AIRCOOLED MOTORS

48–50–1 Franklin Applies to All Bellanca 14–13, 14–13–2 and Universal (Stinson) 108, 108–1 Aircraft Equipped With Franklin Model 6A4–150–B3 and B31 Engines With Serial Numbers 11000 to 14000 Inclusive.

Compliance reequired after each 25 hours of operation.

To prevent possible cylinder base flange failure, visual inspection for cracks just above the base flange should be made every 25 hours of operation on the early type cylinders until replaced by the later type cylinders. Early type cylinders have a flat section which extends ⅜ inch to ⅞ inch from the outer edge of the base flange. On later type cylinders the flat section has been practically eliminated by extending the ribbed section close to the edge of the flange.

It is urgently recommended that early type cylinders be replaced at the earliest opportunity.

(Franklin Service Bulletin No. 69 covers this same subject and offers special discounts effective through January 1949, for cylinder replacements).

This supersedes AD 48–47–2.

51–15–2 Franklin Applies to All Franklin 6A4–165–B3 Engines Serially Numbered 33046 and Below Incorporating Original Crankcase (Left Half No. 18305; Right Half No. 18306). These Two Parts Form Crankcase Assembly, P/N 18553. The Number of Each Crankcase Half is Located on Each Casting Below the Number 1 and 6 Cylinder Location.

To be accomplished by July 15, 1951.

Effective on and after this date, all applicable crankcases with 500 hours of operation since new or 250 hours since last overhaul should be inspected as follows: Remove crankcase cover and visually inspect the webbing near the main journal area for cracks.

(1) Crankcases found to be free of cracks should be inspected at 250-hour intervals thereafter. In the event that the conditions described in (2) and (3) are detected, the provisions of (2) and (3) will apply.

(2) Crankcases found with (a) surface indications, hairline cracks, or small wall cracks and (b) cracks starting at main bearing stud hole on the opposite side from main bearing support, may be operated further at the option of the owner. Such crankcases should be inspected at 50-hour intervals thereafter to determine progress of cracks.

(3) Crankcases found fractured or with cracks that have progressed to the extent that they enter the main bearing supports (usually from back near (a) main bearing stud hole and (b) drilled oil hole) indicate that a complete break soon will occur. Such crankcases should be replaced with the reinforced crankcase assembly, P/N 18925, at which time no further inspection is required.

Crankcase assembly P/N 18925 may be identified by casting No. 18905 appearing below No. 1 cylinder location and casting No. 18906 appearing below No. 6 cylinder location.

(Franklin Service News No. 10 also covers this subject.)

51–28–2 Franklin Applies to Model 6V4–178 Series Engines Prior to Serial Number 17690 and 6V4–200 Series Engines Prior to Serial Number 26235.

Compliance required as indicated.

To preclude the possibility of oil pump failure, oil pump gears (P/N 10673 and 17736) must be inspected at each 300 hours of operation. Excessively galled gears must be replaced. If same part numbers are used for replacements, the 300-hour inspections will still apply. If carbonitrided oil pump drive gear, P/N 19377, and oil pump driven gear, P/N 19373, are installed, no further inspection is required. When these new carbonitrided gears are installed, suffix "P" must be stamped after the serial number of the engine on the nameplate—example: No. 1700P.

(Franklin Service Bulletin No. 86, revised November 1, 1951, covers this same subject.)

This supersedes AD's 51–22–2 and 51–11–3.

ALLISON

59–13–1 Allison Applies to Models 501–D13 and –D13A Engines.

Compliance required as indicated.

Seven recent cases of spalling of the propeller shaft roller bearing on Allison 501–D13 engines necessitates a continuity check using a probe be made of the reduction gear magnetic plug at least every 10 hours on engine installations not modified in accordance with Allison Commercial Engine Bulletin 72–74 and Lockheed Bulletin SB 262. This check is necessary due to high bearing loads caused by propeller during certain aircraft flight conditions. If metal chips are found as described in Allison Maintenance Manual, section 72–0, paragraph 8B, page 219, remove gearbox.

This supersedes AD 59–11–1.

59–18–1 Allison Applies to Models 501–D13 and –D13A Engines.

Compliance required as indicated.

A few cases of Allison 501–D13 and –D13A third stage turbine blade failures have occurred due to a resonance condition at low speed ground idle. All of these failures to date have resulted in visible damage to fourth stage blades as well as fourth stage vanes. In one case continued operation of an engine with a failed blade resulted in failure of the turbine inlet case-vane case split line bolts.

(a) Aircraft not having operating engine vibration detection equipment must observe the following engine operating restriction and inspection.

(1) Low speed ground idle operation from time all engines are started to stopping all engines at end of flight not to exceed 4 minutes total time.

(2) Conduct inspection of fourth stage turbine blades before next departure of airplane from maintenance base and at intervals not to exceed 25 hours of operation for indications of damage using adequate light and optical aid.

(b) Aircraft having operating engine vibration detection equipment shall use this equipment to detect any indications above normal and if found, the above inspection of fourth stage turbine blades shall be conducted upon arrival at the next maintenance base. If any damage is discovered as a result of (a) or (b) it is cause for more detailed inspection and/or engine removal.

(c) This restriction will not apply to engines modified in accordance with Allison Commercial Engine Bulletin No. 72–77 by installation of third stage turbine blades P/N 6794773 identified by a stripe of heat and corrosion resistant aluminum polytherm paint ½-inch wide and 4-inches long around contour of the inlet casing clockwise starting at the 1:00 position forward of the terminal block mounting flange.

(Allison Commercial Engine Bulletin No. 72–77 covers the same subject.)

This supersedes AD 59–12–4.

59–21–3 Allison Applies to Models 501–D13 and –D13A Engines.

Compliance required not later than November 15, 1959.

Ten cases of compressor blade retention failures have occurred in service including one case that resulted in serious bulging and separation on the split line of the compressor case and flash fire inside the cowling during ground running. To preclude the possibility of serious engine damage resulting from failure of first stage compressor blade retention one of the following modifications must be incorporated not later than November 15, 1959.

Install first stage compressor wheel assembly P/N 67 92821 or first stage compressor wheel assembly P/N 67 93351 or compressor rotor assembly P/N 67 92332. Allison Commercial Engine Bulletins Numbers 61 or 80 cover the first two modifications while the last is a new design.

60–7–1 Allison Amdt. 124 Part 507 Federal Register March 29, 1960. Applies to Models 501–D13D and 501–D13E Engines.

Compliance required within the next 25 hours of operation.

A few cases of third stage turbine blade failures have occurred due to a resonance condition at low speed ground idle. All of these

failures to date have resulted in visible damage to fourth stage blades as well as fourth stage vanes. In one case continued operation of an engine with a failed blade resulted in failure of the turbine inlet case-vane case split line bolts.

(a) Aircraft not having operating engine vibration detection equipment must observe the following engine operating restriction and inspection.

(1) Low speed ground idle operation from time all engines are started to stopping all engines at end of flight not to exceed 4 minutes total time.

(2) Conduct inspection of fourth stage turbine blades at intervals not to exceed 25 hours of operation for indications of damage using adequate light and optical aid.

(b) Aircraft having operating engine vibration detection equipment shall use this equipment to detect any indications above normal and if found, the above inspection of fourth stage turbine blades shall be conducted upon arrival at the next maintenance base. If any damage is discovered as a result of (a) or (b) it is cause for more detailed inspection and/or engine removal.

(c) This restriction will not apply to engines modified in accordance with Allison Commercial Engine Bulletin No. 72–77 by installation of third stage turbine blades P/N 6794773 identified by a stripe of heat and corrosion resistant aluminum polytherm paint ½-inch wide and 4 inches long around contour of the inlet casing clockwise starting at the 1:00 position forward of the terminal block mounting flange.

(Allison Commercial Engine Bulletin No. 72–77 covers the same subject.)

60–21–1 Allison Amdt. 208 Part 507 Federal Register October 8, 1960. Applies to All Model 501–D13 Series Engines.

Compliance required at next overhaul of the engine, power section or torquemeter, whichever occurs first, after the effective date of this amendment.

Several cases of rubbing of the torquemeter housing by the torquemeter reference shaft have resulted in complete separation of the housing into two sections. To preclude such failures, a mid-bearing torquemeter assembly, P/N 6823900, identified by a ½-inch by 2½-inch blue stripe on the forward bevel of the housing shall be installed. (Allison Commercial Engine Bulletin No. 72–113 covers the same subject.)

This directive shall become effective November 9, 1960.

AVCO

(*Lycoming*)

51–24–1 Lycoming Applies to All Lycoming GO–435–C2 Engines Serially Numbered 1815–11 and Below Not Having the Letter "P" Stamped on the Upper Right-hand Corner of Each Cylinder Rocker Box and Installed in Navion Model B Aircraft.

To be accomplished by June 1, 1952 or next overhaul, whichever occurs first.

To prevent loosening of the exhaust valve seats in Lycoming GO–435–C2 engines installed in Navion Model B airplanes, the exhaust valve seats are to be peened in the cylinder head. The cylinders must be removed from the engine for this operation. When peening is accomplished, stamp "P" ⅛ inch high on upper right-hand corner of cylinder rocker box flange face near exhaust push rod.

(Lycoming Service Bulletin No. 145 also covers this subject.)

54–2–1 Lycoming Applies to All Model O–290–D2 Engines.

Compliance required by February 1, 1954, and at each subsequent 100-hour inspection.

In order to preclude the possibility of serious engine damage from incipient detonation under certain atmospheric and altitude conditions, the magneto timing of all Lycoming O–290–D2 engines must be set at 18° BTC. To insure that the magneto timing does not change substantially from this setting, it should be checked and reset, if necessary, at each subsequent 100-hour inspection.

(Lycoming Service Bulletin No. 169 covers this same subject, but recommends that the timing be checked every 50 hours.)

54–5–2 *See* Sensenich Propellers.

55–2–2 Lycoming Applies to Model O–320 Engines Below Serial Number 612 Installed in Aircraft Equipped With Fixed Pitch Propellers.

Compliance required as soon as possible but not later than February 28, 1955.

Several immediate forced landings have occurred with aircraft equipped with the above engine and propeller combinations due to rapid loss of engine oil from the engine accesssory drive adapter gasket location. To preclude this possibility, all such engines should be inspected to insure that the proper gasket is installed under the lower accessory drive adapter cover. For engines with fixed pitch propellers, Lycoming P/N 69551, gasket must be installed at this location.

(Lycoming Service Bulletin No. 176 covers this same subject.)

55–3–2 *See* Hartzell Propellers.

59–9–3 *See* Hartzell Propellers.

59–10–7 Lycoming Applies to O–320, O–340, O–360, GO–480, GSO–480, IGSO–480 and O–540 Series Engines As Noted.

Compliance required as soon as possible but not later than July 1, 1959.

It has been found that due to normal expansion of the cylinders during engine operation, the cylinder baffle clamps can become wedged between the cylinders causing barrel distortion and possible extensive damage to the cylinder bore and piston assembly. To correct this condition, the cylinder baffle clamps must either be

(1) removed and replaced with baffle retainers and retainer hooks, or

(2) removed and reworked to provide more clearance between the lower portion of the clamp and the cylinder.

Lycoming Service Bulletin No. 254A lists the parts required to comply with alternate method (1) above. An acceptable method of accomplishing the rework noted as alternate method (2) is also outlined in that bulletin, as well as the serial numbers of engines which comply with the requirements of this directive as delivered from the factory.

60–11–6 Lycoming Amdt. 162 Part 507 Federal Register May 27, 1960. Applies to GO–480–C, –G and All GSO–480 Series Engines.

Compliance required at first engine overhaul after July 1, 1960.

To prevent excessive crankshaft counterweight bushing wear and subsequent detuning of the counterweights, crankshafts with cast counterweights must be modified to incorporate forged counterweights with hardened steel counterweight bushings.

(Lycoming Service Bulletin No. 249A covers this same subject.)

60–11–8 *See* Sensenich Propellers.

62–3–2 Lycoming Amdt. 394 Part 507 Federal Register January 26, 1962. Applies to All VO–540 Series Engines.

Compliance required as indicated.

To preclude failures of the hydraulic valve tappet body and plunger assembly, an improved hydraulic tappet body and plunger assembly has been provided.

Unless already incorporated, install a Lycoming P/N 72876 plunger assembly and a Lycoming P/N 73061 tappet body at the next engine overhaul after the effective date of this AD.

(Lycoming Service Instruction No. 1011 covers this same subject.)

This directive effective February 27, 1962.

62–11–4 *See* Hughes Helicopters.

