

MD-80

FLIGHT CREW OPERATING MANUAL

AIR LIBERTE INDUSTRIES

TO: ALL HOLDERS OF MD-80 FLIGHT CREW OPERATING MANUAL

CONCERNING: VOLUME II – OPERATING PROCEDURES, REVISION 68, DATED: APR 1/99.

HIGHLIGHTS:

ADDITIONS, DELETIONS, OR CHANGES ON TEXT PAGES ARE INDICATED BY A VERTICAL LINE ADJACENT TO THE CHANGE.

Front Matter

(No changes)

Section 1

(No changes)

Section 2

1-30-0 AFTER START EXPANDED PROCEDURES. Revised to add NOTE for -217C/-219 engines, recommending warm-up time following shut-down exceeding 2 hours. TAXI EXPANDED PROCEDURES and AFTER LANDING EXPANDED PROCEDURES. Revised to add NOTE recommending maximum taxi speed.

Section 3

7-10-0 ENGINES – LIMITATIONS (JT8D-219) revised to incorporate Temporary Revision 2-1594. Please remove Temporary Revision 2-1594 from your FCOM.

14-Cont Chapter 14. LANDING GEAR AND BRAKES, TABLE OF CONTENTS. Revised page number of "Red Light On With Landing Gear Handle UP" procedure.

14-30-0 LANDING GEAR AND BRAKES, ABNORMAL OPERATION, RED LIGHT ON WITH LANDING GEAR HANDLE UP. Revised procedure to match MD-90 procedure.

16-Cont Chapter 16. PROCEDURES AND TECHNIQUES, TABLE OF CONTENTS. TAKEOFF section revised to update subject titles and page numbers. MISCELLANEOUS section revised to add FOD Prevention Procedures subject.

16-20-5 PROCEDURES AND TECHNIQUES, TAKEOFF, REJECTED TAKEOFF procedure. Revised to incorporate Temporary Revision 2-1577. Please remove Temporary Revision 2-1577 from your FCOM.

16-20-25 PROCEDURES AND TECHNIQUES, MISCELLANEOUS, COLD WEATHER PROCEDURES. Revised to incorporate Temporary Revision 2-1602. Please remove Temporary Revision 2-1602 from your FCOM.

PROCEDURES AND TECHNIQUES, MISCELLANEOUS, COLD WEATHER PROCEDURES. Revised to re-issue Page 30A/B, which was inadvertently omitted.

PROCEDURES AND TECHNIQUES, MISCELLANEOUS, FOD PREVENTION PROCEDURES. Revised to add recommended maximum taxi speed.

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IS SUBJECT TO RESTRICTIVE LEGEND ON TITLE PAGE OR FIRST PAGE

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MANUAL REVISION RECORD

DOUGLAS REVISION NUMBER	REVISION DATE	DOUGLAS REVISION NUMBER	REVISION DATE	DOUGLAS REVISION NUMBER	REVISION DATE
Initial	Sep 1/79	32	Oct 1/87		
1	Dec 1/79	33	Dec 1/87		
2	Mar 1/80	34	Mar 1/88		
3	Jun 1/80	34A	Mar 15/88		
4	Sep 1/80		(Z1 ONLY)		
5	Dec 1/80	34B	No Coverage		
6	Mar 1/81	35	Jun 1/88		
7	Jun 1/81	36	Sep 1/88		
8	Sep 1/81	37	Dec 1/88		
9	Dec 1/81	38	Apr 1/89		
10	Mar 15/82	39	Jul 1/89		
10A	Apr 1/82	40	Oct 1/89		
	(MC ONLY)	41	Jan 1/90		
11	Jun 1/82	42	Apr 1/90		
12	Sep 1/82	43	Jul 1/90		
13	Dec 1/82	44	Oct 1/90		
14	Mar 1/83	45	Jan 1/91		
14A	Apr 1/83	46	Apr 1/91		
	(TW ONLY)	47	Jul 1/91		
14B	Apr 15/83	48	Oct 1/91		
	(TW ONLY)	49	Jan 1/92		
15	Jun 1/83	50	Apr 1/92		
16	Sep 1/83	51	Jul 1/92		
17	Dec 1/83	52	Oct 1/92		
18	Mar 1/84	53	Jan 1/93		
19	Jun 1/84	54	Apr 1/93		
20	Sep 1/84	55	Jul 1/93		
21	Dec 1/84	56	Oct 1/93		
22	Apr 1/85	57	Jan 1/94		
23	Jun 1/85	58	Apr 1/94		
23A	Jul 1/85	59	Oct 1/94		
	(KE ONLY)	60	Apr 1/95		
24	Sep 1/85	61	Oct 1/95		
24A	No Coverage	62	Apr 1/96		
24B	No Coverage	63	Oct 1/96		
25	Dec 1/85	64	Apr 1/97		
26	Mar 1/86	65	Oct 1/97		
27	Jun 1/86	66	Apr 1/98		
28	Sep 1/86	67	Oct 1/98		
29	Dec 1/86	68	Apr 1/99		
30	Mar 1/87				
31	Jun 1/87				

