

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:

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Revision 2 dated Dec 28/73
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Revision 4 dated Feb 28/75
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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

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

<u>Part No.</u>	<u>Model No.</u>	<u>Prior to Serial No.</u>	<u>Application</u>
3070000-1 thru -14	TFE731-2-1C	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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<u>Part No.</u>	<u>Model No.</u>	<u>Prior to Serial No.</u>	<u>Application</u>
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.

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

None.

L. Other Publications Affected

Not applicable.

2. Accomplishment Instructions

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

<u>Engine Model</u>	<u>Paragraph</u>
TFE731-2	A
TFE731-2A/-2B/-3/-3A/-3AR/ -3B/-3BR/-3C/-3CR/-3R	B
TFE731-4R	C
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.
- (7) Refer to *Table 2* to determine established service life limits for critical elements.

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

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 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	3073563	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

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

Components	Part No.	Service Life Cycles
(HPC) HP Compressor		
Radial Impeller	3070274	6,200
	(See Note 1)	5,100
Radial Impeller	3072639	6,200
	(See Note 2)	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
<p>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.</p> <p>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.</p>		

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.

<u>Component</u>	<u>Part No.</u>
(FAN)	
Fan Driveshaft	3071955
(LPC)	
Tie Rod	3070065
Tie Rod	3073049
(HPC)	
Shouldered Shaft	3070104
Shouldered Shaft	3071441
Shouldered Shaft	3073444
(HPT)	
Seal Rotor (Thrust Balance Piston)	3072979
Seal Rotor (Thrust Balance Piston)	3073448
(LPT)	
Rotating Seal	3070154
Rotating Seal	3072621
Rotating Seal	3073016

- (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.

<u>Component</u>	<u>Part No.</u>
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

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.

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

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

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.
- (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.

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	-2B	-3A	-3B	-3C
			-3 -3R		-3AR	-3BR	-3CR
(FAN) Fan							
Disc	3072162	4,100	X				
Disc	3072816	10,000			X	X	X
Disc	3073436	4,100	X				
Disc	3073539	7,100	X				
Disc	3073563	10,000	X				
Disc	3074107	10,000	X	X			
Disc	3074529	7,100	X	X			
(LPC) LP Axial Compressor Disc							
1st Stage	3072395	10,000	X		X	X	X
2nd Stage	3072396	10,000	X		X	X	X
3rd Stage	3072397	10,000	X		X	X	X
4th Stage	3072398	10,000	X		X	X	
4th Stage	3074065	10,000	X	X			
2nd Stage	3075190	10,000	X	X			
3rd Stage	3075192	10,000	X	X			
4th Stage	3075194	10,000	X				
1st Stage	3075198	10,000	X	X			
4th Stage	3075326	10,000					X
(HPC) HP Compressor							
Radial Impeller	3070274 (See Note 1)	5,100	X		X	X	
Shouldered Shaft	3072545	12,000	X		X	X	X
Radial Impeller	3072639 (See Note 3)	5,100	X		X	X	
Radial Impeller	3072931	3,000	X		X	X	
Shouldered Shaft	3073059	12,000	X	X			
Radial Impeller	3073393	10,000	X		X	X	X
Radial Impeller	3073394	10,000	X		X	X	X
Radial Impeller	3073398	10,000	X		X	X	X
Radial Impeller	3073433	10,000	X				
Radial Impeller	3073434	10,000	X				
Radial Impeller	3073435	10,000	X	X			

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	X		X		
Rotor Seal Plate	3072411	10,000	X		X	X	X
Disc	3072748	4,200				X	X
Rotor Stepped Seal Plate	3072827	10,000				X	X
Rotor Seal Plate	3073057	10,000	X	X			
Disc	3073110	7,000	X	X			
Disc	3075227	10,000				X	X
(LPT) LP Turbine Disc							
1st Stage	3072351 (See Note 2)	3,000	X		X	X	
1st Stage	3073497 (See Note 2)	3,000				X	
2nd Stage	3072542	3,000	X		X	X	
3rd Stage	3072544	3,000	X		X		
3rd Stage	3072821	6,000	X		X	X	X
1st Stage	3073113 (See Note 2)	1,700	X				
2nd Stage	3073114	1,700	X				
3rd Stage	3073115	1,900	X				
3rd Stage	3073572	6,000	X				
1st Stage	3073733 (See Note 6)	3,000			X		
1st Stage	3074054	3,000	X	X			
2nd Stage	3074056	3,000	X	X			
3rd Stage	3074058	6,000	X	X			
1st Stage	3074076	3,500					X
2nd Stage	3074077	3,500					X
3rd Stage	3074096	7,000	X		X	X	X
1st Stage	3074103 (See Note 4)	3,000			X		
2nd Stage	3074105 (See Note 5)	3,000			X		

