



CIVIL AVIATION AUTHORITY
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AIRWORTHINESS DIRECTIVE

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Pratt & Whitney

PW4050, PW4052, PW4056, PW4060, PW4060A,
PW4060C, PW4062, PW4152, PW4156,
PW4156A, PW4158, PW4160, PW4460, PW4462,
PW4650

ENGINE - HIGH PRESSURE COMPRESSOR (HPC) - INSPECTION/REPLACEMENT

Applicability: This airworthiness directive (AD) is applicable to Pratt & Whitney (PW) model PW4050, PW4052, PW4056, PW4060, PW4060A, PW4060C, PW4062, PW4152, PW4156, PW4156A, PW4158, PW4160, PW4460, PW4462, and PW4650 turbofan engines. These engines are installed on, but not limited to, certain models of Airbus Industrie A300, Airbus Industrie A310, Boeing 747, Boeing 767, and McDonnell Douglas MD-11 series airplanes.

Effective date: July 07, 2003

Compliance: Required as indicated FAA AD 2003-11-18.

Remarks: The compliance of this AD must be recorded in Aircraft Logbook, where applicable the requirements of this AD must be integrated into Aircraft Technical Documentation. Address inquiries concerning this AD to: Civil Aviation Authority, Airworthiness Division, Ruzyně Airport, 160 08 Prague 6, Czech Republic, tel.: 420 2 33320922, fax: 420 2 20562270.

Ing. Pavel MATOUŠEK
Director

2003-11-18 Pratt & Whitney: Amendment 39-13177. Docket No. 2000-NE-47-AD. Supersedes AD 2002-21-10, Amendment 39-12916.

Applicability: This airworthiness directive (AD) is applicable to Pratt & Whitney (PW) model PW4050, PW4052, PW4056, PW4060, PW4060A, PW4060C, PW4062, PW4152, PW4156, PW4156A, PW4158, PW4160, PW4460, PW4462, and PW4650 turbofan engines. These engines are installed on, but not limited to, certain models of Airbus Industrie A300, Airbus Industrie A310, Boeing 747, Boeing 767, and McDonnell Douglas MD-11 series airplanes.

Note 1: This AD applies to each engine identified in the preceding applicability provision, regardless of whether it has been modified, altered, or repaired in the area subject to the requirements of this AD. For engines that have been modified, altered, or repaired so that the performance of the requirements of this AD is affected, the owner/operator must request approval for an alternative method of compliance in accordance with paragraph (w) of this AD. The request should include an assessment of the effect of the modification, alteration, or repair on the unsafe condition addressed by this AD; and, if the unsafe condition has not been eliminated, the request should include specific proposed actions to address it.

Compliance: Compliance with this AD is required as indicated, unless already done.

To prevent engine takeoff power losses due to high-pressure-compressor (HPC) surges, do the following:

(a) When complying with this AD, determine the configuration of each engine on each airplane using the following Table 1:

Table 1.-Engine Configuration Listing

Configuration	Configuration designator	Description
(1) Phase 1 without high pressure turbine (HPT) 1st turbine vane cut back stator (1TVCB).	A	Engines that did not incorporate the Phase 3 configuration at the time they were originally manufactured, or have not been converted to Phase 3 configuration; and have not incorporated HPT 1TVCB using any Revision of service bulletin (SB) PW4ENG 72-514.
(2) Phase 1 with 1TVCB	B	Same as Configuration A except that HPT 1TVCB has been incorporated using any Revision of SB PW4ENG 72-514.
(3) Phase 3, 2nd Run	C	Engines that incorporated the Phase 3 configuration at the time they were originally manufactured, or have been converted to the Phase 3 configuration during service; and that have had at least one HPC overhaul since new.
(4) Phase 3, 1st Run	D	Same as Configuration C except that the engine has not had an HPC overhaul since new, except those engines that are defined as Configuration Designator G.
(5) HPC Cutback Stator Configuration Engines	E	Engines that currently incorporate any Revision of SBs PW4ENG 72-706, PW4ENG 72-704, or PW4ENG 72-711.
(6) Engines that have passed Testing-21	F	Engines which have successfully passed Testing-21 performed in accordance with paragraph (i) or (j) of this AD. Once an engine has passed a Testing-21, it will remain a Configuration F engine until the HPC is overhauled, or is replaced with a new or overhauled HPC.
(7) Phase 3, 1st Run Subpopulation	G	Engines that incorporated the Phase 3

Engines. These engines are identified by model and serial numbers (SNs) as follows: PW4152: SN 724942 through SN 724944 inclusive; PW4158: SN 728518 through SN 728533 inclusive; PW4052, PW4056, PW4060, PW4060A, PW4060C, PW4062: SN 727732 through SN 728000 inclusive and SN 729001 through SN 729010 inclusive; PW4460, PW4462: SN 733813 through SN 733840 inclusive.		configuration and did not incorporate Haynes material HPC inner case rear hook at the time they were originally manufactured, that were built from August 29, 1997 up to the incorporation of the HPC inner rear case with Haynes material rear hook at the original engine manufacturer and have not had an HPC overhaul since new.
(8) Engines from Configuration G that have passed Testing-21.	H	Engines that have successfully passed Testing-21 performed in accordance with paragraph (i) or (j) of this AD. Once an engine has passed a Testing-21, it will remain a Configuration H engine until the HPC is overhauled, or is replaced with a new or overhauled HPC.
(9) Engines installed on Boeing airplanes with a build standard that incorporates a ring case configuration (RCC) rear HPC.	I	Engines that have incorporated PW SB PW4ENG 72-755, Revision 2, dated May 23, 2003, or have been manufactured with an RCC rear HPC.