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TEMPORARY REVISION SUMMARY RECORD

AIR LIBERTE INDUSTRIES

(SERIES 80)

TEMPORARY REV. NO.	ISSUE DATE	REV. DATE INCP.
2-1 thru 2-1576		Not Applicable, Cancelled or Previously Incorporated
2-1577	Oct 5/98	Apr 1/99
2-1578 thru 2-1593		Not Applicable
2-1594	Nov 30/98	Apr 1/99
2-1595 thru 2-1601		Not Applicable
2-1602	Dec 15/98	Apr 1/99
2-1603 thru 2-1604		Not Applicable

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OPERATIONS BULLETIN SUMMARY RECORD

AIR LIBERTE

(SERIES 80)

OPERATIONS BULLETIN NO.	ISSUE DATE	STATUS
1 thru 3		Cancelled
4	Aug 30/85	Applicable
5	Mar 28/86	Not Applicable
6		Cancelled
7		Cancelled
8	Nov 1/89	Applicable
9	Nov 14/89	Not Applicable

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OPERATIONS BULLETIN

DATE: AUG 30/85

BULLETIN NO: 4

SUBJECT: ENGINE STALLS WITH OTHER THAN NORMAL BLEED CONDITIONS

EFFECTIVITY: ALL MD-80 CUSTOMERS

SUMMARY: Recent tests at DAC have indicated the possibility of engine stalls occurring during engine acceleration from low power settings when altitude is above 25,000 feet and the AIR CONDITIONING SUPPLY switch is in the HP BLD OFF or OFF position. Slow throttle movement should minimize this problem.

The tests also indicated that the engine should accelerate through the stall and operate normally at stabilized power. If the engine will not accelerate through the stall, descent to a lower altitude should restore normal engine acceleration.

If engine stalls continue at lower altitudes, refer to Engines-Abnormal Operation-ENGINE SURGING OR POPPING IN FORWARD THRUST.

Procedures where other than normal bleed conditions may occur are as follows:

AIR CONDITIONING SMOKE/FUMES (Emergency)

TAIL COMPT TEMP HIGH LIGHT ON (Emergency)

AIR COND SUPPLY TEMP HI LIGHT ON (Abnormal)

CABIN DIFFERENTIAL PRESSURE UNCONTROLLABLE, OFF
SCHEDULE OR OSCILLATES (Abnormal)

SUPPLY PRESSURE DROPS RAPIDLY TO ZERO (Abnormal)

This Operations Bulletin is also applicable to any other operation where one or both AIR CONDITIONING SUPPLY switches are in the HP BLD OFF or OFF positions.

File this Operations Bulletin immediately behind the Operations Bulletin divider in Volume II.

Retain this Operations Bulletin until advised to remove it.