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	-2B	-3A	-3B	-3C
			-3 -3R		-3AR	-3BR	-3CR
(LPT) Rotating Seal Plate							
1st Stage	3073552	10,000					X
1st Stage	3074053	3,000	X	X			
<u>NOTE 1:</u> 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 Engines, Phoenix, AZ for rework.							
<u>NOTE 2:</u> Dimensionally inspect disc for growth at the major periodic inspection, at intervals defined by the applicable inspection interval service bulletin, but not to exceed 1,700 engine operating hours.							
<u>NOTE 3:</u> 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 Engines, Phoenix, AZ for rework.							
<u>NOTE 4:</u> Refer to Service Bulletin, TFE731-A72-3519. Replacement of the disc is required when the disc has accumulated 750 engine operating hours. If the disc accumulates 750 engine operating hours prior to reaching its life cycle of 3,000 cycles, it must be retired (scrap) from service.							
<u>NOTE 5:</u> Refer to Service Bulletin, TFE731-A72-3519. Inspection of the disc is required at intervals not to exceed 1500 engine operating hours. If the disc accumulates 4,500 engine operating hours prior to reaching its life cycle of 3,000 cycles, it must be retired (scrap) from service.							
<u>NOTE 6:</u> Refer to Service Bulletin, TFE731-A72-3519. Replacement of the disc is required when the disc has accumulated 1500 engine operating hours. If the disc accumulates 1500 engine operating hours prior to reaching its life cycle of 3,000 cycles, it must be retired (scrap) from service.							

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.

<u>Component</u>	<u>Part No.</u>
(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.

<u>Component</u>	<u>Part No.</u>
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

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.

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

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

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.

2. C. (5) Use of the Automatic Performance Reserve (APR) resulting in operation in excess of 952°C (1746°F) ITT or 100 percent (29,989 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) above, shall be recorded as four cycles.
 - (c) APR operation requires Life Limited Components listed in *Table 6* and step C.(9) to have three additional cycles (total of four) imposed for each operation.
- (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 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.
- (8) Refer to *Table 6* to determine established service life limits for critical elements.
- (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.

<u>Component</u>	<u>Part No.</u>
(FAN)	
Fan Driveshaft	3071955
(LPC)	
Tie Rod	3074744
(LPT)	
Air Seal	3073765
Seal Support	3074052
Air Seal	3074741

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

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

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 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.

<u>Component</u>	<u>Part No.</u>
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

- (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.

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

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

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.

2. 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.

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						
Disc	3074621	10,000		X	X	X
Disc	3075163	10,000	X			
(LPC) LP Axial Compressor Disc						
1st Stage	3072395	10,000		X	X	X
2nd Stage	3072396	10,000		X	X	X
3rd Stage	3072397	10,000		X	X	X
4th Stage	3072398	10,000		X	X	
2nd Stage	3075190	10,000	X			
3rd Stage	3075192	10,000	X			
4th Stage	3075194	10,000	X			
1st Stage	3075198	10,000	X			
4th Stage	3075326	10,000		X	X	X
(HPC) HP Compressor						
Shouldered Shaft	3072545	12,000		X	X	X
Radial Impeller	3073394	10,000		X	X	X
Radial Impeller	3073398	10,000		X	X	X
Radial Impeller	3075171	10,000	X			
Shouldered Shaft	3075172	12,000	X			
(HPT) HP Turbine						
Rotor Seal Plate	3075173	10,000	X			
Rotor Seal Plate	3075205	10,000		X	X	X
Disc	3075227	10,000		X	X	X
Disc	3075228	10,000	X			
Rotor Seal Plate	3077065	10,000				X
(LPT) LP Turbine Disc						
1st Stage	3074747	10,000		X	X	X
2nd Stage	3074752	5,000		X	X	
3rd Stage	3074756	10,000		X	X	
1st Stage	3075183	10,000	X			
2nd Stage	3075186	5,000	X			
3rd Stage	3075188	10,000	X			
2nd Stage	3075425	10,000		X	X	X
3rd Stage	3075436	10,000		X	X	X
1st Stage	3075446	10,000		X	X	X

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.

