nitrogen supply, regulated to 30 to 50 psig (207 to 345 kPa) to the wash tanks. If drinking water is used, connect through a centrifugal pump if water pressure is below 30 psig (207 kPa).

WARNING: RESIDUAL VOLTAGE IN IGNITION EXCITER MAY BE DANGEROUSLY HIGH. MAKE SURE THE IGNITION IS SWITCHED OFF. ALWAYS DISCONNECT THE COUPLING NUTS AT THE IGNITION EXCITER FIRST. ALWAYS USE INSULATED TOOLS TO REMOVE THE COUPLING NUTS. DO NOT TOUCH THE OUTPUT CONNECTORS OR COUPLING NUTS WITH BARE HANDS.

(3) Remove the most accessible igniter (1, Fig. 704) and gasket (2) . Discard gasket.

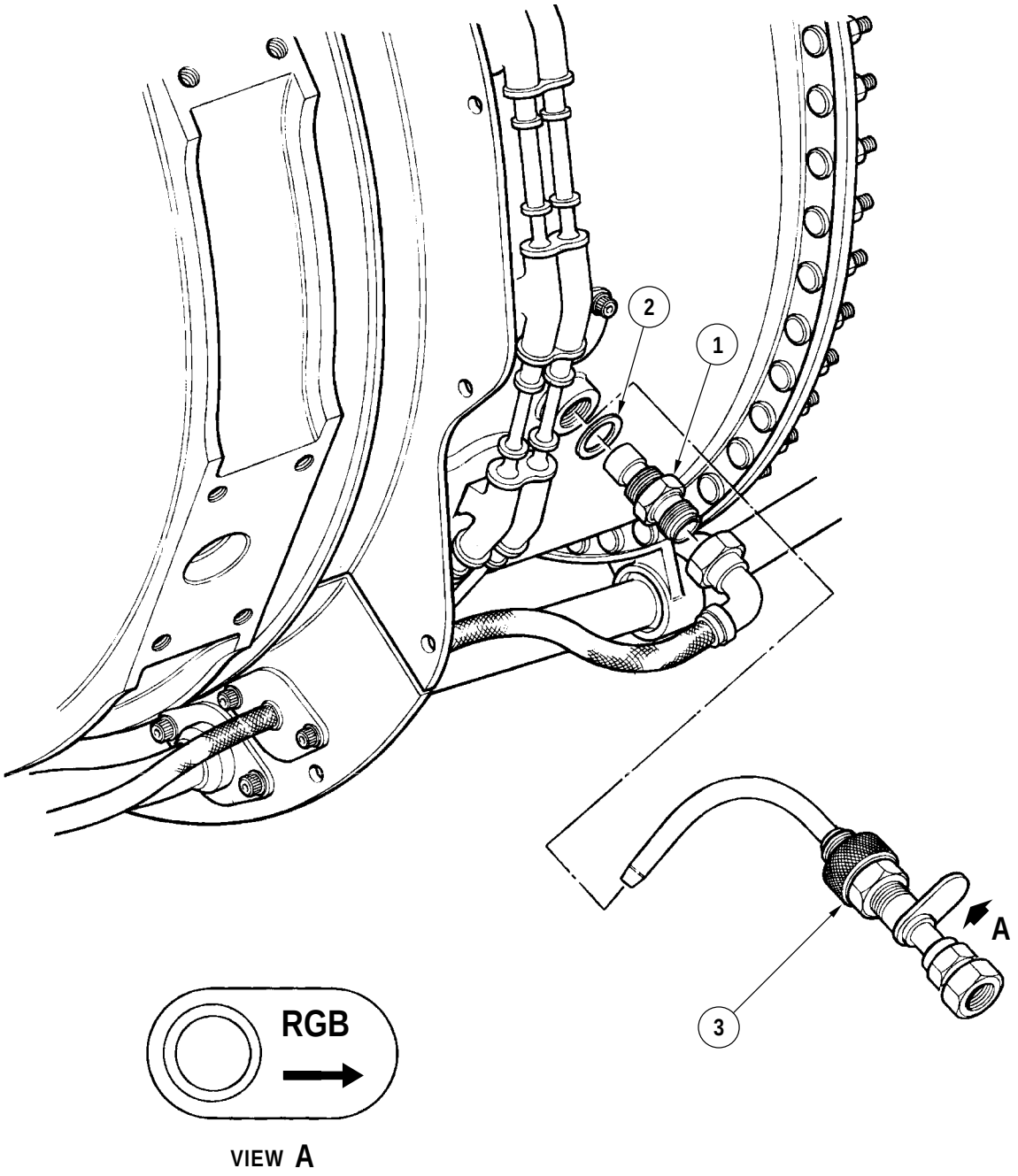
(4) Install the compressor turbine wash tube assembly (3) fingertight in the igniter port. Make sure the arrow and ‘‘RGB’’ on the tang point toward the reduction gearbox and the tang is parallel with the engine centerline.

CAUTION: SUPPORT THE DELIVERY HOSE TO PREVENT DAMAGE TO THE SPRAY TUBE.

(5) Connect the pressurized tank or drinking water supply to the wash tube assembly.

NOTE: A minimum cool-down period of 40 minutes should be observed after the engine run. Engine temperature must be below 65 °C (150 °F) to make sure that inadvertent use of hard water does not result in the precipitation of deposits.