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OPERATIONS BULLETIN

BULLETIN NO: 8

DATE: NOV 1/89

SUBJECT: GROUND FORMATION OF WING ICE IN ABOVE FREEZING WEATHER

EFFECTIVITY: ALL MD-80 OPERATORS

SUMMARY: IT IS RECOMMENDED THAT THE WING UPPER SURFACE BE INSPECTED FOR ICE PRIOR TO FLIGHT ANYTIME FACTORS ARE FAVORABLE FOR FORMATION OF ICE.

THE WING ICE, IF NOT DETECTED AND REMOVED, IS LIKELY TO BREAK LOOSE DURING TAKEOFF AND, AT ROTATION, MAY BE INGESTED BY THE ENGINES.

While on the ground, the MD-80 may develop clear ice on the wing upper surface in the fuel tank area due to fuel cooled to sub-freezing temperatures during flight. Overnighting with full fuel tanks on a cold night, or refueling with cold fuel, may also contribute to the formation of wing ice. A considerable thickness of ice has been found to develop in a relatively short time even with ambient temperatures well above freezing. An inspection must be performed whenever the ambient temperature is between 25°F (-3°C) and 50°F (10°C) or whenever frost or ice is found on the lower wing surface.

THE WING UPPER SURFACE ICE IS DIFFICULT TO DETECT BY VISUAL INSPECTION ALONE AND THE OPERATOR SHOULD CONFIRM BY TOUCH THAT ICE IS NOT PRESENT PRIOR TO DEPARTURE.

An inspection must be made of the wing upper surface over the inboard end of the wing fuel tank after fueling. This area may be reached from a ladder placed forward of the leading edge, 6 to 8 feet outboard of the fuselage. The leading edge slats must be retracted and the hydraulic power off to prevent their inadvertent extension.

The wing surface must be touched by hand all of the forward spar outboard of the wing tank bulkhead to confirm the absence/presence of ice (see Figure 1). The area beyond that which can be comfortably touched by hand must be inspected to ensure that it is free from ice or frost. Visual inspection is not adequate if Service Bulletin 30-59 or a Douglas approved equivalent has not been accomplished. If installed, ice indicator tufts on the wing upper surface must be verified for freedom of movement.

Any ice detected must be removed and its removal confirmed by touch or other suitable means.

THE ICE IS VERY DIFFICULT TO DETECT, ESPECIALLY WHEN THE WING IS WET FROM RAIN OR DE-ICING.

Retain this Operations Bulletin until advised to remove it.