<u>Component</u>	<u>Part No.</u>
<u>(FAN)</u>	
Fan Spinner	3074623
Fan Driveshaft	3074641
Fan Spinner	3075212
<u>(LPC)</u>	
Tie Rod	3074744
<u>(LPT)</u>	
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.

<u>Component</u>	<u>Part No.</u>
<u>DEEC</u>	2118002
Accessory Gearbox Assembly	3070003
Fuel Control Assembly	3070800
Fuel Pump	3070850
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

3. Material Information

None



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 _____

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 NO.	REVISION NO.	SERVICE BULLETIN NO.	REVISION NO.	SERVICE BULLETIN NO.	REVISION NO.	SERVICE BULLETIN NO.	REVISION NO.
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_____	_____	_____	_____	_____	_____	_____	_____

Signature _____ Date _____
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

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*.

List of Effective Pages:

<u>Page No.</u>	<u>Date</u>	<u>Page No.</u>	<u>Date</u>
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4	Aug 4/94	12	Aug 4/94
5	Aug 4/94	13	July 17/95
6	July 17/95	14	July 17/95
7	Aug 4/94	15	July 17/95
8	Aug 4/94	16	Aug 4/94

Previous Revisions:

Revision 1 dated Oct 25/73	Revision 22 dated Sept 19/86
Revision 2 dated Dec 28/73	Revision 23 dated June 24/88
Revision 3 dated Dec 17/74	Revision 24 dated Oct 20/89
Revision 4 dated Feb 28/75	Revision 25 dated June 6/90
Revision 5 dated Feb 28/78	Revision 26 dated Mar 29/91
Revision 6 dated May 15/79	Revision 27 dated Nov 29/91
Revision 7 dated July 20/79	Revision 28 dated Jan 17/92
Revision 8 dated June 20/80	Revision 29 dated Mar 23/92
Revision 9 dated Oct 27/80	Revision 30 dated Apr 24/92
Revision 10 dated Nov 12/80	Revision 31 dated June 23/92
Revision 11 dated Feb 17/81	Revision 32 dated Nov 20/92
Revision 12 dated Apr 23/81	Revision 33 dated Jan 29/93
Revision 13 dated June 11/82	Revision 34 dated May 11/93
Revision 14 dated Sept 13/82	Revision 35 dated June 1/93
Revision 15 dated June 30/83	Revision 36 dated July 27/93
Revision 16 dated Oct 26/83	Revision 37 dated Aug 20/93
Revision 17 dated Dec 8/83	Revision 38 dated Dec 16/93
Revision 18 dated Nov 15/84	Revision 39 dated Jan 4/94
Revision 19 dated Nov 30/84	Revision 40 dated May 4/94
Revision 20 dated Mar 7/85	Revision 41 dated Aug 4/94
Revision 21 dated May 17/85	

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

1. Planning Information

A. Effectivity

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

<u>Part No.</u>	<u>Model No.</u>	<u>Prior to Serial No.</u>	<u>Application</u>
3070000-1 thru -14	TFE731-2-1C	All	Falcon 10/100
3070300-1 thru -9/-11/-12	TFE731-2-2B	All	Learjet 35/36
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
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
3074800-9	TFE731-3AR-2B2	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
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

<u>Part No.</u>	<u>Model No.</u>	<u>Prior to Serial No.</u>	<u>Application</u>
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	All	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.

1. C. Description

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.

F. Manhour Requirements

Not applicable.

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

Not applicable.

L. Other Publications Affected

Not applicable.

2. Accomplishment Instructions

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.)

NOTE: 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.
 - 1 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.
 - (b) Partial cycle counting applies to specific critical components only.

