

**JT3D-1, D-1A, D-3, D-3B, D-3C, D-1-MC6,
D-1A-MC6, D-1-MC7, AND D-1A-MC7**

TURBOFAN

OVERHAUL MANUAL

PART NO. 411568

**VOLUME NO. 1
OF
7 VOLUMES**

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INITIAL ISSUE DATE

APRIL 1/60

REVISED FEBRUARY 1/02

FAA APPROVED/ACCEPTED

The Federal Aviation Administration (FAA) has reviewed the Instructions for Continued Airworthiness (ICA) submitted pursuant to FAA Part 33 for the engine models listed. The ICA were found to be acceptable and the Airworthiness Limitations Section contained therein is hereby approved.



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Printed in United States of America

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LIST OF EFFECTIVE PAGES

Please insert the revised pages into this manual and delete obsolete pages in accordance with the following List of Effective Pages. Revised pages are indicated by the letter "R", added pages by the letter "A", and deleted pages by the letter "D". Superseded pages shall be removed and destroyed.

The List of Effective Pages records not only each page of subject revision but also each previously issued page which is still current. Blank pages and pages which are no longer current do not appear on this list. If there is any question about the currency of the recipient's copy, it is recommended that each page of the manual be checked off against this List of Effective Pages. Any page which does not check out with this list, either by number or by date, shall be discarded.

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1. Disk Life - General

- A. Service life of disk is limited to, and must not exceed, specified hours or cycles, whichever occurs first as listed for engine model ratings specified. Certain listed disks must not be installed in some model engines listed below. Such engine model ratings are listed to provide applicable life limits for disks which have never operated above the lower thrust ratings applicable to listed model, but which have been installed in higher thrust rated engines. Refer to applicable Illustrated Parts Catalog for listing of disks acceptable for use in each engine model. If a disk has been used in a model other than the one listed below, the disk is limited to the lowest hours and cycles permitted for the engine models in which it has been exposed. This applies regardless of percentage of total time accumulated in the model with lowest hour and cycle limit. Reference appropriate Overhaul Manual.
- B. A cycle is defined as any flight, consisting of one take-off and one landing, regardless of length of flight and whether or not thrust reverser was used on landing. A touch and go landing is included in this definition. For further clarification see Section 70-30, Standard Practices Manual.
- R C. Time is defined as that accumulated time from the moment an
R aircraft leaves the surface of the Earth until it touches it
R at the point of landing (flight time).

2. The Disk Life Factor Concept

A. General

- (1) Since reduced take-off thrust is being used by many air carriers, a procedure is provided which recognizes that some life limited disks operate at reduced stress levels during those take-offs at reduced thrust. Both cyclic and hourly life benefits can be realized for those disks which reach their peak stress levels during take-off speeds and temperatures. Certain disks are not eligible for cyclic or hourly benefits because they do not reach their peak stress at take-off conditions or service experience excludes them. Only those disks which have disk life factors specified may be considered eligible for cyclic or hourly benefits.
- (2) To determine the degree of credit for each disk in the engine, it is necessary to know the specific part number of the disk, the number of cycles or hours operated in each reduced take-off thrust range and the disk life factors for the specific disk.

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ENGINE - TIME LIMITS

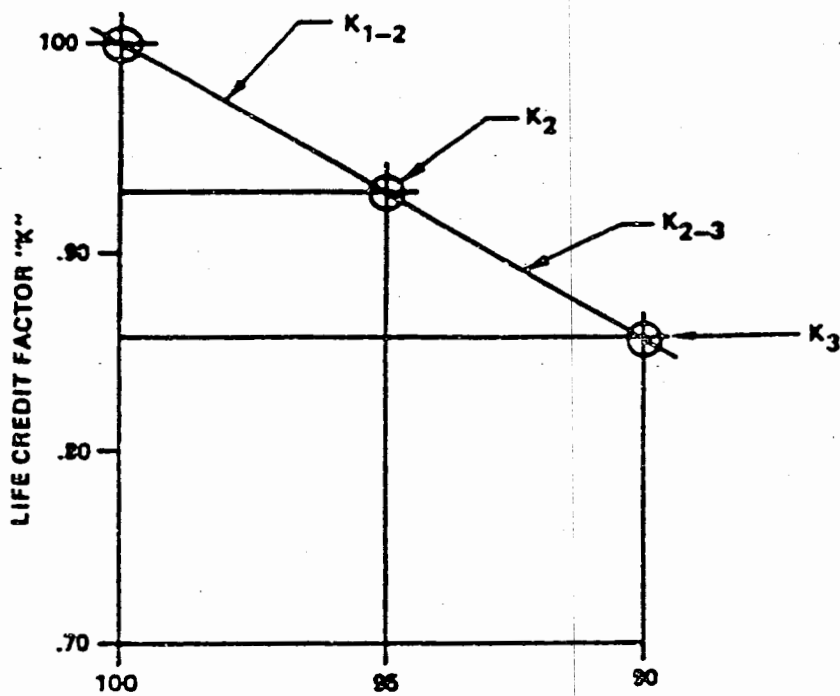
B. Glossary of Terms Used in this Section

- (1) Certified LCF cycles = Certified cyclic life limits as published in the Overhaul Manual
- (2) Certified Hourly limits = Certified hourly life limits as published in the Overhaul Manual
- (3) Actual Cycle = 1 take-off and landing
- (4) K2 = Disk life factor used for 95 percent to 90 percent take-off thrust range
- (5) K3 = Disk life factor used for 90 percent and below take-off thrust range
- R (6) N1 = Actual LCF cycles at 100 percent to 95 percent take-off thrust range
- R (7) N2 = Actual LCF cycles at 95 percent to 90 percent take-off thrust range
- R (8) N3 = Actual LCF cycles at 90 percent and below take-off thrust range
- R (9) H1 = Actual hours following take-off at 100 percent to 95 percent take-off thrust range
- R (10) H2 = Actual hours following take-off at 95 percent to 90 percent take-off thrust range
- R (11) H3 = Actual hours following take-off at 90 percent and below take-off thrust range
- (12) Adjusted Cycles = Actual cycles adjusted to provide credit for reduced thrust take-offs by applying a "K" factor
- (13) Adjusted Hours = Actual hours flown adjusted to provide credit for reduced thrust take-offs by applying a "K" factor
- (14) No = Number of cycles accumulated using 100 percent maximum rated take-off thrust.
- (15) N₁₋₂ = Number of cycles accumulated at a particular thrust level from 95 percent up to but less than 100 percent maximum rated take-off thrust. (See notes).
- (16) N₂₋₃ = Number of cycles accumulated at a particular thrust lever from 90 percent up to but less than 95 percent maximum rated take-off thrust. (See notes).
- (17) N₄ = Number of cycles accumulated using less than 90 percent of the maximum rated take-off thrust.
- (18) K₁₋₂ = A calculated life credit factor for engine operation using a percent (Fn₁₋₂ of the maximum rated take-off thrust between 95 percent and 100 percent (See Figure 301).

