EFFECTIVITY *This cover sheet shall not be used for French registered helicopters*

BK117 B-2
APPROVED ROTORCRAFT FLIGHT MANUAL



Valid for Model: **MBB-BK117 B-2 and MBB-BK117 B-2D**

Registration Mark: _____

Serial No.: _____

Year of Manufacture: _____

IT IS THE OPERATOR'S RESPONSIBILITY TO MAINTAIN THIS MANUAL IN A CURRENT STATUS IN ACCORDANCE WITH THE LIST OF EFFECTIVE PAGES.

This manual is part of the above designated helicopter. It includes the material to be furnished to the pilot as required by FAR Part 29.

The "Airworthiness Limitations" section of the Rotorcraft Maintenance Manual shall be complied with.

THIS MANUAL MUST BE CARRIED IN THE HELICOPTER AT ALL TIMES.

Original Issue - January 17, 1992

Approved by:

Luftfahrt-Bundesamt
Braunschweig

Published by:

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REVISION	1	JUL 28, 1992
REVISION	2	NOV 11, 1992
REVISION	3	MAR 11, 1993
REVISION	4	JUL 08, 1993
REVISION	5	APR 06, 1994
REVISION	5A	MAR 23, 1995
REVISION	6	JUL 11, 1996
REVISION	7	OCT 10, 1996
REVISION	8	NOV 11, 1999
REVISION	9	APR 05, 2002
REVISION	10	APR 29, 2003
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EASA approval no.: 2005-4260		
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EASA approval no.: R.C.01230		
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REVISION	14.3	APR 27, 2007
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EASA approval no.: R.A.01429		
REVISION	16	AUG 14, 2008
EASA approval no.: R.A.01495		
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EASA approval no.: 10027515		
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EASA approval no.: 10030041		
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REVISION	22	(see entry below)

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LOG OF REVISIONS (CONTINUED)

LIST OF EFFECTIVE PAGES

NOTE **N**, **R**, or **D** indicate pages which are New, Revised or Deleted respectively. Remove and dispose of superseded pages, insert the latest revision pages and complete the Record of Revisions as necessary.

	Page	Rev No.	Remarks/Effectivity
	Section 0		
	0-1	6	Cover sheet (TITLE)
	0-2	14	Approving Authorities
	A	9	DGAC only
	B	9	DGAC only
	C	9	DGAC only
	0-3/0-4	6	Manual Contents
R	0-5	22	Log of Revisions
R	0-6	22	Log of Revisions
	0-7	0	Record of Revisions
	0-8	0	Record of Revisions
	0-9	0	Record of temp. Rev.
	0-10	0	Record of temp. Rev.
R	0-11	22	List of effective pages
R	0-12	22	List of effective pages
R	0-13	22	List of effective pages
R	0-14	22	List of effective pages
R	0-15	22	List of effective pages
R	0-16	22	List of effective pages
R	0-17	22	List of effective pages
R	0-18	22	List of effective pages
R	0-19	22	List of effective pages
R	0-20	22	List of effective pages
R	0-21	22	List of effective pages
R	0-22	22	List of effective pages
	0-23/0-24	8	Record of Modifications
	ROIV	–	Record of SW versions and performed (A)SBs
	ROOT	–	Record of used oil types
	Section 1		
	1-i	11	
	1-ii	11	
	1-1	7	
	1-2	7	
	1-3	8	
	1-4	7	
	1-5	7	
	1-6	11	
	1-7	11	
	1-8	11	
	1-9	11	
	1-10	11	
	1-11	11	
	1-12	11	
	1-13	11	
	1-14	11	
	1-15	11	
	1-16	11	
	1-17	11	
	1-18	11	
	1-19	11	
	1-20	11	
	1-21	11	
	1-22	11	
	1-23	11	
	Section 2		
	2-i	6	
	2-ii	7	
	2-iii/2-iv	7	
	2-1	9	
	2-2	7	
	2-3	6	
R	2-4	22	S/N ≤ 7252, before...
R	2-4	22	S/N ≥ 7253, after...
	2-5	8	
	2-6	6	S/N ≤ 7252, before...
	2-6	6	S/N ≥ 7253, after...
	2-7	6	
	2-8	7	

Page	Rev No.	Remarks/Effectivity
2-9	6	S/N ≤ 7252 or bef....
2-9	6	S/N ≥ 7253 or after...
2-10	6	S/N ≤ 7252 or bef....
2-10	6	S/N ≥ 7253 or after...
2-11	6	
2-12	6	
2-13	7	
2-14	7	Not for French reg.
2-14	7	For French reg.
2-15	20	
2-16	6	
2-17	20	
2-18	6	
2-19	12	
2-20	6	
2-21	6	
2-22	6	S/N ≤ 7252 or bef....
2-22	6	S/N ≥ 7253 or after...
2-23	7	
2-24	8	S/N ≤ 7252 or bef....
2-24	8	S/N ≥ 7253 or after...
2-25	6	
2-26	6	
2-27	6	Not for Arg./Braz. reg.
2-27	6	For Brazilian reg.
2-27	6	For Argentinian reg.
2-28	6	
2-29	8	
2-30	6	
2-31	6	
2-32	6	
Section 3		
3-i	10	S/N ≤ 7183
3-i	10	S/N ≥ 7184
3-ii	14	
3-iii/3-iv	21.2	S/N ≤ 7183
3-iii/3-iv	21.2	S/N ≥ 7184
3-1	5A	
3-2	10	
3-3	20	
3-4	5A	
3-5	5A	S/N ≤ 7183

Page	Rev No.	Remarks/Effectivity
3-5	5A	S/N ≥ 7184
3-6	10	
3-7	5A	
3-8	5A	
3-9	5A	S/N ≤ 7183
3-9	5A	S/N ≥ 7184
3-10	8	
3-11	20	
3-12	5A	
3-13	5A	S/N ≤ 7183
3-13	5A	S/N ≥ 7184
3-14	5A	S/N ≤ 7183
3-14	5A	S/N ≥ 7184
3-15	5A	If YAW CSAS installed
3-16	5A	
3-17	5A	
3-18	10	
3-19	10	
3-20	5A	
3-21	17	
3-22	5A	
3-23	17	
3-24	5A	
3-25	5A	
3-26	21.2	
3-27	21.2	S/N ≤ 7183
3-27	21.2	S/N ≥ 7184
3-28	21.2	
3-29	5A	
3-30	5A	
3-31	5A	
3-32	5A	
3-33	5A	
3-34	5A	
3-35	5A	
3-36	8	
3-37	5A	
3-38	14	
3-39	14	
3-40	14	
3-41	14	
3-42	14	

Page	Rev No.	Remarks/Effectivity
3-43	14	
3-44	14	
3-45	14	
3-46	14	
3-47	14	
3-48	14	
3-49	14	
3-50	14	
3-51	14	
3-52	14	
3-53	14	
3-54	14	S/N ≤ 7183
3-54	14	S/N ≥ 7184
3-55	14	S/N ≤ 7183
3-55	14	S/N ≥ 7184
3-56	14	
3-57	14	S/N ≤ 7183
3-57	14	S/N ≥ 7184
3-58	14	
3-59	14	
3-60	14	
3-61	14	
3-62	21.2	S/N ≤ 7183
3-62	21.2	S/N ≥ 7184
3-63	21.2	S/N ≤ 7183
3-63	21.2	S/N ≥ 7184
3-64	21.2	If LEAR SIEGLER trim actuators installed
3-64	21.2	If SFENA trim actuators installed
3-65	21.2	
3-66	21.2	
3-67	21.2	
3-68	21.2	If YAW CSAS installed
Section 4		
4-i	7	
4-ii	7	
4-1	7	
4-2	7	
4-3	7	
4-4	7	S/N ≤ 7183
4-4	7	S/N ≥ 7184
4-5	21.2	

Page	Rev No.	Remarks/Effectivity
4-6	21.2	
4-7	7	
4-8	7	
4-9	7	
4-10	21.2	
4-11	7	
4-12	7	S/N ≤ 7183
4-12	7	S/N ≥ 7184
4-13	7	S/N ≤ 7183
4-13	7	S/N ≥ 7184
4-14	17	(See respective page)
4-15	7	
4-16	17	
4-17	14	S/N ≤ 7183
4-17	14	S/N ≥ 7184
4-18	7	
4-19	7	
4-20	7	
4-21	7	
4-22	7	(See respective page)
4-23	17	
4-24	17	S/N ≤ 7183
4-24	17	S/N ≥ 7184
4-25	7	
4-26	7	
Section 5		
5-i	8	S/N ≤ 7252 or bef....
5-i	8	S/N ≥ 7253 or after...
5-ii	6	S/N ≤ 7252 or bef....
5-ii	6	S/N ≥ 7253 or after...
5-iii/5-iv	8	
5-1	8	
5-2	8	
5-3	6	
5-4	6	
5-5	6	
5-6	6	
5-7	6	
5-8	8	
5-9	6	
5-10	6	
5-11	6	