62–23–5 Lycoming Amdt. 501 Part 507 Federal Register October 30, 1962. Applies to All GO, IGO, GSO and IGSO Series Lycoming Engines Listed in Lycoming Service Bulletin No. 290 When Installed in Twin Engine Aircraft With Full Feathering Hartzell Propellers:

Model Series	*Applicable Serials Nos.*	*Excepted Serial Nos.*
GO–435	3306–11 through 3324–11	3315–11 and 3316–11
GO–580–B	1161–28 through 1221–28	1173–28
GO–480–F	607–29 through 614–29	
GO–480–D	402–32 through 404–32	
GSO 480	3010–33 through 3065–33	3336–33 through 3338–33
GO–480–C and –G	1446–34 through 1492–34	1481–34 and 1483–34 through 1488–34
GO–480–C and –G	1315–35 through 1326–35	
GO–480–C and –G	219–37 through 290–37	276–37, 286–37, 287–37 and 289–37
GO–480–G	203–42 and 204–42	
IGSO–480	701–44 through 1038–44	755–44, 756–44, 797–44, 798–44, 833–44, 834–44, 1007–44 through 1012–44, 1014–44 through 1016–44, 1022–44 through 1025–44
IGO–540	101–49 through 226–49	204–49 through 207–49, 210–49, 211–49, 214–49, 217–49, 223–49, 224–49
IGSO–540	101–50 through 537–50	322–50, 323–50, 395–50, 439–50, 442–50, 443–50, 450–50 through 452–50, 478–50 through 482–50, 484–50, 485–50, 489–50, 490–50, 495–50, 498–50, 501–50 through 509–50, 511–50 through 513–50, 516–50 through 521–50, 523–50, 526–50, 528–50, through 530–50, 212–50, 213–50, 215–50, 216–50, 218–50, 219–50, 303–50, 304–50, 307–50, 308–50, 326–50, 327–50, 335–50, through 338–50, 341–50,

Model Series	*Applicable Serials Nos.*	*Excepted Serial Nos.*
		342–50, 345–50 through 350–50, 376–50 through 379–50, 382–50, 383–50, 387–50, 388–50, 399–50, 400–50, 402–50, 403–50, 436–50, 437–50, 460–50, 461–50, 464–50, 465–50, 468–50 through 472–50, 483–50, 486–50, 487–50, 491–50 through 494–50;

and to Remanufactured and Factory Overhauled Engines Shipped from the Lycoming Division During the Period of February 16, 1961, through August 31, 1962; and to All Applicable Engines Overhauled at Facilities Other than the Manufacturer, in Which the Provisions of Lycoming Service Instruction No. 1033 Have Been Incorporated. (Note: If the Compliance Status of Service Instruction No. 1033 is Unknown, Inspection per this AD is Required.)

Compliance required within 10 hours' time in service after the effective date of this AD; 25 hours' time in service after the first inspection; 25 hours' time in service after the second inspection, and every 100 hours' time in service thereafter.

To detect excessive wear of the propeller shaft oil seal rings, a propeller oil leakdown inspection shall be made in accordance with the instructions contained in Lycoming Service Bulletin No. 290. These inspections shall be continued until Lycoming P/N 67722 propeller shaft oil seal rings are installed in the reduction gear assembly at which time the inspections may be discontinued. Reduction gear assemblies incorporating P/N 67722 oil seal rings shall be identified by stamping an "M" following the reduction gear serial number on the machined pad to the right side of the timing plug in the reduction gear housing.

(Lycoming Service Bulletin No. 290 covers this subject.)

This directive effective November 14, 1962.

CONTINENTAL

46–36–1 Continental (Was Mandatory Note 8 of AD–675–2; 11 of AD–728–1; 2 of AD–751–1; 1 of AD–761–2; 6 of AD–718–6; 9 of AD–737–1; 1 of AD–759–3; 11 of AD–729–1; 8 of AD–720–1; 2 of AD–611–1; 9 of AD–725–1; 11 of AD–691–1; 9 of AD–703–1; 5 of AD–740–1; 9 of AD–725–1; 10 of AD–694–4; 6 of AD–709–1; 8 of AD–730–2; 8 of AD–746–1; and 11 of AD–696–3.) Applies to Aeronca 65–CA; 65–TC, 65–TAC, YO–58; O–58A, O–58B, SO–58B; 11AC; Air Products (Erco) 415–C, 415–CD; CallAir S–1A; Champion 7AC, S7AC; Commonwealth (Rearwin) 175, 180, 185; Northwestern (Porterfield) CP–65, CS–65; 75C; Piper AE–1, HE–1; J3C–65, J3C–65S; J4, J4A, J4A–S; J4E; J5A, J5A–80, J5C; Silvaire (Luscombe) 8, 8A, 8B, 8C, 8D, 8E; Stinson HW–75, 10; Superior (Culver) LCA; Taylorcraft DC–65, DCO–65; Universal (Taylorcraft) BC, BCS, BC–65, BCS–65, BC12–65, BCS12–65, BC12–D, BC12–D1, BCS12–D1 Airplanes Having Continental A–65 Series Engines With Serial Numbers From 3456658 to 4109568, Inclusive; or Continental A–65, A–75, or A–80 Series Engines Which Have Had A–21422 Piston Pins or New 3-Ring Pistons Installed Since September 25, 1945.

Compliance required immediately if possible, but in any event not later than 50 hours of engine operation after August 27, 1946.

A certain percentage of piston pins installed in engines of the above numbers and distributed as replacement parts are subject to failure without warning. The weakness of these pins cannot be detected by normal inspection methods. Piston pin breakage can result in complete engine failure. It is the owner's responsibility to avoid this risk by making the changes outlined in (*a*) and (*b*) at the earliest possible time.

(*a*) Replace piston pin P/N A–21422 (0.626 inch inside diameter) with thick wall piston pin No. A–25127 (0.5945 inch inside diameter). The engine manufacturer has given assurance that every possible effort will be made to supply the required quantity of replacement piston pins.

(*b*) Simultaneously with (a), all pistons should be examined for skirt cracks and the necessity for rework of the bottom rib. This rework involves reducing the height of the rib until it is at least $\frac{1}{16}$-inch wide and rounding all sharp corners.

(*c*) As an acceptable alternate to (*a*) and (*b*), cam ground pistons, P/N 40731, which necessitate using piston pins of greater outside diameter, may be installed. This change will likewise remove the possibility of piston pin failure and piston skirt cracking.

(Continental Motors Service Bulletin M46–6 covers this same subject.)

47–40–2 Continental (Was Mandatory Note of Airworthiness Directive Supplement Dated October 3, 1947.) Applies Only to the Following Models: Cessna 120 and 140, Commonwealth (Rearwin) 185, Superior (Culver) V and V2, Air Products (Erco) 415C, McClish (Funk) B85C, Universal (Globe) GC–1A, GC–1B, Silvaire (Luscombe) 8E, and Piper J3C–65, J4E, J5A Having Continental C75–12 or –12F Engines With Serial Numbers Below 1794–6–12 Except 1788–6–12: Airplanes Having Continental C85–12, –12F or –12FHJ Engines With Serial Numbers Below 20668–6–12 Except: 20656–6–12, 20658–6–12, 20659–6–12, 20661–6–12, and 20666–6–12; Airplanes Having Continental C125–1 or –2 Engines With Serial Numbers Below 1046–6–12 Except: 1034–6–12, 1037–6–12 Through 1042–6–12, and 1044–6–12.

Compliance required immediately if engine has attained or passed 600-hour major overhaul period, but in any event not later than December 31, 1947, or 600 hours of operation, whichever occurs first.

A certain percentage of piston pins installed in engines of the above numbers and distributed as replacement parts are subject to failure without warning. The weakness of these pins cannot be detected by normal inspection

methods. Piston pin breakage can result in complete engine failure. It is the owner's responsibility to avoid this risk by making the following change at the earliest possible time.

Replace piston pin assembly No. 22248–A1 (0.6875-inch inside diameter) with thick wall piston pin assembly No. 25121–A1 or 25262–A1 (0.5945-inch inside diameter). Supplies of the heavy wall pins are adequate so that immediate replacement can be effected.

(Continental Service Bulletin No. M47–9 covers this same subject.)

48–43–2 Cessna and Aeronca Applies to All Cessna Model 170 and Aeronca Model 15AC Airplanes Equipped With Continental C–145–2 Engines Serial Numbers 3001–8–2 to 3775–8–2, Inclusive.

Compliance required not later than December 31, 1948.

Some piston pin plugs of the loose fit type with which the engines as noted were originally equipped, are subject to rapid and excessive wear which may eventually cause disintegration of the piston pin plugs, failure of pistons, and complete engine failure due to oil stoppage caused by metal particles on the screen and in the system.

To preclude the possibility of such failures, piston pin and plug assemblies, P/N 25262–A1 (with loose fit plugs), should be removed and replaced with piston pin and plug assemblies, P/N 530830 (with press fit plugs) as soon as possible, and in no case later than the compliance date shown.

Pending installation of the new assemblies, oil screens should be inspected prior to each flight. If aluminum particles are evident on the screen the airplane should be removed from service until the change is accomplished.

(Continental Service Bulletins Nos. M48–20 and M48–25 cover this same subject.)

49–5–3 *See* Navion Aircraft.

49–50–1 Continental Applies to All Continental C–75, C–85, C–90, C–125 and C–145 Engines Equipped With Generators, Except Those Engines Listed Below. (A–65 Series Engines Are No Longer Subjected to Compliance With This Note.)

To be accomplished prior to May 2, 1949, and upon each 100 hours of operation after inspection has been accomplished, or at major overhaul, as indicated.

To preclude possible engine failure as a result of disintegration of the generator drive coupling rubber disc, inspect and/or replace the disc as follows:

I. Old Type—Without Metal Retainer Cup.

(1) Inspect rubber disc, P/N 22348 prior to May 2, 1949, and at 100-hour intervals after this inspection, and replace if deterioration or cracks are noted. Special attention should be given corners of slot to detect beginning of cracks or tears.

(2) Above periodic inspection may be discontinued by installing the improved type of coupling incorporating metal retainer cup P/N 352030.

II. Improved Type—With Metal Retainer Cup.

(1) Rubber disc P/N 25120 must be replaced at major overhaul.

NOTE: Engines with the following serial numbers are excluded from the inspection requirements of this directive. However, if rubber disc P/N 25120 is incorporated, it must be replaced at major overhaul.

C–75: Serial No. 5257–7–12 and all higher numbers.

C–85: Serial No. 30568–8–12 and all higher numbers.

C–90: Serial No. 41132–8–12 and all higher numbers and including Nos. 41122 and 41124 through 41127.

C–125: Serial No. 8108–8–2 and all higher numbers.

C–145: Serial No. 3470–8–2 and all higher numbers.

All "C" model engines reworked at Continental Motors Corp. since September 1, 1948.

(Description of generator drive couplings is contained in Continental Motors Corp. Service Bulletin Number M49–4.)

This supersedes AD 49–47–1.

50–12–1 *See* Hamilton Standard Propellers.

50–20–1 Continental Applies to All Model C145 Engines, Serially Numbered 3000 to 5031 Inclusive, Except: Nos. 3612, 4650, 4652, 4654, 4671, 4676, 4679, 4683, 4690, 4710, 4855, 4889, 4904, 4996, 4997, 5002 Through 5021, 5023 Through 5029.

Compliance required by June 1, 1950, and each 25-hour period of operation thereafter.

To minimize possible engine operation difficulty due to crankcase and/or cylinder barrel failures, the following inspection procedure should be accomplished as indicated.

(1) Visually inspect crankcase for cracks giving special attention to those areas around each cylinder base.

This portion of the inspection need not be accomplished or new type crankcases (P/N 530836 and 530837) which are incorporated on all serially numbered engines above No. 4383, and on all engines overhauled by the manufacturer after September 1, 1949. This new type crankcase can be identified by through-bolts (extending through both halves of crankcase) located ahead of the front cylinder and adjacent to nose oil seal. The old style crankcase (P/N 6642 and 6643) requiring inspection has studs at this location extending through one crankcase half only.

(2) Visually inspect cylinder barrels for cracks at the base flange fillet. New flanged-typed cylinder base nuts, P/N 531001 and 531003 have been made available for service operation. This portion of the inspection may be discontinued upon accomplishing one additional 25-hour inspection including a torque check after installation of these new flanged nuts.

During installation of new cylinder base nuts, special attention should be given to the removal of paint and burrs from the cylinder flange nut seat and to compliance with the engine manufacturer's torque limits of 500 plus or minus 10 inch-pounds for the 7/16 studs and through bolts, and 420 plus or minus 10 inch-pounds for 3/8 studs. Improperly torqued nuts are a major contributing factor to cylinder barrel, cylinder base studs, and crankcase failures. The engines exempted from this inspection, as indicated above, have had the new flanged nuts installed at the manufacturer's plant.