Configuration E Engines Installed on Boeing 747, 767, and MD-11 Airplanes

(b) For Configuration E engines, do the following:

- (1) Before further flight, limit the number of engines with Configuration E as described in Table 1 of this AD, to one on each airplane.
- (2) Remove all engines with Configuration E from service before accumulating 1,300 cycles-since-new (CSN) or cycles-since-conversion (CSC) to Configuration E, whichever is later.

Configuration G and H Engines Installed on Boeing 747, 767, MD-11, and Airbus A300 and A310 Airplanes

(c) For Configuration G and H engines installed on Boeing 747, 767, MD-11, and Airbus A300 and A310 airplanes, except as provided in paragraph (b) of this AD:

- (1) Before further flight, remove from service engines that exceed the CSN or cycles-since-Testing-21 (CST) limits listed in the following Table 2. Thereafter, ensure that no Configuration G or H engines exceed the HPC CSN or CST limits listed in Table 2 of this AD.

Table 2.-Configuration G and H Limits

Configuration designator	B747 PW4056	B767 PW4052	B767 PW4056	B767 PW4060 PW4060A PW4060C PW4062	MD-11 PW4460 PW4462	A300/310 PW4152 PW4156A PW4158
G	1,700 CSN	3,000 CSN	2,100 CSN	1,350 CSN	1,150 CSN	2,800 CSN
H	600 CST	600 CST	600 CST	600 CST	600 CST	600 CST

- (2) Prior to return to service and installed on Boeing 747 and 767 airplanes, Configuration G and H engines must meet the requirements of paragraph (j) of this AD.
- (3) Prior to return to service and installed on Airbus or McDonnell Douglas airplanes, Configuration G or H engines

must meet the requirements of paragraph (i) of this AD.

Engines Installed on Boeing 767 and MD-11 Airplanes

(d) For engines installed on Boeing 767 and MD-11 airplanes, except as provided in paragraph (b) and (c) of this AD:

(1) Before further flight, limit the number of engines that exceed the HPC CSN, HPC cycles-since-overhaul (CSO), or HPC CST limits in Table 3 of this AD, to no more than one engine per airplane. Thereafter, ensure that no more than one engine per airplane exceeds the HPC CSN, CSO, or CST limit in Table 3 of this AD.

(2) Prior to return to service and installed on MD-11 airplanes, engines must meet the requirements of paragraph (i) of this AD.

(3) Prior to return to service and installed on Boeing 767 airplanes, engines must meet the requirements of paragraph (j) of this AD.

Engines Installed on Boeing 747 Airplanes

(e) Except as provided in paragraph (b) and (c) of this AD, before further flight, and thereafter, manage the engine configurations installed on Boeing 747 airplanes as follows:

(1) Limit the number of Configuration A, B, C, or E engines that exceed the HPC CSN or HPC CSO limits listed in Table 3 of this AD, to not more than one engine per airplane. Table 3 follows:

Table 3.-Engine Limits for Boeing Airplanes

Configuration designator	B747 PW4056	B767 PW4052	B767 PW4056	B767 PW4060 PW4060A PW4060C PW4062	MD-11 PW4460 PW4462
A	1,400 CSN or CSO	3,000 CSN or CSO	1,600 CSN or CSO	900 CSN or CSO	800 CSN or CSO
B	2,100 CSN or CSO	4,400 CSN or CSO	2,800 CSN or CSO	2,000 CSN or CSO	1,200 CSN or CSO
C	2,100 CSO	4,400 CSO	2,800 CSO	2,000 CSO	1,300 CSO
D	2,600 CSN	4,400 CSN	3,000 CSN	2,200 CSN	2,000 CSN
E	750 CSN or CSO	750 CSN or CSO.	750 CSN or CSO	750 CSN or CSO	750 CSN or CSO
F	800 CST	800 CST	800 CST	800 CST	800 CST

(2) The single Configuration A, B, C, or E engine per airplane that exceeds the HPC CSN or CSO limits listed in Table 3 of this AD, must be limited to 2,600 HPC CSN or CSO for Configuration A, B, or C engines, or 1,300 HPC CSN or CSC to Configuration E, whichever is later, for Configuration E engines.

(3) Remove from service or perform on-wing Testing-21 in accordance with paragraph (j)(3) for Configuration D engines, before accumulating 2,600 CSN.

(4) Remove from service or perform on-wing Testing-21 in accordance with paragraph (j)(3) for Configuration F engines, before accumulating 800 CST.

(5) Prior to return to service and installed on Boeing airplanes, Configuration A, B, C, D, and F engines must meet the requirements of paragraph (j) of this AD.

Engines Installed on Airbus A300 and A310 Airplanes

(f) For Airbus operators that began operation of their A300 fleet after the effective date of this AD, use paragraphs

(f)(1) through (f)(9) to determine which Airbus A300 PW4158 engine category 1, 2, or 3 limits of the following Table 4 of this AD apply to your engine fleet. For Airbus operators that have been in operation before the effective date of this AD, use your PW4158 engine category classification previously determined for your fleet and continue to apply the A300 PW 4158 Category limits in Table 4 of this AD, to your fleet.

