REVISION TRANSMITTAL SHEET

This sheet transmits Revision 40 to Service Bulletin No. TFE731-72-3001 titled ENGINE - SERVICE LIFE - Service Life Limits of Critical Life Limited Components.

This is a **COMPLETE** revision. This bulletin has been reprinted in its entirety. Please remove and discard all pages of prior issues and replace with pages of this revision.

Reason for Revision:

NOTE: This revision **DOES NOT** require further action if in compliance with a previous issue.

This service bulletin is revised to add Part No. 3073733 to Engine Model TFE731-3A/-3AR-200G and to add Part No. 3074096 to all TFE731-3 engines in *Table 4*.

Section 1

Title page is revised to reflect current revision date.

Section 2

Accomplishment instructions are revised to add Part No. 3073733 to Engine Model TFE731-3A/-3AR-200G and to add Part No. 3074096 to all TFE731-3 engines in *Table 4*.

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Previous Revisions:

Revision 1 dated Oct 25/73 Revision 2 dated Dec 28/73 Revision 3 dated Dec 17/74 Revision 4 dated Feb 28/75 Revision 5 dated Feb 28/78 Revision 6 dated May 15/79 Revision 7 dated July 20/79 Revision 8 dated June 20/80 Revision 9 dated Oct 27/80 Revision 10 dated Nov 12/80 Revision 11 dated Feb 17/81 Revision 12 dated Apr 23/81 Revision 13 dated June 11/82 Revision 14 dated Sept 13/82 Revision 15 dated June 30/83 Revision 16 dated Oct 26/83 Revision 17 dated Dec 8/83 Revision 18 dated Nov 15/84 Revision 19 dated Nov 30/84 Revision 20 dated Mar 7/85

Revision 21 dated May 17/85 Revision 22 dated Sept 19/86 Revision 23 dated June 24/88 Revision 24 dated Oct 20/89 Revision 25 dated June 6/90 Revision 26 dated Mar 29/91 Revision 27 dated Nov 29/91 Revision 28 dated Jan 17/92 Revision 29 dated Mar 23/92 Revision 30 dated Apr 24/92 Revision 31 dated June 23/92 Revision 32 dated Nov 20/92 Revision 33 dated Jan 29/93 Revision 34 dated May 11/93 Revision 35 dated June 1/93 Revision 36 dated July 27/93 Revision 37 dated Aug 20/93 Revision 38 dated Dec 16/93 Revision 39 dated Jan 4/94



ENGINE - SERVICE LIFE - SERVICE LIFE LIMITS OF CRITICAL LIFE LIMITED COMPONENTS

1. Planning Information

A. Effectivity

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This service bulletin is applicable to the following turbofan aircraft engines.

Part No.	Model No.	Prior to Serial No.	Application
3070000-1 thru -14		All	Falcon 10/100
3070300-1 thru -9/-11/-12	TFE731-2-2B	All	Learjet 35/36
3073000-2 thru -5	TFE731-2-2J	All	CASA 101
3073500-3/-5	TFE731-2-2L	All	AT-3
3074900-1/-2	TFE731-2-2N	All	IA-63
3073610-1/-2/-3	TFE731-2-3B	All	Learjet M31
3072800-1/-2/-4/-5	TFE731-3-1C	All	Falcon 50
3072300-1/-2/-4	TFE731-3-1E	All	731 Jetstar/L1329
3072600-1/-3	TFE731-3-1F	All	Jetstar II/L1329
3072500-1/-2/-4	TFE731-3-1G	All	Westwind 1124
3072900-2/-3/-4/-6/-7	TFE731-3-1H	All	BAe HS125-SERIES
3075300-2/-3	TFE731-2A-2A	All	K8
3073100-1 thru -4	TFE731-3-1J	All	CASA 101
3074850-1/-3	TFE731-3-1K	All	Jetstar II/L1329 (Springfield)
3073720-1	TFE731-2B-1V	All	PAMPA 2000
3074100-3/-6/-9	TFE731-3A-2B	All	Learjet 55
3074100-4/-7/-10	TFE731-3A-2B1	All	Learjet 55
3074550-1/-2/-3/-4	TFE731-3A-200G	All	IAI Astra 1125
3074560-1/-2/-3/-4	TFE731-3AR-200G	All	IAI Astra 1125
3074800-1/-4/-7/-9	TFE731-3AR-2B	All	Learjet 55
3074800-2/-5/-8	TFE731-3AR-2B1	All	Learjet 55
3074800-10/-13	TFE731-3AR-3B	All	Learjet 55
3074800-11/-14	TFE731-3AR-3B1	All	Learjet 55
3074800-12/-15	TFE731-3AR-3B2	All	Learjet 55
3074400-1/-2/-4/-5/ -6/-8	TFE731-3B-100S	All	Citation III/VI
3073400-1/-2/-4/-5/ -6/-8	TFE731-3BR-100S	All	Citation III/VI

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		Prior to	
Part No.	Model No.	Serial No.	Application
3074080-1/-2/-3	TFE731-3C-100S	All	Citation III/VI
3074070-1/-2/-3	TFE731-3CR-100S	All	Citation III/VI
3074040-1/-2/-3	TFE731-3C-200G	All	IAI Astra 1125
3074090-1/-2/-3	TFE731-3CR-200G	All	IAI Astra 1125
3073750-2/-3	TFE731-3R-1D	All	Sabreliner 65/65A (NA-265-65)
3074910-1 thru -4	TFE731-3R-1G	All	Westwind 1124
3074000-1 thru -6	TFE731-3R-1H	All	BAe HS125-SERIES
3073640-2	TFE731-4R-2S	All	Cessna Citation VII
3074970-1/-2	TFE731-5-1J	All	CASA 101
3074860-1/-2	TFE731-5AR-1C	All	Falcon 900
3075360-1/-2	TFE731-5AR-2C	All	Falcon 20-5
3075330-2/-3	TFE731-5BR-1C	All	Falcon 900B
3075370-1/-2	TFE731-5BR-2C	All	Falcon 20-5
3074600-1/-2	TFE731-5R-1H	All	BAe 125-800

1. B. Reason

To establish life limits of certain critical elements which are subject to low cycle fatigue induced by cyclic stresses caused primarily by thermal stresses combined with centrifugal or pressure loads induced during engine start and operation cycles.

C. Description

This service bulletin provides service life limits for critical components listed in Section 2.

D. Compliance

Not applicable.

E. Approval

The procedures outlined in this service bulletin have been found to comply with applicable Federal Aviation Regulations and are FAA approved.

F. Manhour Requirements

Not applicable.





AlliedSignal Propulsion Engines

1. G. Material - Price and Availability Not applicable.

H. Tooling - Price and Availability
None.

- I. Weight and Balance Not applicable.
- J. Publications References Not applicable.

K. Service Bulletin References

L. Other Publications Affected Not applicable.





2. Accomplishment Instructions

NOTE: Refer to applicable paragraph to determine service life limit requirements for applicable engine model.

Engine Model	Paragraph
TFE731-2	A
TFE731-2A/-2B/-3/-3A/-3AR/	В
-3B/-3BR/-3C/-3CR/-3R	
TFE731-4R	С
TFE731-5/-5AR/-5BR/-5R	D

A. (TFE731-2) Service Life Limits

- (1) Service life limits are based upon the engines being operated within approved operating limits and maintained in accordance with AlliedSignal published instructions.
- (2) The fan, low pressure compressor (LPC), high pressure compressor (HPC), high pressure turbine (HPT), and low pressure turbine (LPT) have components that are cyclic life limited and therefore require that an accurate history (cycles) be kept on their operation. Cycles must be determined and recorded as indicated in steps (3) and (4).
- (3) Each landing is to be counted as one cycle.

NOTE: If it is felt that this cycle counting method does not fit the mission being flown, contact AlliedSignal Customer Information Center.

- (4) To minimize cycle count penalties, the following alternate to counting landings where no engine shutdown occurs may be used. Refer to *Table 1* to determine component cycle count.
 - (a) Touch and go landing, followed by a flight confined to the landing pattern.
 - (b) Landings (which are not touch and go) where no engine shutdown occurs prior to the next flight.
- (5) Cycles as determined in step (3) or (4) above must be counted and recorded in the engine log book.
- (6) Upon removal (retire) from service of Life Limited Component(s), Life Limited Part Log Card must be updated from engine records (log book) and maintained (kept) with specific component(s) (part(s)) listed in *Table 2* and step A.(8). Forward a copy of completed card to AlliedSignal Engines, Reliability and Maintainability, Dept 93-47/503-4AC, P.O. Box 52181, Phoenix, AZ 85072-2181.

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(7) Refer to *Table 2* to determine established service life limits for critical elements.