Page	Rev No.	Remarks/Effectivity
5-12	6	
5-13	6	
5-14	6	
5-15	6	
5-16	6	
5-17	6	
5-18	6	S/N ≤ 7252 or bef....
5-18	6	S/N ≥ 7253 or after...
5-19	6	S/N ≤ 7252 or bef....
5-19	6	S/N ≥ 7253 or after...
5-20	6	
5-21	6	
5-22	6	
5-23	6	
5-24	6	
5-25	6	
5-26	6	
5-27	6	
5-28	6	
5-28A	8	S/N ≥ 7253 or after...
5-28B	8	S/N ≥ 7253 or after...
5-28C	8	S/N ≥ 7253 or after...
5-28D	6	S/N ≥ 7253 or after...
5-29	6	
5-30	8	
5-31	6	
5-32	6	
5-33	6	
5-34	6	
5-35	6	
5-36	6	
5-37	6	
5-38	6	
5-39	8	S/N ≤ 7252 or bef....
5-39	8	S/N ≥ 7253 or after...
5-40	8	S/N ≤ 7252 or bef....
5-40	8	S/N ≥ 7253 or after...
5-41	8	S/N ≤ 7252 or bef....
5-41	8	S/N ≥ 7253 or after...
5-42	8	
5-43	8	
5-44	8	
5-45	8	S/N ≤ 7252 or bef....
5-45	8	S/N ≥ 7253 or after...
5-46	8	S/N ≤ 7252 or bef....
5-46	8	S/N ≥ 7253 or after...
5-47	8	S/N ≤ 7252 or bef....
5-47	8	S/N ≥ 7253 or after...
5-48	6	
5-49	6	
5-50	8	S/N ≤ 7252 or bef....
5-50	8	S/N ≥ 7253 or after...
5-51/5-52	8	S/N ≤ 7252 or bef....
5-51/5-52	8	S/N ≥ 7253 or after...
Section 6		
6-i/6-ii	7	
6-1	7	
6-2	7	
6-3	7	
6-4	7	
6-5	7	
6-6	7	
6-7	7	
6-8	7	
6-9	7	
6-10	7	
6-11/6-12	7	
Form MBR-1	0	
Form MBR-1	0	
Form MBR-1	0	
Form MBR-1	0	
Form EL-1	0	
Form EL-1	0	
Form EL-1	0	
Form EL-1	0	
Section 7		
7-i	8	
7-ii	8	
7-iii	8	
7-iv	8	
7-1	8	
7-2	8	
7-3	8	
7-4	20	
7-5	14	

Page	Rev No.	Remarks/Effectivity
7-6	14	
7-7	8	
7-8	8	
7-9	17	
7-10	8	
7-11	8	
7-12	8	
7-13	8	
7-14	8	
7-15	8	
7-16	8	
7-17	8	
7-18	8	
7-19	8	
7-20	8	
7-21	8	
7-22	8	
7-23	8	
7-24	8	
7-25	8	
7-26	8	
7-27	8	
7-28	8	
7-29	8	
7-30	8	
Section 8		
8-1/8-2	0	
Section 9		
9-i	12.1	
9-ii	8	
9-1	6	
9-2	6	
9-3	8	
9-4	6	
9-5	8	
9-6	6	
9-7	6	
9-8	6	
9-9	6	
9-10	6	
9-11	6	
9-12	6	
9-13	6	
9-14	6	
9-15	6	
9-16	6	
9-17	6	
9-18	6	
9-19	6	
9-20	12.1	
Section 10		
10-1	13	Log of Supplements
10-2	13	Log of Supplements
10-3	13	Log of Supplements
10-4	13	Log of Supplements
10-5	13	Log of Supplements
10-6	13	Log of Supplements
10-7	13	Log of Supplements
10-8	13	Log of Supplements
10-2-1	21	
10-2-2	21	
10-2-3	21	
10-2-4	21	
10-2-5	21	
10-2-6	21	
10-2-7	21	
10-2-8	21	
10-2-9	21	
10-2-10	21	
10-2-11	21	
10-2-12	21	
10-2-13	21	
10-2-14	21	
10-2-15	21	
10-2-16	21	
10-2-17/-18	21	
10-3-1	8	
10-3-2	8	
10-3-3	8	
10-3-4	8	
10-3-5	8	
10-3-6	8	
10-3-7	8	
10-3-8	8	

Page	Rev No.	Remarks/Effectivity
10-3-9	8	
10-3-10	8	
10-3-11	8	
10-3-12	8	
10-3-13	8	
10-3-14	8	
10-3-15/-16	8	
10-4-1	0	
10-4-2	0	
10-4-3	0	
10-4-4	0	
10-4-5	0	
10-5-1	8	
10-5-2	8	
10-5-3	8	
10-5-4	8	
10-6-1	0	
10-6-2	0	
10-6-3	0	
10-6-4	0	
10-7-1	0	
10-7-2	0	
10-7-3	0	
10-7-4	0	
10-7-5	0	
10-8-1	6	
10-8-2	6	
10-8-3	6	S/N $\leq$ 7252 or bef....
10-8-3	6	S/N $\geq$ 7253 or after...
10-8-4	6	
10-8-5	6	
10-8-6	6	
10-9-1	0	
10-9-2	0	
10-10-1	0	
10-10-2	0	
10-11-1	1	
10-11-2	1	
10-11-3	1	
10-11-4	1	
10-11-5	1	
10-11-6	4	
10-11-7	1	
10-11-8	1	
10-11-9	1	
10-11-10	1	
10-12-1	6	
10-12-2	6	
10-12-3/-4	6	
10-13-1	8	
10-13-2	8	
10-15-1	0	
10-15-2	0	
10-15-3	0	
10-15-4	0	
10-15-5	0	
10-15-6	21.1	
10-16-1	0	
10-16-2	0	
10-16-3	0	
10-17-1	0	
10-17-2	0	
10-17-3	0	
10-17-4	0	
10-17-5	0	
10-18-1	8	
10-18-2	8	
10-18-3	8	
10-18-4	8	
10-20-1	8	
10-20-2	8	
10-20-3	8	
10-20-4	8	
10-21-1	8	
10-21-2	11	
10-21-3/-4	8	
10-22-1	8	
10-22-2	8	
10-23-1	8	
10-23-2	8	
10-23-3	8	
10-23-4	8	
10-23-5	8	
10-23-6	8	
10-23-7	8	
10-23-8	8	

Page	Rev No.	Remarks/Effectivity
10-25-1	8	
10-25-2	8	
10-25-3/-4	8	
10-26-1	0	
10-26-2	0	
10-26-3	0	
10-26-4	0	
10-26-5	0	
10-26-6	0	
10-28-1	8	
10-28-2	8	
10-29-1	0	
10-29-2	0	
10-29-3	0	
10-29-4	0	
10-30-1	0	
10-30-2	0	
10-30-3	0	
10-31-1	0	
10-31-2	0	
10-31-3	0	
10-31-4	0	
10-31-5	0	
10-31-6	0	
10-31-7	0	
10-31-8	0	
10-32-1	18	
10-32-2	18	
10-32-3	18	
10-32-4	18	
10-32-5	18	
10-32-6	18	
10-32-7	18	
10-32-8	18	
10-32-9	18	
10-32-10	18	
10-32-11	18	
10-32-12	18	
10-32-13	18	
10-33-1	4	
10-33-2	4	
10-33-3	4	
10-33-4	4	
10-33-5	4	
10-34-1	0	
10-34-2	0	
10-34-3	3	
10-34-4	0	
10-35-1	21.2	
10-35-2	21.2	
10-35-3	21.2	
10-35-4	21.2	
10-35-5	21.2	
10-35-6	21.2	
10-35-7	21.2	
10-35-8	21.2	
10-35-9	21.2	
10-35-10	21.2	
10-35-11	21.2	
10-35-12	21.2	
10-35-13	21.2	
10-35-14	21.2	
10-35-15	21.2	
10-35-16	21.2	
10-35-17	21.2	
10-35-18	21.2	
10-35-19	21.2	
10-35-20	21.2	
10-35-21	21.2	
10-36-1	8	
10-36-2	8	
10-37-1	0	
10-37-2	0	
10-37-3	0	
10-37-4	0	
10-38-1	0	
10-38-2	0	
10-38-3	0	
10-38-4	0	
10-38-5	0	
10-38-6	0	
10-38-7	0	
10-38-8	0	
10-38-9	0	
10-38-10	0	
10-38-11	0	