Table 4.-Engine Limits for Airbus Airplanes

Configuration designator	A300 PW4158 Category 1, and A310 PW4156 and PW4156A	A300 PW4158 Category 2, and A310 PW4152	A300 PW4158 Category 3
A	900 CSN or CSO	1,850 CSN or CSO	500 CSN or CSO
B	2,200 CSN or CSO	4,400 CSN or CSO	1,600 CSN or CSO
C	2,200 CSO	4,400 CSO	1,600 CSO
D	4,400 CSN	4,400 CSN	4,400 CSN
E	Not Applicable	Not Applicable	Not Applicable
F	800 CST	800 CST	800 CST

(1) Determine the number of Group 3 takeoff surges experienced by engines in your fleet before April 13, 2001. Count surge events for engines that had an HPC overhaul and incorporated either SB PW 4ENG 72-484 or SB PW4ENG 72-575 at the time of overhaul. Do not count surge events for engines that did not have the HPC overhauled (i.e. 1st run engine) or had the HPC overhauled but did not incorporate either SB PW4ENG 72-484 or SB PW4ENG 72-575. See paragraph (v)(5) of this AD for a definition of a Group 3 takeoff surge.

(2) Determine the number of cumulative HPC CSO accrued by engines in your fleet before April 13, 2001. Count HPC CSO for engines that had an HPC overhaul and incorporated either SB PW4ENG 72-484 or SB PW4ENG 72-575 at the time of overhaul. Do not count HPC CSO accrued on your engines while operating outside your fleet.

(3) Calculate the surge rate by dividing the number of Group 3 takeoff surges determined in paragraph (f)(1) of this AD, by the number of cumulative HPC CSO determined in paragraph (f)(2) of this AD, and then multiply by 1,000.

(4) If the surge rate calculated in paragraph (f)(3) of this AD is less than 0.005, go to paragraph (f)(5) of this AD. If the surge rate calculated in paragraph (f)(3) of this AD is greater than or equal to 0.005, go to paragraph (f)(6) of this AD.

(5) If the cumulative HPC CSO determined in paragraph (f)(2) of this AD is greater than or equal to 200,000 cycles, use A300 PW4158 Category 2 limits of Table 4 of this AD. If less than 200,000 cycles, go to paragraph (f)(7) of this AD.

(6) If the surge rate calculated in paragraph (f)(3) of this AD is greater than 0.035, use A300 PW 4158 Category 3 limits of Table 4 of this AD. If less than or equal to 0.035, go to paragraph (f)(7) of this AD.

(7) Determine the percent of takeoffs with greater than a 1.45 Takeoff engine pressure ratio (EPR) data for engines operating in your fleet. Count takeoffs from a random sample of at least 700 airplane takeoffs that has occurred over at least a 3-month time period, for a period beginning no earlier than 23 months prior to the effective date of this AD. See paragraph (v)(6) of this AD for definition of Takeoff EPR data.

(8) If there is insufficient data to satisfy the criteria of paragraph (f)(7) of this AD, use A300 PW4158 Category 3 limits of Table 4 of this AD.

(9) If the percentage of takeoffs with greater than a 1.45 Takeoff EPR data determined in paragraph (f)(7) of this AD is greater than 31%, use A300 PW 4158 Category 3 limits listed in Table 4 of this AD. If the percentage of takeoffs with greater than a 1.45 Takeoff EPR data determined in paragraph (f)(7) of this AD is less than or equal to 31%, use A300 PW 4158 Category 1 limits listed in Table 4 of this AD.

(g) For engines installed on Airbus A300 or A310 airplanes, except as provided in paragraph (c) of this AD, before further flight, limit the number of engines that exceed the CSN, CSO, or CST limits listed in Table 4 of this AD, to no more than one engine per airplane. Thereafter, ensure that no more than one engine per airplane exceeds the HPC CSN, CSO, or CST limits listed in Table 4 of this AD. See paragraph (i) of this AD for return to service

requirements.

(h) For Airbus A300 PW4158 engine operators, except those operators whose engine fleets are determined to be Category 3 classification based on surge rate in accordance with paragraph (f)(6) of this AD, re-evaluate your fleet category within 6 months from the last evaluation, and thereafter, at intervals not to exceed 6 months, using the following criteria:

(1) For operators whose engine fleets are initially classified as Category 1 or 3 in accordance with paragraph (f) of this AD, determine the percent of takeoffs with greater than a 1.45 Takeoff EPR data for engines operating in your fleet. Count takeoffs from a sample of at least 200 takeoffs that occurred over the most recent six month time period since the last categorization was determined, or the total number of takeoffs accumulated over 6 months if less than 200 takeoffs. See paragraph (v)(6) of this AD for definition of takeoff EPR data.

(i) If there is insufficient data to satisfy the criteria of paragraph (h)(1) of this AD, use A300 PW4158 Category 3 limits listed in Table 4 of this AD.

(ii) If the percentage of takeoffs with greater than a 1.45 Takeoff EPR data determined in paragraph (h)(1) of this AD is greater than 31%, use A300 PW4158 Category 3 limits listed in Table 4 of this AD.