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Component (Area)	Touch and Go	Landing (No Engine Shutdown)		
FAN	1/4	3/4		
LPC	0	1/2		
HPC	1/2	1/2		
HPT	0	0		
LPT	1/4	1		

Table 1. (TFE731-2) Component (Area) and Cycle Count

Table 2. (TFE731-2) Service Life Limits for Critical Elements

Components	Part No.	Service Life Cycles
(FAN) Fan		
Disc	3072162	4,100
Disc	3073436	4,100
Disc	3073539	7,100
Disc	307 3 563	10,000
Disc	3074107	10,000
Disc	3074529	7,100
(LPC) LP Axial Compressor Disc		
1st Stage	3072190	3,000
2nd Stage	3072191	3,700
3rd Stage	3072192	1,200
4th Stage	3072193	1,200
1st Stage	3072395	10,000
2nd Stage	3072396	10,000
3rd Stage	3072397	10,000
4th Stage	3072398	10,000
2nd Stage	3075190	10,000
3rd Stage	3075192	10,000
4th Stage	3075194	10,000
1st Stage	3075198	10,000



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Components	Part No.	Service Life Cycles
(HPC) HP Compressor		
Radial Impeller	3070274 (See Note 1)	6,200 5,100
Radial Impeller	3072639 (See Note 2)	6,200 5,100
Radial Impeller	3072931	3,000
Radial Impeller	3073393	10,000
Radial Impeller	3073394	10,000
Radial Impeller	3073398	10,000
Radial Impeller	3073433	10,000
Radial Impeller	3073434	10,000
Radial Impeller	3073435	10,000
(HPT) HP Turbine		
Disc	3072112	5,200
Disc	3072732	5,200
Disc	3073010	5,200
(LPT) LP Turbine Disc		
3rd Stage	3072068	9,500
2nd Stage	3072069	4,500
1st Stage	3072070	4,400
1st Stage	3073013	4,400
2nd Stage	3073014	4,500
3rd Stage	3073015	9,500

Table 2. (TFE731-2) Service Life Limits for Critical Elements (Cont)

NOTE 1: If HP Compressor Radial Impeller, Part No. 3070274, has been previously installed in Engine Model TFE731-3 (Engine Serial Numbers beginning with 75, 76, 77, 78, 80, 82, 83, 84, 85, 87 or 90) and is now installed in Engine Model TFE731-2, the service life cycle limit is 5,100 cycles. When cycle life limit is reached on Impeller, Part No. 3070274, impeller is reworkable to Part No. 3073393. After impeller is reworked to Part No. 3073393, cycle count returns to zero, with a service life limit of 10,000 cycles. Return impeller with life limit part log card to AlliedSignal, Phoenix, AZ for rework.

NOTE 2: If HP Compressor Radial Impeller, Part No. 3072639, has been previously installed in Engine Model TFE731-3 (Engine Serial Numbers beginning with 75, 76, 77, 78, 80, 82, 83, 84, 85, 87 or 90) and is now installed in Engine Model TFE731-2, the service life cycle limit is 5,100 cycles. When cycle life limit is reached on Impeller, Part No. 3072639, impeller is reworkable to Part No. 3073394. After impeller is reworked to Part No. 3073394, cycle count returns to zero, with a service life limit of 10,000 cycles. Return impeller with life limit part log card to AlliedSignal, Phoenix, AZ for rework.

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2. A. (8) Certain component parts of the fan, compressor and turbine do not have cyclic life limits assigned, but may have finite lives. Therefore, to provide a record of service experience and cycles (partial cycle counting in step (4) does not apply) for the following parts, a life limited part log card must be maintained. If part is removed, the life limited part log card must be updated and stay with that part.

Component	Part No.
(FAN)	
Fan Driveshaft	3071955
(LPC)	0070005
lie Hod	3070065
Tie Rod	3073049
(HPC) Shouldered Shaft	3070104
Shouldered Shaft	2071441
Shouldered Shall	3071441
Shouldered Shaft	3073444
(HPT)	
Seal Rotor (Thrust Balance Piston)	3072979
Seal Rotor (Thrust Balance Piston)	30734 4 8
•	
(LPT)	
Rotating Seal	3070154
Rotating Seal	3072621
Rotating Seal	3073016
Totaling bear	0070010

(9) Specific components when removed from the engine/aircraft (electronic engine control (EEC)/digital electronic engine control (DEEC) is aircraft mounted), require a record of operating hours and maintenance history. Therefore, to provide a history of operating hours and maintenance, a component maintenance/modification record card (SB TFE731-72-3397) must be maintained on the following components. If component is removed, the component maintenance/modification record card must be updated and stay with that component.

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Component	Part No.
EEC	949572
EEC	2101142
DEEC	2118002
Accessory Gearbox Assembly	3070003
Fuel Control Assembly	3070800
Fuel Pump	3070850
Combustion Chamber Plenum Case	3071330
Turbine Interstage Transition Duct	3071486
Combustion Chamber Plenum Case	3072443
Turbine Interstage Transition Duct	3072726
Turbine Interstage Transition Duct	3076070



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2. B. (TFE731-2A/-2B/-3/-3A/-3AR/-3B/-3BR/-3C/-3CR/-3R) Service Life Limits

- (1) Service life limits are based upon the engines being operated within approved operating limits and maintained in accordance with AlliedSignal published instructions.
- (2) The fan, low pressure compressor (LPC), high pressure compressor (HPC), high pressure turbine (HPT), and low pressure turbine (LPT) have components that are cyclic life limited and therefore require that an accurate history (cycles) be kept on their operation. Cycles must be determined and recorded as indicated in steps (3) and (4).
- (3) Each landing is to be counted as one cycle.

NOTE: If it is felt that this cycle counting method does not fit the mission being flown, contact AlliedSignal Customer Information Center.

- (4) To minimize cycle count penalties, the following alternate to counting landings where no engine shutdown occurs may be used. Refer to *Table 3* to determine component cycle count.
 - (a) Touch and go landing, followed by a flight confined to the landing pattern.
 - (b) Landings (which are not touch and go) where no engine shutdown occurs prior to the next flight.

Component (Area)	Touch and Go	Landing (No Engine Shutdown)
FAN	1/4	3/4
LPC	0	1/2
HPC	1/2	1/2
HPT	0	0
LPT	1/4	1

Table 3. (TFE731-2A/-2B/-3/-3A/-3AR/-3B/-3BR/-3C/-3CR/-3R) Component (Area) and Cycle Count



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NOTE: The TFE731-3R, -3AR, -3BR, and -3CR engines are approved at increased takeoff ratings relative to the -3, -3A, -3B, and -3C models, respectively. In some applications, operation at these increased ratings is limited to emergency purposes and is accomplished by utilizing an Automatic Performance Reserve (APR) feature. However, operation in excess of the takeoff limits for N2 and ITT applicable to the -3, -3A, -3B, and -3C result in increased stresses in critical life-limited components which must be taken into account in terms of accumulated cycles.

Maintenance checks of the APR system which are made at engine thrust settings below 80 percent low pressure rotor speed should not be counted.

- 2. B. (5) Use of Automatic Performance Reserve (APR).
 - (a) (TFE731-3AR/-3R) Use of the Automatic Performance Reserve (APR) resulting in operation in excess of 907°C (1665°F) ITT or 100 percent (29,692 rpm) N2 shall be noted in the engine log book.
 - (b) (TFE731-3BR) Use of the Automatic Performance Reserve (APR) resulting in operation in excess of 890°C (1635°F) ITT or 100 percent (29,692 rpm) N2 shall be noted in the engine log book.
 - (c) (TFE731-3CR) Use of Automatic Performance Reserve (APR) resulting in operation in excess of 910°C (1670°F) ITT or 100 percent (29,692 rpm) N2 shall be noted in the engine log book.
 - (6) Cycles shall be counted and recorded in engine log book as follows.
 - (a) Cycles as determined in step (3) or (4) above.
 - (b) An APR cycle, as determined in step (5)(a), (5)(b) or (5)(c) above (as applicable), shall be recorded as four cycles.
 - (c) APR operation requires Life Limited Components listed in *Table 4* and step B.(9) to have three additional cycles (total of four) imposed for each operation.

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- (7) Upon removal (retire) from service of Life Limited Component(s), Life Limited Part Log Card must be updated from engine records (log book) and maintained (kept) with specific component(s) (part(s)) listed in *Table 4* and step B.(9). Forward a copy of completed card to AlliedSignal Engines, Reliability and Maintainability, Dept 93-47/503-4AC, P.O. Box 52181, Phoenix, AZ 85072-2181.
- (8) Refer to Table 4 to determine established service life limits for critical elements.