Since small cracks are more easily detectable by oil leaks, it is recommended that each inspection include a run-up with a clean engine.

(*Continental Motors Corp. Service Bulletin* No. M50–2 covers this same subject.)

This supersedes AD 50–18–4.

50–32–1 Continental Applies to All Airplanes Equipped With Continental Model E185–3 Engines Serially Numbered 4514–D and Below, E185–1 Engines Serially Numbered 4566–D and Below and E165–2 Engines Serially Numbered 10025 and Below. This Includes Navion, Beech Model 35 and Temco (Luscombe) Model 11A Airplanes.

Compliance required each 10 hours of operation as indicated.

AD 49–2–4 describes an inspection procedure to preclude the possibility of sudden oil pump failure (and almost immediate complete engine failure resulting therefrom) due to shearing of the square corners of the oil pump drive gear shaft.

There have been a few recent oil pump failures which could have been avoided by continuation of periodic wear checks of the oil pump drive until the related parts are proven satisfactory by teardown inspection and/or replacement. Therefore, the following should be accomplished on all engines in the serial number ranges indicated above which have not already complied with Continental Service Bulletin No. M48–15:

Remove tachometer drive cable and insert tapered flat end of Continental Drive Fit Indicator flat end of Continental Drive Fit Indicator (P/N 530757) in slot of tachometer drive shaft, tapping slightly to be sure it is tight in place. By holding the graduated indicator with one finger, and moving the bar with another, a reading (in degrees) of total backlash is obtained. Total backlash should not exceed 15°.

If total backlash does not exceed 15°, the wear check should be repeated at 10-hour intervals until the engine is overhauled and oil pump parts are dimensionally inspected and/or replaced, to determine whether or not excessive wear is accumulating. An accumulation of an additional 5° indicated wear in 20 hours, over the original reading, whether a total of 15° is reached or not, is sufficient to warrant replacement of parts as hereafter noted.

A reading of more than 15° on the indicator indicates excessive wear, a potential failure, and requires immediate replacement of worn parts prior to further operation of the airplane. Parts affected include the oil pump

drive gear, oil pump housing, accessory case, and cam gear. The cam gear need not be replaced if concentricity check shows total run-out of square holes to be less than 0.004 inch.

At the time of major overhaul (or first disassembly), oil pump drive parts as per Continental Service Bulletin No. M48–15, should be checked and replaced if necessary. These parts are the oil pump drive gear and cam gear.

The wear check can be made at any Continental Authorized Service Station, and involves only a few minutes for accomplishment.

(Continental Service Bulletins Nos. M48–14, with supplements Nos. 1 and 2, and M48–15, cover this same subject.)

This supersedes AD 49–2–4.

51–26–3 Continental Applies to All Continental Model E185 Engines Serially Numbered 2600 and Below Which Have Not Been Major Overhauled Since November 1, 1947, by Continental Motor Corp., or July 1, 1948, by Field Overhaul Agencies.

To be accomplished as soon as possible, but not later than January 1, 1952.

To preclude valve failures as caused by partially deflated hydraulic valve lifters, the engine must be inspected and modified, if necessary, to assure proper oil flow to the lifters and zero valve lash under all operating conditions. This will require either a partial engine disassembly or a special test as outlined below:

(1) Partial Disassembly Method: Remove the cylinders and the hydraulic units of the valve lifters. Check each valve lifter guide bore for proper position of the oil feed hole.

(2) Special Test (Alternate Method): By application of air pressure to the crankcase oil galley lines after removal of each rocker arm, determine the number of degrees of crankshaft rotation that the oil groove on each valve lifter in in registration with the oil feed hole. A minimum of 145° registration is required.

If any oil feed hole is shown by the method chosen to be drilled incorrectly, the end of the hole must be enlarged.

As lack of oil flow to the rocker boxes also can result in valve mechanism malfunctioning, the diameter of the pushrod holes should be checked. If $\frac{1}{32}$-inch diameter replace with push rods incorporating $\frac{1}{16}$-inch diameter holes.

(Continental Motors Corp. Service Bulletins Numbers M48–12 and M51–2, Supp. No. 1, cover this same subject and describe both of the above compliance methods.)

This supersedes AD 51–8–1.

53–9–4 Continental Applies to All Aircraft Equipped With Continental W–670–9A (Ordnance-Tank) Engines and Ground Adjustable Propellers Having Blades 11C1 (Hamilton Standard Model Designation) or 4350, 4350F, or 4350F1 (Navy Model Designation.)

Compliance required not later than May 15, 1953.

In the absence of suitable propeller vibration stress data, the following precautionary measures should be taken to minimize the possibility of propeller blade fatigue failures:

(1) Disassemble propeller and inspect for cracks by etching the shank areas of the blades under the hub clamp rings.

(2) Cut propellers to between 102 inches maximum and 100 inches minimum diameter.

(3) Set blade angle so that static r.p.m. is between 1,500 and 1,975.

(4) Install propeller on engine in the zero degree position (blades in line with crankthrow).

(5) Placard airplane, "Do not exceed 1,900 r.p.m. for all operations except takeoff."

(6) Remove all nicks and gouges from tip region and maintain propeller blades as outlined in Civil Aeronautics Manual 18.

55–3–2 *See* Hartzell Propellers.

56–6–1 Continental Applies to O–470 Series and E Series Engine Serial Numbers Below Excepting Any Remanufactured Engine Shipped From Continental Motors Corp. After May 1, 1955, and Engine Serial Numbers Designated "Exceptions."

Compliance required as soon as possible but not later than July 1, 1956.

To prevent serious engine damage in flight, the following must be accomplished:

1. Replace present piston pin assembly with piston pin assembly P/N 539467 in the following serially numbered engines:

Engine Model O–470–A, Serial Nos. 41258 to 41679, 40015–2–A, 40021–2–A, 40028–2–A, 40045–2–A, 40054–2–A, 40074–3–A, 40110–3–A, 40125–3–A, 40154–3–A, 40168–3–A, 40176–3–A, 40177–3–A, 40203–3–A, 40204–3–A, 40242–3–A, 40264–3–A, 40267–3–A, 40293–3–A, 40334–3–A, 40371–3–A, 40418–3–A, 40424–3–A, 40438–3–A, 40444–3–A, 40485–3–A, 40494–3–A, 40567–3–A, 40579–3–A, 40581–3–A, 40601–3–A, 40619–3–A, 40647–3–A, 40651–3–A, 41008–3–A, 41025–3–A, 41032–3–A, 41033–3–A, 41038–3–A, 41039–3–A, 41068–3–A, 41094–3–A, 41109–4–A, 41175–4–A, 41181–4–A, 41187–4–A, 41189–4–A, 41196–4–A, 41251–4–A, 41254–4–A.

Engine Model O–470–B, Serial Nos. 50001 to 50256. EXCEPTIONS—50189, 50241, 50245, 50246, 50247, 50250, 50251, 50252.

Engine Model O–470–J, Serial Nos. 45001 to 45533. EXCEPTIONS—45520, 45521, 45525, 45529.

Engine Models E–225–4, E–225–8, Serial Nos. 30163 to 30715.

Engine Models E–185–8, E–185–11, Serial Nos. 22200 to 22269.

Engine Model E–185–9, Serial Nos. 6128 to 6135.

In addition, replace piston pin assembly, P/N 535145, with piston pin assembly, P/N 539467, in any O–470 or E Series engine that was overhauled in the field and in which it is known that P/N 535145 was installed at time of overhaul.

(Continental Motors Corp. Service Bulletin No. M56–2, Supplement No. 1, dated March 12, 1956, further discusses this subject.)

2. Replace present oil pump gear assembly with oil pump gear assembly P/N 539525 in the following serially numbered engines:

Engine Model O–470–B, Serial Nos. 50076 to 50256. EXCEPTIONS—50189, 50241, 50245, 50246, 50247, 50250, 50251, 50252.

Engine Model O–470–J, Serial Nos. 45001 to 45533. EXCEPTIONS—45447, 45448, 45456, 45457, 45462, 45463, 45466, 45468, 45473, 45474, 45481, 45484, 45489, 45491, 45494, 45495, 45500, 45503, through 45514, 45516, 45519, 45520, 45522, 45523, 45525, 45526, 45528, 45529, 45532.

3. Replace present exhaust valve with exhaust valve P/N 539449 in the following serially numbered engines:

Engine Model O–470–A, Serial Nos. 40001 to 40673.

Engine Model O–470–A, Serial Nos. 41001 to 41679.

Engine Model O–470–J, Serial Nos. 45001 to 45489. EXCEPTION—45487.

(Continental Motors Corp. Service Bulletin M56–2, dated February 14, 1956, further discusses this subject and offers special discounts for replacement parts ordered prior to July 1, 1956, from bona fide Continental aircraft engine spare parts distributors.)

60–6–4 Continental Amdt. 114 Part 507 Federal Register March 11, 1960. Applies to E165, E185, and E225 Series Engines Equipped with Delco-Remy Generators P/N 1101886, 1101887, 1101888, and 1101908.

Compliance required at next periodic inspection, engine overhaul or generator removal whichever occurs first, but in any case not later than December 31, 1960.

To prevent failure of the generator drive gear retaining nut internal tooth lockwasher (CMC P/N 531232) remove the generator and inspect the generator drive to determine whether the internal tooth lockwasher or the plain flat washer (CMC P/N 401507) is installed. If the internal tooth lockwasher is installed, remove it and install the flat washer. (Note: The flat washer is not an aircraft standard part.) Use a new retaining nut (CMC P/N 531231, Esna P/N 29NTE–064 or equivalent) for reassembly. Apply a torque of 175–195 inch-pounds to the nut.

(Continental Motors Corporation Service Bulletin M57–4 covers this same subject.)

60–12–1 Continental Amdt. 153 Part 507 Federal Register May 17, 1960. Applies to E185–8, E185–9, E185–11, E225–4 and E225–8 Engine Models.

Compliance required at next periodic inspection, but not later than September 1, 1960.

An inflight failure has indicated that additional information regarding engines affected by piston pin replacement requirements of AD 56–6–1 should be provided. This AD is therefore issued to supply specific serial numbers of engines that were rebuilt (remanufactured) between April 1, 1954 and May 1, 1955. The affected engines are:

Remanufactured E185–8, –9 and –11 Engines: 25015, 25037, 25044, 25048, 25057, 25065, 25071, 25075, 25086, 15087, 25137, 25141, 25162, 25189, 25202, 25210, 25220, 25234, 25243, 25254, 25269, 25288, 25307, 25320, 25325, 25333, 25376, 25379, 25381, 25387, 25422, 25426, 25464, 25518, 25526, 25545, 25562, 25575, 25578, 25611, 25649, 25718, 25754, 15761, 25766, 25767, 25783, 25790, 25795, 25819, 25834, 25897, 25930, 25950, 25957, 25958, 25996, 26003, 26088, 26095, 26104, 26121, 26138, 26304, 26321, 26327, 26343, 26352, to 26412 inclusive.

Remanufactured E225–4 and –8 Engines: 30122, 30391, 30454, 32154, 35001, 35082, 35086, 35095, 35113, 35128, 35132, 35133, 35135, 35137, 35138, 35139, 35144, 35145, 35151 to 35254 inclusive.

The above engines may have piston pin assembly P/N 530845, which is satisfactory, or piston pin assembly P/N 535145, which is unsatisfactory.

Unless previously accomplished per Continental Service Bulletin No. M56–2 dated February 14, 1956, including Supplement No. 1 dated March 12, 1956, or AD 56–6–1, replace piston pin assembly P/N 535145 with P/N 539467.

Use the applicable method of inspection outlined below to determine which piston pin assembly is installed in the above remanufactured engines:

(a) If none of the cylinders on the engine in question have been removed in the field since the engine was shipped from the factory, remove and inspect the piston pin assembly in any one of the cylinders. Continental Motors Corporation procedures provide that all cylinders will have the same piston pin assembly.

(b) If the engine in question has had any of the cylinders removed in the field since the engine was shipped from the factory, inspect those cylinders and also at least one of the factory installed cylinders which has not been disturbed.

This supplements AD 56–6–1 and supersedes AD 59–10–4.

61–3–2 Continental Amdt. 245 Part 507 Federal Register February 2, 1961. Applies to All E165, E185, E225, and O–470 Series Engines. (These Engines May Be Found in Such Aircraft as Beech 35 Series, Cessna 180, 182, 310 and Navion.)

Compliance required at next engine top overhaul or overhaul, whichever occurs first after the effective date of this directive.