(iii) If the percentage of takeoffs with greater than a 1.45 Takeoff EPR data determined in paragraph (h)(1) of this AD is less than or equal to 31%, use A300 PW4158 Category 1 limits listed in Table 4 of this AD.

(2) For operators whose engine fleets are initially classified as Category 2 in accordance with paragraph (f) of this AD, determine the percent of takeoffs with greater than a 1.45 Takeoff EPR data for engines operating in your fleet. Count takeoffs from a sample of at least 200 takeoffs that occurred over the most recent six month time period since the last categorization was determined, or the total number of takeoffs accumulated over 6 months if less than 200 takeoffs. See paragraph (v)(6) of this AD for definition of takeoff EPR data.

(i) If there is insufficient data to satisfy the criteria of paragraph (h)(2) of this AD, use A300 PW4158 Category 3 limits listed in Table 4 of this AD.

(ii) If the percentage of takeoffs with greater than a 1.45 Takeoff EPR data determined in paragraph (h)(2) of this AD is greater than 37%, use A300 PW4158 Category 3 limits listed in Table 4 of this AD.

(iii) If the percentage of takeoffs with greater than a 1.45 Takeoff EPR data determined in paragraph (h)(2) of this AD is greater than or equal to 21% and less than or equal to 37%, use A300 PW4158 Category 1 limits listed in Table 4 of this AD.

(iv) If the percentage of takeoffs with greater than a 1.45 Takeoff EPR data determined in paragraph (h)(2) of this AD is less than 21%, use A300 PW4158 Category 2 limits listed in Table 4 of this AD.

Return to Service Requirements for Engines To Be Installed on Airbus or McDonnell Douglas Airplanes

(i) Engines removed from service in accordance with paragraph (c), (d), or (g) of this AD may be returned to service and installed on Airbus or McDonnell Douglas airplanes under the following conditions:

(1) After passing a cool-engine fuel spike stability test (Testing-21) that has been done in accordance with one of the following PW4000 Engine Manuals (EM) as applicable, except for engines configured with Configuration E, or engines that have experienced a Group 3 takeoff surge:

(i) PW4000 EM 50A443, 71-00-00, TESTING-21, dated March 15, 2002.

(ii) PW4000 EM 50A822, 71-00-00, TESTING-21, dated March 15, 2002.

(2) Engines tested before the effective date of this AD, in accordance with PW4000 EM 50A443, 71-00-00, Testing-21, dated November 14, 2001; or PW4000 EM 50A822, 71-00-00, TESTING-21, dated November 14, 2001; or PW4000 EM 50A443, Temporary Revision No. 71-0026, dated November 14, 2001; or PW4000 EM 50A822, Temporary Revision No. 71-0018, dated November 14, 2001; or PW Internal Engineering Notice (IEN) 96KC973D, dated October 12, 2001, meet the requirements of TESTING-21; or

(3) After passing an on-wing Testing-21 on PW4460 and PW4462 engines installed on the MD-11 airplanes that has been done in accordance with Major IEN 02KCW13H, dated December 9, 2002 or done prior to the approval of Major IEN 02KCW13H, dated December 9, 2002 in accordance with Minor IEN 02KCW13F, dated October 14, 2002 except for engines configured with Configuration E, or engines that have experienced a Group 3 takeoff surge; or

(4) The engine HPC was replaced with an HPC that is new from production with no time in service; or

(5) The engine HPC has been overhauled, or the engine HPC replaced with an overhauled HPC with zero cycles since overhaul; or

(6) An engine that is either below or exceeds the limits of Table 3 or Table 4 of this AD may be removed and installed on another airplane without Testing-21, as long as the requirements of paragraph (c), (d), or (g) of this AD are met at the time of engine installation.

Return to Service Requirements for Engines To Be Installed on Boeing 747 or 767 Airplanes

(j) Engines removed from service in accordance with paragraph (c), (d), or (e) of this AD may be returned to service and installed on Boeing airplanes under the following conditions:

(1) After passing a cool-engine fuel spike stability test (Testing-21) that has been done in accordance with PW4000 EM 50A605, 71-00-00, Testing-21, dated June 15, 2003, except for engines configured with Configuration E, or engines that have experienced a Group 3 takeoff surge; or

(2) Engines tested before the effective date of this AD, in accordance with PW4000 EM 50A605, 71-00-00, Testing-21, dated March 15, 2002; or PW IEN 96KC973D, dated October 12, 2001; or PW4000 EM 50A605, Temporary Revision No. 71-0035, dated November 14, 2001 meet the requirements of Testing-21; or

(3) For PW4056 engines installed on Boeing 747 airplane, after successfully completing on-wing Testing-21 in accordance with Major IEN 02KCW13E, dated November 21, 2002 or if done prior to the approval of Major IEN 02KCW13E dated November 21, 2002 in accordance with Minor IENs 02KCW13, dated October 14, 2002, 02KCW13A, dated October 14, 2002, 02KCW13C, dated July 25, 2002, or 02KCW13D, July 29, 2002 except for engines configured with Configuration E, or engines that have experienced a Group 3 takeoff surge; or

(4) An engine that is either below or exceeds the limits of Table 3 or Table 4 of this AD may be removed and installed on another airplane without Testing-21, as long as the requirements of paragraph (c), (d), or (e) of this AD are met at the time of engine installation.

(5) Engine has incorporated the RCC rear HPC in accordance with PW SB PW4ENG 72-755, Revision 2, dated May 23, 2003. Completing this SB changes the engine configuration to Configuration I.