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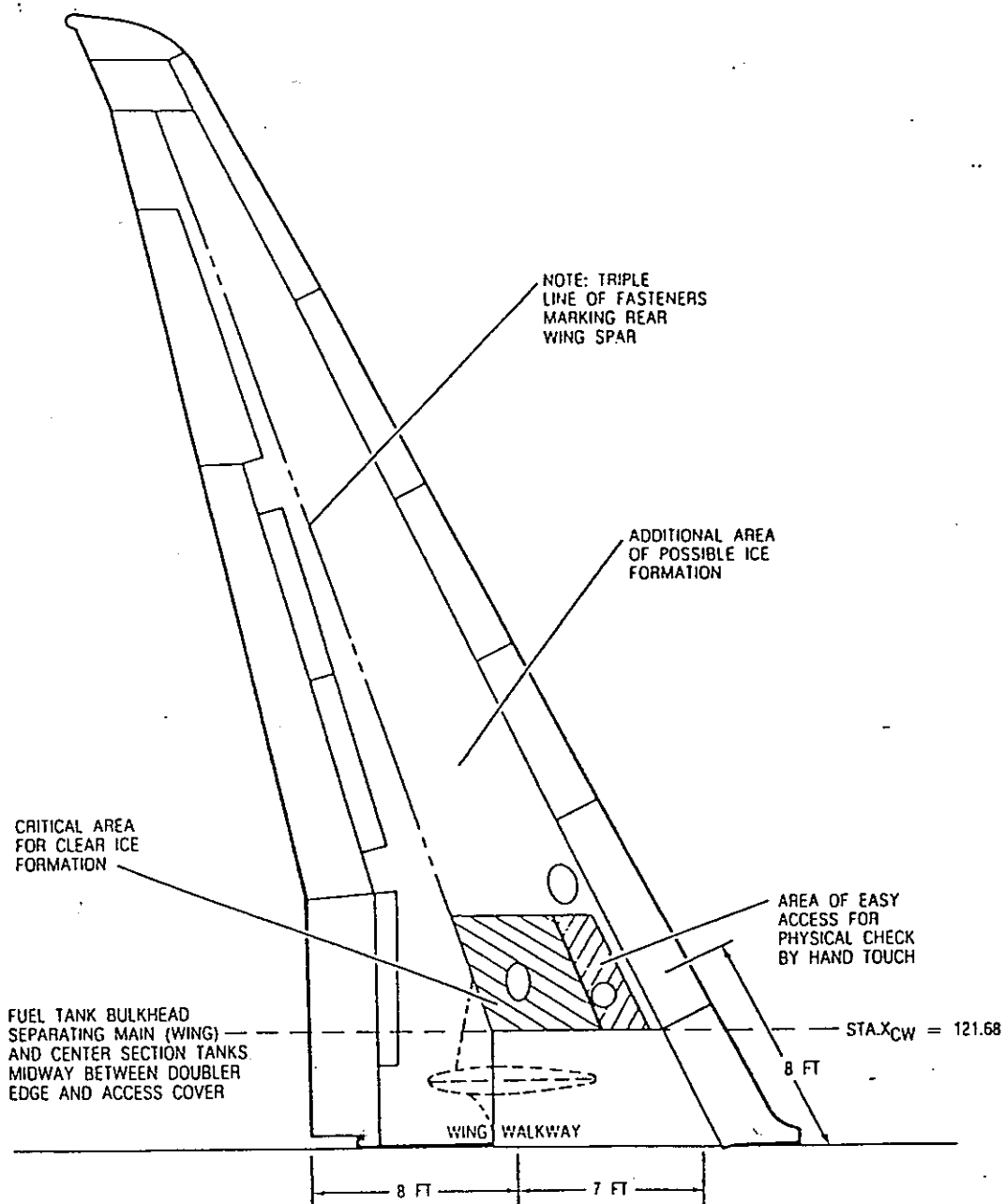
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OPERATIONS BULLETIN

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GROUND FORMATION OF WING ICE IN ABOVE FREEZING WEATHER



RA1-4892

FIGURE 1

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AIR LIBERTE INDUSTRIES

(SERIES 80)

THIS MANUAL IS EFFECTIVE FOR THE FOLLOWING AIRPLANES

Factory Serial Numbers	Model Designation	Registration Numbers	Effectivity Code
49576	MD-83	F-GHED	101
49662	MD-83	G-PATC	104
49707	MD-83	F-GFZB	102
49822	MD-83	F-GHEB	103
49823	MD-83	G-BPSC	108
49968	MD-83	F-GHEI	105
49985	MD-83	F-GHHO	106
49986	MD-83	F-GHHP	107