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 Table 4. (TFE731-2A/-2B/-3/-3A/-3AR/-3B/-3BR/-3C/-3CR/-3R)

 Service Life Limits for Critical Elements

Components	Part No.	Service Life Cycles	-2A -3 -3R	-2B	-3A -3AR	-3B -3BR	-3C -3CR
(FAN) Fan			T *				
Disc	3072162	4,100	X				
Disc	3072816	10,000			Х	Х	х
Disc	3073436	4,100	Х				
Disc	3073539	7,100	Х				
Disc	3073563	10,000	Х				
Disc	3074107	10,000	Х	Х			
Disc	3074529	7,100	х	Х			
(LPC) LP Axial Compressor Disc							
1st Stage	3072395	10,000	Х		Х	Х	х
2nd Stage	3072396	10,000	Х		Х	Х	х
3rd Stage	3072397	10,000	Х		Х	Х	х
4th Stage	3072398	10,000	Х		Х	Х	
4th Stage	3074065	10,000	X	Х			
2nd Stage	3075190	10,000	Х	Х			
3rd Stage	3075192	10,000	Х	X			
4th Stage	3075194	10,000	Х				
1st Stage	3075198	10,000	Х	Х			
4th Stage	3075326	10,000					Х
(HPC) HP Compressor							
Radial Impeller	3070274 (Se e No te 1)	5,100	Х		Х	X	
Shouldered Shaft	307 2 545	12,000	Х		Х	Х	Х
Radial Impeller	3072639 (See Note 3)	5,100	Х		Х	Х	
Radial Impeller	3072931	3,000	Х		X	Х	
Shouldered Shaft	3073059	12,000	X	Х			
Radial Impeller	3073393	10,000	Х		Х	Х	х
Radial Impeller	3073394	10,000	Х		Х	Х	х
Radial Impeller	3073398	10,000	Х		Х	Х	х
Radial Impeller	3073433	10,000	Х				
Radial Impeller	3073434	10,000	Х				
Radial Impeller	3073435	10,000	Х	Х			

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Table 4.	(TFE731-2A/-2B/-3/-3A/-3AR/-3B/-3BR/-3C/-3CR/-3R)
	Service Life Limits for Critical Elements (Cont)

Components	Part No.	Service Life Cycles	-2A -3 -3R	-2B	-3A -3AR	-3B -3BR	-3C -3CR
(HPT) HP Turbine		· · · · · · · · · · · · · · · · · · ·					
Disc	3072316	7,000	Х		Х		
Rotor Seal Plate	3072411	10,000	Х		Х	Х	Х
Disc	3072748	4,200				Х	X
Rotor Stepped Seal Plate	3072827	10,000				Х	X
Rotor Seal Plate	3073057	10,000	X	Х			
Disc	3073110	7,000	х	X			
Disc	3075227	10,000				x	Х
(LPT) LP Turbine Disc							
1st Stage	3072351 (See Note 2)	3,000	Х		X	x	
1st Stage	3073497 (See Note 2)	3,000				X	.'
2nd Stage	3072542	3,000	Х		Х	X	
3rd Stage	3072544	3,000	Х		Х		
3rd Stage	3072821	6,000	Х		X	Х	Х
1st Stage	3073113 (See Note 2)	1,700	Х				
2nd Stage	3073114	1,700	Х				
3rd Stage	3073115	1,900	Х				
3rd Stage	3073572	6,000	Х				
1st Stage	3073733 (See Note 6)	3,000			Х		
1st Stage	3074054	3,000	Х	Х			
2nd Stage	3074056	3,000	Х	Х			
3rd Stage	3074058	6,000	Х	Х			
1st Stage	3074076	3,500					Х
2nd Stage	3074077	3,500					Х
3rd Stage	3074096	7,000	Х		Х	Х	X
1st Stage	3074103 (See Note 4)	3,000			Х		
2nd Stage	3074105 (See Note 5)	3,000			X		

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Table 4. (TFE731-2A/-2B/-3/-3A/-3AR/-3B/-3BR/-3C/-3CR/-3R) Service Life Limits for Critical Elements (Cont)

				-2A				
Component	is .	Part No.	Service Life Cycles	-3 -3R	-2B	-3A -3AR	-3B -3BR	-3C -3CR
(LPT) Rot	ating Seal Plate							
1st Stag	je	3073552	10,000					Х
1st Stag	je	3074053	3,000	х	Х			
<u>NOTE 1</u> :	When cycle life limit is read Part No. 3073393. After in zero, with a service life lim to AlliedSignal Engines, Pl	ched on Impell npeller is rewor it of 10,000 cyc hoenix, AZ for	er, Part No. 307 rked to Part No. cles. Return im rework.	0274, 30733 peller v	impelle 393, cy with life	er is rev cle cou e limit p	workab Int retu Part log	le to irns to card
<u>NOTE 2</u> :	Dimensionally inspect disc by the applicable inspectic operating hours.	for growth at ti on interval servi	he major period ice bulletin, but	ic insp not to	ection, exceed	at inte 1 1,700	rvals d) engin	efined e
<u>NOTE 3</u> :	When cycle life limit is read Part No. 3073394. After in zero, with a service life lim to AlliedSignal Engines, Pl	ched on Impell npeller is rewor it of 10,000 cyc hoenix, AZ for	er, Part No. 307 rked to Part No. cles. Return im rework.	2639, 30733 peller v	impelle 394, cy with life	er is rev cle cou e limit p	workab Int retu Part log	le to Irns to card
<u>NOTE 4</u> :	Refer to Service Bulletin, 7 the disc has accumulated engine operating hours pri (scrap) from service.	FE731-A72-38 750 engine op or to reaching	519. Replacem erating hours. I its life cycle of 3	ent of f the d 3,000 c	the dis isc acc cycles,	c is rec sumula it must	quired v tes 750 : be ret	when) ired
<u>NOTE 5:</u>	Refer to Service Bulletin, T vals not to exceed 1500 er operating hours prior to re- from service.	FE731-A72-38 ngine operating aching its life c	519. Inspection g hours. If the c ycle of 3,000 cy	of the lisc ac cles, i	disc is cumula t must	requir ites 4,5 be retii	red at in 500 eng red (sci	nter- gine rap)
<u>NOTE 6</u> :	Refer to Service Bulletin, 1 the disc has accumulated engine operating hours pri (scrap) from service.	FE731-A72-35 1500 engine o or to reaching	519. Replacem perating hours. its life cycle of 3	ent of If the 3,000 c	the dis disc ac ycles,	c is rec cumul it must	quired v ates 15 be reti	when 500 ired

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2. B. (9)

Certain component parts of the fan, compressor and turbine do not have cyclic life limits assigned, but may have finite lives. Therefore, to provide a record of service experience and cycles (partial cycle counting in step (4) does not apply) for the following parts, a life limited part log card must be maintained. If part is removed, the life limited part log card must be updated and stay with that part.

Component	Part No.
(FAN)	
Fan Driveshaft	3071955
(LPC)	
Tie Rod	3070065
Tie Rod	3073049
(LPT)	
Rotating Seal	3072350
Rotating Seal	3072729
Rotating Seal	3073116
Air Seal	3073355
Air Seal	3073382
Seal Support	3073764
Air Seal	3073765

(10) Specific components when removed from the engine/aircraft (electronic engine control (EEC)/digital electronic engine control (DEEC) is aircraft mounted), require a record of operating hours and maintenance history. Therefore, to provide a history of operating hours and maintenance, a component maintenance/modification record card (SB TFE731-72-3397) must be maintained on the following components. If component is removed, the component maintenance/modification record card must be updated and stay with that component.

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Component	Part No.
EEC	2101144
DEEC	2118002
Accessory Gearbox Assembly	3070003
Fuel Control Assembly	3070800
Fuel Pump	3070850
Turbine Interstage Transition Duct	3072318
LP First Stage Nozzle Assembly	3072319
Combustion Chamber Plenum Case	3072443
LP First Stage Nozzle Assembly	3072842
Turbine Interstage Transition Duct	3076070

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2. C. (TFE731-4R) Service Life Limits

- (1) Service life limits are based upon the engines being operated within approved operating limits and maintained in accordance with AlliedSignal published instructions.
- (2) The fan, low pressure compressor (LPC), high pressure compressor (HPC), high pressure turbine (HPT), and low pressure turbine (LPT) have components that are cyclic life limited and therefore require that an accurate history (cycles) be kept on their operation. Cycles must be determined and recorded as indicated in steps (3) and (4).
- (3) Each landing is to be counted as one cycle.

NOTE: If it is felt that this cycle counting method does not fit the mission being flown, contact AlliedSignal Customer Information Center.

- (4) To minimize cycle count penalties, the following alternate to counting landings where no engine shutdown occurs may be used. Refer to *Table 5* to determine component cycle count.
 - (a) Touch and go landing, followed by a flight confined to the landing pattern.
 - (b) Landings (which are not touch and go) where no engine shutdown occurs prior to the next flight.

Component (Area)	Touch and Go	Landing (No Engine Shutdown)
FAN	1/4	3/4
LPC	0	3/4
HPC	1/2	1/2
HPT	0	0
LPT	1/2	1

Table 5. (TFE731-4R) Component (Area) and Cycle Count





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NOTE: The TFE731-4R engine is approved at increased takeoff ratings. In some applications, operation at these increased ratings is limited to emergency purposes and is accomplished by utilizing an Automatic Performance Reserve (APR) feature. However, operation in excess of the takeoff limits for N2 and ITT, result in increased stresses in critical life-limited components which must be taken into account in terms of accumulated cycles.

> Maintenance checks of the APR system which are made at engine thrust settings below 80 percent low pressure rotor speed should not be counted.