$$K_{1-2} = 1 - \left(\frac{1-K_2}{.05} \right) \left(1 - \frac{Fn_{1-2}}{100} \right)$$

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PERCENT TAKE-OFF THRUST

ASSUME: $K_2 = .83$

$K_3 = .86$

L-84299

R
R

Graphic Explanation Of Life Credit Factors
Figure 301

Aug 1/85

TIME LIMITS
5-10-00
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- R
R
R
R
R
R
R
R
R
R
- (19) K_{2-3} = A calculated life credit factor for engine operation using a percent ($F_{n_{2-3}}$) of the maximum rated take-off thrust between 90 percent and 95 percent (See Figure 301).
- (20)
$$K_{2-3} = K_2 - \left(\frac{K_2 - K_3}{.05} \right) \left(.95 - \frac{\% F_{n_{2-3}}}{100} \right)$$
- (21) H_0 = Total flight hours following a take-off using 100 percent of the maximum rated take-off thrust.
- (22) H_{1-2} = Number of flight hours accumulated following a take-off at a particular thrust level from 95 percent up to but less than 100 percent of the maximum rated take-off thrust. (See notes).
- (23) H_{2-3} = Number of flight hours accumulated following a take-off at a particular thrust level from 90 percent up to but less than 95 percent of the maximum rated take-off thrust. (See Notes).
- (24) H_4 = Total flight hours following a take-off using less than 90 percent of the maximum rated take-off thrust.

NOTE 1 - When calculating cycles using this procedure any percentage thrust should be rounded to the next higher whole percent i.e. 96.1 percent to 97 percent.

NOTE 2.- $K_{1-2} N_{1-2}$ and $K_{2-3} N_{2-3}$ must be calculated individually for each thrust increment and summed between 95 percent to 99 percent and between 90 percent to 94 percent thrust level respectively.

NOTE 3 - If the aircraft engine pressure ratio gage is out, that cycle should be recorded as using 100 percent maximum rated take-off thrust.

NOTE 4 - Total flight hours includes air flight time from take-off to landing.

NOTE 5 - The "K" life credit factors are common to both cycle and hour calculations.

C. Explanation of the Constants (K2 and K3)

- (1) The constants (K) are hour and cycle weighting factors equal to less than 1.0 and they vary in value depending on the specific eligible disk. The "K" values appear in columns at the right side of each page in this section. The disk life factor, when applied to those cycles or hours of operation at reduced thrust, result in adjusted cycles or hours less than the actual accumulated count. Calculation of adjusted cycles and hours (K.n and K.h) is allowed for take-offs made in the ranges of 95 percent to 90 percent and lower reduced thrust.

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D. Explanation of Reduced Take-off Thrust

- (1) The percent of reduced thrust is obtained by dividing the reduced thrust used by the rated thrust available x 100. Rated thrust is determined by reference to the applicable aircraft operations manual with the usual consideration for the normal restraints such as gross weight, ambient temperature, altitude and airport analysis information.

NOTE: If take-off engine pressure ratio (EPR) is reduced by a decrement of 0.07 but less than 0.14, K2 disk life factor used for 95 percent to 90 percent take-off thrust range may be applied. If take-off EPR is reduced by a decrement of 0.14 or greater, K3 disk life factor used for 90 percent and below take-off thrust range may be applied.

E. Application

- (1) Total adjusted cycles can be determined for a specific eligible disk part number by substitution of accumulated cycle count and appropriate disk life factors in either of the following formulas:

R
$$N1 + K2n2 + K3N3 = \text{Total adjusted cycles (constant values for life credit factors) or}$$
$$N0 + \sum K1-2 Nr2 + \sum K2-3 + K3 N4 = \text{Total adjusted cycles (linear interpolation of life credit factors).}$$

- (2) Total adjusted hours can be determined for a specific eligible disk part number by substitution of accumulated hours count and appropriate disk life factors in either of the following formulas:

$$H1 + K2H2 + K3H3 = \text{Total adjusted hours (constant values for life credit factors) or}$$
$$H0 + \sum K1-2 H1-2 + \sum K2-3 H2-3 + K3H4 = \text{Total adjusted hours (linear interpolation of life credit factors).}$$

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- CAUTION:**
1. THE TOTAL ADJUSTED CYCLES OR HOURS FOR ANY DISK SHALL NOT EXCEED THE CERTIFIED CYCLE OR HOUR LIMITS LISTED IN THIS SECTION.
 2. THE TOTAL ACTUAL CYCLES ($n_1+n_2+n_3$) FOR ANY DISK SHALL NOT EXCEED 30,000.
 3. ANY DISK CERTIFIED FOR 30,000 OR MORE CYCLES SHALL NOT RECEIVE K FACTOR CYCLIC CREDIT.

F. Examples Of Adjusted Cycle/Hour Calculation

(1) Adjusted cycles may be calculated as follows:

- Assume:
- . Total take-offs made in one week = 70
 - . Take-offs made above 95 percent thrust = 20
 - . Take-offs made at more than 90 percent but less than 95 percent thrust = 20
 - . Take-offs made at 90 percent thrust or less = 30

R Thus: $N_1 = 20$
R $N_2 = 20$
R $N_3 = 30$

Assume: $K_2 = .95$
 $K_3 = .90$

R And: Adjusted cycles = $N_1+N_2K_2+N_3K_3$

 = $20+20(.95)+30(.90)$
 = $20+19+27$
 = 66

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- (2) Adjusted hours may be computed in a similar manner as follows:

Assume: . Total hours flown in one week = 50
 . Hours flown following take-offs made above 95 percent thrust = 25
 . Hours flown following take-offs made at more than 90 percent but less than 95 percent thrust = 20
 . Hours flown following take-offs made at 90 percent thrust or less = 5

R Thus: H 1 = 25
R H 2 = 20
R H 3 = 5

Assume: K2 = .95
 K3 = .90

R And: Adjusted Hours = $H1+H2K2+H3K3$

 = $25+20(.95)+5(.90)$
 = $25+19+4.5$
 = 48.5

- (3) Result: For the one week period, 66 cycles and 48.5 hours should be logged against the certified lives of the eligible disk rather than 70 cycles and 50 hours such as would occur had reduced thrust benefits not been employed.