Unless already accomplished per Continental Motors Corporation Service Bulletin No. M60–1, remove exhaust valves, CMC P/N 40651, 537844, 538997, or 539449, and replace with CMC P/N 626540. P/N 626540 may be identified by the following:

(a) The part number on the top surface of the head, or

(b) The letter "H" or a triangle stamped or etched 0.06-inch high in two places 180 degrees apart on the valve stem between the keeper groove and the end of the valve.

This directive effective March 3, 1961.

62–22–1 *See* Cessna Aircraft.

de HAVILLAND

53–13–1 de Havilland Gypsy Queen Applies to All Model 70–4 Engines and to Those 70, 70–2, and 70–3 Engines Incorporating Modification G.1493.

Compliance required not later than September 1, 1953.

In order to prevent the loss of propeller control because of failure of the oil transfer mechanism, Modification G.1920, as described in de Havilland Engine Service Modification News Sheet GQ. 70 dated May 8, 1953, must be accomplished. Should Modification G.1728 not be incorporated, it is strongly recommended that it be embodied concurrently with Modification G.1920.

The FAA concurs in this mandatory action.

(de Havilland Modification News Sheet GQ. 70 dated May 8, 1953, available from de Havilland Aircraft Co., representative at Linden Airport, Linden, N.J., covers this same subject and describes method of repair.)

FAIRCHILD

(*Ranger*)

52–3–1 Ranger Applies to All 6–440–C Series Engine Models.

To be accomplished as indicated.

To preclude the failure of cast pistons, the following inspections and modifications should be accomplished at engine overhaul or when installing new or replacement pistons.

1. Inspection.

(*a*) Inspect pistons by the fluorescent penetrant inspection method, or an equivalent, for cracks especially in areas around the piston pin boss and on the reinforcing web inside the piston. If cracks are found in these locations, the piston should be discarded.

(*b*) Inspect pistons to ascertain if a 3/32-inch radius has been added at the inner ends of the ID of the piston pin bosses. Pistons which do not incorporate this radius should be modified as shown in Figure 1 in order to relieve stress concentrations. Pistons with cracks in this location which cannot be removed by the following modification should be discarded also.

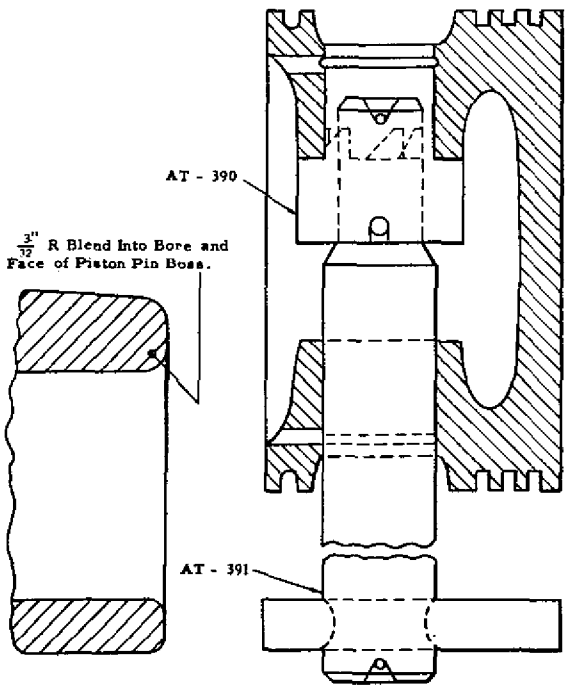

FIGURE 1

2. Modification.

After thoroughly cleaning the piston, place it head down on the bench; insert cutter No. AT–390, or an equivalent, between the piston pin bosses, facing in the direction of the boss to be cut. Insert handle No. AT–391, or an equivalent, through the opposite boss and engage with cutter. Cut radius by rotating cutter in a clockwise direction until the outer end of the 3/32-inch radius blends into the surface at the end of the piston pin boss.

Repeat this procedure for the opposite piston pin boss.

Blending tools No. AT–390 and AT–391 are no longer available from the engine manufacturer.

(Drawings for these tools may be obtained from Fairchild Engine and Airplane Corp., Farmingdale, Long Island, N.Y.)

54–9–1 Ranger Applies to All 6–440–C Series Engine Models.

To be accomplished as indicated.

To preclude the failure of carburetor hotspot heater assembly P/N 7683, 7697, 7699 or 7708, due to corrosion from accumulations of exhaust products which in some instances have been found to completely close the inner passages, the following inspection should be accomplished by July 31, 1954, and additionally, as indicated below:

1. Remove the manifold pipes and inspect the hotspot casting for cracks on both the outside surfaces and the inside carburetor air passages, particularly at the bottom.

2. If no cracks are evident, the hotspot may be replaced with the hot air supply blocked off, per Ranger Engine Service Bulletin No. 91. Since no appreciable benefit in icing protection is provided by the use of the hotspot, it will be permissible to operate the engine with the hotspot blocked off. If the hotspot is blocked off, it is suggested that hot lubricating oil be applied to coat thoroughly the internal passage walls formerly

used for exhaust gas circulation through the hotspot; this will tend to retard further corrosion.

3. If it is desired to continue to use a heated hotspot, it should be checked initially, and at 400-hour intervals to ascertain that the hot air passages are unobstructed with carbon or other exhaust gas products. This can most easily be accomplished by blocking off one hot air boss with a plate and pouring into the other hot air passage, 120 cc's of oil or gasoline. If this will not all be contained in the hotspot casting, a new hotspot casting should be utilized since no satisfactory method is known whereby all of the deposits can be removed.

4. If the hotspot has been used unheated since the last overhaul, only the initial inspection in 1. need be performed before normal overhaul.

GENERAL ELECTRIC

62–9–3 General Electric Amdt. 423. Superseded by AD 62–11–2.

62–11–1 General Electric Amdt. 434 Part 507 Federal Register May 3, 1962. Applies to All CJ805–3, –3A and –3B Engines Equipped With GE P/N 105R684P5 or 105R684P6 Thrust Reverser Actuating Pumps.

Compliance required at next engine overhaul.

Instances of thrust reverser pump failure have occurred causing the reverser to be inoperative and resulting in asymmetric power conditions upon application of reverse thrust during the aircraft landing roll. To correct this unsafe condition replace reverser pumps GE P/N's 105R684P5 and 105R684P6 with GE P/N 105R684P10 reverser pump, or modify the reverser pumps to conform to the P/N 105R684P10 by reducing the width of the pump drive gears and enlarging the size of the pump shaft oil seal vent in accordance with GE Service Bulletins Nos. (3B)78–1 and (3)78–16. Pumps so modified shall be reidentified as P/N 105R684P10.

This directive effective June 4, 1962.

62–11–2 General Electric Amdt. 437 Part 507 Federal Register May 12, 1962. Applies to All Models CJ805–23, CJ805–23B, and CJ805–23C Turbofan Engines.

Compliance required as indicated.

To preclude low cycle fatigue failure of the fan bluckets, remove GE P/N's 109R164P1, 107R392P1, 107R362P5, 107R362P6, 109R200-P1, or 109R197P1 from engines and retire from further service upon accumulation of operating cycle life limit as scheduled in GE Alert Service Bulletins Nos. A/23/72–58 and A/23B/72–18, unless the engine is operated in conjunction with an inspection program approved by FAA Eastern Region Engineering and Manufacturing Branch. (Effective September 7, 1962.) Under an approved inspection program, the bluckets shall be removed from service and replaced with new units when inspection dictates. For the purposes of this AD, an operating cycle is considered to be an excursion of engine operation from engine start to takeoff to shutdown. Restart in the air is also a cycle. Ground operations encompassing a start and operation to takeoff power is a cycle.

This directive effective upon publication in the Federal Register for all persons except those to whom it was made effective immediately by telegram dated April 26, 1962.

This supersedes AD 62–9–3.

GLADDEN

46–6–2 Kinner (Was Mandatory Note 8 of AD–749–1 and Special Note 11 of AM–231.) Applies Only to Jobmaster DGA–18K and Ryan ST–3KR Airplanes With R–5 Series 2 Engines With the Following Serial Numbers: 371, 378, 379, 380, 383, 386, 398, 399, 400, 401, 404, 405, 406, 407, 409, 410, 411, 413, 414, 415.

Install master rod (P/N 835) before exceeding 200 hours total operation with the early type rod. This replacement should preclude further master rod failures and involves the rebalancing of the cranckshaft and rod assembly.

(Kinner Service Bulletin No. E–1–8 dated July 24, 1942, covers this same subject.)

46–6–3 Kinner (Was Mandatory Note 5 of AD–707–2; 9 of AD–749–1; Special Note 12 of AM–231 and 4 of AD–336.) Applies Only to Fairchild 24J, 24JS, and 24W Series, Jobmaster DGA–18K, Meyers OTW–160, and Ryan ST–3KR Airplanes Having R–5 Series 2 (Military R–540–2) Engines, R–55 (R–540–1) Engines of the Following R–56 (R–540–3) Engines: 12005 to 12319 Inclusive; 12805 to 12846 Inclusive; 12938 to 12948 Inclusive; 12950 to 12952 Inclusive; 12954 to 12961 Inclusive; 12963 to 12973 Inclusive; 12975 to 12976 Inclusive; 13034 to 13037 Inclusive; and 13040 to 13056 Inclusive.

Rework required immediately, if total engine time has already exceeded 500 hours, or if not, rework must be accomplished before exceeding 500 hours.

Grind the master rod knuckle pinholes to a fit of 0.0003 to 0.0008-inch (tight) with the knuckle pins. This will necessitate reboring the connecting rod bushings, replacement of the knuckle pins and wrist pin bushings. The letter "O" preceding the engine serial numbed will indicate that this rework has already been accomplished.

(Kinner Service Bulletins Nos. KCE–33 and KCE–4 cover this same subject.)

PRATT & WHITNEY

48–22–1 Pratt & Whitney Applies to Martin 202, Convair 240, and Douglas DC–6 Aircraft Powered With Double Wasp Engines Equipped With Water-Alcohol Injection System.

Compliance required prior to next flight.

If water injection lines to carbuertor are incorporated, the water system should be blanked off. This should be accomplished by disconnecting water feed line and installing ½-inch pipe plug in regulator entrance. Water vent line should be disconnected at regulator and ¼-inch pipe plug installed. Water tank should be drained and pump disconnected to preclude inadvertent water flow or pump failure from dry running. If impracticable to secure lines with tape to prevent vibration, they should be removed and stored until system reactivated. Operation of aircraft should be restricted to dry takeoff power pending correction.

Water-alcohol injection systems may be reactivated provided either of the following two modifications are accomplished:

1. (*a*) Incorporate general control solenoid valve part 40R1009 (or equivalent approved by P&W No. 139262) in vapor vent line extending from water tank to water regulator and,

(*b*) Incorporate Mansfield and Green Co. check valve 31–B (P&W No. 139263) in water feed line extending from water pump to water regulator. The installation of these parts should be accomplished in accordance with instructions issued by Pratt and Whitney.

2. (*a*) Incorporate hydraulically operated check valve Airite Products No. 1015 (or equivalent approved by Pratt and Whitney) in vapor vent line extending from water tank to water regulator and,

(*b*) Incorporate Parker check valve No. 527–10D (or equivalent approved by Pratt and Whitney) in water feed line extending from water pump to water regulator. The installations of these parts should be accomplished in accordance with Consolidated Vultee Drawing 6121501–P.

49–40–2 Pratt & Whitney Applies to Double Wasp CA Series (–3, –5, –15, –18) and Military R–2800–C Series (–22, –22W, –34, –34W, –57, –73, –77, –81, –83, –85) Engines.

To be accomplished at next overhaul but in no case later than March 1, 1950.

To preclude the possibility of complete loss of power as a result of failure of the supercharger impeller thrust bearing, the engine must be modified to incorporate a new thrust plate P/N 127770 with larger (No. 51) oil feed holes. Also P/N 84012 thrust spacer must be reworked to incorporate circumferential oil skates. Details of this modification and rework are given in Pratt & Whitney Service Bulletin No. 892, Revision B.

As a precautionary measure, it is recommended that the engine be operated with minimum use of high ratio supercharger and that particular attention be directed toward keeping oil sludge to a minimum until the above modification has been accomplished.

50–22–1 Pratt & Whitney Applies to All Military R2800 B Series Engines Installed in Certificated Curtiss-Wright C–46 Aircraft (R–2800–21, –27, –41, –43, –51, –59, –63, –71, –75, –79).

To be accomplished at next overhaul but not later than August 1, 1950, provided the following inspections are made:

1. Prior to next flight, inspect impeller shaft end play as described below, and

2. Continue similar inspections thereafter at intervals not to exceed 40 hours of operation.

The above inspections can be accomplished by removing the carburetor and measuring the end play of the impeller shaft at any convenient point. End play in excess of 0.010 inch is cause for accomplishment of the modification listed below.