Page	Rev No.	Remarks/Effectivity
10-38-12	0	
10-38-13	0	
10-38-14	0	
10-38-15	0	
10-39-1	8	
10-39-2	8	
10-39-3	8	
10-39-4	8	
10-40-1	0	
10-40-2	0	
10-40-3	0	
10-40-4	0	
10-40-5	0	
10-40-6	0	
10-40-7	0	
10-40-8	0	
10-40-9	0	
10-40-10	0	
10-41-1	0	
10-41-2	0	
10-41-3	0	
10-41-4	0	
10-41-5	0	
10-41-6	0	
10-41-7	0	
10-41-8	0	
10-41-9	0	
10-41-10	0	
10-42-1	0	
10-42-2	0	
10-42-3	0	
10-42-4	0	
10-42-5	0	
10-42-6	0	
10-44-1	0	
10-44-2	0	
10-44-3	0	
10-45-1	3	
10-45-2	3	
10-45-3	3	
10-45-4	3	
10-46-1	8	
10-46-2	8	
10-46-3	1	
10-46-4	8	
10-46-5	1	
10-46-6	1	
10-46-7	1	
10-46-8	1	
10-47-1	10	
10-47-2	17	
10-47-3	8	
10-47-4	8	
10-47-5	8	
10-47-6	10	
10-47-7	19.1	
10-47-8	19.1	
10-48-1	8	
10-48-2	8	
10-48-3	8	
10-48-4	8	
10-48-5	8	
10-48-6	8	
10-48-7	8	
10-48-8	8	
10-48-9	8	
10-48-10	8	
10-48-11	8	
10-48-12	8	
10-48-13	8	
10-48-14	8	
10-48-15	8	
10-48-16	8	
10-48-17	8	
10-48-18	8	
10-48-19	8	
10-48-20	8	
10-48-21	8	
10-48-22	8	
10-48-23	8	
10-48-24	8	
10-48-25	8	
10-48-26	8	
10-48-27	8	
10-48-28	8	
10-48-29	8	

Page	Rev No.	Remarks/Effectivity
10-48-30	8	
10-48-31	8	
10-48-32	8	
10-48-33	8	
10-48-34	8	
10-48-35	8	
10-48-36	8	
10-48-37	8	
10-48-38	8	
10-48-39	8	
10-48-40	8	
10-48-41	8	
10-48-42	8	
10-48-43	8	
10-48-44	8	
10-48-45	8	
10-48-46	8	
10-48-47	8	
10-48-48	8	
10-53-1	8	
10-53-2	8	
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10-66-14	3	
10-66-15	3	
10-66-16	3	
10-66-17	3	
10-66-18	3	
10-66-19	3	
10-66-20	3	
10-66-21	3	

Page	Rev No.	Remarks/Effectivity
10-66-22	3	
10-66-23	3	
10-66-24	3	
10-66-25	3	
10-66-26	3	
10-66-27/-28	8	
10-67-1	3	
10-67-2	3	
10-67-3	3	
10-67-4	3	
10-67-5	3	
10-67-6	3	
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10-67-8	3	
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10-68-2	5	
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10-68-6	5	
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10-69-4	8	
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10-69-6	8	
10-69-7	6	
10-69-8	6	
10-69-9	6	
10-69-10	6	
10-69-11	6	
10-69-12	6	
10-69-13/-14	6	
10-70-1	6	
10-70-2	8	
10-70-3	6	
10-70-4	6	
10-71-1	6	
10-71-2	8	
10-71-3	8	
10-71-4	6	
10-71-5	6	
10-71-6	6	

Page	Rev No.	Remarks/Effectivity
10-74-1	13	
10-74-2	13	
10-74-3/4	13	
Section 11		
11-1	8	Log of Supplements
11-2	8	Log of Supplements
11-1-i	6	S/N ≤ 7252 or bef....
11-1-ii	6	S/N ≤ 7252 or bef....
11-1-1	6	S/N ≤ 7252 or bef....
11-1-2	6	S/N ≤ 7252 or bef....
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11-1-12	6	S/N ≤ 7252 or bef....
11-1-13	8	S/N ≤ 7252 or bef....
11-1-14	6	S/N ≤ 7252 or bef....
11-1-15	8	S/N ≤ 7252 or bef....
11-1-16	6	S/N ≤ 7252 or bef....
11-1-17	6	S/N ≤ 7252 or bef....
11-1-18	6	S/N ≤ 7252 or bef....
11-1-19	6	S/N ≤ 7252 or bef....
11-1-20	6	S/N ≤ 7252 or bef....
11-1-21	6	S/N ≤ 7252 or bef....
11-1-22	6	S/N ≤ 7252 or bef....
11-1-23	6	S/N ≤ 7252 or bef....
11-1-24	6	S/N ≤ 7252 or bef....
11-1-25	6	S/N ≤ 7252 or bef....
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11-1-ii	8	S/N ≥ 7253 or after...
11-1-iii	8	S/N ≥ 7253 or after...
11-1-iv	8	S/N ≥ 7253 or after...
11-1-v	8	S/N ≥ 7253 or after...
11-1-vi	8	S/N ≥ 7253 or after...
11-1-1	8	S/N ≥ 7253 or after...

Page	Rev No.	Remarks/Effectivity
11-1-2	8	S/N ≥ 7253 or after...
11-1-3	8	S/N ≥ 7253 or after...
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11-6-9	16	S/N ≤ 7183
11-6-10	16	S/N ≤ 7183
11-8-i	8	
11-8-ii	8	

Page	Rev No.	Remarks/Effectivity
11-8-1	8	
11-8-2	8	
11-8-3	8	
11-8-4	8	
11-8-5/-6	8	
11-8-7	8	
11-8-8	8	
11-8-9/-10	8	
11-8-11	8	
11-8-12	8	
11-8-13/-14	8	

SECTION 4

NORMAL PROCEDURES

TABLE OF CONTENTS

		Page
4	**NORMAL PROCEDURES**	4 - 1
4.1	**GENERAL**	4 - 1
4.2	**PREPARATION FOR FLIGHT**	4 - 1
4.2.1	Flight Restrictions	4 - 1
4.2.2	Flight Planning	4 - 1
4.2.3	Mass and Balance	4 - 1
4.3	**PREFLIGHT CHECK**	4 - 2
4.3.1	General	4 - 2
4.3.2	Exterior Check	4 - 3
4.3.3	Interior Check	4 - 12
4.4	**STARTING ENGINES**	4 - 15
4.4.1	Before starting engines	4 - 15
4.4.2	Starting first engine	4 - 15
4.4.3	Starting second engine	4 - 17
4.4.4	Cold weather starts	4 - 18
4.5	**SYSTEM CHECKS**	4 - 19
4.5.1	Hydraulic system check	4 - 19
4.5.2	YAW CSAS system check	4 - 20
4.5.3	SPAS system check	4 - 21
4.5.4	Avionic checks	4 - 21
4.5.5	Miscellaneous checks	4 - 21
4.5.6	Power check	4 - 21
4.5.7	Bleed air heating check	4 - 21
4.5.8	Force trim release (FTR) function check (EFFECTIVITY)	4 - 22
4.5.9	Engine overspeed trip system check (EFFECTIVITY)	4 - 22

4.6 **PRE-TAKEOFF CHECK** . . . . . 4 - 23

4.7 **TAKEOFF CHECK** . . . . . 4 - 23

4.8 **PRE-LANDING CHECK** . . . . . 4 - 23

4.9 **ENGINE SHUTDOWN** . . . . . 4 - 24

4.10 **FLIGHT CHARACTERISTICS** . . . . . 4 - 25

4.10.1 Flight Control . . . . . 4 - 25

4.10.2 Lateral Control Characteristics . . . . . 4 - 26

4.10.3 Maximum bank angles in turns . . . . . 4 - 25

4.10.4 Maximum rate-of-descent during hover or low speed flight . . . . . 4 - 26

SECTION 4

NORMAL PROCEDURES

4.1 GENERAL

This Section contains instructions and recommended procedures which are peculiar to the operation of this helicopter.

For definition of terms, abbreviations and symbols used in this Section refer to Section 1.

4.2 PREPARATION FOR FLIGHT

4.2.1 Flight Restrictions

The minimum, normal, maximum and cautionary operation ranges for the helicopter and its subsystems are indicated by instrument markings, placards and decals.

For helicopter and subsystem restrictions refer to Section 2, Limitations.

NOTE Before helicopter operation with a passenger on copilot's seat, cyclic stick and collective pitch lever on copilot's side should be removed, copilot's pedals adjusted to the most forward position and the dual control covers (see FMS 10-16) installed.

If the covers are not available, cyclic and collective levers shall remain installed. However, in this case, the passenger must be briefed properly before starting engines not to interfere with any pilot's control operation.

4.2.2 Flight Planning

Refer to Sections 5 and 9 to determine required fuel, airspeeds and power settings for takeoff, climb, cruise, hovering and landing data necessary to accomplish the mission.

NOTE Before flight it is necessary to check that the fuel grade is selected properly relative to fuel temperature/altitude limitations given in section 2.