CAUTION: IT IS THE OPERATOR'S RESPONSIBILITY TO MAINTAIN ACCURATE RECORDS OF REDUCED THRUST TAKE-OFFS AND OTHER PERTINENT DATA AS MAY BE REQUIRED BY THE APPROPRIATE FAA FIELD OFFICE OR FOREIGN AIRWORTHINESS AUTHORITY.

WHILE THE TESTING AND ANALYSIS UPON WHICH THIS PROGRAM IS BASED HAS RECEIVED APPROVAL OF THE FAA, THIS DOES NOT CONSTITUTE APPROVAL OF THE VARIOUS METHODS THAT COULD BE USED TO IMPLEMENT THE PROGRAM. THIS PROGRAM HAS BEEN APPROVED BY THE FAA WITH THE UNDERSTANDING THAT USERS WILL OBTAIN APPROVAL FOR THE COMPLETE PROCEDURES REQUIRED FROM THE APPROPRIATE FAA FIELD OFFICE OR FOREIGN AIRWORTHINESS AUTHORITY.

NOTE: The actual number of reduced thrust take-offs to which a specific disk is exposed must be recorded to employ the benefits of this program. Averaging cyclic counts on a fleet wide basis or for a group of engines or disks is not permissible.

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ENGINE - TIME LIMITS

R 3. Compressor Blades

R A. First Stage Fan Blades *A.D. 80-12-51R2*

R (1) Ultrasonic inspect first stage fan blades for cracks in
R convex airfoil to platform fillet radius near trailing edge
R every 2200 cycles per Alert Service Bulletin 5136.

R 4. Disk/Hub/Shaft Life

NOTE: Disk life is limited to maximum accumulated hours or cycles, whichever come first. A Letter "X" before part number indicates no potential for life extension, except through reidentification to a new part number through service bulletin incorporation.

A. Front Compressor Rotor

DESCRIPTION PART NUMBER	IF OPERATED AT ENGINE MODEL RATINGS	CYCLES MAX REPLACE AT	HOURS MAX REPLACE AT	K2	K3
Hub/Hub Assy, Front					
Comp. Front					
X431001	D-1, MC-6, MC-7	6000	8000		
X431001	D-1, MC-6, MC-7	6000	X16000		
X431001	D-3, D-3B	4000	8000		
X431001	D-3, D-3B	4000	X16000		
X431001-	D-1, MC-6, MC-7				
SB1066B1	D-3, D-3B	X10000	X16000		
X431001-	D-1, MC-6, MC-7				
SB1066B2	D-3, D-3B	X10000	X16000		
X431001-	D-1, MC-6, MC-7				
SB1066B3	D-3, D-3B	X10000	X16000		
X431001-	D-1, MC-6, MC-7,				
SB1066B4	D-3, D-3B	X10000	X16000		
X376801	D-1, MC-6, MC-7				
	D-3, D-3B	*14000	*16000		
X576801-	D-1, MC-6, MC-7				
SB1219S	D-3, D-3B	*14000	*16000		
X629301	D-1, MC-6, MC-7	25000	**	.93	.88
X629301	D-3, D-3B	20000	**	.93	.88
X694401	D-1, MC-6, MC-7	25000	**	.93	.88
X694401	D-3, D-3B	20000	**	.93	.88
X730801	D-1, MC-6, MC-7,				
	D-3, D-3B	*14000	*16000		
X739201	D-1, D-3, D-3B, MC7, 1MC6	*14000	**		

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<u>DESCRIPTION</u> <u>PART NUMBER</u>	<u>IF OPERATED</u> <u>AT ENGINE</u> <u>MODEL RATING</u>	<u>CYCLES MAX</u> <u>REPLACE AT</u>	<u>HOURS MAX</u> <u>REPLACE AT</u>	<u>K2</u>	<u>K3</u>
Sub/Sub Assy, Front Comp. Front (continued)					
X739301	D-1,MC-7	25000	**	.93	.88
X739301	D-3,D-3B	20000	**	.93	.88
XB746431+	D-1,MC-6,MC-7	25000	**	.93	.88
XB746431+	D-3,D-3B	20000	**		
XB746441+	D-1,D-3,D-3B,MC-6, MC-7	*14000	**		
XB747041+	D-1,D-3,D-3B,MC-6, MC-7	*14000	*16000		
XB747121+	D-1,MC-6,MC-7	25000	**	.93	.88
XB747121+	D-3,D-3B	20000	**	.93	.88
XB747131+	D-1,MC-6,MC-7	25000	**	.93	.88
XB747131+	D-3,D-3B	20000	**	.93	.88
XB747141+	D-1,D-3,D-3B,MC-6, MC-7	*14000	*16000		
R XE747221	D-1,D-3B,-HC7	10000	16000		
XB747231+	D-1,MC-6	6000	8000		
Disk, Second Stage Comp.					
X405702	D-1,MC-6,MC-7 D-3,D-3B	7000	8000		
X405702	D-1,MC-6,MC-7 D-3,D-3B	*10000	*16000		
X421602	D-1,MC-6,MC-7	5000	8000		
X421602	D-1,MC-6,MC-7	*5000	*16000		
X457802	D-1,MC-6,MC-7, D-3,D-3B	7000	8000		
X457802 (prior to change letter "N")	D-1,MC-6,MC-7, D-3,D-3B	*10000	*16000		
X457802 (change letter "N" and sub- sequent)	D-1,MC-6,MC-7, D-3,D-3B	10000	20000		