Supercharger impeller thrust bearing failures with resulting complete loss of power have been reported; their failure is believed due principally to sludged oil feed passages. As a precautionary measure, it is recommended that the engine be operated with

minimum use of high ratio supercharger and that particular attention be directed toward keeping oil sludge to a minimum and maintaining open oil screens until modifications (*a*) and (*b*) or (*a*) and (*c*) have been accomplished.

(*a*) Install a modified thrust bearing plate in accordance with the P&W Service Bulletin No. 847. This Service Bulletin covers the use of thrust plates No. 74576 modified to, or which already incorporate, four oil skates and enlarged (3/32-inch) oil holes. Some R-2800-21, -27, -31, -41, -43, -51, 59, -63, -79 engines may already incorporate this part.

(*b*) Incorporate "outside in" lubrication system modification in accordance with methods approved by FAA. This modified system is similar to that incorporated in the R-2800-C engine configuration, and is covered by Pratt & Whitney Special Instruction No. 5F-50. Companies having FAA approval of this modification or other modification which can be accomplished, are as follows:

Air Carrier Engine Service, Miami, Fla. (Bulletin No. B-12-48).

Aircraft Engine Service, Inc., Division of Aerodex, Inc., Miami, Fla.

Aircraft Service Corporation, Miami, Fla. (Engineering Authorization No. 52).

American Airmotive, Miami, Fla. (Engineering Directive No. 28B-1-49).

Opa Locka Aircraft Engine Station, Opa Locka, Fla. (Dwg. No. 2800-01).

Pacific Airmotive, Linden, N.J.

Pacific Airmotive, Burbank, Calif. (Dwg. No. 648 B.)

Slick Airways, Inc., San Antonio, Texas.

Miner's Aircraft Engine Service, Seattle, Wash.

Alaska Airlines, Inc., Everett, Wash.

American Air Service, Charlotte, N.C.

The Steward-Davis Co., Gardena, Calif.

Pratt & Whitney Service Bulletin No. A-441, dated July 9, 1945, describes a similar modification. However, copies of this bulletin and the special engine parts required for this modification are no longer available from Pratt & Whitney.

(*c*) Alternative impeller bearing and lubrication system modifications are acceptable provided they accomplish essentially equivalent lubrication to that of (*b*). Modifications based on design data which differs from the above modifications require FAA engineering approval.

This supersedes AD-50-7-2.

51-5-1 Pratt & Whitney Applies to Douglas DC-6 and Convair 240 Aircraft Equipped With R-2800-34M1, -83AM3, -83AM4, and Double Wasp CA Series Engines Using Antidetonant Injection (Wet Power) for Takeoff.

Compliance required as soon as possible but not later than February 15, 1951.

A. Each operator of an airplane covered shall select a power which he undertakes to maintain. If that power is less than the corresponding value available during the type certification tests of the airplane, the operating weights of the entire fleet shall be reduced to values such as will enable the airplanes to perform as indicated in the approved airplane flight manual with the power selected.

B. The power actually develop by each engine shall be measured each time it reaches each of the following stages.

1. Upon installation of overhauled engines in aircraft.

2. At the No. 3 inspection nearest to the midpoint of the authorized service time between overhauls.

3. At the nearest No. 3 inspection or some convenient point near or at the end of the authorized service time between overhauls.

C. The procedures and methods employed in making these power measurements shall be acceptable to the FAA.

1. The frequency of the power measurements should be contained as indicated above until the results obtained on each operator's fleet have been evaluated for the purpose of establishing whether more frequent or less frequent measurements are warranted.

2. Operators not employing line maintenance practices which will reasonably insure the continued availability of the selected power will start this program making more frequent power measurements than indicated above.

D. An airplane incorporating an engine which at any of the required power measurements, fails to develop the selected power shall not be dispatched unless:

1. The power is restored to the selected value, or

2. The engine is replaced by one developing the selected power, or

3. The operating weights of the individual airplane are reduced as specified in A.

E. If, on a fleet-wide basis, the initial powers measured during any individual power measurement are consistently below the selected power, the operator shall:

1. Initiate or improve line maintenance to the extent necessary to give reasonable assurance that the selected power is continuously available, or

2. Make more frequent measurements of power, or

3. Select a lower value of power representative of the initially measured values and reduce operating fleet weights as specified in A.

F. An acceptable method for power measurement and data correction utilizing static ground runups in the aircraft is described by AAL in their instructions on "Convair Ground Power Check". This information has been distributed by ATA to all the airlines involved. Alternative methods providing equivalent or greater accuracy will be acceptable.

G. Results of the above power checks are to be submitted regularly and promptly to the assigned CAA Field Agents.

51–9–1 Pratt & Whitney Applies to Boeing Model 377 Aircraft Equipped With Wasp Major TSB3–G or B5 Engines Using Antidetonate (Wet Power) for Takeoff.

Compliance required as soon as possible but not later than May 1, 1951.

A. Each operator of an airplane covered shall select a power which he undertakes to maintain. If that power is less than the corresponding value available during the type certification tests of the airplane, the operating weights of the entire fleet shall be reduced to values such as will enable the airplanes to comply with the transport category performance requirements with the takeoff power selected. Appropriate flight manual revisions shall be made to indicate whatever changes in performance have resulted.

B. The power actually developed by each engine shall be measured each time it reaches each of the following stages:

(1) Upon installation of overhauled engines in aircraft;

(2) At the No. 3 inspection nearest to the midpoint of the authorized service time between overhauls; and

(3) At the nearest No. 3 inspection or some convenient point near or at, the end of the authorized service time between overhauls.

C. The procedures and methods employed in making these power measurements shall be acceptable to the FAA.

(1) The frequency of the power measurements should be continued as indicated above until the results obtained on each operator's fleet have been evaluated for the purpose of establishing whether more frequent or less frequent measurements are warranted;

(2) Operators not employing line maintenance practices which will reasonably insure the continued availability of the selected power will start this program making more frequent power measurements than indicated above.

D. An airplane incorporating an engine which at any of the required power measurements fails to develop the selected power shall not be dispatched unless:

(1) The power is restored to the selected value, or

(2) The engine is replaced by one developing the selected power, or

(3) The operating weights of the individual airplane are reduced as specified in A.

E. If, on a fleet-wide basis, the initial powers measured during any individual power measurement are consistently below the selected power, the operator shall:

(1) Initiate or improve line maintenance to the extent necessary to give reasonable assurance that the selected power is continuously available, or

(2) Make more frequent measurements of power, or

(3) Select a lower value of power representative of the initially measured values and reduce operating fleet weights as specified in A.

F. Results of the above power checks are to be submitted regularly and promptly to the assigned CAA Field Agents.

53–9–1 Pratt & Whitney Applies to R–2000 Series Engines Overhauled by San Antonio Air Depot Between July 1, 1952, and April 9, 1953.

Compliance required prior to further carriage of passengers or cargo in aircraft with such engines installed. Aircraft may be ferried to base where inspection is to be conducted.

Several operators of C–54 aircraft utilizing military overhauled engines, have experienced failures of link (knuckle) pins in the subject engines due to improper overhaul, inspection, or assembly procedures. The failures have occurred in comparatively low-time engines, and cracked pins have been found in engines with zero TSO.

To preclude the possibility of further failures of this nature, engines falling within the category as noted must be dissassembled and the link pins magnetically inspected, eliminating any found with cracks, then reassembled in accordance with manufacturer's instructions, prior to further flight. Date of overhaul and identification of overhaul base stamped on exterior surface of engine nose housings.

56–3–2 Pratt & Whitney Applies to All Double Wasp CA and CB, and Military R–2800–34, –52W, –57, –73, –77, –83, and –101 Series Engines Using Water Injection.

Compliance required as indicated.

As a result of engine fires reported due to fuel leakage of the derichment valve cover of PR58 carburetors, the following must be accomplished to reduce the possibility of the derichment valve cover loosening with subsequent fuel leakage:

A. At each scheduled inspection which requires the engine cowl to be opened (approximately 100-hour intervals), inspect for fuel leakage while subjected to boost pump pressure. If leakage is noted, either retorque derichment valve cover screws to stop leakage as outlined in B, or replace derichment valve diaphragm as outlined in C.

This leakage inspection may be made at alternate scheduled inspections which require the engine cowl to be opened (approximately 200-hour intervals) provided four locating screws with a shank to act as dowels are installed to eliminate lateral movement of the derichment valve cover.

B. The first time leakage is noted it is permissible to retighten the derichment valve cover screws to 20 to 30 inch-pounds torque. If this retorquing corrects the leakage, it will be satisfactory to continue to use the subject diaphragm. NOTE: This retightening can be accomplished only once on a leaking diaphragm.

C. At overhaul and whenever a derichment valve diaphragm is replaced:

1. The derichment valve diaphragm holding surfaces of the derichment valve body and diaphragm cover should be lapped to assure that they are flat and to roughen their surfaces. This lapped surface roughness will aid in holding the diaphragm by minimizing cold flow of the diaphragm rubber.

2. The derichment valve diaphragm and the surfaces which clamp it should be dry when the parts are assembled and in particular should be free of oil.

3. During assembly of the parts, the derichment valve cover screws should be tightened to a torque of 20 to 30 inch-pounds. After a period of at least 20 minutes the screws should be retigtened to the same torque value.

CAUTION: Do not loosen the screws before retightening.

P&W Alert Bulletin No. 43 also covers this subject.) When the two new dowel pins described in Bendix Aircraft Carburetor Service Bulletin No. 816 (Advance) or equivalent are accomplished, the inspections in part A. will no longer be required.

(P&W Service Bulletin No. 1625 also covers this subject.)

56–6–2 Pratt & Whitney Applies to All Models Engines.

Compliance required as indicated.

As a result of engine fire reported due to cylinder failure as a result of stud failures, the following must be accomplished to reduce cylinder and stud failures:

A. If a cylinder flange attaching stud fails during engine operation, the adjacent studs may be subjected to severe overstress. The same is true if an attaching nut becomes loosened to the extent that there is clearance between the nut and the cylinder flange. If more than two adjacent studs have broken, or the nuts have become loose, there is a probability that the cylinder flange has been overstressed.

B. If, during line inspection or at engine teardown prior to overhaul, a nut is found to be loose or there has been failure of a stud, replace that stud and the two adjacent studs.

C. If more than two adjacent studs have failed or if more than two adjacent nuts are known to have been loose during engine operation, the cylinder should be scraped or rebarreled and all the studs on the cylinder mounting pad replaced.

D. If only two adjacent studs have failed or two adjacent nuts have been found loose, the cylinder should be replaced, but it need not be scrapped provided that the nuts adjacent to the failed studs or loose nuts are found to be at least to minimum torque and that the cylinder flange has not become distorted more than 0.003 inch; also, that the flange and area above the flange are magnafluxed and show no crack indicators. If the bottom of the cylinder flange is not perfectly flat, but is not distorted more than 0.003 inch, it should be lapped flat before reinstallation. Before a replacement cylinder is installed, the crankcase studs immediately adjacent to the two broken or loose ones should be replaced.

E. During cylinder installation, securely tighten the cylinder flange attaching nuts (P&W Service Bulletin No. 1000 describes approved methods and torques.)

This subject is also covered in P&W Alert Bulletin No. 42 entitled "Cylinder Attachment Inspection and Maintenance".)

57–5–4 Pratt & Whitney Applies to All Wasp Jr. and Military R–985 Series Engines, Except Those Used in Helicopters.

Compliance required at next overhaul.

It has been found that an earlier AD was not effective in preventing crankshaft cracking at the thrust nut threads and possible loss of the propeller in flight as failures of these crankshafts are still occurring. Increased strength afforded the old design cranckshaft by the rework on (1) has been determined to be necessary to raise the level of safety of these engines. This rework included the smoothly blended thread roots and a closely controlled undercut depth and the special inspections and shotpeening as required by AD 56–26–3.

At the next overhaul, accomplish either (1) or (2):

1. Except for the new design crankshafts noted in (2), or those marked "14F–56" at the front end between the locking holes for the propeller retaining nut, the crankshaft is to be subjected to a special magnetic inspection procedure, shadowgraph inspection, necessary radius in the thread root, and shotpeening of the thrust bearing nut threaded area. Because of the special equipment and techniques involved, only those activities approved by P&W will be able to accomplish this rework, inspection, and shotpeening. Interested parties should contact Technical Supervisor, Service Department, Pratt & Whitney Aircraft, East Hartford 8, Conn., for approval and detail instructions. Crankshafts reworked in accordance with these special instructions can be identified by the marking 14F–56 on the front end near the propeller retaining nut locking holes.