Phase 0 or Phase 1, FB2T or FB2B Fan Blade Configurations

(k) For Configuration A, B, C, D, E, F, G, and H engines with Phase 0 or Phase 1, FB2T or FB2B fan blade configurations complying with the requirements of AD 2001-09-05, (66 FR 22908, May 5, 2001), AD 2001-09-10, (66 FR 21853, May 2, 2001), or AD 2001-01-10, (66 FR 6449, January 22, 2001), do the following:

(1) Operators complying with the ADs listed in paragraph (k) of this AD using the weight restriction compliance method, must perform Testing-21 in accordance with paragraph (i) or (j) of this AD whenever any quantity of fan blades are replaced with new fan blades, overhauled fan blades, or with fan blades having the leading edges recontoured after the effective date of this AD, if during the shop visit the HPC is not overhauled and separation of a major engine flange, located between "A" flange and "T" flange, does not occur.

(2) If an operator changes from the weight restriction compliance method to the fan blade leading edge recontouring method after the effective date of this AD, testing-21 in accordance with paragraph (i) or (j) of this AD is required each time fan blade leading edge recontouring is done, if the fan blades accumulate more than 450 cycles since new or since fan blade overhaul, or since the last time the fan blade leading edges were recontoured.

Minimum Build Standard For Engines Installed on Airbus and McDonnell Douglas Airplanes

(l) Use the following minimum build standards for engines to be returned to service and installed on Airbus and McDonnell Douglas airplanes:

(1) After the effective date of this AD, do not install an engine with HPC and HPT modules where the CSO of the HPC is 1,500 cycles or greater than the CSN or CSO of the HPT.

(2) For any engine that undergoes an HPC overhaul after the effective date of this AD:

(i) Inspect the HPC mid hook and rear hook of the HPC inner case for wear in accordance with PW Clean, Inspect and Repair (CIR) Manual PN 51A357, Section 72-35-68 Inspection/Check-04, Indexes 8-11, dated December 15, 2002, or March 15, 2002, or September 15, 2001. If the HPC rear hook is worn beyond serviceable limits, replace the HPC inner case rear hook with an improved durability hook in accordance with PW SB PW4ENG 72-714, Revision 1, dated November 8, 2001, or Revision 2, dated February 28, 2003; or Chromalloy Florida Repair Procedure 00 CFL-039-0, dated December 27, 2000. If the HPC inner case mid hook is worn beyond serviceable limits, repair the HPC inner case mid hook in accordance with PW SB PW4ENG 72-749, dated June 17, 2002, or Revision 1, dated January 8, 2003; or Chromalloy Florida Repair Procedure 02 CFL-024-0, dated September 15, 2002.

(ii) After the effective date of this AD, any engine that undergoes an HPC overhaul may not be returned to service unless it meets the build standard of PW SB PW4ENG 72-484, PW4ENG 72-486, PW4ENG 72-514, and PW4ENG 72-575. Engines that incorporate the Phase 3 configuration already meet the build standard defined by PW SB PW4ENG 72-514.

(3) After the effective date of this AD, any engine that undergoes separation of the HPC and HPT modules must not be installed on an airplane unless it meets the build standard of PW SB PW4ENG 72-514. Engines that incorporate the Phase 3 configuration already meet the build standard defined by PW SB PW4ENG 72-514.

Minimum Build Standard for Engines Installed on Boeing 747 and 767 Airplanes

(m) For engines to be returned to service and installed on Boeing 747 and 767 airplanes, after the effective date of this AD:

(1) Any SCC HPC module that is disassembled to a level that fully separates the HPC rear case assembly at H flange from the HPC module may not be returned to service unless the RCC rear HPC is incorporated in accordance with PW SB PW4ENG 72-755, Revision 2, dated May 23, 2003. Any SCC HPC module that is not disassembled in accordance with (m)(1), must meet the following minimum build standard:

(i) Do not install an engine with HPC and HPT modules where the CSO of the HPC is 1,500 cycles or more than the CSN or CSO of the HPT.

(ii) Any engine that undergoes separation of the HPC and HPT modules must not be installed on an airplane unless it meets the build standard defined by PW SB PW4ENG 72-514. Engines that incorporate the Phase 3 configuration meet the build standard defined by PW SB PW4ENG 72-514.

Stability Testing Requirements for Engines To Be Installed on Airbus or McDonnell Douglas Airplanes

(n) For engines to be installed on Airbus or McDonnell Douglas airplanes, after the effective date of this AD, Testing-21 must be performed in accordance with paragraph (i) of this AD, before an engine can be returned to service after having undergone maintenance in the shop, except under any of the following conditions:

(1) The engine HPC was overhauled, or replaced with an overhauled HPC with zero cycles since overhaul; or the engine HPC was replaced with an HPC that is new from production with no time in service, or

(2) Engine maintenance intended to maintain the airworthiness of the engine between planned shop visits, that requires separation of a major engine flange located between "A" flange and "T" flange, that results in the engine being reassembled with all gas path-related components remaining in the as-removed condition, or

(3) Engines with an HPC having zero CSN or CSO, or engines that successfully passed Testing-21 with zero CST; and are split at Flange E for transportation reasons as specified in the applicable Storage/Transport section of the applicable Engine Manual.