4.2.3 Mass and Balance

The takeoff and anticipated landing gross mass and balance should be obtained before takeoff and checked against mass and load limits and center of gravity restrictions (see Section 2).

4.3 PREFLIGHT CHECK

4.3.1 General

The preflight check shall be accomplished, according to either the Flight Manual, the Maintenance Manual or the Pilot's Checklist.

The preflight check is not a detailed mechanical inspection, but essentially a visual check of the helicopter for correct condition.

This check shall be completed before each flight. However, items not marked with a star (★) need only be checked before the first flight of the day.

When unusual local conditions dictate, the extent and/or frequency of this check shall be increased as necessary to promote safe operation.

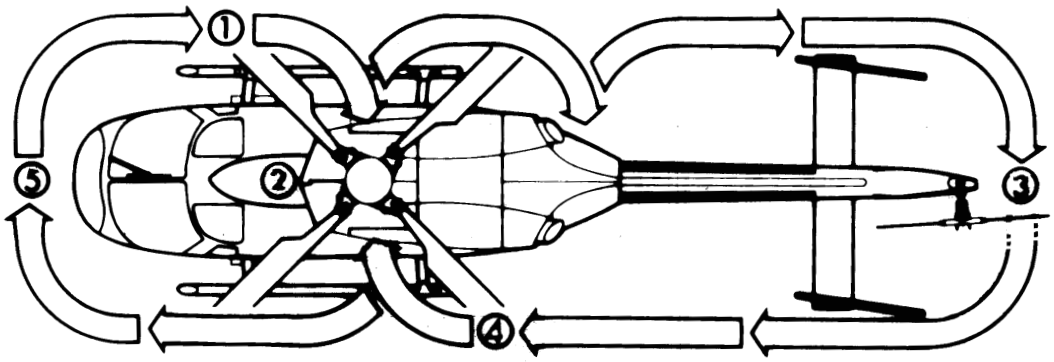
NOTE

- The following list contains only check items for the standard configuration.
- In addition to these items, check antennas and all installed optional equipment.
- Make certain that all relevant intermediate and special inspections in accordance with the Maintenance Manual have been complied with.
- For optional equipment check items, refer to the respective Flight Manual Supplement or Maintenance Manual, Chapter 800.

4.3.2 Exterior Check

The exterior check is laid out as a walk-around check, starting forward right at the pilot's door, proceeding clockwise to the tail boom, to the left hand side (including the upper and lower areas of the helicopter) and is completed at the helicopter nose area.

NOTE
- If possible, the helicopter should be headed into wind before starting the engines.
- The area around the helicopter should be clear of all foreign objects.
- To avoid excessive drain on the helicopter battery, particularly during cold weather, all ground operations should be conducted using an external power unit (EPU).
- When the battery is used, the operation of electrical equipment should be kept to a minimum.



1. Fuselage	-	Right side
2. Cabin	-	Top
3. Tail boom	-	Aft area
4. Fuselage	-	Left side
5. Cabin	-	Front

Fig. 4-1 Exterior Check Sequence

Before exterior check

★	Helicopter forms and documents	-	Check, complete
	Fuel tanks	-	Drain
	Fuselage underside	-	Condition, no fuel leaks
★	Covers and tie-downs	-	Removed
★	Ice and snow (if any)	-	Removed
★	Ground handling wheels	-	Removed

★ To be checked **before each flight**

EFFECTIVITY Up to S/N 7183

Cockpit

Center Control Panel		
All switches and avionics except:	-	OFF
FUEL VALVE I + II	-	OP, guarded
Collective pitch		
All switches	-	OFF or neutral position
Overhead panel:		
All circuit breakers	-	In
All switches	-	OFF
Power levers	-	OFF
Instrument panel:		
FIRE EXT switches	-	NORM
AGENT DISCH switch	-	OFF
FIRE DET TEST switch	-	NORM
All switches and avionics	-	OFF
Center control panel:		
MASTER PWR switch	-	NORM
Voltmeter indication	-	Minimum 24 V DC
PWR SELECT switch	-	BAT
BUS-TIE switch	-	NORM
Pitot tube heating (PITOT HTR)	-	Function
Static port heating (STATIC HTR)	-	Function
Lighting:		
Position lights	-	Function
Anti-collision light	-	Function
Strobe lights	-	Function
Landing lights	-	Function
Before night flights:		
Instrument lights	-	Function
Utility light	-	Function
Dome light	-	Function
Hand lamp	-	Function
Center control panel:		
MASTER PWR switch	-	OFF

4.3.2 Exterior Check

The exterior check is laid out as a walk-around check, starting forward right at the pilot's door, proceeding clockwise to the tail boom, to the left hand side (including the upper and lower areas of the helicopter) and is completed at the helicopter nose area.

NOTE
- If possible, the helicopter should be headed into wind before starting the engines.
- The area around the helicopter should be clear of all foreign objects.
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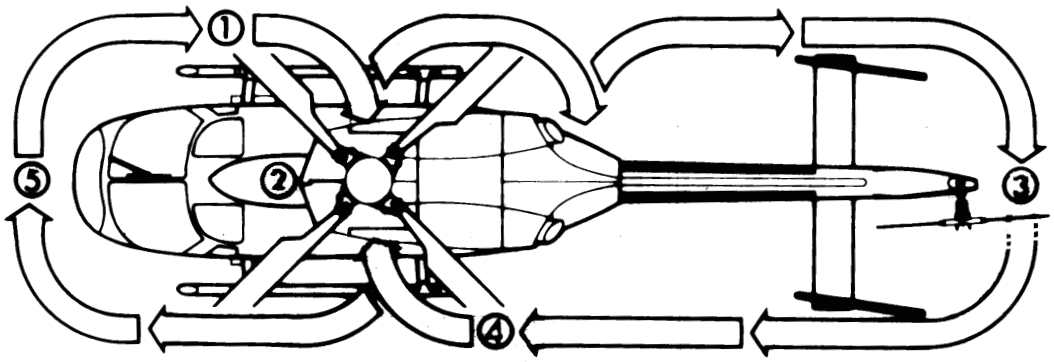

1. Fuselage	-	Right side
2. Cabin	-	Top
3. Tail boom	-	Aft area
4. Fuselage	-	Left side
5. Cabin	-	Front

Fig. 4-1 Exterior Check Sequence

Before exterior check

★	Helicopter forms and documents	-	Check, complete
	Fuel tanks	-	Drain
	Fuselage underside	-	Condition, no fuel leaks
★	Covers and tie-downs	-	Removed
★	Ice and snow (if any)	-	Removed
★	Ground handling wheels	-	Removed

★ To be checked **before each flight**

EFFECTIVITY S/N 7184 and subsequent

Cockpit

Center Control Panel

All switches and avionics except:	-	OFF
FUEL VALVE I + II	-	OP, guarded

Collective pitch

All switches	-	OFF or neutral position

Overhead panel:

All circuit breakers	-	In
All switches	-	OFF
Power levers	-	OFF

Instrument panel:

FIRE EXT switches	-	NORM
AGENT DISCH switch	-	OFF
FIRE DET TEST switch	-	NORM
All switches and avionics	-	OFF

Center control panel:

PWR SELECT switch	-	BAT
Voltmeter indication	-	Minimum 24 V DC
BUS-TIE switches (2)	-	ON
Pitot tube heating (PITOT HTR)	-	Function
Static port heating (STATIC HTR)	-	Function

Lighting:

Position lights	-	Function
Anti-collision light	-	Function
Strobe lights	-	Function
Landing lights	-	Function

Before night flights:

Instrument lights	-	Function
Utility light	-	Function
Dome light	-	Function
Hand lamp	-	Function

Center control panel:

PWR SELECT switch	-	OFF

Fuselage - right side

	Cockpit air intake	-	Clear
	Lower cockpit window	-	Condition
★	Pedal area	-	No foreign objects
	Circuit breakers, fwd junction box	-	Check in
★	Pitot tube	-	Clear, condition
	Drain port	-	Clear
★	Static ports (2)	-	Clear
	Cockpit door	-	Condition, function
	Pilot seat and safety belt	-	Condition
	Cabin door	-	Condition, function

EFFECTIVITY *Jettisonable sliding door installed, after ASB-BK117-20A-114*

	Stretch seal strips on exterior and interior jettisoning handles	-	Condition

EFFECTIVITY *All*

Cabin top

	Cockpit overhead window	-	Condition
	Hydraulic compartment	-	No leakage, no foreign objects
	Hydraulic system	-	Condition
	Hydraulic system filter clogging indicator pins (4)	-	Check in
★	Hydraulic system fluid reservoirs (2)	-	Oil level
	Hydraulic system outboard fittings (4)	-	Secured
	Rotor brake oil reservoir	-	Oil level, filler cap secured
★	Hydraulic compartment cowling	-	Closed, secured
★	Oil cooler air inlet screen (2)	-	Clear
★	Transmission oil	-	Oil level
	Swash plate and boot	-	Condition