2. New design crankshafts which can be identified by P/N 261278, 261279, or 264164 on the front end near the propeller retaining nut locking holes may be installed. These crankshafts incorporate roll hardened threads and these threads should not be reworked.

NOTE: In the event of oil leakage in the front section of the engine during any operation, immediately conduct the following inspection:

(1) Remove the propeller, thrust nut cover, nut, slinger and spacer.

(2) Carefully clean the area to be inspected.

(3) Using a dye penetrant and a 6– to 10–power optical glass, check for the presence of cracks. If any crack is found, the crankshaft must be replaced.

(P&W Service Bulletin No. 1488, dated October 10, 1956, covers this subject).

This supersedes AD 56–26–3.

57–6–3 Pratt & Whitney Applies to All Wasp Major Engines.

Compliance required as soon as possible but not later than May 31, 1957.

As a result of propeller shaft oil transfer bearing failures, several cases of loss of propeller control occurred which made it impossible to feather the affected propellers. It has been determined that brazing of the propeller shaft oil transfer tube adapter to the propeller shaft oil transfer bearing is subject to failure if the brazing is not adequate.

To assure that the brazed joint is satisfactory, the following inspection must be accomplished on bearings with brazed oil tube transfer adapters:

1. X-ray the brazed joints to determine if brazing is satisfactory (limits established by Pan American World Airways and/or Pratt & Whitney Aircraft.)

2. Subject the bearing to 1,500 p.s.i. hydraulic pressure test.

3. Conduct a dye penetrant inspection of the brazed joints.

If the bearing does not pass these inspections it must be repaired or replaced.

A new bearing, P/N 341627, which has eliminated the brazed joints is available and may be used. This new bearing does not require the above mandatory inspections. Information on inspection procedure and limitation is available from Pratt & Whitney Aircraft.

59–10–9 Pratt & Whitney Applies to Following Turbo Wasp JT3C–6 Engines: JT3C–6 Engines Prior to Serial Numbers P630735B, Except P630406B Through P630413B, P630607B Through P630609B, P630614B Through P630618B, P630623B Through P630635B, and P630637B. JT3C–6 Engines Prior to Serial Numbers P630742D, Except P629708D, P630612D, P630315D, P630317D, P630319D Through P630325D, P630610D Through P630613D, P630619D Through P630622D, and P630636D.

Compliance required as indicated.

As a result of two third-stage turbine blade failures, it will be necessary to replace by 300 hours' of blade operating time, the P/N 271303 blade prior to change J–3 and P/N 371603 blade prior to change C–3. Third stage turbine blades P/N 271303, change J–3 and P/N 371603, change C–3, or later, do not require this replacement.

(P&W Service Bulletin, Chapter 72–8 dated April 3, 1959, of the Heavy Maintenance Manual, P/N 367069 covers this same subject.)

60–22–2 Pratt & Whitney Amdt. 211 Part 507 Federal Register October 22, 1960, revised by Amdt. 228 Federal Register November 26, 1960. Applies to All JT3C–6 Turbojet Engines.

Compliance required as indicated.

(a) Inspect the entire circumference on the rear face of the rear flange of the combustion chamber outer case assembly P/N 255639, (case detail P/N 255640) outboard of the attaching nuts which secure the combustion chamber outer case to the turbine case as indicated below. Inspection should be performed using approximately 6-power glass. Any crack requires replacement of the case.

(1) Engines with combustion chamber outer cases which have not been hardness checked per paragraph (b) and Magnaglo inspected must be inspected per above visual inspection every 65 hours' time in service.

(2) Engines with combustion chamber outer cases which have been hardness checked per paragraph (b) but not Magnaglo inspected must be inspected per above visual inspection every 130 hours' time in service.

(3) Engines with combustion chamber outer cases which have been hardness checked per paragraph (b) and Magnaglo inspected do not require visual inspection.

(b) At overhaul in addition to the visual inspections above:

(1) Inspect fillet between snap diameter and front face of rear flange using approximately 6-power glass. Any crack requires replacement of the case.

(2) Check hardness of combustion chamber outer case rear flange at three locations approximately 120 degrees apart between the bolt holes of the flange. If hardness is more than Rockwell C40, the case must be replaced. After one hardness check is accomplished this hardness check is no longer required.

This supersedes AD 60–11–7.

This directive effective October 22, 1960.

60–23–4 Pratt & Whitney Amdt. 215 Part 507 Federal Register November 4, 1960. Applies to Turbo Wasp JT3C–7 Turbojet Engines Prior to Serial Number P632425B and all JT3C–6 Turbojet Engines.

Compliance required at first engine overhaul after December 15, 1960. To prevent failure of the bevel accessory drive gearshaft and resultant loss of engine power, replace P/N 350460 gearshaft with P/N 401493 gearshaft.

61–3–3 *See* Hartzell Propellers.

61-26-4 Pratt & Whitney Amdt. 380 Part 507 Federal Register December 21, 1961. Applies to All JT3D-1, JT3D-1-MC6, JT3D-1-MC7, and JT3D-3 Turbofan Engines.

Compliance required as indicated.

Due to recent inflight engine fires resulting from fuel leakage occurring at the fuel transfer points where the fuel pressurizing and dump valve attaches to the engine, the following is required:

(a) All Pratt & Whitney aircraft JT3D-1, JT3D-1-MC6, JT3D-1-MC7, and JT3D-3 turbofan engines installed in Boeing aircraft.

Compliance required within the next 100 hours' time in service unless already accomplished within the last 200 hours' time in service and every 300 hours' time in service thereafter until metal chevron type seals are incorporated.

Replace the P/N's 443098, 379644, 371339, or 367444 fuel pressurizing and dump valve seals with new seals of the same part numbers where the pressurizing and dump valve assembly attaches to the fuel manifold inlet distributor assembly.

(Pratt & Whitney Aircraft telegraphic message dated September 28, 1961, covers the same subject.)

(b) All Pratt & Whitney aircraft JT3D-1, JT3D-1-MC6, JT3D-1-MC7, and JT3D-3 turbofan engines installed in Boeing and Douglas aircraft.

Compliance required not later than the first engine overhaul after June 1, 1962.

Rework the engine in accordance with Pratt & Whitney Aircraft Turbojet Engine Service Bulletin No. 274 which provides for metal chevron type seals.

(c) Upon request of the operator, an FAA maintenance inspector, subject to prior approval of the Chief, Engineering and Manufacturing Branch, FAA Eastern Region, may adjust the repetitive inspection intervals specified in this AD to permit compliance at an established inspection period of the operator if the request contains substantiating data to justify the increase for such operator.

This directive effective December 21, 1961. Revised March 16, 1962.

62-9-4 Pratt & Whitney Amdt. 424 Part 507 Federal Register April 19, 1962. Applies to All JT3C-7 and JT3C-12 Turbojet Engines.

Compliance required as indicated.

Because of fatigue cracking which has occurred in the dovetail attachment of P/N 359403 third stage compressor rotor blades the following is required:

(a) For blades previously inspected by the procedure described in paragraph (c), reinspect in accordance with paragraph (c) as follows:

(1) Inspect baldes which have accumulated 300 hours or less time in service since the last inspection, prior to the accumulation of 350 hours' time in service and thereafter within each 350 hours' time in service.

(2) Inspect blades which have accumulated more than 300 hours' time in service since the last inspection, within the next 50-hours' time in service and thereafter within each 350 hours' time in service.

(b) For blades not previously inspected by the procedure described in paragraph (c), inspect in accordance with paragraph (c) as follows:

(1) Inspect blades with 700 or more total hours' time in service within the next 50 hours' time in service and every 350 hours' time in service thereafter.

(2) Inspect blades with less than 700 total hours' time in service prior to the accumulation of 750 hours' time in service and every 350 hours' time in service thereafter.

(c) Incorporate an inspection hole and plug in the compressor case and third stage stator shroud in accordance with Pratt & Whitney Aircraft (R.G.B.) letter dated February 24, 1962, and its attached sketch to all JT3C-7 and JT3C-12 operators. Using an American Cystoscope Makers, Inc. Model B35A-12 or equivalent viewing instrument inserted through this hole, inspect each third stage blade dovetail attachment for possible cracking in both flanks, rear radius, and rear face. If any crack indications are found, remove the engine prior to further flight and disassemble for confirmation of the indications. Replace any cracked blades.

(d) Upon request of the operator, an FAA maintenance inspector, subject to prior approval of the Chief, Engineering and Manufacturing Branch, FAA Eastern Region, may adjust the repetitive inspection intervals specified in this AD to permit compliance at an established inspection period of the operator if the request contains substantiating data to justify the increase for such operator.

(Pratt & Whitney Aircraft (R.G.B.) letter dated February 24, 1962, and attached sketch, to all JT3C–7 and JT3C–12 operators, and P&WA telegraphic message dated February 28, 1962, to all JT3C–7 and JT3C–12 operators, covers the same subject.)

This directive effective April 19, 1962.

62–10–4 Pratt & Whitney Amdt. 432 Part 507 Federal Register April 26, 1962. Applies to All JT4A Series Turbojet Engines.

Compliance required within the next 85 hours' time in service after the effective date of this directive and thereafter at periods not to exceed 85 hours' time in service from the last inspection.

Inspect third stage turbine rotor blades, P/N 405903, 411803, or 411903, for looseness or rattling in accordance with Pratt & Whitney Aircraft telegraphic message of November 15, 1961. If any blade looseness or rattling is found, remove the engine for blade replacement prior to further flight, except that an operator conducting more frequent periodic inspections than at the 85-hour intervals may delay replacement of loose blades for one additional 15-hour period of time in service provided that time in service since a known no-loose blade condition will not exceed 85 hours. (Revised June 14, 1962, for all persons except those to whom it was made effective immediately by individual telegrams dated May 14, 1962.)

Upon request of the operator, an FAA maintenance inspector, subject to prior approval of thee Chief, Engineering and Manufacturing Branch, FAA Eastern Region, may adjust the repetitive inspection intervals specified in this AD to permit compliance at an established inspection period of the operator if the request contains substantiating data to justify the increase for such operator.

(Pratt & Whitney Aircraft telegraphic messages of November 15, 1961, and January 29, 1962, cover the same subject.)

This directive effective April 26, 1962.

62–11–5 Pratt & Whitney Amdt. 436 Part 507 Federal Register May 12, 1962. Applies to All Pratt & Whitney Aircraft Wasp Jr. and R–985 Series Engines.

Compliance required at next engine overhaul.

To prevent failure of the cam reduction drive gear assembly and resultant loss of engine power, replace P/N 3965 cam reduction drive gear assembly incorporating six rivets with either P/N 3965 cam reduction drive gear assembly incorporating twelve rivets or P/N 331098 cam reduction drive gear assembly.

(Pratt & Whitney Aircraft Service Bulletin 1671 dated December 13, 1957, and Supplement No. 1, Revision A dated February 12, 1959, revised November 24, 1959, cover this same subject.)

This directive effective June 12, 1962.

62–14–5 Pratt & Whitney Amdt. 451 Part 507 Federal Register June 14, 1962. Applies to All Pratt & Whitney Aircraft JT3D–1, JT3D–1–MC6, JT3D–1–MC7 and JT3D–3 Turbofan Engines Equipped With Fourth Stage Turbine Rotor Blades P/N 395304 Change H or Earlier and P/N 434104 Change C or Earlier.

Compliance required at first engine overhaul after the effective date of this AD unless already accomplished.

As the result of fourth stage turbine rotor blade failures, the following is required.

Rework all P/N 395304 Change H or earlier and P/N 434104 Change C or earlier, fourth stage turbine rotor blades as follows:

(a) Rework these blades to incorporate a 55° tip shroud lock angle in accordance with P&WA telegraphic message dated August 17, 1961, to all JT3D operators.

(b) Rework the first serration of the blade root at both rear corner radii and the entire trailing edge of the airfoil section in accordance with Pratt & Whitney Aircraft Service Bulletin No. 387 together with P&WA telegraphic message dated March 15, 1962, to all JT3D operators. Each blade must be floures-

cent penetrant inspected prior to and after rework. Blades exhibiting any indications must be rejected.

(c) After completing of inspection, stress relieve all reworked blades at 1500° F. plus or minus 25° for four (4) hours. Glass bead peen the reworked area of the airfoil trailing edge in accordance with AMS–2430 to an intensity of 15N2.

NOTE: This AD does not apply to engines equipped with blades P/N 395304 Change J or later, P/N 434104 Change D or later, or P/N 434104 which carry the inscription PL–5651 or PL–5670 on the blade root.