Stability Testing Requirements for Engines To Be Installed on Boeing 747 or 767 Airplanes

(o) For engines to be installed on Boeing 747 or 767 airplanes, after the effective date of this AD, Testing-21 must be performed in accordance with paragraph (j) of this AD, before an engine can be returned to service after having undergone maintenance in the shop, except under any of the following conditions:

(1) Engine HPC has incorporated the RCC rear HPC in accordance with PW SB PW4ENG 72-755, Revision 2, dated May 23, 2003. Completing this SB changes the engine configuration to Configuration I; or

(2) Engine maintenance intended to maintain the airworthiness of the engine between planned shop visits, that requires separation of a major engine flange located between "A" flange and "T" flange, that results in the engine being reassembled with all gas path-related components remaining in the as-removed condition; or

(3) Engines that successfully passed Testing-21 with zero CST, and are split at Flange E for transportation reasons as specified in the applicable Storage/Transport section of the applicable EM.

Thrust Rating Changes, Installation Changes, and Engine Transfers

(p) When a thrust rating change has been made by using the Electronic Engine Control (EEC) programming plug, or an installation change has been made during an HPC overhaul, use the lowest cyclic limit of Table 3 or Table 4 of this AD, associated with any engine thrust rating change or with any installation change made during this period. See paragraph (v)(2) for definition of HPC overhaul period.

(q) When a PW4158 engine is transferred to another PW4158 engine operator whose engine fleet has a different category, use the lowest cyclic limit in Table 4 of this AD that was used or will be used during the affected HPC overhaul period.

(r) When a PW4158 engine operator whose engine fleet changes category in accordance with paragraph (h) of this AD, use the lowest cyclic limits in Table 4 of this AD that were used or will be used during the affected HPC overhaul period.

(s) Engines with an HPC having zero CSN or CSO at the time of thrust rating change, or installation change, or engine transfer between PW4158 engine operators, or subsequent change in operator engine fleet category in accordance with paragraph (h) of this AD in the direction of lower to higher Table 4 limits, are exempt from the lowest cyclic limit requirement in paragraphs (p), (q), and (r) of this AD.

Engines That Surge

(t) For engines that experience a surge, and after troubleshooting procedures are completed for airplane-level surge during forward or reverse thrust, do the following:

(1) For engines that experience a Group 3 takeoff surge, remove the engine from service before further flight and for engines that will be installed on Airbus or McDonnell Douglas airplanes, perform an HPC overhaul; or for engines that will be installed on Boeing airplanes, incorporate the RRC rear HPC in accordance with PW SB PW4ENG 72-755, Revision 2, dated May 23, 2003.

(2) For any engine that experiences a forward or reverse thrust surge at EPR's greater than 1.25 that is not a Group 3 takeoff surge, do the following:

(i) For Configuration A, B, C, D, F, G, and H engines, remove engine from service within 25 CIS or before further flight if airplane-level troubleshooting procedures require immediate engine removal, and perform Testing-21 in accordance with paragraph (i) or (j) of this AD, as applicable.

(ii) For Configuration E engines, remove engine from service within 25 CIS or before further flight if airplane-level troubleshooting procedures require immediate engine removal.

(3) Paragraphs (t)(1) and (t)(2) are not applicable to engines that incorporate the RCC rear HPC in accordance with PW SB PW4ENG 72-755, Revision 2, dated May 23, 2003.

Terminating Action for Boeing Airplanes

(u) For Boeing operators with PW4000 engines installed on Boeing 747 or Boeing 767 airplanes, modify the engine HPC assembly by incorporating the RCC rear HPC in accordance with PW SB PW4ENG 72-755, Revision 2, dated May 23, 2003 as follows:

(1) For engines installed on Boeing 767 airplanes, manage the engine configuration installed on the airplanes in your fleet as follows:

(i) By May 31, 2006 and thereafter, ensure that at least one Configuration I engine is installed on the airplane.

(ii) After May 31, 2006, the non-Configuration I engine (SCC HPC module) installed on the airplane must have incorporated the Haynes material in the HPC inner case rear hook during the original engine build or during an HPC overhaul in accordance with PW4ENG 72-714, Revision 1, dated November 8, 2001, or Revision 2, dated February 28, 2003; or SB PW4ENG 72-749, dated June 17, 2002, or Revision 1, dated January 8, 2003; or Chromalloy Florida Repair procedure 00CFL-039-0, dated December 27, 2000.

(2) For engines installed on Boeing 747 airplanes, manage the engine configuration installed on the airplanes in your fleet as follows:

(i) By January 31, 2007 and thereafter, ensure that no more than one non-Configuration I engine is installed on the airplane.

(ii) After January 31, 2007, the non-Configuration I engine installed on the airplane must have incorporated the Haynes-material in the HPC inner case rear hook during the original build or during an HPC overhaul in accordance with SB PW4ENG 72-714, dated June 27, 2000, or Revision 1, dated November 8, 2001, or Revision 2, dated February 28, 2003; or SB PW4ENG 72-749, dated June 17, 2002, or Revision 1, dated January 8, 2003; or Chromalloy Florida Repair procedure 00CFL-039-0, dated December 27, 2000.