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:

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 Fan Disc Cycles

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

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

Table 1

Engine Section	Component	Partial Cycle Multipliers							
		Touch & Go Landing				Full Stop Landing (No Shutdown)			
		TFE731				TFE731			
		-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

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).

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.
- 3 (TFE731-3CR) Use of APR which results in operation in excess of 910°C ITT 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.

2. A. (5) (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
Dept. 93-42/554-12
P.O. Box 52181
Phoenix, AZ 85072-2181

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

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

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	3072162	4,100
Disc	3073539	7,100
Disc	3073563	10,000
(LPC) LP Axial Compressor		
Tie Rod	3070065	(See Note 1)
1st Stage Disc	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 Disc	3072397	10,000
4th Stage Disc	3072398	10,000
Tie Rod	3073049	(See Note 1)
(HPC) HP Compressor		
Shouldered Shaft	3070104	(See Note 1)
Radial Impeller	3070274	6,200
	(See Note 2)	5,100
Shouldered Shaft	3071441	(See Note 1)
Radial Impeller	3072639	6,200
	(See Note 3)	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)

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

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

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: 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 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: 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 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.

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

Components	Part No.	Service Life Cycles	-3 -3R	-3A -3AR	-3B -3BR	-3C -3CR
(FAN) Fan						
Fan Driveshaft	3071955	(See Note 1)	X	X	X	X
Disc	3072162	4,100	X			
Disc	3072816	10,000		X	X	X
Disc	3073539	7,100	X			
Disc	3073563	10,000	X			
(LPC) LP Axial Compressor						
Tie Rod	3070065	(See Note 1)	X	X	X	X
1st Stage Disc	3072395	10,000	X	X	X	X
2nd Stage Disc	3072396	10,000	X	X	X	X
3rd Stage Disc	3072397	10,000	X	X	X	X
4th Stage Disc	3072398	10,000	X	X	X	
Tie Rod	3073049	(See Note 1)	X	X	X	X
4th Stage Disc	3075326	10,000				X
(HPC) HP Compressor						
Radial Impeller	3070274 (See Note 2)	5,100	X	X	X	
Shouldered Shaft	3072545	12,000	X	X	X	X
Radial Impeller	3072639 (See Note 3)	5,100	X	X	X	
Radial Impeller	3072931	3,000	X	X	X	
Radial Impeller	3073393	10,000	X	X	X	X
Radial Impeller	3073394	10,000	X	X	X	X
Radial Impeller	3073398	10,000	X	X	X	X
(HPT) HP Turbine						
Disc	3072316	7,000	X	X		
Rotor Seal Plate	3072411	10,000	X	X	X	X
Disc	3072748	4,200			X	X
Rotor Stepped Seal Plate	3072827	10,000			X	X
Disc	3075227	10,000			X	X

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	-3B -3BR	-3C -3CR
(LPT) LP Turbine						
Rotating Seal	3072350	(See Note 1)	X			
1st Stage Disc	3072351 (See Note 4)	3,000	X	X	X	
1st Stage Disc	3073497 (See Note 4)	3,000			X	
2nd Stage Disc	3072542	3,000	X	X	X	
3rd Stage Disc	3072544	3,000	X	X	X	
Rotating Seal	3072729	(See Note 1)	X	X	X	X
3rd Stage Disc	3072821	6,000	X	X	X	X
Air Seal	3073355	(See Note 1)	X	X		
Air Seal	3073382	(See Note 1)			X	X
1st Stage Rotating Seal Plate	3073552	3,700			X	X
1st Stage Disc	3073733 (See Note 5)	3,000		X		
1st Stage Rotating Seal Plate	3073735	10,000				X
Seal Support	3073764	(See Note 1)	X	X	X	X
Air Seal	3073765	(See Note 1)	X	X	X	X
1st Stage Disc	3074076	3,500				X
2nd Stage Disc	3074077	3,500				X
3rd Stage Disc	3074096	7,000	X	X	X	X
1st Stage Disc	3074103 (See Note 6)	3,000		X		
2nd Stage Disc	3074105 (See Note 7)	3,000		X		

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.