(Pratt & Whitney Aircraft Service Bulletin No. 387 and P&WA telegraphic messages dated August 17, 1961, March 15, 1962, and March 21, 1962, to all JT3D operators, cover this same subject.)

This directive effective July 16, 1962.

62–16–5 Pratt & Whitney Amdt. 464 Part 507 Federal Register July 17, 1962. Applies to All Pratt & Whitney Aircraft JT3D–1–MC7 Turbofan Engines.

Compliance required as indicated.

To preclude failure of the fourth stage compressor rotor disc, P/N 426504, accomplish the following:

(a) For engines previously inspected by the procedure described in paragraph (c), reinspect in accordance with paragraph (c) every 365 hours' time in service from the last inspection.

(b) For engines not perviously inspected by the procedure described by paragraph (c), inspect in accordance with paragraph (c) as follows:

(1) Inspect engine with 300 or more hours' time in service since last engine overhaul within the next 365 hours' time in service and each 365 hours' time in service thereafter.

(2) Inspect engines with less than 300 hours' time in service since last overhaul prior to the accumulation of 675 hours' time in service and each 365 hours' time in service thereafter.

(c) Remove the front accessory drive support assembly (NI gearcase) and the front accessory drive main spur gear (NI gearcase coupling). Using a strong light, visually inspect the fourth stage compressor rotor disc in the area between the disc bore and the spacer shoulder on the disc. If cracking is found, remove the engine for disc replacement prior to further flight.

(d) When fourth stage compressor disc, P/N 471904 is installed in place of P/N 426504 disc, the repetitive inspections required by this AD are no longer required.

(e) The requirement for main oil screen inspections per AD 61–24–1 does not apply when the No. 1 bearing compartment is exposed for this disc inspection.

(f) Upon request of the operator, an FAA maintenance inspector, subject to prior approval of the Chief, Engineering and Manufacturing Branch, FAA Eastern Region, may adjust the repetitive inspection intervals specified in this AD to permit compliance at an established inspection period of the operator if the request contains substantiating data to justify the increase for such operator.

(Pratt & Whitney Aircraft telegraphic message of June 6, 1962, to American Airlines, covers the same subject).

This directive effective July 17, 1962.

62–17–6 Pratt & Whitney Amdt. 470 Part 507 Federal Register August 1, 1962. Applies to All JT3C–12 Turbojet Engines.

Compliance required as indicated.

To preclude fatigue cracking in the rear face of the P/N 359708 eighth stage compressor rotor disc, accomplish the following:

(a) For discs previously inspected by the procedure described in paragraph (c), reinspect in accordance with paragraph (c) every 90 hours' time in service from the last inspection.

(b) For discs not previously inspected by the procedure described in paragraph (c), inspect in accordance with paragraph (c) as follows:

(1) Inspect discs with 1,000 or more hours' time in service within the next 90 hours' time in service and every 90 hours' time in service thereafter.

(2) Inspect discs with less than 1,000 hours' time in service prior to the accumulation of 1,090 hours' time in service and every 90 hours' time in service thereafter.

(c) Incorporate an inspection hole and plug in the compressor case and eighth stage stator shroud in accordance with Pratt & Whitney Aircraft letter dated June 21, 1962, and its attached sketch number L–53852. Using an American Cystoscope Markers, Inc. Model B–175–AS–15 or FAA approved equivalent viewing instrument inserted through this hole, inspect each eighth stage compressor rotor disc rear blade dovetail area and the entire circumferential area of the eighth stage disc spacer for possible cracks. If any crack indications are found, remove the engine prior to further flight and disassemble for confirmation of the indications. Replace cracked discs.

(d) Remove all eighth stage compressor rotor discs P/N 359708 from further service after 3,200 hours' time in service.

(e) Upon request of the operator, an FAA maintenance inspector, subject to prior approval of the Chief, Engineering and Manufacturing Branch, FAA Eastern Region, may adjust the repetitive inspection intervals specified in this AD to permit compliance at an established inspection period of the operator if the request contains substantiating data to justify the increase for such operator.

(Pratt & Whitney Aircraft telegraphic message dated June 13, 1962, to Eastern Air Lines and Pratt & Whitney Aircraft letter dated June 21, 1962, and attached sketch L–53852 to Eastern Air Lines covers the same subject.)

This directive effective August 1, 1962.

62–22–2 Pratt & Whitney Amdt. 496 Part 507 Federal Register October 16, 1962. Applies to All Pratt & Whitney Aircraft JT3D–1 Turbofan Engines.

Compliance required as indicated.

To preclude failure of the fourth stage compressor rotor disc, P/N 393504, accomplish the following:

(a) For engines previously inspected by the procedure described in paragraph (c) or for engines which have been overhauled, inspect in accordance with paragraph (c) as follows:

(1) Inspect engines which have accumulated 235 or more hours' time in service since the last such inspection or engine overhaul within the next 130 hours' time in service after the effective date of this AD, and every 365 hours' time in service thereafter.

(2) Inspect engines which have accumulated less than 235 hours' time in service since the last such inspection or engine overhaul, prior to the accumulation of 365 hours' time in service since the last such inspection or engine overhaul and every 365 hours' time in service thereafter.

(b) For engines which have not previously been inspected by the procedure described by paragraph (c) and which have not been overhauled, inspect in accordance with paragraph (c) as follows:

(1) Inspect engines with 300 or more hours' time in service within the next 65 hours' time in service after the effective date of this AD, and every 365 hours' time in service thereafter.

(2) Inspect engines with less than 300 hours' time in service prior to the accumulation of 365 hours' time in service and every 365 hours' time in service thereafter.

(c) Remove the front accessory drive support assembly (NI gearcase) and the front accessory drive main spur gear (NI gearcase coupling). Using a strong light, visually inspect the fourth stage compressor rotor disc in the area between the disc bore and the spacer shoulder on the disc. If cracking is found, remove the engine for disc replacement prior to further flight.

(d) When fourth stage compressor disc P/N 468304 is installed in place of P/N 393504, the repetitive inspections required by this AD are no longer required.

(e) The requirement for main oil screen inspections per AD 61–24–1 does not apply when the No. 1 bearing compartment is exposed for this disc inspection.

(f) Upon request of the operator, an FAA maintenance inspector, subject to prior approval of the Chief, Engineering and Manufacturing Branch, FAA Eastern Region, may adjust the repetitive inspection intervals specified in this AD to permit compliance at an established inspection period of the operator if the request contains substantiating data to justify the increase for such operator.

(Pratt & Whitney Aircraft telegraphic message of August 21, 1962, to all JT3D operators, covers the same subject.)

This directive effective October 16, 1962.

62–26–1 *See* Douglas Aircraft.

ROLLS-ROYCE

56–2–3 Rolls-Royce Applies to All Dart 506 and 510 Engines.

Compliance required as indicated.

Due to the possibility of low stage compressor impeller failure, all impellers, P/N's RK13782, RK17877, RK19795, RK20156 and RK20181, must be removed from service and not reused after a maximum of 725 hours service time, except that when Rolls-Royce Modifications 335 and 348 have been accomplished the maximum service time may be increased to 750 hours.

The British Air Registration Board considers this parts replacement program mandatory and the FAA concurs.

Operation beyond 750 hours total time is not authorized.

60–4–5 Rolls-Royce Amdt. 103 Part 507 Federal Register February 17, 1960. Applies to Dart 510 Engines.

Compliance required as indicated.

In order to prevent failure of impeller shaft, P/N 10543/16719, the following action shall be taken:

Beginning April 20, 1960, all impeller shafts, P/N 10543/16719, which have been in operation for 6,000 hours or more, shall be replaced by new impeller shafts of the same part number or by any subsequent approved impeller shafts. (Rolls-Royce Modification 378 covers this subject.)

62–8–8 Rolls Royce Amdt. 425 Part 507 Federal Register April 17, 1962. Applies to All Dart 525 Series, 526, 527, 528 Series, and 529 Series Engines With Rolls Royce Modification 529 (Part 2) Bearing In the Rear Position.

Compliance required as indicated.

For engines not incorporating Rolls Royce Dart Mod. 1023, compliance required within the next 25 hours' time in service after the effective date of this AD, unless already accomplished within the last 25 hours, and thereafter at each 50 hours' time in service from the last inspection.

For engines incorporating Rolls Royce Dart Mod. 1023, inspections shall be performed in accordance with the operators' normal inspection period.

(a) To detect incipient failure of the compressor rear bearing, inspect the oil filters in accordance with Rolls Royce Dart Notice to Operators No. 100.

(b) If metal particles are found in the filters remove the engine from service for further inspection.

(c) If defective Rolls Royce Dart Mod. 529 (Part 2) bearings in the rear position are found upon inspection, replace the bearings in accordance with Rolls Royce Dart Mod. 1030 prior to further engine operation.

(d) Upon request of the operator, an FAA maintenance inspector, subject to prior approval of the Chief, Engineering and Manufacturing Branch, International Division, may adjust the repetitive inspection intervals specified in this AD to permit compliance at an established inspection period of the operator if the request contains substantiating data to justify the increase for such operator.

(Rolls Royce Dart Notice to Operators No. 100 dated February 26, 1962, covers this subject.)

This directive effective April 17, 1962.

62–19–4 Rolls Royce Amdt. 480 Part 507 Federal Register September 1, 1962. Applies to All Tyne 512 and 515 Engines With Pre-Modification 750 Flame Tubes Installed.

Compliance required as indicated.

Investigation of an inflight failure of flame tubes on a Rolls Royce Tyne engine reveals the need for the following corrective action.

(a) Pre-Modification 750 flame tubes shall be removed and replaced with new Pre-Modification 750 or Modification 750 flame tubes as follows:

(1) On engines not incorporating a clutch mounted tail bearing (Rolls Royce Modification 549):

(i) Pre-Modification 750 flame tubes which have accumulated 325 or more hours' time in

service as of the effective date of this AD shall be replaced within the next 25 hours' time in service after the effective date of this AD.

(ii) Pre-Modification 750 flame tubes which have accumulated less than 325 hours' time in service as of the effective date of this AD shall be replaced prior to the accumulation of 350 hours' time in service.

(2) On engines incorporating a clutch mounted tail bearing (Rolls Royce Modification 549):

(i) Pre-Modification 750 flame tubes which have accumulated 450 or more hours' time in service as of the effective date of the AD shall be replaced within the next 50 hours' time in service after the effective date of this AD.

(ii) Pre-Modification 750 flame tubes which have accumulated less than 450 hours' time in service as of the effective date of the AD shall be replaced prior to the accumulation of 500 hours' time in service.

(b) If new Pre-Modification 750 flame tubes are installed in accordance with paragraph (a), such flame tubes must be replaced with Modification 750 flame tubes prior to the accumulation of 350 hours' time in service.

(Rolls Royce Service Bulletin No. Ty72–375 concerns the same subject.)

This directive effective October 2, 1962.

WARNER

51–4–2 Warner *Applies to All Engines Except Those With the Letter "A" Stamped After the Serial Number on the Engine Nameplate. The Letter "A" Indicates That the Modifications Hereinafter Discussed Have Already Been Accomplished.*

Compliance required as indicated.

As a precautionary measure to preclude serious flight hazards resulting from failure of the 5/16-inch cylinder holddown studs P/N S506, the following inspections or replacements should be accomplished.

A. Compliance required as soon as possible but not later than April 1, 1951 and at each 100 hours of operation thereafter.

1. Check the cylinder holddown nuts to determine that they are tightened to a torque of 180 inch-pounds desired to a 200 inch-pounds maximum.

(*a*) If one or more of the studs is found to be broken, replace all of the studs for the particular cylinder.

(*b*) Loose cylinder holddown nuts are a good indication that the stud may have stretched to the extent that fatigue failure may soon result. If one or more of the nuts is found loose, it is recommended that all of the studs in the cylinder be replaced.

(*c*) When installing a cylinder with oil on the stud threads, tighten nuts to 200 inch-pounds desired to 225 inch-pounds maximum.

(Warner Service Letter No. A–15 discusses procedures for inspecting and replacing 5/16-inch studs and nuts.)

B. Compliance not required, but will eliminate foregoing mandatory inspections.

1. Replace cylinder stud P/N S506 and nut N–511 with 3/8-inch stud S–911 and nut N–910.

2. Replace gasket between cylinder barrel and crankcase with an "O" type ring.

3. Stamp letter "A" after serial number on engine nameplate when this modification has been completed.

(Warner Service Letter No. A–17 explains the details connected with the replacement of these parts.)

The Warner Aircraft Co., P. O. Box 229, Niles, Mich., which purchased the assets of the Warner Division of the Clinton Machine Co., Detroit, Mich., have a large supply of replacement part stocks that will be held in their inventory for an indefinite period. Warner Service Letter No. A–17 should be consulted before ordering these replacement parts. If either Letter A–17 or Letter A–15 is not available, copies may be obtained from the Warner Aircraft Co., Box 229, Niles, Mich.