(6) Make sure the ignition and aircraft bleed air are OFF.



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Removal/Installation Compressor Turbine Wash Tube Connection (Typical)
Figure 704

Key to Figure 704

1. Igniter/Glow Plug
2. Gasket
3. Tube Sprayer (PWC32271)

CAUTION: DO NOT MOTOR THE ENGINE FOR MORE THAN 30 SECONDS; OBSERVE THE STARTER COOLING PERIOD (REF. STARTER MANUFACTURER'S MANUAL).

(7) Do a dry motoring run (Ref. ADJUSTMENT/TEST).

CAUTION: WHEN USING A WATER/ALCOHOL SOLUTION, DO AN ADDITIONAL DRY MOTORING RUN TO PURGE THE ENGINE. OBSERVE THE STARTER LIMITS.

(8) When the Ng reaches 5%, inject the water or water/alcohol as applicable, into the engine.

(9) Stop the motoring run after 30 seconds.

(10) Shut off the water or water/alcohol as the Ng decreases through 5%.

CAUTION: OBSERVE THE STARTER COOLING PERIOD (REF. STARTER MANUFACTURER'S MANUAL).

(11) Repeat the washing cycles as necessary to remove contaminants from the turbines.

(12) Disconnect the pressurized tanks or drinking water supply from the wash tube assembly (3, Fig. 704) and remove the assembly from the igniter port.

(13) Install the igniter (1) with a new gasket into the igniter port.

CAUTION: OBSERVE THE STARTER COOLING PERIOD (REF. STARTER MANUFACTURER'S MANUAL).

(14) Do an additional 30 second dry motoring run if the water/alcohol has been used.

(15) Start the engine (Ref. ADJUSTMENT/TEST) and run at 80% Ng for one minute or more to completely dry the engine.

(16) Shut down the engine.

9. Fuel Nozzle In-situ Cleaning

A. General

Wash cart (PWC32677-100) is required. Prior to the wash cycle, the cleaning rig must be prepared and operated in accordance with the Cleaning Rig Manual.

Cleaning should be initiated on new or recently cleaned nozzles as the procedure will not clear previous blockages. Clean every 200 hours. Adjust the interval based on condition and experience.

B. Preparation

CAUTION: CLEANING AGENT IS AN ALKALINE SUBSTANCE THAT CAN CAUSE SKIN IRRITATION. AVOID SKIN CONTACT.

(1) Mixture ratios:

(a) At ambient temperatures above 2°C (36°F) mix by volume: 1 part cleaner (PWC11-001G) to 4 parts demineralized water (PWC05-073).

(b) At ambient temperatures below 2°C (36°F) mix a 50% solution of alcohol(PWC11-014) and demineralized water (PWC05-073), then mix 4 parts of water/alcohol (by volume) to 1 part cleaner (PWC11-001G).

CAUTION: MAKE SURE THAT AIR HAS BEEN RELEASED FROM RESERVOIRS.

(2) Fill reservoirs with an appropriate volume of cleaning solution.

(3) Fill rinse reservoir with appropriate volume of demineralized water or demineralized water/alcohol mixture according to ambient temperature.

(4) Remove two gas generator drain valves from engine (Ref. 73-10-06). Install suitable drain hoses.

(5) Disconnect fuel inlet line from flow divider and purge valve outlet elbow (Ref. 73-10-04).

(6) Connect wash rig fluid delivery hose to valve outlet elbow using adapter (0.4375-20 UNJF).

(7) Connect rig fluid delivery hose to rig ‘‘FUEL NOZZLE’’ quick disconnect.

(8) Connect compressed air.

CAUTION: DO NOT EXCEED 120 PSIG.

(9) Set wash rig to 60 psig using reservoir regulator, and pulse to 70 psig using pulse regulator.

C. Cleaning

(1) Let the engine cool for a minimum of 40 minutes after engine shutdown before cleaning the fuel nozzles.

(2) Place valve A and B to AGITATE and valve C OFF, and agitate detergent solution for two minutes.

(3) Place valve A and B to WASH and valve C ON, and detergent wash for three minutes.

(4) Place all valves OFF and let soak for ten minutes.

(5) Place valve A and B to WASH and valve C ON, and detergent wash for three minutes.

(6) Place all valves OFF and let soak for ten minutes.

(7) Place valve A and B to RINSE and valve C ON, and rinse for five minutes.

(8) Place valve A and B OFF and valve C to AIR DRY, and dry for five minutes.

(9) Place valves OFF and reduce both reservoir and pulse pressure to zero.

(10) Remove compressed air supply from wash rig.

(11) Remove wash rig fluid delivery hose from flow divider elbow.

(12) Reconnect dump line or air inlet line (Ref. 73-10-04).

(13) Remove blanking cap at fuel inlet line and elbow on flow divider and dump or purge valve.

(14) Reconnect fuel inlet line (Ref. 73-10-04).

(15) Remove drain hoses and reinstall gas generator case drain valves (Ref. 73-10-06).

(16) Do an engine ground run and check for leaks (Ref. ADJUSTMENT/TEST).

(17) Clean wash rig, stow fluid delivery hoses, and bleed the air pressure from the reservoirs.