- Use of the Automatic Performance Reserve (APR) resulting in operation in excess of 2. C. (5) 952°C (1746°F) ITT or 100 percent (29,989 rpm) N2 shall be noted in the engine log book.
 - Cycles shall be counted and recorded in engine log book as follows. (6)
 - Cycles as determined in step (3) or (4) above. (a)
 - An APR cycle, as determined in step (5) above, shall be recorded as four cycles. (b)
 - APR operation requires Life Limited Components listed in Table 6 and step C.(9) (C) to have three additional cycles (total of four) imposed for each operation.
 - Upon removal (retire) from service of Life Limited Component(s), Life Limited Part Log (7) Card must be updated from engine records (log book) and maintained (kept) with specific component(s) (part(s)) listed in Table 6 and step C.(8). Forward a copy of completed card to AlliedSignal Engines, Reliability and Maintainability, Dept 93-47/503-4AC, P.O. Box 52181, Phoenix, AZ 85072-2181.
 - Refer to Table 6 to determine established service life limits for critical elements. (8)
 - Certain component parts of the fan, compressor and turbine do not have cyclic life (9) limits assigned, but may have finite lives. Therefore, to provide a record of service experience and cycles (partial cycle counting in step (4) does not apply) for the following parts, a life limited part log card must be maintained. If part is removed, the life limited part log card must be updated and stay with that part.

Component (FAN)	Part No.
Fan Driveshaft	3071955
(LPC) Tie Rod	3074744
(LPT) Air Soal	3073765
All Seal	3074052
Ala Cast	2074701
Air Seal	3074741

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Components	Part No.	Service Life Cycles
(FAN) Fan	······································	·
Disc	3072816	10,000
(LPC) LP Axial Compressor Disc		
1st Stage	3072395	10,000
2nd Stage	3072396	10,000
3rd Stage	3072397	10,000
4th Stage	3075326	10,000
(HPC) HP Compressor		
Shouldered Shaft	3072545	12,000
Radial Impeller	3073394	10,000
Radial Impeller	3073398	10,000
(HPT) HP Turbine		
Rotor Seal Plate	3075205	10,000
Disc	3075227	10,000
(LPT) LP Turbine Disc		
2nd Stage	3075425	10,000
1st Stage	3075429	10,000
3rd Stage	3075436	10,000
1st Stage	3075446	10,000

Table 6. (TFE731-4R) Service Life Limits for Critical Elements

2. C. (10) Specific components when removed from the engine/aircraft (digital electronic engine control (DEEC) is aircraft mounted), require a record of operating hours and maintenance, a nance history. Therefore, to provide a history of operating hours and maintenance, a component maintenance/modification record card (SB TFE731-72-3397) must be maintained on the following components. If component is removed, the component maintenance/modification record card must be updated and stay with that component.

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Component	Part No.
DEEC	2118002
Accessory Gearbox Assembly	3070003
Fuel Control Assembly	3070800
Fuel Pump	3070850
Combustion Chamber Plenum Case	3072443
LP First Stage Nozzle Assembly	3075406
Turbine Interstage Transition Duct	3077063

2. D. (TFE731-5/-5AR/-5BR/-5R) Service Life Limits

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- (1) Service life limits are based upon the engines being operated within approved operating limits and maintained in accordance with AlliedSignal published instructions.
- (2) The fan, low pressure compressor (LPC), high pressure compressor (HPC), high pressure turbine (HPT), and low pressure turbine (LPT) have components that are cyclic life limited and therefore require that an accurate history (cycles) be kept on their operation. Cycles must be determined and recorded as indicated in steps (3) and (4).
- (3) Each landing is to be counted as one cycle.

NOTE: If it is felt that this cycle counting method does not fit the mission being flown, contact AlliedSignal Customer Information Center.

- (4) To minimize cycle count penalties, the following alternate to counting landings where no engine shutdown occurs may be used. Refer to *Table 7* to determine component cycle count.
 - (a) Touch and go landing, followed by a flight confined to the landing pattern.
 - (b) Landings (which are not touch and go) where no engine shutdown occurs prior to the next flight.

Component (Area)	Touch and Go	Landing (No Engine Shutdown)
FAN	0	1/2
LPC	Ο	3/4
HPC	1/2	1/2
HPT	0	0
LPT	1/2	1

Table 7. (TFE731-5/-5AR/-5BR/-5R) Component (Area) and Cycle Count



NOTE: The TFE731-5AR/-5BR/-5R engines are approved at increased takeoff ratings relative to the -5 models. In some applications, operation at these increased ratings is limited to emergency purposes and is accomplished by utilizing an Automatic Performance Reserve (APR) feature for -5AR-2C/-5BR-2C/-5R-1H engines and a Restricted Performance Reserve (RPR) or Manual Performance Reserve (MPR) (as applicable) feature for -5AR-1C engines. However, operation in excess of the takeoff limits for N2 and ITT applicable to the -5AR/-5BR/-5R, result in increased stresses in critical life-limited components which must be taken into account in terms of accumulated cycles and an operating time penalty if MPR is actuated.

Maintenance checks of the APR, RPR and MPR systems which are made at engine thrust settings below 80 percent low pressure rotor speed should not be counted.

- D. (5) (TFE731-5R-1H) Use of Automatic Performance Reserve (APR) resulting in operation in excess of 952°C (1746°F) ITT or 100 percent (29,692 rpm) N2 shall be noted in the engine log book.
 - (6) (TFE731-5AR-2C/-5BR-2C) Operation of the Automatic Performance Reserve (APR) shall automatically register as one cycle on the Digital Electronic Engine Control (DEEC) and shall be noted in engine log book.
 - (7) (TFE731-5AR-1C/-5BR-1C) Operation of the Restricted Performance Reserve (RPR) shall automatically register as one cycle on the Digital Electronic Engine Control (DEEC) and shall be noted in engine log book.
 - (8) (TFE731-5AR-1C) Actuation of the Manual Performance Reserve (MPR) shall automatically register as one cycle on the Digital Electronic Engine Control (DEEC) and shall be noted in engine log book.
 - (9) Cycles/time penalties shall be counted and recorded in engine log book as follows.
 - (a) Cycles as determined in step (3) or (4) above.
 - (b) An APR, RPR or MPR cycle, as determined in step (5), (6), (7), or (8) above, shall be recorded as four cycles.
 - (c) APR or RPR cycle, operation requires Life Limited Components listed in *Table 8* and step D.(11) to have three additional cycles (total of four) imposed for each operation.
 - (d) MPR cycle, operation requires Life Limited Components listed in *Table 8* and step D.(11) to have three additional cycles (total of four) imposed and one additional hour added to engine operating time for each operation.

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SERVICE BULLETIN

Table 8. (TFE731-5/-5AR/-5BR/-5R) Service Life Limits for Critical Elements

Components	Part No.	Service Life Cycles	-5	-5AR	-5R	-5BR
(FAN) Fan		<u></u>				
Disc	3074621	10,000		X	X	Х
Disc	3075163	10,000	Х			
(LPC) LP Axial Compressor Disc						
1st Stage	3072395	10,000		Х	Х	Х
2nd Stage	3072396	10,000		Х	X	Х
3rd Stage	3072397	10,000		X	Х	Х
4th Stage	3072398	10,000		Х	Х	
2nd Stage	3075190	10,000	Х			
3rd Stage	3075192	10,000	Х			
4th Stage	3075194	10,000	X			
1st Stage	3075198	10,000	Х			
4th Stage	3075326	10,000		Х	Х	X
(HPC) HP Compressor						
Shouldered Shaft	3072545	12,000		Х	Х	Х
Radial Impeller	3073394	10,000		Х	Х	Х
Radial Impeller	3073398	10,000		Х	Х	Х
Radial Impeller	3075171	10,000	Х			
Shouldered Shaft	3075172	12,000	Х			
(HPT) HP Turbine						
Rotor Seal Plate	3075173	10,000	Х			
Rotor Seal Plate	3075205	10,000		Х	Х	Х
Disc	3075227	10,000		Х	Х	Х
Di s c	3075228	10,000	X			
Rotor Seal Plate	3077065	10,000				Х
(LPT) LP Turbine Disc	•					
1st Stage	3074747	10,000		X	Х	Х
2nd Stage	3074752	5,000		Х	X	
3rd Stage	3074756	10,000		X	Х	
1st Stage	3075183	10,000	X			
2nd Stage	3075186	5,000	Х			
3rd Stage	3075188	10,000	X			
2nd Stage	3075425	10,000		Х	X	Х
3rd Stage	3075436	10,000		X	Х	X
1st Stage	3075446	10,000		Х	Х	Х

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- 2. D. (9) (e) Upon removal (retire) from service of Life Limited Component(s), Life Limited Part Log Card must be updated from engine records (log book) and maintained (kept) with specific component(s) (part(s)) listed in *Table 8* and step D.(11). Forward a copy of completed card to AlliedSignal Engines, Reliability and Maintainability, Dept 93-47/503-4AC, P.O. Box 52181, Phoenix, AZ 85072-2181.
 - (10) Refer to Table 8 to determine established service life limits for critical elements.
 - (11) Certain component parts of the fan, compressor and turbine do not have cyclic life limits assigned, but may have finite lives. Therefore, to provide a record of service experience and cycles (partial cycle counting in step (4) does not apply) for the following parts, a life limited part log card must be maintained. If part is removed, the life limited part log card must be updated and stay with that part.