(continued)

★ To be checked **before each flight**

Fuselage - right side (continued)

★	Main rotor head	-	Oil level, condition
	Blade attachment bolts, driving link assembly and rotor hub cap	-	Condition, secured
★	Rotating control rods	-	Condition, free movement
	Rotating control rod spherical bearings	-	Check for smooth operation by moving control rods by hand
	Vibration absorbers	-	Condition, free movement, no leakage
	Rotor blades and trim tabs	-	Condition, turn rotor by hand in direction of rotor rotation and check for free run
★	Maintenance steps	-	Check in
	Landing gear and step	-	Condition
	Vents and drainports	-	Clear
★	Transmission compartment	-	No leakage, no foreign objects
	Oil cooler inlet duct	-	Clear
	Transmission oil cooler block plate	-	Installed, if OAT below -35°C (recommended to be removed if OAT above +35°C)
★	Engine oil tank	-	Oil level
	Engine oil tank	-	Condition, no leakage, security of mounting, filler cap closed and secured
	Transmission	-	Condition
	Transmission struts	-	Condition, secured
	Transmission oil filter clogging indicator pin	-	Check in
	Transmission oil filler cap	-	Secured, locked
	Mixing lever assembly	-	Condition, secured
	Rotor brake system	-	Condition
★	Transmission access door	-	Closed, secured

(continued)

★ To be checked **before each flight**

Fuselage - right side (continued)

	Engine compartment	-	No leakage, no foreign objects
	Engine	-	Condition
★	Engine air inlet screen	-	Clear, secured
	Wiring, linkages and lines	-	Condition, no leakage, no chafing
	Tubes and nozzles of engine water washing system (if installed)	-	Security
	Engine exhaust pipe	-	Condition, secured
	Engine mounts	-	Condition, secured
	Fire detectors	-	Condition
★	Engine access door	-	Closed, secured
★	Maintenance step	-	Closed, secured
	Battery (if located here)	-	Condition, no electrolyte spillage, security of mounting
	Battery door	-	Closed, secured
	Fire extinguisher bottles	-	Check for correct pressure indications (2) according to the pressure-temperature table

NOTE Engine must be cold for pressure-temperature table to be valid.

★	Red bursting plate for fire extinguisher system	-	Check undamaged
	Aft engine cowling	-	Secured
★	Fuselage - right side	-	Condition
	Clam shell doors	-	Condition, function
	First aid kit	-	On board
	Baggage compartment	-	Condition
	Small baggage compartment	-	Condition
★	Clam shell doors	-	Closed, secured

★ To be checked **before each flight**

Tail boom

★	Tail boom - right side	-	Condition
★	RH horizontal and vertical stabilizer, position light	-	Condition
	Vertical fin and cowling	-	Condition, secured
	Position light and anti-collision light	-	Condition
	Tail skid	-	Condition
★	Tail rotor gear box	-	Oil level, no leakage, filler cap secured
	NOTE Verification of oil level may be easier when tail skid is shaken briefly.		
	Tail rotor head, shaft, bellow	-	Condition
★	Pitch links	-	Condition
	Blade attachment bolts, balance masses, dynamic masses	-	Condition, secured
	Sliding sleeve	-	Check free movement
★	Tail rotor blades	-	Condition
	Vertical fin and cowling	-	Condition, secured
★	Intermediate gear box	-	Oil level, no leakage
	NOTE Verification of oil level may be easier when tail skid is shaken briefly.		
	Intermediate gear box	-	Filler cap and drain screw secured
★	Vertical fin access door	-	Closed, secured
★	LH horizontal and vertical stabilizer, position light	-	Condition
★	Tail boom - left side	-	Condition
	Flux valve cover	-	Condition

★ To be checked **before each flight**

Fuselage - left side

	Aft engine cowling	-	Secured
	Bleed air heater screens (2)	-	Clear
	Engine compartment	-	No leakage, no foreign objects
	Engine	-	Condition
★	Engine air inlet screen	-	Clear, secured
	Wiring, linkages and lines	-	Condition, no leakage, no chafing
	Tubes and nozzles of engine water washing system (if installed)	-	Security
	Engine exhaust pipe	-	Condition, secured
	Engine mounts	-	Condition, secured
	Fire detectors	-	Condition
★	Engine access door	-	Closed, secured
★	Transmission compartment	-	No leakage, no foreign objects
	Oil cooler inlet duct	-	Clear
	Transmission oil cooler block plate	-	Installed, if OAT below -35°C (recommended to be removed if OAT above +35°C)
★	Engine oil tank	-	Oil level
	Engine oil tank	-	Condition, no leakage, security of mounting, filler cap closed and secured
	Transmission	-	Condition
	Transmission struts	-	Condition, secured
	Transmission oil filter clogging indicator pin	-	Check in
	Mixing lever assembly	-	Condition, secured
	Rotor brake system	-	Condition

(continued)

★ To be checked **before each flight**

Fuselage - left side (continued)

★	Transmission access door	-	Closed, secured
★	Maintenance step	-	Closed, secured
	Landing gear and step	-	Condition
★	Fuel filler cap	-	Secured, locked
	Vents and drainports	-	Clear
★	Fuselage - left side	-	Condition
	Cabin door	-	Condition, function

EFFECTIVITY *Jettisonable sliding door installed, after ASB-BK117-20A-114*

	Stretch seal strips on exterior and interior jettisoning handles	-	Condition

EFFECTIVITY *All*

	Cockpit door	-	Condition, function
	Cyclic stick	-	Secured, safety-wired
	Copilot seat and safety belts	-	Condition
★	For single pilot flights: Copilot's safety belts	-	Fastened, secured
★	Static ports (2)	-	Clear
	Drain port	-	Clear
★	Pitot tube	-	Clear, condition
★	Pedal area	-	No foreign objects
	Lower cockpit window	-	Condition
	Cockpit air intake	-	Clear

★ To be checked **before each flight**

Nose area

	Cockpit windshields	-	Condition, clean
	Windshield wipers	-	Condition
	OAT-bulb	-	Condition
	Battery	-	Condition, no electrolyte spillage, security of mounting
	Battery connectors (2)	-	Connected
	Avionic equipment	-	Condition
★	Battery/avionics access door	-	Closed, secured
	Circuit breaker for EPU	-	Check in
★	EPU access door	-	Closed, secured
	Battery vents	-	Clear
	Landing light	-	condition, retracted
★	Fuselage bottom	-	Condition

Miscellaneous

★	Baggage, cargo, loose items	-	Stowed, secured
	Hand-fire extinguisher	-	On board, check pressure
	Hand lamp	-	On board
★	Passengers	-	Briefed

★ To be checked **before each flight**

EFFECTIVITY Up to S/N 7183

4.3.3 ★ **Interior Check**

Seat and pedals	-	Adjust
Safety belts	-	Fasten, adjust
Shoulder harness locks	-	Function
<u>Center control panel</u>		
All switches and avionics except:	-	OFF
- PWR SELECT switch	-	BAT
- STATIC PRESS switch	-	PRIMARY
- GEN TRIP switch	-	NORM
- DG switch	-	SLAVE
- FUEL VALVE I + II	-	OP, guarded
<u>Collective pitch</u> (pilot / copilot)		
All switches	-	OFF or neutral position
<u>Instrument panel</u>		
FIRE EXT switches	-	NORM
AGENT DISCH switch	-	OFF
FIRE DET TEST switch	-	NORM
All switches and avionics	-	OFF or neutral position
Clock	-	Set
<u>Overhead panel</u>		
All switches	-	OFF
All circuit breakers	-	In
Power levers	-	OFF
COLD START switch	-	NORM
HYD TEST switch	-	NORM
OAT	-	Check

★ To be checked **before each flight**

Nose area

	Cockpit windshields	-	Condition, clean
	Windshield wipers	-	Condition
	OAT-bulb	-	Condition
	Battery	-	Condition, no electrolyte spillage, security of mounting
	Battery connectors (2)	-	Connected
	Avionic equipment	-	Condition
★	Battery/avionics access door	-	Closed, secured
	Circuit breaker for EPU	-	Check in
★	EPU access door	-	Closed, secured
	Battery vents	-	Clear
	Landing light	-	condition, retracted
★	Fuselage bottom	-	Condition

Miscellaneous

★	Baggage, cargo, loose items	-	Stowed, secured
	Hand-fire extinguisher	-	On board, check pressure
	Hand lamp	-	On board
★	Passengers	-	Briefed