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TITLE				1-CONT	46	2	OCT 1/93
*REV REC	1	1/2	APR 1/99	1-1-0	3	1	OCT 1/92
*TR SUM	46	1/2	APR 1/99	1-1-0	3	2	OCT 1/92
OB SUM	46	1/2	OCT 1/97 *	1-1-0	3	3/4	OCT 1/92
MAN EFF	46	1/2	OCT 1/97	1-10-0	1	1	APR 1/96
*EFF PGS	46	1-7/8	APR 1/99	1-10-0	1	2	APR 1/96
FOREWORD	1	1/2	APR 1/98	1-10-0	1	3	APR 1/96
CONT	6	1/2	MAR 1/88	1-10-0	1	4	APR 1/96
INTRO	1	1	APR 1/93	1-10-0	1	5	APR 1/96
INTRO	1	2	JAN 1/93	1-10-0	1	6	APR 1/96
INTRO	1	3	JAN 1/93	1-10-0	1	7/8	APR 1/96
INTRO	1	4	JAN 1/93	1-20-0	1	1/2	MAR 1/84
SECTION 1				1-30-0	46	1	JAN 1/91
1-CONT	46	1/2	OCT 1/97	1-30-0	46	2	JAN 1/91
1-10-0	1	1	JUL 1/93	1-30-0	46	3	JAN 1/91
1-10-0	1	2	OCT 1/97	1-30-0	46	4	JAN 1/91
1-10-0	1	3	JUL 1/91	1-30-0	46	5	JAN 1/91
1-10-0	1	4	JAN 1/93	1-30-0	46	6	JAN 1/91
1-10-0	1	5	JUL 1/93	1-30-0	46	7	JUL 1/93
1-10-0	1	6	APR 1/91	1-30-0	46	8	JAN 1/91
1-10-0	1	7	APR 1/91	1-30-0	46	8A/8B	OCT 1/91
1-10-0	1	8	OCT 1/98	1-30-0	46	9	JUL 1/92
1-10-0	1	9	JAN 1/92	1-30-0	46	10	JUL 1/92
1-10-0	1	10	APR 1/91	1-30-0	46	11	JAN 1/91
1-10-0	1	11	APR 1/91	1-30-0	46	12	JAN 1/91
1-10-0	1	12	APR 1/91	1-30-0	46	13	JAN 1/91
1-10-0	1	13	APR 1/95	1-30-0	46	14	APR 1/95
1-10-0	1	14	OCT 1/98	1-30-0	46	15	JAN 1/91
1-10-0	1	15	APR 1/96	1-30-0	46	16	JAN 1/91
1-10-0	1	16	OCT 1/97	1-30-0	46	17	JAN 1/91
1-10-0	1	17	APR 1/95	1-30-0	46	18	JAN 1/91
1-10-0	1	18	OCT 1/97	1-30-0	46	19	JAN 1/91
1-10-0	1	19	APR 1/91	1-30-0	46	20	OCT 1/95
1-10-0	1	20	APR 1/96	1-30-0	46	21	JAN 1/91
1-10-0	1	21	APR 1/91	1-30-0	46	22	JAN 1/93
1-10-0	1	22	APR 1/91	1-30-0	46	23	JAN 1/91
1-10-0	1	23/24	OCT 1/91	1-30-0	46	24	JAN 1/91
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				1-30-0	46	26	OCT 1/96
				1-30-0	46	27	JAN 1/91
				1-30-0	46	28	JAN 1/91
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1-30-0	46	34	JAN 1/91	1-30-0	1	3/4	JUN 1/83
1-30-0	46	35	JAN 1/91	1-30-5	1	1/2	JUN 1/81
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1-30-0	46	40	OCT 1/92	2-20-0	1	2	MAR 1/82
1-30-0	46	41	OCT 1/91	2-20-0	1	3	DEC 1/83
1-30-0	46	42	OCT 1/91	2-20-0	1	4	DEC 1/82
1-30-0	46	43	JAN 1/91	2-20-0	1	5	DEC 1/88
1-30-0	46	44	OCT 1/96	2-20-0	1	6	OCT 1/95
1-30-0	46	45	OCT 1/91	2-30-0	2	1	APR 1/95
1-30-0	46	46	JAN 1/91	2-30-0	2	2	APR 1/95
1-30-0	46	47	APR 1/98	2-30-0	2	3	JUL 1/93
1-30-0	46	48	APR 1/98	2-30-0	2	4	JUN 1/87
1-30-0	46	49	JAN 1/91	2-30-0	2	5	OCT 1/96
*1-30-0	46	50	APR 1/99	2-30-0	2	6	OCT 1/96
1-30-0	46	51	JUL 1/92	2-30-0	2	7	OCT 1/96
1-30-0	46	52	OCT 1/97	2-30-0	2	8	OCT 1/94
1-30-0	46	53	APR 1/96	2-30-0	2	9	JUL 1/93
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1-40-0	46	5	OCT 1/91	3-CONT	46	3/4	OCT 1/93
1-40-0	46	6	JUL 1/92	3-10-0	3	1	OCT 1/97
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1-20-5	1	4	SEP 1/80	3-20-0	17	9	DEC 1/84
1-20-5	1	5	SEP 1/80	3-20-0	17	10	DEC 1/84
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3-20-0	23	11	DEC 1/87	3-20-5	44	18	JUL 1/90
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3-20-5	29	2	OCT 1/90	3-20-5	44	21	MAR 15/88
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3-20-5	29	8	DEC 1/85	3-20-10	5	4	JUN 1/87
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3-20-5	29	10	APR 1/91	3-20-10	5	6	JUN 1/87
3-20-5	29	11	DEC 1/85	3-20-10	5	7	JUN 1/87
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3-20-5	29	15	DEC 1/85	3-20-10	5	11	JUN 1/87
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3-20-5	29	21	JUN 1/87	3-20-10	5	17	JUN 1/87
3-20-5	29	22	DEC 1/85	3-20-10	5	18	JUN 1/87
3-20-5	29	23	JAN 1/90	3-20-10	5	19	JUN 1/87
3-20-5	29	24	DEC 1/85	3-20-10	5	20	JUN 1/87
3-20-5	44	1	JUL 1/93	3-20-10	5	21	JUN 1/87
3-20-5	44	2	MAR 15/88	3-20-10	5	22	JUN 1/87
3-20-5	44	3	OCT 1/92	3-20-10	5	23	JUN 1/87
3-20-5	44	4	MAR 15/88	3-20-10	5	24	JUN 1/87
3-20-5	44	5	MAR 15/88	3-20-10	5	25	JUN 1/87
3-20-5	44	6	MAR 15/88	3-20-10	5	26	JUN 1/87
3-20-5	44	7	MAR 15/88	3-20-10	5	27	JUN 1/87
3-20-5	44	8	MAR 15/88	3-20-10	5	28	JUN 1/87
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3-20-10	5	36	JUN 1/87	6-30-0	2	10	JUL 1/91
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3-20-10	5	39	JUN 1/87				
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4-20-0	1	2	JUL 1/91	7-1-0	27	3	JUN 1/88
4-20-0	1	3	OCT 1/97	7-1-0	27	4	OCT 1/94
4-20-0	1	4	OCT 1/91	7-10-0	29	1	JUN 1/88
4-20-0	1	5/6	APR 1/95	7-10-0	29	2	DEC 1/85
4-30-0	1	1	JUL 1/91	7-10-0	29	3	DEC 1/85
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FOREWORD