(3) Prior to June 30, 2009 or whenever the HPC module is disassembled to a level that fully separates the HPC rear case assembly at H flange from the HPC module, whichever occurs first, incorporate the RCC rear HPC in accordance with PW SB PW4ENG 72-755, Revision 2, dated May 23, 2003. Engines incorporating the RCC rear HPC are Configuration I engines. See paragraph (v)(7) for definition of HPC rear case assembly.

(4) Incorporation of the RCC rear HPC constitutes terminating action to the Testing-21 requirements as specified in paragraph (o) of this AD, and engine stagger limit requirements as specified in paragraphs (c), (d), and (e) of this AD for engines installed on Boeing airplanes.

Note 2: Terminating action to this AD for engines installed on Airbus and McDonnell Douglas airplanes is pending RCC rear HPC certification to 14 CFR part 25. Once approved, this AD will be superseded to add terminating action requirements for the Airbus and McDonnell Douglas fleets.

Definitions

(v) For the purposes of this AD, the following definitions apply:

(1) An HPC overhaul is defined as restoration of the HPC stages 5 through 15 blade tip clearances to the limits specified in the applicable fits and clearances section of the engine manual.

(2) An HPC overhaul period is defined as the time period between HPC overhauls.

(3) An HPT overhaul is defined as restoration of the HPT stage 1 and 2 blade tip clearances to the limits specified in the applicable fits and clearances section of the engine manual.

(4) A Phase 3 engine is identified by a (-3) suffix after the engine model number on the data plate if incorporated at

original manufacture, or a "CN" suffix after the engine serial number if the engine was converted using PW SBs PW4ENG 72-490, PW4ENG 72-504, or PW4ENG 72-572 after original manufacture.

(5) A Group 3 takeoff surge is defined as the occurrence of any of the following engine symptoms that usually occur in combination during an attempted airplane takeoff operation (either at reduced, derated or full rated takeoff power setting) after takeoff power set, which can be attributed to no specific and correctable fault condition after completing airplane-level surge during forward thrust troubleshooting procedures:

- (i) Engine noises, including rumblings and loud "bang(s)."
- (ii) Unstable engine parameters (EPR, N1, N2, and fuel flow) at a fixed thrust setting.
- (iii) Exhaust gas temperature (EGT) increase.
- (iv) Flames from the inlet, the exhaust, or both.

(6) Takeoff EPR data is defined as Maximum Takeoff EPR if takeoff with Takeoff-Go-Around (TOGA) is selected or Flex Takeoff EPR if takeoff with Flex Takeoff (FLXTO) is selected. Maximum Takeoff EPR or Flex Takeoff EPR may be recorded using any of the following methods:

- (i) Manually recorded by the flight crew read from the Takeoff EPR power management table during flight preparation (see Aircraft Flight Manual (AFM) chapter 5.02.00 and 6.02.01, or Flight Crew Operation Manual (FCOM) chapter 2.09.20) and then adjusted by adding 0.010 to the EPR value recorded; or
- (ii) Automatically recorded during Takeoff at 0.18 Mach Number (Mn) (between 0.15 and 0.20 Mn is acceptable) using an aircraft automatic data recording system and then adjusted by subtracting 0.010 from the EPR value recorded; or
- (iii) Automatically recorded during takeoff at maximum EGT, which typically occurs at 0.25-0.30 Mn, using an aircraft automatic data recording system.

(7) HPC rear case assembly is defined as the HPC rear case with heat shields and other minor detail parts installed within the HPC rear case, but not including the HPC rear segmented stators.

Alternative Methods of Compliance

(w) An alternative method of compliance or adjustment of the compliance time that provides an acceptable level of safety may be used if approved by the Manager, Engine Certification Office (ECO). Operators must submit their request through an appropriate FAA Principal Maintenance Inspector, who may add comments and then send it to the Manager, ECO.

Note 3: Information concerning the existence of approved alternative methods of compliance with this AD, if any, may be obtained from the ECO.

Special Flight Permits and Testing-21 Reports

(x) Special flight permits may be issued in accordance with §§ 21.197 and 21.199 of the Federal Aviation Regulations (14 CFR 21.197 and 21.199) to operate the airplane to a location where the requirements of this AD can be done. Within 60 days of test date, report the results of the cool-engine fuel spike stability assessment tests (Testing-21) and on-wing Testing-21 to the ANE-142 Branch Manager, Engine Certification Office, 12 New England Executive Park, Burlington, MA 01803-5299, or by electronic mail to 9-ane-surge-ad-reporting@faa.gov. Reporting requirements have been approved by the Office of Management and Budget and assigned OMB control number 2120-0056. Be sure to include the following information:

- (1) Engine serial number.
- (2) Engine configuration designation per Table 1 of this AD.
- (3) Date of the cool-engine fuel spike stability test or on-wing Testing-21, as applicable.

(4) HPC Serial Number, and HPC time and cycles-since-new and since-compressor-overhaul at the time of the test.

(5) Results of the test (Pass or Fail).