Component	Part No.
(FAN)	
Fan Spinner	3074623
Fan Driveshaft	3074641
Fan Spinner	30752 12
(LPC)	
Tie Rod	3074744
(LPT)	
Air Seal	3073765
Seal Support	3074052
Air Seal	3074741

(12) Specific components when removed from the engine/aircraft (digital electronic engine control (DEEC) is aircraft mounted), require a record of operating hours and maintenance history. Therefore, to provide a history of operating hours and maintenance, a component maintenance/modification record card (SB TFE731-72-3397) must be maintained on the following components. If component is removed, the component maintenance/modification record card must be updated and stay with that component.

TFE731-72-3

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Component	Part No.
DEEC	2118002
Accessory Gearbox Assembly	3070003
Fuel Control Assembly	3070800
Fuel Pump	307085 0
Combustion Chamber Plenum Case	3072443
Turbine Interstage Transition Duct	3074766
LP First Stage Nozzle Assembly	3075225
LP First Stage Nozzle Assembly	3075271
LP First Stage Nozzle Assembly	3075406
Turbine Interstage Transition Duct	3077063
LP First Stage Nozzle Assembly	3077104
LP First Stage Nozzle Assembly	3077105





AlliedSignal Propulsion Engines

3. Material Information

None

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AlliedSignal Engines Phoenix, Arizona

CERTIFICATE OF COMPLIANCE

To: **Operator or Service Center Performing Modification**

Upon modification of equipment, please fill in the information requested below, then mail or fax the completed certificate to:

> AlliedSignal Engines Attn: Information Services, Dept. 66-03/2102-124 P.O. Box 29003 Phoenix, AZ 85038-9003 FAX: 602-365-2025

Owner/Operator

٩

Aircraft Model ______Aircraft Serial No. _____

I certify that the following engine/equipment has been modified in accordance with the listed Service Bulletins.

ENGINE/EQUIPMENT

NO. 1	NO. 2	NO. 3	NO. 4
PART NO.	PART NO.	PART NO.	PART NO.
MODEL NO.	MODEL NO.	MODEL NO.	MODEL NO.
SERIAL NO.	SERIAL NO.	SERIAL NO.	SERIAL NO.
TSN/TSO	TSN/TSO	TSN/TSO	TSN/TSO
CYCLES	CYCLES	CYCLES	CYCLES
SERVICE BULLETIN REVISION NO. NO.	SERVICE BULLETIN REVISION NO. NO.	SERVICE BULLETIN REVISION NO. NO.	SERVICE BULLETIN REVISION NO. NO.
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Signature Repair Facility



REVISION TRANSMITTAL SHEET

This sheet transmits Revision 42 to Service Bulletin No. TFE731-72-3001 titled ENGINE - SERVICE LIFE - Service Life Limits of Critical Life Limited Components.

This is a **COMPLETE** revision. This bulletin has been reprinted in its entirety. Please remove and discard all pages of prior issues and replace with pages of this revision.

Reason for Revision:

NOTE: This revision **DOES NOT** require further action if in compliance with a previous issue.

This service bulletin is revised to:

Add Engine Models TFE731-3AR-2B2 and TFE731-5BR-1H.

Update Engine Part No. on Engine Model, TFE731-5BR-1C.

Add HP Turbine Seal Plate, Part No. 3075579, to Table 5.

Add Fuel Pump, Part No. 3060710, to Table 6.

Add HP Compressor Shouldered Shaft, Part No. 3075617, to Table 5.

Section 1

Paragraph A is revised to add engine models TFE731-3AR-2B2 and TFE731-5BR-1H and to update Engine Part No. on Engine Model, TFE731-5BR-1C.

Paragraph K is revised to delete reference to Service Bulletin TFE731-72-3501.

Section 2

July 17/95

Accomplishment instructions are revised to:

Add HP Turbine Seal Plate, Part No. 3075579, to Table 5.

Add Fuel Pump, Part No. 3060710, to Table 6.

Add Engine Models TFE731-3AR-2B2 and TFE731-5BR-1H.

Add HP Compressor Shouldered Shaft, Part No. 3075617, to Table 5.



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Previous Revisions:

Revision 1 dated Oct 25/73 Revision 2 dated Dec 28/73 Revision 3 dated Dec 17/74 Revision 4 dated Feb 28/75 Revision 5 dated Feb 28/78 Revision 6 dated May 15/79 Revision 7 dated July 20/79 Revision 8 dated June 20/80 Revision 9 dated Oct 27/80 Revision 10 dated Nov 12/80 Revision 11 dated Feb 17/81 Revision 12 dated Apr 23/81 Revision 13 dated June 11/82 Revision 14 dated Sept 13/82 Revision 15 dated June 30/83 Revision 16 dated Oct 26/83 Revision 17 dated Dec 8/83 Revision 18 dated Nov 15/84 Revision 19 dated Nov 30/84 Revision 20 dated Mar 7/85 Revision 21 dated May 17/85

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Revision 22 dated Sept 19/86 Revision 23 dated June 24/88 Revision 24 dated Oct 20/89 Revision 25 dated June 6/90 Revision 26 dated Mar 29/91 Revision 27 dated Nov 29/91 Revision 28 dated Jan 17/92 Revision 29 dated Mar 23/92 Revision 30 dated Apr 24/92 Revision 31 dated June 23/92 Revision 32 dated Nov 20/92 Revision 33 dated Jan 29/93 Revision 34 dated May 11/93 Revision 35 dated June 1/93 Revision 36 dated July 27/93 Revision 37 dated Aug 20/93 Revision 38 dated Dec 16/93 Revision 39 dated Jan 4/94 Revision 40 dated May 4/94 Revision 41 dated Aug 4/94



AlliedSignal SERVICE BULLETIN

AlliedSignal Engines

ENGINE - SERVICE LIFE - SERVICE LIFE LIMITS OF CRITICAL LIFE LIMITED COMPONENTS

1. Planning Information

A. Effectivity

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This service bulletin is applicable to the following turbofan aircraft engines.

		Prior to	1
Part No.	Model No.	<u>Serial No.</u>	Application
3070000-1 thru -14	TFE731-2-1C	All	Falcon 10/100
3070300-1 thru	TFE731-2-2B	All	Learjet 35/36
-9/-11/-12			
3073610-1/-2/-3	TFE731-2-3B	All	Learjet M31 222 - Market
3072800-1/-2/-4/-5	TFE731-3-1C	Ali	Falcon 50 March Structure et M
3072300-1/-2/-4	TFE731-3-1E	All	731 Jetstar/L1329
3072600-1/-3	TFE731-3-1F	All	Jetstar II/L1329
3072500-1/-2/-4	TFE731-3-1G	All	Westwind 1124
3072900-2/-3/-4/-6/-7	TFE731-3-1H	All	BAe HS125-SERIES
3074850-1/-3	TFE731-3-1K	All	Jetstar II/L1329 (Springfield)
3074100-3/-6/-9	TFE731-3A-2B	All	Learjet 55
3074100-4/-7/-10	TFE731-3A-2B1	All	Learjet 55
3074550-1/-2/-3/-4	TFE731-3A-200G	All	IAI Astra 1125
3074560-1/-2/-3/-4	TFE731-3AR-200G	All	IAI Astra 1125
3074800-1/-4/-7	TFE731-3AR-2B	All	Learjet 55
3074800-2/-5/-8	TFE731-3AR-2B1	All	Learjet 55 and 80 million
3074800-9	TFE731-3AR-2B2	All	∜ Lēarjet 55 ∷ ≉b ≌⊺ a⇔ab
3074800-10/-13	TFE731-3AR-3B	All	Cearjet 55 35 Thomas
3074800-11/-14	TFE731-3AR-3B1	All	Learjet 55
3074800-12/-15	TFE731-3AR-3B2	All	Learjet 55
3074400-1/-2/-4/-5/ -6/-8	TFE731-3B-100S	All	Citation III/VI
3073400-1/-2/-4/-5/ -6/-8	TFE731-3BR-100S	All	Citation III/VI
3074080-1/-2/-3	TFE731-3C-100S	All	Citation III/VI
3074070-1/-2/-3	TFE731-3CR-100S	All	Citation III/VI
3074040-1/-2/-3	TFE731-3C-200G	All	IAI Astra 1125
3074090-1/-2/-3	TFE731-3CR-200G	All	IAI Astra 1125

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nal SERVICE BULLETIN

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Part No.	Model No.	Prior to Serial No.	Application
3073750-2/-3	TFE731-3R-1D	All	Sabreliner 65/65A (NA-265-65)
3074910-1 thru -4	TFE731-3R-1G	All	Westwind 1124
3074000-1 thru -6	TFE731-3R-1H	All	BAe HS125-SERIES
3073640-2	TFE731-4R-2S	All	Cessna Citation VII
3074860-1/-2	TFE731-5AR-1C	Ali	Falcon 900
3075360-1/-2	TFE731-5AR-2C	All	Falcon 20-5
3075330-3/-4/-5	TFE731-5BR-1C	All	Falcon 900B
3075160-1/-2/-3	TFE731-5BR-1H	All	Hawker 800XP
3075370-2	TFE731-5BR-2C	All	Falcon 20-5
3074600-1/-2	TFE731-5R-1H	All	Hawker 800

1. B. Reason

- (1) Problem: Turbofan engines incur component stresses during normal operation. Accurate accounting of engine stress cycles and operating hours for turbofan engines ensures that no critical component remains in operation beyond its service life limit.
- (2) Background: Critical engine components are components whose failure could threaten the structural integrity of the engine. Certain critical components of turbine engines have service life limits. These components may fail, when subjected to repeated or alternating stresses (cyclic fatigue) or operating time at temperature (stress rupture). Stress cycles of turbine engine critical components result from the transients of engine speed and temperature which occur during normal engine operation. Life limits expressed in "cycles", can be related to the number of stress cycles which occur during engine operation. Life limits expressed in hours can be related to operating time at temperature which occurs during normal engine operation. Life limits define the useful service life of a component so that it may be removed from service before possible failure.
- (3) Action: AlliedSignal has established life limits on critical components through analysis and/or testing. It is imperative that operators maintain accurate records of life limited components. AlliedSignal has developed a cycle counting methodology to ensure accurate records of all engine cycles are maintained. This methodology requires that every landing be counted as one cycle, and authorizes partial cycle counting for specific critical components.