The MD-80 Flight Crew Operating Manual provides descriptive information and operational procedures to be used as a guide for operation of the MD-80 airplane. The data in this manual are based upon engineering information and calculations.

The MD-80 Flight Crew Operating Manual reflects the airplane description and operating recommendations approved by the Douglas Aircraft Company. This does not mean that individual airlines may not publish manuals reflecting their own operating philosophies.

Due to inherent delays in research, compilation, preparation, and printing of technical manuals, this publication may not include the most recent changes to the airplane.

The data contained herein are current as of approximately 60 days prior to the publication date, but are subject to change without notice during the conduct of any Flight Test Program.

In the event of conflict between the limitations and performance data of this manual and the FAA Approved Airplane Flight Manual, the FAA Approved Flight Manual shall govern.

Comments or inquiries concerning this manual should be addressed to:

Director
Flight Operations
DOUGLAS AIRCRAFT COMPANY
3855 Lakewood Blvd.
Long Beach, California 90846

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• **ABNORMAL AND EMERGENCY PROCEDURES HANDBOOK** **VOLUME I**

• **OPERATING PROCEDURES AND SYSTEMS DESCRIPTION** **VOLUME II**

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• **PERFORMANCE** **VOLUME VI**

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INTRODUCTION

GENERAL

Volume I, ABNORMAL and EMERGENCY PROCEDURES HANDBOOK contains emergency and abnormal procedures.