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<u>DESCRIPTION PART NUMBER</u>	<u>IF OPERATED AT ENGINE MODEL RATING</u>	<u>CYCLES MAX REPLACE AT</u>	<u>HOURS MAX REPLACE AT</u>	<u>K2</u>	<u>K3</u>
Disk, Second Stage Comp. (continued)					
X571202	D-1, MC-6, MC-7	85000	816000		
X571502	D-1, MC-6, MC-7	85000	816000		
X576302	D-1, MC-6, MC-7, D-3, D-3B	810000	820000		
X576602	D-1, MC-6, MC-7, D-3, D-3B	810000	820000		
X576702	D-1, MC-6, MC-7	85000	816000		
X576802	D-1, MC-6, MC-7	85000	816000		
X576902	D-1, MC-6, MC-7	85000	816000		
X629302	D-1, D-3, D-3B, MC-6, MC-7	20000	**	.94	.88
X728202	D-1, D-3, D-3B, MC7, MC6	20000	**	.94	.88
Disk, Fourth Stage Comp.					
X243204	MC-6	7500	12000		
X243204	MC-6	810000	816000		
X393504	D-1, D-3, D-3B	Not App.	8000		
X426504	MC-7	4000	8000		
X468304	D-1, D-3, D-3B, MC-6	7000	8000		
X468304	D-1, D-3, D-3B, MC-6	815000	830000		
X471904	MC-7	4000	8000		
X471904	MC-7	811000	830000		
X480604	MC-6	10000	30000		
X701504	MC-6	10000	30000		
X719404	D-1, D-3, D-3B, MC-6	30000	**		
X719504	MC-7	30000	**		
R X749504	D-1, -3B	30000			
R X749604	D-1MC7	30000			

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Disk, Fifth Stage Comp.					
X199005	MC-6	5000	**		
X199005	MC-6	\$12000	**		
X393505	D-1,D-3,D-3B	7000	8000		
X393505	D-3,D-3B	\$19000	\$30000		
X393505	D-1	\$22000	\$30000		
X426505	MC-7	4000	8000		
X426505	MC-7	\$11000	\$24000		
X480605	MC-6	12000	**		
X697105	MC-7	11000	**	.90	.75
X701605	MC-6	12000	**		
X719505	D-1	30000	**		
X719505	D-3B	25000	**		
X749505	D-1	30000			
X749505	D-3B	25000			
X749605	D-1MC7	11000			
Disk, Sixth Stage Comp.					
X272906	MC-6	7500	12000		
X272906	MC-6	\$15000	\$30000		
X389806	D-1,D-3,D-3B	7000	8000	.92	.75
X389806	D-3,D-3B	\$17000	\$24000	.92	.75
X389806	D-1	\$22000	\$24000	.92	.75
X426506	MC-7	4000	8000	.83	.75
X426506	MC-7	\$9000	\$30000	.83	.75
X475106	D-3,D-3B	17000	30000	.96	.90
X475106	D-1	22000	30000	.96	.90
X480606	MC-6	15000	30000		
X701906	MC-6	15000	30000		
X719406	D-1	30000	**		
X719506	MC7	30000	**		
X719606	D-1,D-3,D-3B	30000	**		
X749506	D-1,-3B	30000			
X749606	D1-MC7	30000			
Disk, Seventh Stage Comp.					
X358407	MC-6	7500	**		
X358407	MC-6	\$15000	**		
X389807	D-1,D-3,D-3B	7000	8000		
X389807	D-3,D-3B	\$13000	\$20000		
X389807	D-1	\$15000	\$25000		
X399807	MC-7	4000	**		
X399807	MC-7	\$10000	**		

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<u>DESCRIPTION</u> <u>PART NUMBER</u>	<u>IF OPERATED</u> <u>AT ENGINE</u> <u>MODEL RATING</u>	<u>CYCLES MAX</u> <u>REPLACE AT</u>	<u>HOURS MAX</u> <u>REPLACE AT</u>	<u>K2</u>	<u>K3</u>
Disk, Seventh Stage Comp. (Continued)					
X475107	D-3, D-3B	17000	20000		
X475107	D-1	18000	26000		
X480607	MC-6	15000	**		
X540907	MC-7	12000	**		
X629907	D-1	16000	24000		
X629907	D-3, D-3B	15000	20000		
X633407	D-1	18000	24000		
X633407	D-3, D-3B	17000	20000		
X634907	MC-7	12000	**		
X639307	D-1	18000	24000		
X639307	D-3, D-3B	17000	20000		
X701707	MC-6	15000	**		
X716607	D-1	16000	24000		
X716607	D-3, D-3B	15000	20000		
X716707	D-1	18000	30000		
X716707	D-3, D-3B	17000	30000		
X716807	D-3, D-3B	17000	20000		
X716807	D-1	18000	24000		
X719407	D-1, D-3, D-3B	30000	**		
X726907	D-1, D-3, D-3B	30000	**		
X749507	D-1, -3B	30000			
Disk, Eighth Stage Comp.					
X273708	MC-6	5000	8000		
X273708	MC-6	5000	30000		
X389808	D-1, D-3, D-3B	7000	8000		
X389808	D-1	12000	30000		
X389808	D-3, D-3B	12000	16000		
X399808	MC-7	4000	8000	.86	.75
X444608	D-1, D-3, D-3B	7000	8000	.89	.75
X444608	D-1, D-3, D-3B	17000	30000	.89	.75
X474808	D-1, D-3, D-3B	17000	30000	.86	.78
X480608	MC-6	5000	30000		
X534108	MC-7	10000	**		
X546808	MC-6	10000	**		
X647808	MC-7	10000	**		
X701508	MC-6	10000	**		
X701908	MC-6	5000	30000		
X719408	D-1	23000	**		
X719508	D-1, D-3, D-3B	30000	**		
X719608	D-1, D-3, D-3B	30000	**		