SERVICE BULLETIN AlliedSignal Engines

1. C. Description

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This service bulletin provides service life limits for critical components, with associated policies and procedures listed in Section 2.

D. Compliance

Not applicable.

E. Approval

The procedures outlined in this service bulletin have been found to comply with applicable Federal Aviation Regulations and are FAA approved.

E.	Manhour Requirements	ye maar Anni	8-9-1- 6 8-1-76-3
			and a static state of a State of the state of the stat
	Not applicable.	en en Service Service (1)	

G. Material - Price and Availability

Not applicable.

Tooling - Price and Availability Η.

None.

Weight and Balance I.

Not applicable.

J. **Publications References** Not applicable.

K. Service Bulletin References

Not applicable.

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Other Publications Affected L. Not applicable.



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2. Accomplishment Instructions

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A. TFE731 Service Life Limits

- (1) Service life limits are based upon engines being operated within approved operating limits and maintained in accordance with AlliedSignal published instructions.
- (2) The fan (FAN), low pressure compressor (LPC), high pressure compressor (HPC), high pressure turbine (HPT), and low pressure turbine (LPT) have specific critical components that are cyclic life limited.
- (3) EACH LANDING IS TO BE COUNTED AS ONE CYCLE. (See Example.)
- <u>NOTE</u>: Operators which perform extensive touch and go landings or full stop landings without associated engine shutdowns may elect to use partial cycle counting. Partial cycle counting can reduce cost of ownership without sacrificing safety.
 - If it is felt that this cycle counting method does not fit the mission being flown, contact the AlliedSignal Customer Information Center.
- (4) Partial Cycle Counting.
 - (a) Landings without associated engine shutdowns result in less damage accumulation for some critical components than a landing coupled with an engine shutdown. To minimize cycle count penalties, the following alternative to counting landings, where no engine shutdown occurs, may be used. The following operational procedures are eligible for partial cycle counting.
 - Touch and go landing, followed by a flight confined to the landing pattern.
 - 2 Landings (which are not touch and go) where no engine shutdown occurs prior to the next flight.

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(b) Partial cycle counting applies to specific critical components only.

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2. A. (4)

(c) Partial cycle counts should be applied as shown in *Table 1*. Partial cycles are calculated by multiplying the number of touch and go landings and/or the number of full stop landings without shutdown by the appropriate cycle multiplier for each critical component listed in *Table 1*. Partial cycle counts are in addition to the one (1) cycle count for each full stop landing with shutdown as shown in the following example.

EXAMPLE:

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Training flight, 5 Touch & Go (T&G) Landings + 1 Full Stop Landing With Shutdown. Example for Fan Disc Only.

Every Landing Equals One Cycle Method (2.A.(3)):

5 T&G Landings + 1 Full Stop Landing = 6 Fari Disc Ovoles

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Partial Cycle Counting Method (2.A.(4)): grantedebuarter

Fan Disc Partial Cycle T&G Landing Multiplier = 0.25 (using Table 1 for a TFE731-2 engine)

(5 T&G Landings X 0.25) + 1 Full Stop Landing = 2.25 Fan Disc Cycles

			Ta	ble 1	-20)	nitivy on stra		i yan Yenna	
				P	artial Cycle	• Multiplier	S		
			Touch & G	io Landing		Full St	op Landir	ng (No Shui	tdown)
			TFE	731			TFI	E731	
Engine Section	Component	-2	-3	-4	-5	-2	-3	-4	-5
FAN	Fan Disc	0.25	0.25	0.25	0.00	0.75	0,75	0.75	0.50
LPC	LPC1 Disc	0.00	0.00	0.00	0.00	0.50	0,50	0.75	0.75
	LPC2 Disc	0.00	0.00	0.00	0.00	0.50	0.50	0.75	0.75
	LPC3 Disc	0.00	0.00	0.00	0.00	0.50	0.50	0.75	0.75
	LPC4 Disc	0.00	0.00	0.00	0.00	0.50	0.50	0.75	0.75
HPC	Impeller	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
HPT	HPT Disc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Seal Plate	NA	1.00	1.00	1.00	NA	1.00	1.00	1.00
LPT	LPT1 Disc	0.25	0.25	0.50	0.50	1.00	1.00	1.00	1.00
	LPT2 Disc	0.25	0.25	0.50	0.50	1.00	1.00	1.00	1.00
	LPT3 Disc	0.25	0.25	0.50	0.50	1.00	1.00	1.00	1.00



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2. A. (5) Performance Reserve Systems.

NOTE: The TFE731-3AR, -3BR, -3R, -3CR, -4R, -5AR, -5BR, and -5R engines are approved for increased takeoff ratings. Operation at these increased ratings are accomplished by utilizing an Automatic Performance Reserve (APR) feature for -3AR, -3R, -3BR, -3CR, -4R, -5AR-2C, -5BR-1H, -5BR-2C, and -5R engines, a Restricted Performance Reserve (RPR) feature for -5AR-1C and -5BR-1C engines, or

Manual Performance Reserve (MPR) feature for -5AR-1C engines.

Operation at the increased takeoff ratings result in increased stress cycles in the critical life limited components, and must be accounted for in terms of accumulated cycles.

Maintenance checks of the performance reserve systems which are made at engine thrust settings below 80 percent N1 speed should not be counted.

- (a) Automatic Performance Reserve (APR).
 - 1999 1999 1999 1999 1999 1999 1999 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -

APR operation is for use in emergency situations with one engine inoperative or low on power.

- 1 **(TFE731-3AR/-3R)** Use of APR which results in operation in excess of 907°C ITT or 100 percent N2 shall be noted in the engine log book.
- 2 **(TFE731-3BR)** Use of APR which results in operation in excess of 890°C ITT or 100 percent N2 shall be noted in the engine log book.
- or 100 percent N2 shall be noted in the engine log book.
 - 4 **(TFE731-4R)** Use of APR which results in operation in excess of 952°C ITT or 100 percent N2 shall be noted in the engine log book.
 - 5 (TFE731-5AR-2C/-5BR-2C/-5BR-1H) Use of APR shall automatically register as one actuation in the Digital Electronic Engine Control (DEEC) and shall be noted in the engine log book.
 - 6 **(TFE731-5R)** Use of APR which results in operation in excess of 952°C ITT or 100 percent N2 shall be noted in the engine log book.
 - (b) Restricted Performance Reserve (RPR).

RPR operation is for use when ambient conditions fall within a specific inlet pressure and temperature range.

1 (TFE731-5AR-1C/-5BR-1C) Use of RPR shall automatically register as one actuation in the Digital Electronic Engine Control (DEEC) and shall be noted in the engine log book.

(c) Manual Performance Reserve (MPR). MPR operation is for use when ambient conditions fall within a specific inlet temperature range.

1 **(TFE731-5AR-1C)** Use of MPR shall automatically register as one actuation in the Digital Electronic Engine Control (DEEC) and shall be noted in the engine log book.

NOTE: Partial cycle counts apply only to specific life limited components.