★ To be checked **before each flight**

EFFECTIVITY S/N 7184 and subsequent

4.3.3 ★ Interior Check

Seat and pedals	-	Adjust
Safety belts	-	Fasten, adjust
Shoulder harness locks	-	Function
<u>Center control panel</u>		
All switches and avionics except:	-	OFF
- STATIC PRESS switch	-	PRIMARY
- GEN TRIP switch	-	NORM
- DG switch	-	SLAVE
- FUEL VALVE I + II	-	OP, guarded
<u>Collective pitch</u> (pilot / copilot)		
All switches	-	OFF or neutral position
<u>Instrument panel</u>		
FIRE EXT switches	-	NORM
AGENT DISCH switch	-	OFF
FIRE DET TEST switch	-	NORM
All switches and avionics	-	OFF or neutral position
Clock	-	Set
<u>Overhead panel</u>		
All switches	-	OFF
All circuit breakers	-	In
Power levers	-	OFF
COLD START switch	-	NORM
HYD TEST switch	-	NORM
OAT	-	Check

★ To be checked **before each flight**

EFFECTIVITY Up to S/N 7183

★ **Pre-start check**

MASTER PWR switch	-	NORM
Voltmeter indication	-	Minimum 24 V DC
EMER LTS switch	-	ARM
MASTER PWR switch	-	OFF - check emergency exit lights come on
MASTER PWR switch	-	NORM
EMER LTS switch	-	ON - check emergency exit lights come on
EMER LTS switch	-	ARM
PWR SELECT switch:		
- for battery start	-	Leave in BAT
- for EPU start	-	EXT PWR (EPU caution light must illuminate)
BUS-TIE switch	-	NORM
DOME LIGHT pushbutton	-	ON
BUS-TIE switch	-	OFF, check cockpit dome light off
BUS-TIE switch	-	NORM
DOME LIGHT pushbutton	-	Off, or as required
FUEL PUMP PRIME switches	-	ON (check PRIME PUMPS caution light comes on, FUEL PRESS lights off)
FUEL PUMP PRIME switches	-	OFF
FUEL PUMP XFER switches	-	ON, (F PUMP XFER caution light off)
FUEL PUMP XFER switches	-	OFF, (F PUMP XFER caution light on)
FIRE DET TEST switch	-	Test - check lights come on
Instruments	-	Check
- Mast moment indicator	-	TEST
- FUEL QTY indicator	-	Check quantity
- MASTER warning light	-	Reset

(continued)

★ To be checked **before each flight**

Pre-start check (continued)

ANN PNL TEST switch	-	Push to test annunciator panel lights and check PITOT HEATER 1 and 2 caution lights on the instrument panel, if installed

EFFECTIVITY *S/N 7176 and subsequent or after SB-MBB-BK117-90-101*

CHIP DET TEST switch (spring-loaded)	-	CHIP 1 (foreward chip detectors); both ENG 1 CHIP and ENG 2 CHIP caution lights must come on
CHIP DET TEST switch	-	CHIP 2 (aft chip detectors); both ENG 1 CHIP and ENG 2 CHIP caution lights must come on

EFFECTIVITY *All*

AMM SEL switch	-	GEN II
Trim actuator limit switches (only if DAFCS not installed)	-	Check (check full travel of stick)
Flight controls	-	Check free movement through full travel
Collective pitch	-	Lock
Rotor brake lever	-	Check fully down (to check ROTOR BRAKE caution light, pull the lever slightly and check fully down again)
Cyclic stick position	-	Centered

EFFECTIVITY S/N 7184 and subsequent

★ **Pre-start check**

PWR SELECT switch	-	BAT
Voltmeter indication	-	Minimum 24 V DC
EMER LTS switch	-	ARM
PWR SELECT switch	-	OFF - check emergency exit lights come on
PWR SELECT switch	-	BAT
EMER LTS switch	-	ON - check emergency exit lights come on
EMER LTS switch	-	ARM
PWR SELECT switch:		
- for battery start	-	Leave in BAT
- for EPU start	-	EXT PWR (EPU caution light must illuminate)
BUS-TIE switches (2)	-	ON
FUEL PUMP PRIME switches	-	ON (check PRIME PUMPS caution light comes on, FUEL PRESS lights off)
FUEL PUMP PRIME switches	-	OFF
FUEL PUMP XFER switches	-	ON, (F PUMP XFER caution light off)
FUEL PUMP XFER switches	-	OFF, (F PUMP XFER caution light on)
FIRE DET TEST switch	-	Test - check lights come on
Instruments	-	Check
- Mast moment indicator	-	TEST
- FUEL QTY indicator	-	Check quantity
- MASTER warning light	-	Reset

(continued)

★ To be checked **before each flight**

Pre-start check (continued)

ANN PNL TEST switch	-	Push to test annunciator panel lights and check PITOT HEATER 1 and 2 caution lights on the instrument panel, if installed

EFFECTIVITY *S/N 7176 and subsequent or after SB-MBB-BK117-90-101*

CHIP DET TEST switch (spring-loaded)	-	CHIP 1 (foreward chip detectors); both ENG 1 CHIP and ENG 2 CHIP caution lights must come on
CHIP DET TEST switch	-	CHIP 2 (aft chip detectors); both ENG 1 CHIP and ENG 2 CHIP caution lights must come on

EFFECTIVITY *All*

AMM SEL switch	-	GEN II
Trim actuator limit switches (only if DAFCS not installed)	-	Check (check full travel of stick)
Flight controls	-	Check free movement through full travel
Collective pitch	-	Lock
Rotor brake lever	-	Check fully down (to check ROTOR BRAKE caution light, pull the lever slightly and check fully down again)
Cyclic stick position	-	Centered

4.4 STARTING ENGINES

4.4.1 Before starting engines

Fire guard (if available)	-	Posted
Rotor area	-	Clear
Anti-collision light	-	ON

4.4.2 Starting first engine

CAUTION IMMEDIATELY ABORT START AND, IF INDICATED, PERFORM MAINTENANCE ACTION BEFORE RESTART FOR ANY OF THE FOLLOWING:

- TOT RISES ABNORMALLY RAPIDLY ABOVE 800 °C AND IS QUICKLY APPROACHING 899 °C
  (If start is aborted but TOT limits are not exceeded, wait 15 seconds after N_1 RPM has returned to zero before attempting restart. This permits excess fuel to drain from combustion chamber.)
- NO POSITIVE ENGINE OR TRANSMISSION OIL PRESSURE INDICATIONS UPON REACHING GROUND IDLE CONDITION - MAINTENANCE ACTION!
- N_2 RPM AND ROTOR RPM NEEDLES ARE NOT MATCHED AFTER REACHING STABILIZED GROUND IDLE CONDITION - MAINTENANCE ACTION!
- SUSPECTED BLADE STRIKE INTO VERTICAL STABILIZERS.
  Blade strike should be suspected if unusual noise or bang was audible during runup. Under gusty or turbulent wind conditions, especially with vertical wind components, and low rotor rpm (below 25%) main rotor blade(s) may strike the vertical stabilizer(s) - MAINTENANCE ACTION!

ABORT START PROCEDURE

Power lever	-	OFF
Starter switch	-	ON for minimum 10 seconds as necesarry to lower TOT (blow out)

NOTE
- Either engine may be started first.
- If, for any reason a starting attempt is discontinued, the entire starting sequence must be repeated from the beginning.

(continued)

Starting first engine (continued)

CAUTION
- DO NOT EXCEED STARTER DUTY CYCLE.
- MONITOR CLOSELY TOT (STARTING TRANSIENT BETWEEN 836 °C AND 899 °C FOR MAXIMUM 12 SECONDS).

1. Respective fuel prime pump	-	ON
2. Starter button	-	Depress and hold, simulaneously start clock.
3. At 10% N_1	-	Respective power lever move slowly to approx. middle position between OFF and IDLE

NOTE
- If light-off does not occur within 2 seconds, move power lever slowly forward until light-off occurs. Power lever may be manipulated between middle position and IDLE to stay within TOT limits.
- The ignition system is energized after passing the approx. 10° position of power lever travel range.

4. TOT	-	Monitor, if necessary manipulate with power lever
5. N_2/N_{RO} RPM increase	-	Monitor
6. Engine and XMSN oil pressure	-	Check positive indication
7. Respective power lever	-	Increase slowly to IDLE
8. At 40 % N_1 (white dot)	-	Starter button release
9. At established IDLE RPM	-	Respective generator ON, (check light extinguished - on battery starter only)
10. Cyclic stick	-	Centered

EFFECTIVITY Up to S/N 7183

4.4.3 **Starting second engine**

11. Ammeter - Operating generator, check below 100 A (on battery start only)

12. Repeat items 1 to 9 of this procedure (on previous page)

13. Following an EPU-assisted start:

– PWR SELECT switch - BAT

– BUS-TIE switch - NORM

– GEN I and GEN II lights - Check extinguished

– EPU - Disconnected

– EPU light - Check extinguished

14. FUEL PUMP XFER switches (2) - ON

15. FUEL PUMP PRIME switches (2) - OFF

EFFECTIVITY *After SB-BK117-90-117*

16. PITOT HTR P and CP switches - ON
check PITOT HEATER 1 and 2 caution lights off.

EFFECTIVITY *All*

NOTE
- FUEL PRESS warning light(s) may illuminate after switching off fuel prime pumps.
- Operate engines at ground idle until engine minimum oil temperature (10 °C) is reached.