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ENGINE - TIME LIMITS

<u>DESCRIPTION</u> <u>PART NUMBER</u>	<u>IF OPERATED</u> <u>AT ENGINE</u> <u>MODEL RATING</u>	<u>CYCLES MAX</u> <u>REPLACE AT</u>	<u>HOURS MAX</u> <u>REPLACE AT</u>	<u>K2</u>	<u>K3</u>
Disk, Eighth Stage Comp. (Continued)					
X784808	D-1,D-3,D-3B	30000	**	.86	.78
X785008	D-1	12000	30000		
X785008	D-3,D-3B	12000	16000		
X785108	D-1,D-3,D-3B	17000	30000	.89	.75
X785208	D-1,D-3,D-3B	17000	30000	.86	.78
Disk, Ninth Stage Comp.					
X389809	D-1,D-3,D-3B	7000	8000		
X399809	MC-7	5000	**		
X399809	MC-7	18000	**		
X402109	MC-6	5500	**		
X402109	MC-6	11000	**		
X452309	MC-7	8000	**	.91	.82
X452309	MC-7	10000	**	.91	.82
X468209	D-3,D-3B	18000	30000	.85	.76
X468209	D-1	22000	30000	.85	.76
X585509	MC-7	10000	**		
R X719409	D-1,D-3,D-3B	30000	**		
X749509	D-1,D-3B	30000			

‡ Contingent upon incorporation of Service Bulletin No. 471 at or before 8000 hours of service life.

§ PN 421602 - Cyclic life limit of 5000 cycles may be exceeded under condition specified in Section 72-33-2, Inspection, for this part number disk.

§ PN 431001-SB1066B1 and PN 431001-SB1066B3 - Hubs so identified are limited to a total cumulative life, including time prior to rework, of 10000 cycles or 16000 hours, whichever occurs first, provided rework was accomplished prior to 3000 cycles (hubs operated at D-1, MC-6, or MC-7 ratings) or prior to 2000 cycles (hubs operated at D-3, D-3B ratings).

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- § P/N 431001-SB1066B2 - Hubs so identified which have been reworked after 3000 cycles (hubs operated at D-1, MC-6, or MC-7 ratings) or 2000 cycles (hubs operated at D-3 or D-3B ratings) are life limited to 3000 additional cycles, but not to exceed 10000 cycles or 16000 hours, whichever occurs first.
- § P/N 431001-SB1066B4 - Hubs so identified have an additional life limit of 3000 cycles after rework and reidentification to P/N 431001-SB1066B4, but not to exceed a cumulative life, including time prior to rework of 10000 cycles or 16000 hours, whichever occurs first.
- § P/N 571202 - Reoperation and reidentification of P/N 421602 disk to P/N 571202 will permit operation of P/N 571202 disk for 5000 cycles subsequent to reoperation from P/N 421602 provided, however, that the total operation as P/N 421602 and P/N 571202 shall not exceed 10000 cycles. Hour life is predicated on accumulated life of P/N 421602 disk prior to reoperation and reidentification.

EXAMPLES:

- (1) A disk reoperated and reidentified at 4000 cycles would qualify for an additional 5000 cycles and a total accumulated life (including accumulated cycles prior to reoperation and reidentification) of 9000 cycles.
- (2) A disk reoperated and reidentified at 5500 cycles would qualify for an additional 4500 cycles and total accumulated life of 10000 cycles.
- § P/N 576302 and P/N 576602 - Cyclic life and hour life of P/N 576302 and P/N 576602 disks predicated on accumulated life of P/N 405702 and P/N 457802 disks prior to reoperation and reidentification per Service Bulletin No. 1219.
- § P/N 576702 - Cyclic life and hour life of P/N 576702 disk predicated on accumulated life of P/N 421602 disk prior to reoperation and reidentification.

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- P/N 576801 - Cyclic life and hour life of P/N 576801 hub predicated on accumulated life of P/N 431001 hub prior to reoperation and reidentification per Service Bulletin No. 1219. However, if hub has been operated at a JT3D-3 or JT3D-3B rating prior and/or subsequent to reoperation it should be reinspected using the wink fluorescent penetrant procedure between 9000 and 11000 cycles.
- 576801-5B1219S - Hubs so identified are life limited to 3000 additional cycles after rework and reidentification to P/N 576801-5B1219S per Service Bulletin No. 1219 and must not exceed a total cumulative life of 14000 cycles or 16000 hours, whichever occurs first.

EXAMPLE:

- (1) Hubs reoperated and reidentified to P/N 576801-5B1219S at 12000 cycles will have an additional permissible hub life of 2000 cycles after reoperation and reidentification or accumulated life of 14000 cycles provided the 16000 hours are not exceeded. Hubs reworked at 10000 cycles will have an additional permissible life of 3000 cycles after rework and reidentification or accumulated life of 13000 cycles provided the 16000 hour limit is not exceeded.
- P/N 576802 - Reoperation of P/N 571202 disk to P/N 576802 disk per Service Bulletin No. 1219 is recommended; however, this reoperation does not extend cyclic or hourly life limit established for P/N 571202 disk.
- P/N 576902 - Reoperation of P/N 571502 disk to P/N 576902 disk per Service Bulletin No. 1219 is recommended; however, this reoperation does not extend cyclic or hourly life limit established for P/N 571502 disk.
- 629907 - Cyclic and hour life of P/N 629907 disk predicated on accumulated life of P/N 389807 disk prior to reoperation and reidentification per Service Bulletin No. 1671.
- 633407 - Cyclic and hour life of P/N 633407 disk predicated on accumulated life of P/N 475107 disk prior to reoperation and reidentification per Service Bulletin No. 1671.
- Contingent upon incorporation of Service Bulletin No. 471 at or before 12000 hours of service life.

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* Cyclic life and hour life of 576801 and 730801 predicated on accumulated life of 431001 prior to reoperation and reidentification. Eddy current inspection per Section 72-33-5, paragraph 1.H. or wink fluorescent penetrant inspection must be performed at every overhaul and between 9000 and 11,000 cycles for hubs PW 576801, 730801, 739201, 746441, 747041 and 747141. See SB 1219 for wink fluorescent penetrant inspection procedure. Disk life to be limited to max accumulated hours or cycles, whichever occurs first.

R ** This footnote is no longer in effect.

+ Cycle life of PW 746431, 746441, 747041, 747121, 747131, 747141, 747221, and 747231 predicated on accumulated life of PW 739301, 739201, 730801, 694401, 629301, 576801, 431001, and 395001 respectively prior to reoperation and reidentification.