- (6) Cycles shall be counted and recorded in engine log book as follows,
 - (a) Cycles as determined in steps (3) and (4).
 - (b) Each APR, RPR, or MPR actuation, as determined in step (5), must have three
 (3) additional cycles added to all critical life limited components and the basic engine. Partial cycle credits do not apply to APR, RPR, or MPR actuations.
- (7) When a life limited component is removed from service the Life Limited Part Log Card must be updated and kept with the retired component. Forward a copy of the completed card to:

AlliedSignal Engines Reliability and Maintainability	548-105 330) 5 TT 0 500	4.
Dept. 93-42/554-12		
P.O. Box 52181		Ça
Phoenix, AZ 85072-2181		

(8) Refer to the applicable table to determine the service life limit requirements for the following engine models:

Engine Model TFE731-2-1C/-2B/-3B TFE731-3/-3A/-3AR/-3B/-3BR/-3C/-3CR/-3R TFE731-4R TFE731-5AR/-5BR/-5R

<u>лаынаного</u> зот 2 (6 г.м. 3 (Ал. 4 (СЭТТ)) са э(5) ав м 3 г. эвтор ер Знасят ал альар дых

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Table 2. (TFE731-2-1C/-2B/-3B) Service Life Limits for Critical Components

Components	Part No.	Service Life Cycles
(FAN) Fan		
Fan Driveshaft	3071955	(See Note 1)
Disc OGA	3072162	4,100
Disc DOG A	3073539	7,100
Disc Contraction	3073563	10,000
an start un fai		
(LPC) LP Axial Compressor		
-The Rod e)ಡೆಬ್ಬತ್ ಕಡೆ ಕ್ಷಿಟಿಯ ಗ್ರೇಷೆ ಬಿತ್ರಾಗ್ರವರ್ಷ	3070065	(See Note 1)
	3072190	3,000
2nd Stage Disc.	3072191	3,700
3rd Stage Disc	3072192	1,200
4th Stage Disc	3072193	1,200
1st Stage Disc	3072395	10,000
2nd Stage Disc	3072396	10,000
3rd Stage DiscMay at MULLYDONOS .ch	3072397	10,000
4th Stage Disc	3072398	10,000
Tie Rod	3073049	(See Note 1)
HPC) HPCompressorate and the state		
Shouldered Shaft	3070104	(See Note 1)
Radial Impeller	3070274	6,200
20, 40, 20, 20, 20, 20, 20, 20, 20, 20, 20, 2	(See Note 2)	5,100
Shouldered Shaft	3071441	(See Note 1)
Radial Impeller of average of Yak a new	3072639 (See Note 3)	6,200 5,100
Radial Impeller	3072931	3,000
Radial Impeller	3073393	10,000
Radial Impeller	3073394	10,000
Radial Impeller	3073398	10,000
(HPT) HP Turbine		
Disc	3072112	5,200
Disc	3072732	5,200
Seal Rotor (Balance Piston)	3072979	(See Note 1)

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Table 2. (TFE731-2-1C/-2B/-3B) Service Life Limits for Critical Components (Cont)

Components	Part No.	Service Life Oycles
(LPT) LP Turbine		as (NAS)
Rotating Seal	3070154	(See Note 1)
3rd Stage Disc	3072068	9,500
2nd Stage Disc	3072069	4,500 DelG
1st Stage Disc	3072070	4,400
Rotating Seal	3072621	(See Note 1)
•		

telesignod kixa 91 (OPL)

- NOTE 1: These component parts have not had cyclic life limits assigned, but may be subject to fallure as a result of undetected abuse and unpredictable contingencies. Therefore, to provide a record of service experience and cycles (partial cycle counting does not apply), a life limited part log card must be maintained. If the part is removed, the life limited part log card must be updated and stay with that part. ଅହାପି କୁନ୍ଛାବି ାାରି
- If HP Compressor Radial Impeller, Part No. 3070274, has been previously installed in ... NOTE 2: Engine Model TFE731-3 (Engine Serial Numbers beginning with 75, 76, 77, 78, 80, 82, 83, 84, 85, 87, or 90) and is now installed in Engine Model TFE731-2, the service life cycle limit is 5,100 cycles. volu soste u

When the cycle life limit is reached on Impeller, Part No. 3070274, it is reworkable to Part No. 3073393 per SB TFE731-72-3239RWK. After impeller is reworked to Part No. 3073393, cycle count returns to zero, with a service life limit of 10,000 cycles. Return impeller with life limit part log card to AlliedSignal, Phoenix, AZ for rework.

If HP Compressor Radial Impeller, Part No. 3072639, has been previously installed in NOTE 3: Engine Model TFE731-3 (Engine Serial Numbers beginning with 75, 76, 77, 178, 80, 82, 83, 84, 85, 87, or 90) and is now installed in Engine Model TFE731-2, the service life cycle limit is 5,100 cycles.

> When the cycle life limit is reached on Impeller, Part No. 3072639, it is reworkable to Part No. 3073394 per SB TFE731-72-3239RWK. After impeller is reworked to Part No. 3073394, cycle count returns to zero, with a service life limit of 10,000 cycles. Return impeller with life limit part log card to AlliedSignal, Phoenix, AZ for rework. Heam Habar

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Components	5.5. 5.1.	id in The Alm	S.		Part No.	Service Life Cycles	-3 -3R	-3A -3AR	-3B -3BR	-3C -3CR
(FAN) Fan		<u></u>								
Fari Drive	shaft				3071955	(See Note 1)	Х	Х	Х	Х
Disc	Д. Д	X.	•		3072162	4,100	Х			
Disc					3072816	10,000		Х	Х	Х
Disc	Ú.				3073539	7,100	Х			
Disc	X	X			3073563	10,000	X			
(LPC) LP A	xial C	ompres	ssor							
Tie Rod	X	X	2	(*	3070065	(See Note 1)	Х	Х	Х	Х
1st Stage	Disc		<i></i> *.		3072395	10,000	Х	Х	Х	Х
2nd Stag	e Disc	1. A 3. Ta	×	f etc	3072396	10,000	Х	Х	Х	Х
3rd Stage	e Disc			(e	3072397	10,000	Х	Х	Х	Х
4th Stage	e Disc				3072398	10,000	Х	Х	Х	
Tie Rod		215			3073049	(See Note 1)	Х	Х	Х	X
4th Stage	e Disc				3075326	10,000				Х
(HPC) HP (Compi	ressor	X	T ett						
Radial Im	peller			ो और	3070274 (See Note 2)	5,100	Х	Х	Х	
Shoulder	ed Sh	aft			3072545	12,000	Х	Х	Х	Х
Radial Im	peller	2			3072639 (See Note 3)	5,100	Х	х	Х	
Radial Im	npeller				3072931	3,000	Х	Х	Х	
Radial Im	npeller	•			3073393	10,000	Х	Х	Х	Х
Radial Im	npeller				3073394	10,000	Х	Х	Х	Х
Radial In	npeller				3073398	10,000	Х	Х	Х	Х
ः ेः (HPT) HPी	j Turbin	e	n lier widtu	gitan wekis						
Disc	eni e	8 N	i i caj	s isis .	3072316	7,000	х	х		
Rotor Se	al Plat	in in te	ĉ	int di di Shee	3072411	10,000	х	x	Х	х
Dische			41 2 11	a san Théa la t	3072748	4.200	-		х	х
Rotor St	enped	Seal	ate	an a	3072827	10.000			Χ	X
Diec	- P P 0 0	9 <u>0</u>		The second	3075227	10,000			X	X

Table 3 @(TEE731-3/-3A/-3AR/-3BR/-3C/-3CB/-3B)

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Table 3. (TFE731-3/-3A/-3AR/-3B/-3BR/-3C/-3CR/-3R) Service Life Limits for Critical Components (Cont)

Components	Part No.	Service Life Cycles	-3 -3R	-3A -3AR	-38 -38R	-3C -3CR(mol)
(LPT) LP Turbine						07 - MASP
Rotating Seal	3072350	(See Note 1)	Х		ffr3ft	Han Ste
1st Stage Disc	3072351 (See Note 4)	3,000	Х	Х	Х	Disc. Disc.
1st Stage Disc	3073497 (See Note 4)	3,000			Х	Disc
2nd Stage Disc	3072542	3,000	X	Х	Х	
3rd Stage Disc	3072544	3,000	Xca	omŽres		(1. (011)
Rotating Seal	3072729	(See Note 1)	Х	×	Х	-X
3rd Stage Disc	3072821	6,000	Х	Х	્ ટ્રે લ ્	is: Xa g
Air Seal	3073355	(See Note 1)	Х	Х	ავ ე ავ	- 812 - 1
Air Seal	3073382	(See Note 1)			5:X 3 5.	osi X i nt
1st Stage Rotating Seal Plate	3073552	3,700			08:0 3,	JE X
1st Stage Disc	3073733 (See Note 5)	3,000		Х	74 ¹⁰ 9	nos T
1st Stage Rotating Seal Plate	3073735	10,000				X
Seal Support	3073764	(See Note 1)	Х	ndeas	т аХ оЭ	98 X (1993)
Air Seal	3073765	(See Note 1)	Х	Х	* eX e*	X
1st Stage Disc	3074076	3,500				X
2nd Stage Disc	3074077	3,500		15	Alter Areas	
3rd Stage Disc	3074096	7,000	Х	X	X	Hadan
1st Stage Disc	3074103 (See Note 6)	3,000		х	netier nr	
2nd Stage Disc	3074105 (See Note 7)	3,000		X	mputer naliaam	n heiddig I leidgen
					19/19003	HEIDSA

- NOTE 1: These component parts have not had cyclic life limits assigned, but may be subject to failure as a result of undetected abuse and unpredictable contingencies therefore, to provide a record of service experience and cycles (partial cycle counting does not apply), a life limited part log card must be maintained. If the part is removed, the life limited part log card must be updated and stay with that part.
- NOTE 2: When the cycle life limit is reached on Impeller, Part No. 3070274, it is reworkable to Part No. 3073393 per SB TFE731-72-3239RWK. After impeller is reworked to Part No. 3073393, cycle count returns to zero, with a service life limit of 10,000 cycles. Return impeller with life limit part log card to AlliedSignal, Phoenix, AZ for rework.
- NOTE 3: When the cycle life limit is reached on Impeller, Part No. 3072639, it is reworkable to Part No. 3073394 per SB TFE731-72-3239RWK. After impeller is reworked to Part No. 3073394, cycle count returns to zero, with a service life limit of 10,000 cycles. Return impeller with life limit part log card to AlliedSignal, Phoenix, AZ for rework.