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	-3A	-3B	-3C
			-3R	-3AR	-3BR	-3CR
NOTE 4: Dimensionally inspect disc for growth at each major periodic inspection, at intervals defined by the applicable inspection interval service bulletin, but not to exceed 1,700 hours.						
NOTE 5: Refer to Service Bulletin TFE731-A72-3519. Replacement of the disc is required when the disc has accumulated 1,500 engine operating hours. If the disc accumulates 1,500 engine operating hours prior to reaching its cycle life of 3,000 cycles, it must be retired from service.						
NOTE 6: Refer to Service Bulletin TFE731-A72-3519. Replacement of this disc is required when the disc has accumulated 750 engine operating hours. If the disc accumulates 750 engine operating hours prior to reaching its cycle life of 3,000 cycles, it must be retired from service.						
NOTE 7: Refer to Service Bulletin TFE731-A72-3519. Inspection of the disc is required at intervals not to exceed 1,500 engine operating hours. If the disc accumulates 4,500 engine operating hours prior to reaching its cycle life of 3,000 cycles, it must be retired from service.						

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

Components	Part No.	Service Life Cycles
(FAN) Fan		
Fan Driveshaft	3071955	(See Note 1)
Disc	3072816	10,000
(LPC) LP Axial Compressor		
1st Stage Disc	3072395	10,000
2nd Stage Disc	3072396	10,000
3rd Stage Disc	3072397	10,000
Tie Rod	3074744	(See Note 1)
4th Stage Disc	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

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

Components	Part No.	Service Life Cycles
(LPT) LP Turbine		
Air Seal	3073765	(See Note 1)
Seal Support	3074052	(See Note 1)
Air Seal	3074741	(See Note 1)
2nd Stage Disc	3075425	10,000
1st Stage Disc	3075429	10,000
3rd Stage Disc	3075436	10,000
1st Stage Disc	3075446	10,000

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.

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

Components	Part No.	Service Life Cycles	-5AR	-5R	-5BR
(FAN) Fan					
Disc	3074621	10,000	X	X	X
Fan Spinner	3074623	(See Note 1)	X	X	X
Fan Driveshaft	3074641	(See Note 1)	X	X	X
(LPC) LP Axial Compressor					
1st Stage Disc	3072395	10,000	X	X	X
2nd Stage Disc	3072396	10,000	X	X	X
3rd Stage Disc	3072397	10,000	X	X	X
4th Stage Disc	3072398	10,000	X	X	
Tie Rod	3074744	(See Note 1)	X	X	X
4th Stage Disc	3075326	10,000	X	X	X
(HPC) HP Compressor					
Shouldered Shaft	3072545	12,000	X	X	X
Radial Impeller	3073394	10,000	X	X	X
Radial Impeller	3073398	10,000	X	X	X
Shouldered Shaft	3075617	(See Note 1)			X

Table 5: (TFE731-5AR/-5BR/-5R) Service Life Limits for Critical Components (Cont)

Components	Part No.	Service Life Cycles	-5AR	-5R	-5BR
(HPT) HP Turbine					
Rotor Seal Plate	3075205	10,000	X	X	X
Disc	3075227	10,000	X	X	X
Rotor Seal Plate	3075579	10,000			X
Rotor Seal Plate	3077065	10,000			X
(LPT) LP Turbine					
Air Seal	3073765	(See Note 1)	X	X	X
Seal Support	3074052	(See Note 1)	X	X	X
Air Seal	3074741	(See Note 1)	X	X	X
1st Stage Disc	3074747	10,000	X	X	X
2nd Stage Disc	3074752	5,000	X	X	
3rd Stage Disc	3074756	10,000	X	X	
2nd Stage Disc	3075425	10,000	X	X	X
1st Stage Disc	3075429	10,000	X	X	X
3rd Stage Disc	3075436	10,000	X	X	X
1st Stage Disc	3075446	10,000	X	X	X

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.

2. 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.

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

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

Component	Part No.
EEC	949572
EEC	2101142
EEC	2101144
DEEC	2118002
Fuel Pump	3060710
Accessory Gearbox Assembly	3070003
Transfer Gearbox	3070093
Fuel Control Assembly	3070800
Fuel Pump	3070850
Combustion Chamber Plenum Case	3071330
Turbine Interstage Transition Duct	3071486
Oil Lube Pump	3071949
Turbine Interstage Transition Duct	3072318
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

3. Material Information

None