⊗ Denotes assembly

B. Rear Compressor Rotor

<u>DESCRIPTION</u> <u>PART NUMBER</u>	<u>IF OPERATED</u> <u>AT ENGINE</u> <u>MODEL RATING</u>	<u>CYCLES MAX</u> <u>REPLACE AT</u>	<u>HOURS MAX</u> <u>REPLACE AT</u>	<u>K2</u>	<u>K3</u>
Disk, Tenth Stage Comp.					
X196910	MC-6	5000	8000		
X196910	MC-6	⊗15000	⊗24000		
X358210	MC-7	6500	8000		
X358210	MC-7	⊗6500	⊗24000		
X414210	D-1, MC-7, D-3, D-3B	7000	8000		
X414210	D-3, D-3B	⊗16000	⊗24000		
X414210	D-1, MC-7	⊗20000	⊗24000		
X699610	D-1, MC7	20000	24000		
X699610	D-3, D-3B	16000	24000		
X701510	MC-6	30000	**		
X701810	D-1, MC7	30000	**		
X701810	D-3, -3B	25000	**	.96	.92
X702910	MC-6	15000	24000	.95	.89
X703410	D-3, D-3B	16000	24000		
X703410	D-1, MC7	20000	24000		
X703810	D-3, D-3B	16000	24000		
X703810	D-1, MC7	20000	24000		
X704010	MC7	6500	24000	.97	.92
X762410	D-1, MC7	30000	**		
X762410	D-3B	25000	**		

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<u>DESCRIPTION</u> <u>PART NUMBER</u>	<u>IF OPERATED</u> <u>AT</u> <u>PRATT</u> <u>MODEL RATING</u>	<u>CYCLES MAX</u> <u>REPLACE AT</u>	<u>HOURS MAX</u> <u>REPLACE AT</u>	<u>K2</u>	<u>K3</u>
Disk, Eleventh Stage Comp.					
X310211	MC-6	5000	8000	.95	.86
X310211	MC-6	X8000	X24000	.95	.86
X358211	MC-7	6500	8000	.92	.83
X358211	MC-7	X6500	X24000	.92	.83
X392711	D-1, MC-7, D-3, D-3B	7000	8000	.94	.90
X392711	D-1, MC-7, D-3, D-3B	X10000	X24000	.94	.90
X701511	MC-6	18000	**	.95	.86
X701811	D-1, MC7, D-1, D-3, D-3B	30000	**		
X703011	MC-6	8000	24000	.95	.86
X762411	D-1, MC7 D-3, D-3B	30000	**		
R					
R					
Disk, Twelfth Stage Comp.					
X196912	MC-6	5000	8000		
X196912	MC-6	X15000	X24000		
X358212	MC-7	6500	8000	.94	.90
X358212	MC-7	X6500	X24000	.94	.90
X414212	D-1, MC-7, D-3, D-3B	7000	8000		
X414212	D-3, D-3B	X14000	X24000		
X414212	D-1, MC-7	X16000	X24000		
X699612	D-1, MC7	16000	24000		
X699612	D-3, D-3B	14000	24000		
X701512	MC-6	30000	**		
X701812	D-1, MC7, D-3, D-3B	30000	**		
X762412	D-1, MC7, D-3, D-3B	30000	**		
R					
R					
Disk, Thirteenth Stage Comp.					
X196913	MC-6	5000	8000		
X196913	MC-6	X15000	X24000		
X358213	MC-7	7000	8000		
X358213	MC-7	X10000	X24000		
X414213	D-1, MC-6, MC-7, D-3, D-3B	7000	8000		
X414213	MC-6, D-3, D-3B	X16000	X24000		
X414213	D-1	X22000	X24000		
X414213	MC-7	X18000	X24000		
X450013	MC-6	5000	8000		
X450013	MC-6	X15000	X24000		

* Contingent upon incorporation of Service Bulletin No. 471 at or before 8000 hours of service life.

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ENGINE - TIME LIMITS

DESCRIPTION PART NUMBER	IF OPERATED AT ENGINE MODEL RATING	CYCLES MAX REPLACE AT	HOURS MAX REPLACE AT	K2	K3
Disk, Thirteenth Stage Comp. (Continued)					
X699613	MC7	18000	24000		
X699613	D-1	22000	24000		
X699613	D-3, D-3B	16000	24000		
X701313	D-1, MC6, MC7				
	D-3, D-3B	30000	**		
R X762413	D-1, MC6, MC7				
	D-3, D-3B	30000	**		
Disk, Fourteenth Stage Comp.					
X414114 (Prior to Change Letter H)	D-1, MC6, MC7	7000	8000		
X414114 (Prior to Change letter H)	D-1, MC6, MC7	57000	24000		
X414114 (Change letter H and sub- sequent)	D-1, MC6, MC7	7000	24000		
X438914 (Prior to Change letter D)	D-1, D-3, D-3B	5500	8000		
X438914 (Prior to Change letter D)	D-3, D-3B	18000	30000		
X438914 (Prior to Change letter D)	D-1	10000	30000		

* Contingent upon incorporation of Service Bulletin No. 471 at or before 8000 hours of service life.

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ENGINE - TIME LIMITS

<u>DESCRIPTION</u> <u>PART NUMBER</u>	<u>IF OPERATED</u> <u>AT ENGINE</u> <u>MODEL RATING</u>	<u>CYCLES MAX</u> <u>REPLACE AT</u>	<u>HOURS MAX</u> <u>REPLACE AT</u>	<u>K2</u>	<u>K3</u>
X438914 (Change letter D and subsequent)	D-3, D-3B	8000	30000		
X438914 (Change letter D and Subsequent)	D-1	10000	30000		
X657814	D-1	10000	30000		
X657814	D-3, D-3B	8000	30000		
X699614	D-1, MC7	7000	24000		
X701514	D-1, MC6, MC7	30000	**		
X703214	D-1, MC6, MC7	7000	24000		
X735114	D-1	15000	**		
X735114	D-3, D-3B	13000	**		
X750414	D-1, D-3, D-3B	30000	**		
R X795314 Disk, Fifteenth Stage Comp.	D-1, D-3, D-3B	+30000	**		
X414215	D-1, MC-6, MC-7	Not App.	3000		
X425615	D-1, MC-6, MC-7	Not App.	3000		
X438915 (Prior to Change letter D)	D-1, MC-6, MC-7 D-3, D-3B	7000	8000		
X438915 (Prior to Change letter D)	D-1, MC6, MC7 D-3, D-3B	89000	24000		
X438915 (Change letter D and subsequent)	D-1, MC6, MC7 D-3, D-3B	9000	24000		