4.4.4 Cold weather starts

Some general practices necessary for improved cold weather operation are as follows:

1. When starting at low ambient temperature, oil pressure may exceed 8.3 bar.
   Pressure above 7.0 bar should not exist for more than approx. 4.0 minutes.
2. If N_1 acceleration to ground idle is slow or erratic when ambient temperature is lower than –26 °C (–15 °F) and commercial Jet A or Jet A-1 fuel (JP-5) is used energize the cold start switch until engine stabilizes at ground idle.

CAUTION
- DO NOT LEAVE THE “COLD START SWITCH” ENGAGED DURING OPERATION ABOVE 70 % N_1.
- ENSURE THAT THE COLD START SWITCH IS NOT INADVERTANTLY LEFT IN THE “COLD” POSITION WHEN START ASSIST FUEL IS NOT REQUIRED.

NOTE
- During coldstart at temperatures below –18 °C (0 °F) it may not be possible to achieve 10% N_1 RPM.
  At a minimum value of 7% N_1, the power lever may be slowly advanced from the OFF position to achieve ignition. Power lever may be manipulated as necessary to accomplish the start within limits.
- At temperatures below –30 °C it is generally recommended to preheat the battery to –30 °C or above.
- During engine start at low ambient temperature the mast moment indicator and the triple tachometer pointer movements may be sluggish. After warmup the indications are correct.
- After abrupt temperature changes from cold to warm (parking the helicopter in a heated hangar at low ambient temperatures) a complete loss of the lubricant at the main rotor pendulum absorbers may occur.

EFFECTIVITY S/N 7184 and subsequent

4.4.3 **Starting second engine**

11. Ammeter - Operating generator, check below 100 A (on battery start only)

12. Repeat items 1 to 9 of this procedure (on previous page)

13. Following an EPU-assisted start:

– PWR SELECT switch - BAT

– BUS-TIE switches (2) - Check ON

– GEN I and GEN II lights - Check extinguished

– EPU - Disconnected

– EPU light - Check extinguished

14. FUEL PUMP XFER switches (2) - ON

15. FUEL PUMP PRIME switches (2) - OFF

EFFECTIVITY *After SB-BK117-90-117*

16. PITOT HTR P and CP switches - ON
check PITOT HEATER 1 and 2 caution lights off.

EFFECTIVITY *All*

NOTE
- FUEL PRESS warning light(s) may illuminate after switching off fuel prime pumps.
- Operate engines at ground idle until engine minimum oil temperature (10 °C) is reached.

4.4.4 Cold weather starts

Some general practices necessary for improved cold weather operation are as follows:

1. When starting at low ambient temperature, oil pressure may exceed 8.3 bar.
   Pressure above 7.0 bar should not exist for more than approx. 4.0 minutes.
2. If N_1 acceleration to ground idle is slow or erratic when ambient temperature is lower than –26 °C (–15 °F) and commercial Jet A or Jet A-1 fuel (JP-5) is used energize the cold start switch until engine stabilizes at ground idle.

CAUTION
- DO NOT LEAVE THE “COLD START SWITCH” ENGAGED DURING OPERATION ABOVE 70 % N_1.
- ENSURE THAT THE COLD START SWITCH IS NOT INADVERTANTLY LEFT IN THE “COLD” POSITION WHEN START ASSIST FUEL IS NOT REQUIRED.

NOTE
- During coldstart at temperatures below –18 °C (0 °F) it may not be possible to achieve 10% N_1 RPM.
  At a minimum value of 7% N_1, the power lever may be slowly advanced from the OFF position to achieve ignition. Power lever may be manipulated as necessary to accomplish the start within limits.
- At temperatures below –30 °C it is generally recommended to preheat the battery to –30 °C or above.
- During engine start at low ambient temperature the mast moment indicator and the triple tachometer pointer movements may be sluggish. After warmup the indications are correct.
- After abrupt temperature changes from cold to warm (parking the helicopter in a heated hangar at low ambient temperatures) a complete loss of the lubricant at the main rotor pendulum absorbers may occur.

4.5 SYSTEM CHECKS

4.5.1★ Hydraulic system check

NOTE
- These checks may be performed between starting first and second engine at the pilot's discretion.
- Before operating the HYD TEST switch in cold weather conditions, some cyclic control inputs are necessary to guarantee a perfect switch-over to system 2.

WARNING DO NOT TAKE OFF WITH A FAULTY HYDRAULIC SYSTEM.

CAUTION
- OBSERVE MAST MOMENT LIMITS DURING CHECK.
- IF, AFTER CROSSOVER FROM SYSTEM 1 TO SYSTEM 2, A RUNAWAY OF CYCLIC STICK OR COLLECTIVE PITCH OCCURS (INCREASED CONTROL FORCES IN THE LONGITUDINAL-, LATERAL-, OR COLLECTIVE AXES), RESELECT SYSTEM 1 IMMEDIATELY AND SHUT DOWN THE ENGINES.

Check the hydraulic systems (1 + 2) by small cyclic stick inputs in all four directions and slight up and down movements of the collective pitch lever.

Power lever(s) of started engine(s)	-	Check IDLE
Hydraulic pressure indications	-	Check in the green range
Hydraulic system 1	-	Check
HYD TEST switch	-	Crossover to system 2 - MASTER and HYD 1 → 2 lights must come on.
Hydraulic system 2	-	Check
Hydraulic pressure indications	-	Check in the green range
HYD TEST switch	-	Reselect to system 1 - MASTER and HYD 1 → 2 lights must go off.

★ To be checked **before each flight**

4.5.2★ YAW CSAS system check

NOTE Perform CSAS system checks **before each flight**, after the hydraulic system checks. If the 3-axis CSAS is installed, refer to FMS 10-32. If the DAFCS is installed, refer to FMS 10–48.

Circuit breakers CSAS YAW (2) and INV (1 or 2, as installed)	-	Check in - CSAS YAW caution and YAW OFF segment lights are on.
INVERTER switch (1 or 2, as installed)	-	ON
Artificial horizon, pilot	-	Check warning flag (G) not showing
YAW sequence switch	-	Press - CSAS YAW caution and YAW OFF segment lights go off; YAW STBY segment light comes on.
YAW sequence switch	-	Press again - YAW STBY segment light goes off.
YAW TEST switch	-	TEST position - all YAW CSAS caution and segment lights must come on.
YAW TEST switch	-	OFF (check detent lock) - all YAW CSAS caution and segment lights go off.
Pilot's STABILIZATION CUTOFF pushbutton	-	Press - all YAW CSAS caution and segment lights come on.
YAW sequence switch	-	Press twice to reengage YAW CSAS - all YAW CSAS caution and segment lights go off.

NOTE
- Perform the last two above steps again using copilot's STABILIZATION CUTOFF pushbutton switch.
- The helicopter should not be operated with the YAW CSAS switched OFF, since STANDBY and ON modes provide tail rotor drive shaft protection against hard or abrupt pedal inputs.

★ To be checked **before each flight**

4.5.3★ SPAS system check

Circuit breakers SPAS (2) and INV (1 or 2, as installed)	-	Check in
INVERTER switch (1 or 2, as installed)	-	ON
SPAS toggle switch	-	ON, then TEST and release.
SPAS caution light	-	Check for illumination after approximately 4 seconds.

If caution light fails to illuminate or if illumination occurs immediately after initiation of test procedure:

SPAS toggle switch	-	OFF/RESET - continue with SPAS switched OFF and note that V_{NE} is reduced by15 kt.

If test result positive:

SPAS toggle switch	-	OFF/RESET, then ON - check SPAS caution light extinguished.

4.5.4★ Avionic checks

COMM/NAV equipment	-	ON and check
All other instruments and equipment	-	Check and set

4.5.5★ Miscellaneous checks

Optional equipment switches	-	Set as required

4.5.6 Power check

Perform power check as required (see Section 5)

4.5.7 Bleed air heating check

HTR SELECT switch	-	BOTH
HTR switch	-	ON - check if ENG 1 / ENG 2 HEAT control lights come on and TOT rises simultaneously.
HTR switch	-	OFF - check if ENG 1 / ENG 2 HEAT control lights go off and TOT drops simulaneously.

★ To be checked **before each flight**

EFFECTIVITY *If SFENA cyclic trim actuators installed (special configuration, if provisions for DAFCS installed).*

4.5.8 ★ **Force Trim Release (FTR) function check**

Power levers	-	Check in IDLE position
FTR switch (pilot and copilot, respectively)	-	Press while making small cyclic inputs in all four directions; check that no spring forces are present.