Documents That Have Been Incorporated By Reference

(y) The actions must be done in accordance with the following Pratt and Whitney (PW) service bulletin (SB), Internal Engineering Notice (IEN), Temporary Revisions, (TR's), Clean, Inspection, and Repair Manual (CIR) repair procedures, engine manual (EM) sections, and Chromalloy Florida Repair Procedure:

Document No.	Pages	Revision	Date
PW SB PW4ENG72-714 Total pages: 12	1-2 3 4 5-12	1 Original 1 Original	Nov. 8, 2001. Jun. 27, 2000. Nov. 8, 2001. Jun. 27, 2000.
PW SB PW4ENG72-714 Total pages: 14	All	2	Feb. 28, 2003.
PW SB PW4ENG72-749 Total pages: 14	All	Original	Jun. 17, 2002.
PW SB PW4ENG72-749 Total pages: 14	1 2-4 5-7 8 9-10 11 12-14	1 Original 1 Original 1 Original 1	Jan. 8, 2003. Jun. 17, 2002. Jan. 8, 2003. Jun. 17, 2002. Jan. 8, 2003. Jun. 17, 2002. Jan. 8, 2003.
PW SB PW4ENG72-755 Total pages: 287	1 2-37 38-39 40-54 55 56-152 153 154-166 167-171 172-179 180-183 184-195 196 197-233 234 235-287	2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1	May 23, 2003. Apr. 8, 2003. May 23, 2003. Apr. 8, 2003. May 23, 2003. Apr. 8, 2003. May 23, 2003. Apr. 8, 2003. May 23, 2003. Apr. 8, 2003. May 23, 2003. Apr. 8, 2003. May 23, 2003. Apr. 8, 2003. May 23, 2003. Apr. 8, 2003.
PW IEN 96KC973D Total pages: 19	All	Original	Oct. 12, 2001.
PW TR 71-0018 Total pages: 24	All	Original	Nov. 14, 2001.
PW TR 71-0026	All	Original	Nov. 14, 2001.

Total pages: 24			
PW TR 71-0035	All	Original	Nov. 14, 2001.
Total pages: 24			
PW CIR 51A357, Section 72-35-68, Inspection/Check-04, Indexes 8-11.	All	Original	Sep. 15, 2001.
Total pages: 5			
PW CIR 51A357, Section 72-35-68, Inspection/Check-04, Indexes 8-11.	All	N/A	Mar. 15, 2002.
Total pages: 5			
PW CIR 51A357, Section 72-35-68, Inspection/Check-04, Indexes 8-11.	All	N/A	Dec. 15, 2002.
Total pages: 10			
PW4000 EM 50A443, 71-00-00, TESTING-21	All	Original	Mar. 15, 2002.
Total pages: 20			
PW4000 EM 50A605, 71-00-00, TESTING-21	All	Original	Mar. 15, 2002.
Total pages: 20			
PW4000 EM 50A605, 71-00-00, TESTING-21	1-7 8-25	Original N/A	Mar. 15, 2002. Jun. 15, 2003.
Total pages: 25			
PW4000 EM 50A822, 71-00-00, TESTING-21	All	Original	Mar. 15, 2002.
Total pages: 20			
Chromalloy Florida Repair Procedure, 00 CFL-039-0 Summary Insp/chk-01 Repair-01	1-3 801 901-903	Original Original Original	Dec. 27, 2000. Dec. 27, 2000. Dec. 27, 2000.
Total pages: 7			
Chromalloy Florida Repair Procedure, 02 CFL-024-0 Summary Inspection Repair	1-5 801-802 901-906	Original Original Original	Sep. 15, 2002. Sep. 15, 2002. Sep. 15, 2002.
Total pages: 13			

The incorporation by reference of IEN 96KC973D, dated October 12, 2001; TR 71-0018, TR 71-0026, and TR 71-0035, all dated November 14, 2001; and CIR 51A357, Section 72-35-68, Inspection/Check-04, Indexes 8-11, dated September 15, 2001 was approved by the Director of the Federal Register as of January 17, 2002 (67 FR 1, January 2, 2002). The incorporation by reference of SB PW4ENG 72-714, Revision 1, dated November 8, 2001, SB PW4ENG 72-749, dated June 17, 2002; EM 50A443, Section 71-00-00, Testing-21, EM 50A822, Section 71-00-00, Testing-21, EM 50A605, and Section 71-00-00, Testing-21, all dated March 15, 2002; Chromalloy Florida Repair Procedure, 00 CFL-039-0, dated December 27, 2000; and Chromalloy Florida Repair Procedure, 02 CFL-024-0, dated September 15, 2002; was approved by the Director of the Federal Register as of November 12, 2002 (67 FR 65484, October 25, 2002). The incorporation by reference of SB PW4ENG 72-714, Revision 2, February 28, 2003, SB PW4ENG 72-755, Revision 2, dated May 23, 2003; SB PW4ENG 72-749, Revision 1, dated January 8, 2003; SB PW4ENG 72-714, Revision 2, dated February 28, 2003; CIR 51A357, Section 72-35-68, Inspection/Check-04, Indexes 8-11, dated March 15, 2002; and dated December 15, 2002; and EM 50A605, Section 71-00-00, Testing-21,

dated June 15, 2003, was approved by the Director of the Federal Register on June 23, 2003, in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. PW document copies may be obtained from Pratt and Whitney, 400 Main St., East Hartford, CT 06108; telephone (860) 565-6600; fax (860) 565-4503. Chromalloy Florida document copies may be obtained from Chromalloy Florida, 630 Anchors St., NW., Walton Beach, FL 32548; telephone (850) 244-7684; fax (850) 244-6322. Copies may be inspected at the FAA, New England Region, Office of the Regional Counsel, 12 New England Executive Park, Burlington, MA; or at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC.

Effective Date

(z) This amendment becomes effective on July 7, 2003.