Volume I is intended to provide the flight crew with a quick-reference checklist to EMERGENCY and ABNORMAL procedures contained in Volume II.

Line items are identical to the line items for the emergency and abnormal procedures. However, the procedures are abbreviated by deleting explanatory material from the amplified procedures.

The Emergency and Abnormal Procedures are grouped by systems. All emergency procedures are easily identified by a black hatched border on the page.

The Table of Contents pages, (Emergency - front cover and Abnormal - Page 3) are arranged so that locator arrows for each procedure title block align with the tab of the page on which the procedure is located. Each title block is numbered to correspond with the number of the tab for the envelope containing the specific procedure.

In the Emergency Procedures, certain steps are shown with the line item enclosed in a box. Items identified in this manner are "recall" items that are classified as minimum immediate action items. Steps not enclosed in a box are "reference" items which are to be accomplished as soon as time permits.

Emergency and Abnormal Procedures are written with the assumption that WARNING/CAUTION lights and Fire Aural Warning will be reset when required. Oxygen masks/goggles will be donned

and communications established as required. Specific steps for their use are not included in all written procedures to allow the aircrew more latitude for a given situation.

WARNINGS/CAUTIONS/NOTES

The following definitions and presentations apply to WARNINGS, CAUTIONS and NOTES found in Sections 1, 2 and 3.

WARNING

Operating procedures, techniques, etc., which could result in personal injury or greater consequences if not carefully followed. Warnings are printed in bold face type.

CAUTION

Operating procedures, techniques, etc., which could result in damage to equipment if not carefully followed. Cautions are boxed in.

NOTE

An operating procedure technique, etc., which is considered essential to emphasize.

The following definitions and presentations apply to CAUTIONS and NOTES found in Section 4:

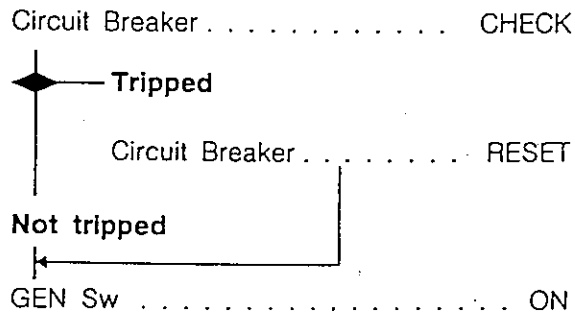
CAUTION: INFORMATION CONCERNING A SYSTEM WHICH COULD CAUSE INJURY TO PERSONNEL IF INSTRUCTIONS ARE IGNORED.

NOTE: Additional information about a system not necessarily related to the actual description.

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Diamond symbols (◆) are used where necessary to indicate a procedure branching point (decision) where the operator must observe an indication or condition and select the appropriate action. In some cases the branch includes all actions necessary to complete the branch and in other cases the branches rejoin at another point. The point where the branches rejoin is indicated by an arrow. An example follows:



Volume II, OPERATING PROCEDURES and SYSTEMS DESCRIPTION, is the complete operating procedures and descriptive document and consists of four sections with additional Appendices as may be required for special operating conditions or procedures.

Volume II is divided into two binders with the Title Page through Section 3, OPERATION - NORMAL/ABNORMAL, in the binder titled OPERATING PROCEDURES and Section 4, SYSTEMS DESCRIPTION, in the binder titled SYSTEMS DESCRIPTION.

OPERATIONS BULLETINS

A separate divider tab is provided for Operations Bulletins. Operations Bulletins are issued as required to provide a more expedient and practical method of disseminating operational information which is not compatible to being issued as a Temporary Revision. Operations Bulletins shall be retained until notified to remove them.

Section 1, EMERGENCY PROCEDURES

Section 1 contains all procedures. Checklists which can be related to foreseeable inflight emergencies. The procedures are presented in amplified form which describes in detail how the procedure is accomplished.