EFFECTIVITY *All*

EFFECTIVITY *S/N 7243 and subsequent or after SB-MBB-BK117-90-103*

4.5.9 **Engine overspeed trip system check**

CAUTION THE OVERSPEED TEST SWITCH SHALL ONLY BE OPERATED, WHEN THE POWER LEVER OF THE ENGINE TO BE CHECKED IS IN OR NEAR THE IDLE POSITION.

Power lever

of engine to be checked	-	IDLE
of other engine	-	Move smoothly to FLY position
N_2 speed of engine to be checked	-	Check at 90 %

NOTE If N_2 (engine to be checked) deviates from the 90% mark, adjust N_2 of respective engine with power lever to achieve 90%, in order to meet the overspeed test trip speed.

OVERSPEED TEST switch	-	Select engine at IDLE (engine to be checked); N_2 speed must decrease
OVERSPEED TEST switch	-	OFF (middle position); N_2 speed must increase to previous value

Repeat procedure for second engine (first move power lever of idling engine smoothly up to FLY position, and then reduce the other to IDLE position).

NOTE If there is no significant engine response (N_2-drop) upon operation of the OVERSPEED TEST switch repeat the check with slightly higher/lower N_2 ($\pm 1\%$) settings.
If there is still no significant engine response an overspeed trip system malfunction must be assumed.

EFFECTIVITY *All*

★ To be checked **before each flight**

4.6 ★ PRE-TAKEOFF CHECK

1. Power levers	-	Move smoothly to FLY position
2. Audio warning tone	-	Check by reducing N_R/N_2 below 95%; ROTOR RPM warning and low rotor RPM audio tone must come on, then adjust N_R/N_2 back to 96%
3. Cyclic stick	-	Check centering device secured
4. Engine and XMSN instruments	-	In the green range
5. Fuel quantity	-	Re-check
6. All caution and warning lights	-	OFF
7. Bleed air consumers	-	OFF
8. Optional equipment	-	As required
9. Collective pitch	-	Unlock; check correct friction

4.7 ★ TAKEOFF CHECK

1. Hover flight	-	Perform
2. N_2/Rotor RPM	-	Adjust to 98 - 102% It is recommended to maintain 100% rotor RPM for steady flight condition
3. Torque	-	Synchronize
4. Hover power	-	Check
5. Engine and XMSN instruments	-	Re-check
6. All caution and warning lights	-	OFF

After takeoff:

7. Bleed air consumers	-	As required

4.8 PRE-LANDING CHECK

1. N_2/Rotor RPM	-	Adjust to 98 - 102%
2. All instruments	-	Check
3. All caution and warning lights	-	Check
4. Bleed air consumers	-	OFF

★ To be checked **before each flight**

EFFECTIVITY Up to S/N 7183

4.9 ENGINE SHUTDOWN

NOTE
- Check illumination of ROTOR RPM warning light plus continuous aural signal when the rotor RPM drop below 95%. If not fulfilled, entry in logbook and maintenance action are required.
- Check illumination of ENG I LOW and ENG II LOW warning lights plus intermittent aural signal, when the N_1 RPM of the engines drop below 60%. If not fulfilled, entry in logbook and maintenance action are required.
- Set clock for a minimum ground idle run of 2 minutes to allow the engines to cool down.

1.	Cyclic stick	-	Check
2.	Collective pitch	-	Lock
3.	Power levers	-	IDLE , start clock
4.		-	
5.	All consumers	-	OFF except anti-collision light and transfer pumps
6.	Power levers	-	After 2 minutes at IDLE, OFF
7.	TOT and N_1 drop	-	Monitor
8.	FUEL PUMP XFER (2)	-	OFF
9.	Generators	-	OFF
10.	Rotor brake	-	Apply below 50% RPM

NOTE In order to prevent oil coking it is recommended to motor the engines with starter for 10 seconds (both power levers OFF). Start motoring appr. 30 seconds after N_1 needles have reached zero.

11.	Anti-collision light	-	OFF
12.	PWR SELECT switch	-	OFF
13.	MASTER PWR switch	-	OFF

4.6 ★ PRE-TAKEOFF CHECK

1. Power levers	-	Move smoothly to FLY position
2. Audio warning tone	-	Check by reducing N_R/N_2 below 95%; ROTOR RPM warning and low rotor RPM audio tone must come on, then adjust N_R/N_2 back to 96%
3. Cyclic stick	-	Check centering device secured
4. Engine and XMSN instruments	-	In the green range
5. Fuel quantity	-	Re-check
6. All caution and warning lights	-	OFF
7. Bleed air consumers	-	OFF
8. Optional equipment	-	As required
9. Collective pitch	-	Unlock; check correct friction

4.7 ★ TAKEOFF CHECK

1. Hover flight	-	Perform
2. N_2/Rotor RPM	-	Adjust to 98 - 102% It is recommended to maintain 100% rotor RPM for steady flight condition
3. Torque	-	Synchronize
4. Hover power	-	Check
5. Engine and XMSN instruments	-	Re-check
6. All caution and warning lights	-	OFF

After takeoff:

7. Bleed air consumers	-	As required

4.8 PRE-LANDING CHECK

1. N_2/Rotor RPM	-	Adjust to 98 - 102%
2. All instruments	-	Check
3. All caution and warning lights	-	Check
4. Bleed air consumers	-	OFF

★ To be checked **before each flight**

EFFECTIVITY S/N 7184 and subsequent

4.9 ENGINE SHUTDOWN

NOTE
- Check illumination of ROTOR RPM warning light plus continuous aural signal when the rotor RPM drop below 95%. If not fulfilled, entry in logbook and maintenance action are required.
- Check illumination of ENG I LOW and ENG II LOW warning lights plus intermittent aural signal, when the N_1 RPM of the engines drop below 60%. If not fulfilled, entry in logbook and maintenance action are required.
- Set clock for a minimum ground idle run of 2 minutes to allow the engines to cool down.

1.	Cyclic stick	-	Check
2.	Collective pitch	-	Lock
3.	Power levers	-	IDLE , start clock
4.		-	
5.	All consumers	-	OFF except anti-collision light and transfer pumps
6.	Power levers	-	After 2 minutes at IDLE, OFF
7.	TOT and N_1 drop	-	Monitor
8.	FUEL PUMP XFER (2)	-	OFF
9.	Generators	-	OFF
10.	Rotor brake	-	Apply below 50% RPM

NOTE In order to prevent oil coking it is recommended to motor the engines with starter for 10 seconds (both power levers OFF). Start motoring appr. 30 seconds after N_1 needles have reached zero.

11.	Anti-collision light	-	OFF
12.	PWR SELECT switch	-	OFF

4.10 FLIGHT CHARACTERISTICS

4.10.1 Flight Controls

CAUTION AVOID EXTREME CYCLIC STICK DISPLACEMENTS WHEN ON THE GROUND WITH ROTOR TURNING.

During ground operations with rotor turning, the cyclic stick must remain in the neutral position and the collective pitch lever in the full down position; however, for functional test purposes, minimum control movements (not more than 3 cm from neutral) are allowed.

Avoid extreme pedal movements during ground operations.

4.10.2 Lateral Control Characteristics

WARNING AVOID STEEP RIGHT TURNS AT AIRSPEEDS BELOW 70 KIAS CLOSE TO THE GROUND IN ORDER TO MAINTAIN SUFFICIENT LATERAL CONTROL MARGIN FOR RECOVERY.

Lateral control characteristics of single-rotor helicopters are significantly influenced by forward speed (airspeed), bank angles and relating g-loads.

During high load factor maneuvers at airspeeds below 70 KIAS the cyclic stick can reach the left lateral stop before retreating-blade stall entry.

Reduction of the load factor and/or nose-left side slip will improve left lateral control margin.

4.10.3 Maximum bank angles in turns

The following tables show the recommended maximum bank angles for right and left turns at vaious altitudes and airspeeds:

For altitudes up to 8000 ft:

INDICATED AIRSPEED	ANGLE OF BANK
0 kt - 30 kt	30°
30 kt - 60 kt	45°
60 kt - (V_{NE}* – 30 kt)	60°
(V_{NE}* – 30 kt) - V_{NE}*	30°

For altitudes above 8000 ft:

INDICATED AIRSPEED	ANGLE OF BANK
0 kt - 30 kt	30°
30 kt - (V_{NE}* – 30 kt)	45°
(V_{NE}* – 30 kt) - V_{NE}*	30°

* For V_{NE} values refer to the V_{NE} table in Section 2.

4.10.4 **Maximum rate-of-descent during hover or low speed flight**

Any descent during hover or low speed flight (up to 20 kt) should be performed with a descent rate of not more than 600 ft/min.