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<u>DESCRIPTION</u> <u>PART NUMBER</u>	<u>IF OPERATED</u> <u>AT ENGINE</u> <u>MODEL RATING</u>	<u>CYCLES MAX</u> <u>REPLACE AT</u>	<u>HOURS MAX</u> <u>REPLACE AT</u>	<u>K2</u>	<u>K3</u>
Disk, Fifteenth Stage Comp. (Continued)					
X657815	MC6	15000	**		
X657815	MC7, D1	15000	**		
X657815	D3, D3B	13000	**		
X750415	D-1, MC6, D-3, D-3B, D-MC7	30000	**		
X795315	D-1, MC-6, MC-7, D-3, D-3B	++30000	**		
Disk, Sixteenth Stage Comp.					
X425616	D-1, MC6, MC7	Not App.	4500		
X438916	D-1, MC6, MC7 D-3, D-3B	7000	8000		
(Prior to Change letter E)					
X438916	D-1, MC6, MC7 D-3, D-3B	X9000	X24000		
(Prior to Change letter E)					
X438916	D-1, MC6, MC7 D-3, D-3B	9000	24000		
(Change letter E and sub- sequent)					
657816	MC6	9000	**		
X657816	D-1, MC7, D-3 D-3B	9000	**		
X739216	D-1, MC6, MC7	21000	**		
X739216	D-3, D-3B	18000	**		

% Contingent upon incorporation of Service Bulletin No. 471 at or before 8000 hours of service life.

R. ** This footnote is no longer in effect.

+ Represents total life accumulated prior to and subsequent to reoperation and reidentification from 750414 to 795314.

++ Represents total life accumulated prior to and subsequent to reoperation and reidentification from 750415 to 795315.

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ENGINE - TIME LIMITS

C. Rear Compressor Drive Turbine Rotor

<u>DESCRIPTION</u> <u>PART NUMBER</u>	<u>IF OPERATED</u> <u>AT ENGINE</u> <u>MODEL RATING</u>	<u>CYCLES MAX</u> <u>REPLACE AT</u>	<u>HOURS MAX</u> <u>REPLACE AT</u>	<u>K2</u>	<u>K3</u>
Disk, First Stage Turbine					
X400701	D-1	7000	8000		
X400801	MC-6	7500	16000		
X416301	D-3, D-3B	16000	**		
X416301	D-1, MC-7	20000	**		
X424301	D-1	10000	**		
X425001	MC-6	11000	**		
X496601	MC-6	11000	**		
X496801	D-3, D-3B	16000	**		
X496801	D-1, MC-7	20000	**		
X811901	D-1, MC-7, D-3, D-3B	24000***	**		
X812001	D-1, MC-7, D-3, D-3B	24000***	**		
X812101	MC-6	19000***	**		
X812201	MC-6	19000***	**		
X813801	D-1, MC-7	20000	**		
X813801	D-3, D-3B	16000	**		
X814001	MC-6	11000	**		
X814101	MC-6	11000	**		
X814201	D-1, MC-7	20000	**		
X814201	D-3, D-3B	16000	**		

*** Represents total life accumulated prior to and subsequent to reoperation and reidentification.

R. ** This footnote is no longer in effect.

Rear Comp.
 Drive Turbine
 Shaft

NOTE: For JT3D-1, -1-MC6 and -1-MC7 shafts, accomplish SB 1998 rework by 8000 cycles. For JT3D-3 and -3B shafts, accomplish SB 1998 rework by 7000 cycles.

For JT3D-1, -1-MC6 and -1-MC7 shafts, accomplish SB 3147 rework by 20,000 cycles but not prior to 18,000 cycles. For JT3D-3 and -3B shafts, accomplish by 17,000 cycles but not prior to 15,000 cycles.

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<u>DESCRIPTION</u> <u>PART NUMBER</u>	<u>IF OPERATED</u> <u>AT ENGINE</u> <u>MODEL RATING</u>	<u>CYCLES MAX</u> <u>REPLACE AT</u>	<u>HOURS MAX</u> <u>REPLACE</u>	<u>K2</u>	<u>K3</u>
Rear Comp. Drive Turbine Shaft (Continued)					
R X699354	D-1,MC-6,MC-7	See Note #1	N/A		
R X699354	D-3,-3B	See Note #2	N/A		
R X699355	MC-6	See Note #1	N/A		
R X699356	D-1,MC-6,MC-7	See Note #1	N/A		
R X699356	D-3,-3B	See Note #2	N/A		

R Note #1 - Any PN 699354, 699355 or 699356 shafts which have reached 28,000 cycles at exclusively JT3D-1, JT3D-1 MC-6, JT3D-1 MC-7 ratings must be wink zyglo inspected every 300 cycles thereafter to be continued in service. Reference Service Bulletin Nos. 1998 and 3147.

Note #2 - Any PN 699354, or 699356 shafts which have reached
LIFE LIMIT = 24,000 cycles at exclusively JT3D-3 or JT3D-3B ratings must be wink zyglo inspected every 300 cycles thereafter to be continued in service. Reference Service Bulletin Nos. 1998 and 3147.

D. Front Compressor Drive Turbine Rotor

<u>DESCRIPTION</u> <u>PART NUMBER</u>	<u>IF OPERATED</u> <u>AT ENGINE</u> <u>MODEL RATING</u>	<u>CYCLES MAX</u> <u>REPLACE AT</u>	<u>HOURS MAX</u> <u>REPLACE AT</u>	<u>K2</u>	<u>K3</u>
Disk, 2nd Stage Turbine					
X 419102	D-1,MC-6,MC-7	Not App.	3000		
X 438902	D-1,MC-6,MC-7	8000	30000		
X 438902	D-3,D-3B	7000	30000		
X 598202	D-1,MC-6,MC-7, D-3,D-3B	10000	30000		
X 645402	D-1,MC-6,MC-7	8000	30000		
X 645402	D-3,D-3B	7000	30000		
X 655902	D-1,MC-6,MC-7	8000	30000		
X 655902	D-3,D-3B	7000	30000		
X 734102+	D-1,MC-6,MC-7, D-3,D-3B	16000	30000		
X 757602	D-1,MC-6,MC-7, D-3,D-3B	16000	++		