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and 5. Jable 3. (TFE731-3/-3A/-3AR/-3B/-3BR/-3C/-3CR/-3R)

 HIMPLERSON AND AND AND AND AND AND AND AND AND AN	Service Life Limite fo	r Critical Componente	(Cont)
and set in the product of		n Uniter Components	

A CONTRACTOR OF THE AND A CONTRACTOR	Soundaries mais and the appendix of the second system of the second system of the second second second second s		Service Life	ş	-3A	-3B	-3C
Component	ts	Part No.	Cycles	-3R	-3AR	-3BR	-3CR
NOTE 4:	Dimensionally inspect defined by the applical hours.	disc for growth at e ble inspection inter	each major period val service bulleti	ic inspe n, but n	ection, at ot to exc	interva ceed 1,	uls 700
NOTE 5:	Refer to Service Bullet the disc has accumula engine operating hours from service.	in TFE731-A72-35 ted 1,500 engine c s prior to reaching	19. Replacement perating hours. I its cycle life of 3,0	t of the f the dis 100 cycl	disc is re sc accun es, it mu	equired nulates ist be re	when 1,500 etired
<u>NOTE 6</u> :	Refer to Service Bullet the disc has accumula engine operating hours from service.	tin TFE731-A72-35 ted 750 engine op s prior to reaching	19. Replacement erating hours. If t its cycle life of 3,0	t of this he disc 100 cycl	disc is r accumu es, it mu	equired lates 7 lst be re	l when 50 etired
NOTE 7:	Refer to Service Bullet	in TFE731-A72-35	19. Inspection of urs If the disc ac	the disc	is requi	red at i	ntervals e oper-

ating hours prior to reaching its cycle life of 3,000 cycles, it must be retired from service.

Components 😕 🚁	NET SO IE.	and only a	Part No.	Service Life Cycles
(FAN) Fan 🔗	a data da ante a caracterizario de la caracterización de en caracterización de la	ungi sta		
Fan Driveshaft	w" Whit-hadded pick at-	Գործի հայն պատգուծանդիաները։	3071955	(See Note 1)
Disc	X		3072816	10,000
	Sa € Rest			
(LPC) LP Axial C	ompresso	or (* 930)		
1st Stage Disc			3072395	10,000
2nd Stage Disc			3072396	10,000
3rd Stage Disc	X	у- са	3072397	10,000
Tie Rod 💦 🔗	X		3074744	(See Note 1)
4th Stage Disc	5. J 5.	ate - No. Na	3075326	10,000
		13		
(HPC) HP Compre	essor			
Shouldered Sha	ıft	*	3072545	12,000
Radial Impeller			3073394	10,000
Radial Impeller			3073398	10,000
	.9			
(HPT) HP Turbine	4 ²	·		
Rotor Seal Plate))	•	3075205	10,000
Disc			3075227	10,000

Table 4. (TFE731-4R) Service Life Limits for Critical Components

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Table 4.	(TFE731-4R)	Service Life	e Limits for	Critical Com	ponents ((Cont)
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Components	Part No. Service Life Cycl	38
(LPT) LP Turbine	ergitikes. −	്നെറ
Air Seal	3073765 307 10 (See Note 1)	втой
Seal Support	3074052 3074052 (See Note 1)	a i s des regais a la gelare
Air Seal	3074741 (See Note 1)	^{بر} و ام ران ، فیراند،
2nd Stage Disc		ا راغیب از از آن مدینیسیست از ا
1st Stage Disc	3075429 1939 ALD CONSTAND,000016	
3rd Stage Disc	3075436	
1st Stage Disc	3075446 State Stat	3:01;
	e robuj avuan gritsse no arigne	

I nese component parts have not had cyclic life limits assigned, but may be su ure as a result of undetected abuse and unpredictable contingencies. Therefore, to pro-vide a record of service experience and cycles (partial cycle counting does not apply), a life limited part log card must be maintained. If the part is removed, the life limited part log card must be updated and stay with that part.

Table 5. (TFE731-5AR	/ -5BR/-5R) Servic	e Life Limits for C	ritical Corr	ponents	e - Marca, na Ú
Components	Part No.	Service Life Cyc	les -5AR	-5R	∩≈-5BR .)
(FAN) Fan				tier) :	?9∿33 2 ≥ 5
Disc	3074621	10,000	Х	Х	$\mathbf{X}_{i} = \mathbf{x}_{i}$
Fan Spinner	3074623	(See Note 1)	X	Х	Х
Fan Driveshaft	3074641	(See Note 1)	toex wi	a s X er	(14 4 x (04 J)
				に通じ	ist Stage
(LPC) LP Axial Compressor				oai€ i	eg At Dirichi
1st Stage Disc	3072395	10,000	Х	X	эрыХ 🖂
2nd Stage Disc	3072396	10,000	Х	Х	00 X 30
3rd Stage Disc	3072397	10,000	Х	XJ	eth X rage
4th Stage Disc	3072398	10,000	Х	Х	
Tie Rod	3074744	(See Note 1)	X	`` X `	X
4th Stage Disc	3075326	10,000	х	Ý	er an X oral
-				5 2 C 3	pra kalue -
(HPC) HP Compressor				10135	maister 1
Shouldered Shaft	3072545	12,000	Х	X	X
Radial Impeller	3073394	10,000	Х	X	X
Radial Impeller	3073398	10,000	Х		X
Shouldered Shaft	3075617	(See Note-1)	te contrato menos	etasu, Josephi ng ng ar	X

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Components	Part No.	Service Life Cycles	-5AR	-5R	-5BR
(HPT) HP Turbine	£				
Rotor Seal Plate cost in Leo Stock	3075205	10,000	Х	Х	Х
Disc	3075227	10,000	Х	Х	Х
Rotor Seal Plate website sources	3075579	10,000			Х
Rotor Seal Plate	3077065	10,000			Х
	far an an thair an an th				
Air Seal		(See Note 1)	Х	х	х
Seal Support	3074052	(See Note 1)	Х	Х	Х
Air Seal	3074741	(See Note 1)	Х	Х	Х
1st Stage Disc	3074747	10,000	Х	Х	Х
2nd Stage Disc	3074752	5,000	Х	Х	
3rd Stage Disc	3074756	10,000	Х	Х	
2nd Stage Disc	3075425	10,000	Х	Х	Х
1st Stage Disc	3075429	10,000	Х	Х	Х
3rd Stage Disc	3075436	10,000	Х	х	Х
1st Stage Disc	3075446	10,000	Х	х	Х

NOTE 1: These component parts have not had cyclic life limits assigned, but may be subject to fail-ure as a result of undetected abuse and unpredictable contingencies. Therefore, to provide a record of service experience and cycles (partial cycle counting does not apply), a life limited part log card must be maintained. If the part is removed, the life limited part log card must be updated and stay with that part.

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A. (9) Specific components require a record of operating hours and maintenance history to be maintained. This record must be updated when the component is removed from the engine/aircraft or maintenance is performed. A component maintenance/modification record card (SB TFE731-72-3397) must be maintained on these components. If the component is removed, the updated maintenance/modification record card must stay with that component.

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NOTE: Refer to Table 6 to determine components that require a maintenance/ web react modification record card.

Component	Part No.
EEC	949572 1100000 .598
EEC	2101142 ISBN 14
EEC	2101144 08 ^{-C} epot 2121
DEEC	2118002 ^{0.04} C ສາສະລີ 102
Fuel Pump	3060710 ^{- වෝ} රි දෙනල සිංව
Accessory Gearbox Assembly	3070003 PRIS 20 32 - 52
Transfer Gearbox	series 3070093 ^{DelO} egeseret
Fuel Control Assembly	3070800 SEC 92.
Fuel Pump	3070850 02 80 000
Combustion Chamber Plenum Case	.3071330
Turbine Interstage Transition Duct	s of the flaten 3071486 and en
Oil Lube Pump	2000 400 TE 307 1949 3 5 1 H
Turbine Interstage Transition Duct	3072318 (m. 25)
LP First Stage Nozzle Assembly	3072319
Combustion Chamber Plenum Case	3072443
Turbine Interstage Transition Duct	3072726
LP First Stage Nozzle Assembly	3072842
Turbine Interstage Transition Duct	3074766
LP First Stage Nozzle Assembly	3075225
LP First Stage Nozzle Assembly	3075271
LP First Stage Nozzle Assembly	3075406
Turbine Interstage Transition Duct	3076070
Turbine Interstage Transition Duct	3077063
LP First Stage Nozzle Assembly	3077104
LP First Stage Nozzle Assembly	3077105

Table 6. TFE731 Engine Components Requiring Records of Operating Hours and Maintenance History

and the Table



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3. Material Information

None

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