WRIGHT

51–12–1 Wright Applies to All Models C9GB, C9GC, C9HD and Military R–1820 Series Engines.

Compliance required as soon as possible, but not later than April 1, 1952.

To preclude piston pin failures, piston pins P/N's 68827, 117691, and 131061, which have not been carburized, must be replaced at each engine overhaul. Piston pins P/N's 117691 and 131061 retain the same part number when carburized, but may be identified by the symbol "C" on the recessed end of the pin. Piston pins P/N 68827 were never carburized and therefore should not be reused. It is suggested that orders for carburized piston pins be placed well in advance of required delivery date.

(Wright Service Bulletin No. C9–156A covers this same subject.)

52–20–2 Wright Applies to All Models C18B9 and C18BD Engines.

Compliance required as soon as possible but not later than October 31, 1952.

To prevent crankpin sludge from washing into the master rod bearing oil supply passages causing failure of the bearing, the use of oil dilution must be discontinued and the dilution lines disconnected or removed. This restriction on oil dilution is to continue until an adequate sludge controlling device is developed and incorporated in these engines.

54–25–2 Wright Applies to All Models 975C18CB1, 972TC18DA1, and 972TC18DA2 Engines.

Compliance required as indicated.

I. Compliance required by November 1, 1955.

To alleviate front intermediate cam drive gear failures and associated possible engine overspeeding, the following intermediate cam drive gears must be removed from the front cam drive gear train: P/N's 138608, 138608 N, 171385, 171238, or 171387.

These gears may still be used in the rear cam drive configuration. Intermediate cam drive gears incorporating increased tooth width and thick hubs must be used in the front cam drive configuration. The following gears comply with this requirement: P/N's 171347, 171348, or 171994.

II. Compliance required at next and each subsequent overhaul.

To insure proper assembly of cam drive gear configurations, the following assembly instructions must be followed and applicable measurements recorded on engine build up sheets:

TC18DA Overhaul Manual:

Section V. Instruction 17.

Section VIII. Instruction No. 2 plus referenced Table of Limits fits including Reference No. 238.

(Wright Aeronautical Division Service Bulletins Numbers C18C–83 and TC18–92 cover these same subjects.)

56–20–6 *See* Hamilton Standard Propellers.

57–6–4 Wright Applies to All Aircraft Incorporating C18CA, C18CB, TC18DA, and TC18EA Series Engines.

Compliance required as indicated.

Results of recent investigations indicate that the engine front section bearing durability can be improved by accomplishing the following:

1. At next engine overhaul the engine front section must be assembled with the propeller shaft thrust bearing (ball bearing) behind the radial bearing (roller bearing) as viewed from the propeller end of the engine.

(Wright Aeronautical Division Service Bulletins Nos. C18C–252, TC18D–255, and TC-18E–66 cover this same subject.)

Propellers must be balanced in accordance with instructions contained in applicable propeller manufacturer's recommendations.

2. Engines overhauled after April 15, 1957, must incorporate engine propeller shaft thrust bearings (ball bearings) and radial bearings (roller bearings) that have been inspected for proper internal bearing clearances in accordance with instructions issued by the Wright Aeronautical Division in their Service Letter dated March 22, 1957.

57–8–7 Wright Applies to All TC18DA and TC18EA Series Engines.

Compliance required at overhauls accomplished after May 1, 1957.

To improve the durability of the impeller drive gear assemblies of the subject engines, impeller drive secondary pinion bushings P/N's 170217, 170148, 145213 and 171190 are not eligible for use in engines overhauled after May 1, 1957.

This supersedes AD 57–1–3.

57–24–1 Wright Applies to All TC18DA and TC18EA Series Engines.

Compliance required at next overhaul but not later than July 31, 1958.

To improve the durability of the impeller drive gear assemblies of the subject engines, intermediate impeller drive gear P/N 145316 must be replaced with P/N 138464 gear, or any gear approved after December 1, 1957.

58–8–5 *See* Hamilton Standard Propellers.

58–13–5 Wright Applies to All TC18DA and TC19EA Series Engines Except as Noted.

Compliance required as indicated.

To improve engine reliability, the following items must be accomplished:

1. At first overhaul after August 1, 1958, but no later than March 1, 1959, install either (a) piston compression ring, Wright Aeronautical Division P/N 147414 or subsequently approved ring in the No. 2 ring groove (WAD Service Bulletins Nos. TC18–269B or TC18E–81B covers this same subject), or (b) install steel, chrome-plated compression ring, Wright Aeronautical Division P/N 139619 or subsequently approved ring in the No. 2 ring groove. In connection with this piston ring, the cylinder barrel finish, piston ring fit, and crankcase oil manifold diverter valve configuration must be in accordance with the instructions contained in WAD Service Bulletins Nos. TC18–363 and TC18E–182.

2. At first overhaul after July 1, 1958, and each succeeding overhaul, install only new, resin graphite coated pistons in the master rod cylinders (1 and 2). In other locations, continued time pistons may be used provided they are recoated with either resin or spray graphite and are otherwise satisfactory for reuse. In addition, prior to reuse, the top and second grooves of all these pistons must be inspected for ring groove step wear and contouring of the ring groove wall. If any of these conditions are found, the piston must be regrooved. WAD Repair Instruction Nos. 860468 and 72–5–12 cover this same subject.

3. Applies to TC18EA Series engines only. At the next overhaul and each succeeding overhaul, the fuel injection pump timing and fuel injection line configuration must be in accordance with either Wright Aeronautical Service Bulletins Nos. TC18E–118 or TC18E–199.

4. At next overhaul but not later than March 1, 1959, the spark advance relays used in the ignition distributors on the subject engines must be assembled with increased relay spring pressures. Detailed instructions for setting the required spring pressure are contained in Scintilla Division Service Bulletin No. 408A.

5. At first overhaul after July 1, 1958, but not later than March 1, 1959, the valve springs used in all TC18 engines must have the coil ends contoured per WAD Service Bulletins Nos. TC18–339 or TC18E–159.

6. Superseded by AD 60–8–5.

7. To insure proper retention of the power recovery turbine wheel, the shaft and shaft nut threads must be inspected for wear and distortion at every power recovery turbine overhaul. WAD Service Bulletins Nos. TC18–327 and TC18E–146 detail the techniques and limits for such inspections. In addition, at first overhaul after September 1, 1958, but not later than March 1, 1959, the power recovery turbine must be assembled with WAD P/N 147555 nut or subsequently approved turbine wheel retaining system.

8. Superseded by AD 60–3–10.

9. To insure proper retention of the power recovery turbine nozzle, WAD P/N 492D21, nozzle to nozzle support attaching screws should be removed at next PRT overhaul and replaced with either WAD P/N 6043D8 or 492D65 screws. Until this is accomplished, a daily check of the tightness of the nozzle must be made in accordance with the instructions contained in WAD letter to all operators dated June 10, 1958.

10. At first overhaul after August 1, 1958, but not later than March 1, 1959, the rocker box drain manifold and sumps must be removed in accordance with WAD Service Bulletins Nos. TC18–347 or TC18E–166.

58–18–1 *See* Hamilton Standard Propellers.

59–10–5 *See* Hamilton Standard Propellers.

59–12–7 Wright Applies to R–1300–1A Engines Installed in North American T–28A Aircraft.

Compliance required by July 1, 1959, or within the next 10 hours of operation, whichever occurs first.

There is a possibility that a small number of R–1300–1A engines were released by the military for civil sale and use with crankshafts that had undergone a chrome plating salvage repair operation during the last military overhaul. This operation was found to render the crankshaft unsafe and accordingly was discontinued. Engines with these salvaged crankshafts have a note to this effect in the records and log sheets kept for the engine. No other identification of such engine was provided.

A reexamination of the miiltary records of these engines must be made and if any indication is found that the crankshaft has been salvaged by chrome plating it is mandatory that the engine be removed from service consistent with the above stipulated compliance provisions and prior to reuse of the engine in civil aircraft the affected crankshaft must be replaced.

59–17–1 Wright Applies to All TC18DA and TC18EA Series Engines.

Compliance required as follows: Engine Model TC18EA2—Not later than October 1, 1959. All other EA Series Models and TC18DA Series—At the first overhaul after October 15, 1959, but not later than March 31, 1960, except TC18DA2, TC18DA3, TC18DA4, TC18EA1, TC18EA3, and TC18EA6 engines not later than July 31, 1960.

Instances of propeller shaft cracking through the hydro-oil holes have occurred causing a loss of propeller control. To increase the strength of the propeller shaft and prevent this type of failure, the walls of the hydro-oil holes must be inspected and shot-peened in accordance with the instructions contained in Wright Aeronautical Division Service Bulletins Nos. TC18E–178 or TC18–359.

60–3–10 Wright Amdt. 90 Part 507 Federal Register January 26, 1960. Applies to All TC18DA and TC18EA Series Engines.

Compliance required at first engine overhaul after February 1, 1960, but not later than October 1, 1960.

To prevent inadvertent loss of oil from the power recovery turbine fluid couplings, the PRT oil control valve must incorporate a WAD P/N 147825 valve body, or subsequently released part. This valve body incorporates three flats to provide a permanent oil bypass to insure an adequate supply of turbine coupling oil in the event of a regulator spring failure. (WAD Service Bulletins Nos. TC18–390 and TC18E–210 cover this same subject and furnish instructions for the rework of the superseded valve bodies to the P/N 147825 configuration.)

This supersedes and cancels item No. (8) of AD 58–13–5.

60–4–7 Wright Amdt. 106 Part 507 Federal Register February 20, 1960. Applies to All 977C9HD1, 2 and 3 Engine Models Installed in Helicopters.

Compliance required at first engine overhaul after March 15, 1960, but not later than October 31, 1960.

To alleviate failures of the master rod assemblies, strengthened master and articulating rods with associated parts must be installed in accordance with the instructions contained in Wright Aeronautical Division Service Bulletin No. C9–353.

60–7–8 Wright Amdt. 121 Part 507 Federal Register March 29, 1960. Applies to All R–1820–103 Engines Installed In Helicopters.

Compliance required at first engine overhaul after June 1, 1960, but not later than December 31, 1960.

To alleviate failures of the master rod assemblies, strengthened master and articulating rods with associated parts must be installed in accordance with the instructions contained in Wright Aeronautical Division Service Bulletin No. C9–353.

60–8–5 **Wright** Amdt. 126 Part 507 Federal Register April 9, 1960. Applies to all TC18DA and TC18EA Series Engines.

Compliance required as indicated.

(a) To insure that the proper PRT cooling shield to wheel lip clearance is retained, this clearance must be checked at the next regular periodic inspection after May 15, 1960, and every regular periodic inspection thereafter. The maximum service limit for this clearance is 0.080 inch with the wheel in the outermost position and must be checked at the four support bolt locations. In addition to this clearance check, the turbine wheel and turbine shaft nut must be checked for security by attempting to wobble these components by hand. Any looseness is an indication that the nut or shaft has been overheated. If this condition is found, the PRT must be removed for overhaul prior to next flight.

(b) At the next overhaul of PRT components after May 15, 1960, and every such overhaul thereafter, dimensional control will be maintained such that a maximum of 0.040-inch wheel to cooling shield clearance with the wheel in the outermost position will not be exceeded when the components are assembled. (WAD Service Bulletins Nos. TC18–323 and TC18E–140 cover the above items.)

(c) To provide an adequate supply of PRT cooling air under critical engine operating conditions, the aircraft in which these engines are operated should not be climbed at air speeds below the all engine en route climb speed as shown in the FAA approved Flight Manual. It is recognized that under certain unusual conditions, this air speed limitation cannot be adhered to and as a result, the PRT units may be subjected to overheat operation. So that appropriate precautionary measures can be taken when such operation is experienced the flight crew must record in the aircraft log whenever the aircraft is operated below the all engine en route climb speed for periods in excess of three (3) minutes with the engines operating in high impeller gear ratio at or above alternate climb power. When such operation is reported the No. 2 PRT on each engine must be inspected per item (a) at the first stop where adequate maintenance facilities are available.

(d) To further insure PRT cooling cap integrity, a cooling shield security check, with flight hood installed, must be accomplished at some interval between regular periodic inspections. This interval should be as close to the mid-periodic inspection point as practical. This check will be accomplished by individually attempting to move both the intermediate and outer cooling shield outlets. Any relative movement will be cause for flight hood removal and further investigation of the condition of the cooling cap and the security of the PRT wheel and shaft nut.

This supersedes and cancels item (6) of AD 58–13–5.