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<u>DESCRIPTION</u> <u>PART NUMBER</u>	<u>IF OPERATED</u> <u>AT ENGINE</u> <u>MODEL RATING</u>	<u>CYCLES MAX</u> <u>REPLACE AT</u>	<u>HOURS MAX</u> <u>REPLACE AT</u>	<u>K2</u>	<u>K3</u>
Disk, 3rd Stage Turbine					
X 418903	D-1, MC-6, MC-7	Not App.	6000		
X 438903	D-1, MC-6, MC-7, D-3, D-3B	7000	8000		
X 438903	D-1, MC-6, MC-7, D-3, D-3B	8000	16000		
X 438903P	D-1, MC-6, MC-7, D-3, D-3B	8000	16000		
X 675803*	D-1, MC-6, MC-7, D-3, D-3B	7000	8000		
X 675803**	D-1, MC-6, MC-7, D-3, D-3B	8000	16000		
X 675803	D-1, MC-6, MC-7, D-3, D-3B	8000	16000		
X 675803	D-1, MC-6, MC-7	---	6000		
X 703803	D-1, MC-6, MC-7	---	6000		
X 703903	D-1, MC-6, MC-7, D-3, D-3B	8000	16000		
X 794903	D-1, MC-6, MC-7, D-3, D-3B	9000***	16000***		
X 795003	D-1, MC-6, MC-7, D-3, D-3B	8000***	16000***		
X 795703	D-1, MC-6, MC-7, D-3, D-3B	8000***	16000***		
X 795803	D-1, MC-6, MC-7, D-3, D-3B	8000***	16000***		
X 795903	D-1, MC-6, MC-7, D-3, D-3B	8000***	16000***		
X 796003	D-1, MC-6, MC-7, D-3, D-3B	8000***	16000***		
X 796103	D-1, MC-6, MC-7, D-3, D-3B	8000***	16000***		
X 795203	D-1, MC-6, MC-7, D-3, D-3B	8000***	16000***		
X 796303	D-1, MC-6, MC-7, D-3, D-3B	9000***	16000***		
X 796403	D-1, MC-6, MC-7, D-3, D-3B	8000***	16000***		
X 796503	D-1, MC-6, MC-7, D-3, D-3B	8000***	16000***		
X 796603	D-1, MC-6, MC-7, D-3, D-3B	9000***	16000***		
R X 797903	D-1, MC-6, MC-7	14000	++		
R X 797903	D-3, D-3B	10000	++		

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ENGINE - TIME LIMITS

<u>DESCRIPTION</u> <u>PART NUMBER</u>	<u>IF OPERATED</u> <u>AT ENGINE</u> <u>MODEL RATINGS</u>	<u>CYCLES MAX</u> <u>REPLACE AT</u>	<u>HOURS MAX</u> <u>REPLACE AT</u>	<u>K2</u>	<u>K3</u>
Front Comp Drive Turbine Shaft PMS With Slanted Oil Holes	D-1,MC-6,MC-7 D-3,D-3B	See Note 1,3,5 See Note 2,4,6	NA NA		

Note 1 - For JT3D-1,-1-MC6 and -1-MC7 shafts, except PN 576583, 671023 and 755107, accomplish SB 1479 rework at 7,000 cycles, 10,000 - 12,000 cycles and 20,000 - 22,000 cycles.

Note 2 - For JT3D-3 and -3B shafts, except PN 576583, 671023 and 755107, accomplish SB 1479 rework at 6000 cycles, 8000 - 10,000 cycles and 16,000 - 18,000 cycles.

R Note 3 - For JT3D-1,-1-MC6 and -1-MC7 shaft, except PN 671023, 755107, accomplish SB 2650 rework at 12,000 cycles.

R Note 4 - For JT3D-3 and 3B shafts, except PN 671023, 755107, accomplish SB 2650 rework at 10,000 cycles.

Note 5 - Shafts, except PN 755107, 671023, having been in service for 32,000 cycles (operated exclusively at JT3D-1,-1-MC6, -1-MC7 ratings) shall be subjected to wink fluorescent penetrant inspection at each 1,000 cycle interval thereafter for remaining life of shaft.

LIFE LIMIT = Note 6 - Shafts, except PN 755107, 671023, having been in service for 26,000 cycles shall be subjected to wink fluorescent penetrant inspection at each 1,000 cycle interval thereafter for remaining life of shaft.

Pratt & Whitney
JT3D OVERHAUL MANUAL (PN 411568)

ENGINE - TIME LIMITS

<u>DESCRIPTION</u> <u>PART NUMBER</u>	<u>IF OPERATED</u> <u>AT ENGINE</u> <u>MODEL RATING</u>	<u>CYCLES MAX</u> <u>REPLACE AT</u>	<u>HOURS MAX</u> <u>REPLACE AT</u>	<u>K2</u>	<u>K3</u>
Disk, 4th Stage Turbine					
X 418904	D-1,MC-6,MC-7, D-3,D-3B	7000	8000		
X 418904	D-1,MC-6,MC-7	*12000	*30000		
X 418904	D-3,D-3B	*10000	*16000		
X 418904D	D-1,MC-6,MC-7	12000	30000		
X 418904D	D-3,D-3B	10000	16000		
X 463504	D-1,MC-6,MC-7, D-3,D-3B	7000	++		
X 463504	D-1,MC-6,MC-7	*12000	++		
X 463504	D-3,D-3B	*10000	++		
X 463504B And Subsequent	D-1,MC-6,MC-7	12000	++		
X 463504B And Subsequent	D-3,D-3B	10000	++		
X 771104	D-1,MC-6,MC-7, D-3,D-3B	20000	++		

+ PN X734102 must always be used with ten counterweights installed in rear flange of disk. This condition is applicable to entire operation life of disk. SB 4989

R

++ This footnote is no longer in effect.

* Contingent upon incorporation of SB 471 at or before 8000 hours.

* Reoperated from 438903 per SB 2822 without SB 471.

** Reoperated from 438903 incorporating SB 471 or PN 438903F and subsequent.

*** Represents total life accumulated prior to and subsequent to reoperation and reidentification per ASB 5358.