In this section certain steps are shown with the line item enclosed in a box. Items identified in this manner are "recall" items that are classified as minimum immediate action items. Steps not enclosed in a box are "reference" items which are to be accomplished as soon as time permits.

Code symbol (◆) for identifying branching points is identical to that described for Volume I.

Section 2, CHECKLISTS

Section 2 contains detailed procedures for conducting a normal flight with all airplane systems operational. Procedures are listed by phase-of-flight, starting with flight preparation and exterior safety inspection, and extending through post-flight duties at destination.

Code symbol (◆) for identifying branching points is identical to that described for Volume I.

Section 3, OPERATION - NORMAL/ABNORMAL

Section 3 contains systems limitations, detailed normal procedures, abnormal procedures and techniques. The information is presented under the appropriate system.

Each system is contained in a separate chapter. The first chapter is Airplane General; the other 15 chapters follow in alphabetical order.

Code symbol (◆) for identifying branching points is identical to that described for Volume I.

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Section 4. SYSTEMS DESCRIPTION

Section 4 contains descriptive airplane systems information. This section is divided into 15 chapters listed alphabetically.

Volume III and Subsequent, PERFORMANCE

Volume III and subsequent Volumes are reserved for performance data for operation with specific engines. The Performance Volume(s) provides the flight crew with the information necessary for safe and efficient operation of the airplane during all phases of flight. Only the Performance Volume(s) applicable to your specific airplanes and engine model(s) is provided.

PAGINATION

The pages in Volume I of the Flight Crew Operating Manual are numbered in sequence.

The page identification and code system for Volumes II and III makes it possible to issue small blocks of revision pages without renumbering and printing a complete section or chapter of the manual. The coding system is a tool for maintaining customized manuals for individual airlines.

TYPICAL PAGE IDENTIFICATION

Section 3	←	Section identification
10-5-1	←	Chapter - Subject - Unit numbering
CODE 1	←	Configuration identification
Page 1	←	Numbers run in sequence, starting with each change in Chapter - Subject - Unit numbering.

Section Identification

A Section number is assigned to the major sections within the volumes as previously described.

Chapter Identification

The first one or two digit number following the section identification is always used to identify a chapter within the section. Sections which are not subdivided into chapters will always use the digit 1 in lieu of a chapter number.

Subject Numbering

The first one or two digit number following the chapter identification is used to break the chapter into smaller blocks of numbered pages, as a means of handling configuration differences.

Unit Numbering

The first one or two digit number following subject numbering is used to further break subject matter into smaller blocks of numbered pages. It is used where subject matter may require frequent revision or contains many configuration differences. It has no direct value or meaning to the user.

Configuration Identification

A CODE number is assigned to a block of pages issued for a specific configuration of the airplane. If all MD-80 airplanes within the operator's fleet are identical in configuration, the CODE number will have no direct value to the user. However, each code page must be checked against the List of Effective Pages issued for each chapter. This is to assure that the pages forwarded are applicable to your manual. Where practical, configuration differences within an operator's fleet will be shown on art pages or defined in text pages. If this is not feasible, an additional text block with a different CODE number will be issued to cover the additional configuration.

When two or more CODES are required to cover a specific subject, within one manual, the chapter Table of Contents will list the airplane effectivity of each CODE.

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SUGGESTIONS FOR HANDLING REVISIONS

1. Using the page identification system, assemble revision pages for each section separately.
2. Split the manual at one of the colored dividers designating a section.
3. Work each chapter within a section on an individual basis, using the revision instructions provided for that chapter. Use the chapter Table of Contents to determine pagination sequence. Check the revised chapter against the List of Effective Pages before starting revision of the next chapter.
4. The CODE number for the List of Effective pages is always the same as every Table of Contents CODE number throughout the manual. Always check the List of Effective pages CODE number against the Table of Contents CODE number to preclude inserting new revision pages into the wrong manual.

CUSTOMER ORIGINATED DATA

Customer originated data will be identified by either of two methods. As an example, if an Airline requests Douglas to incorporate that Airline's procedure into the manual and it fills the entire page, the page will be identified with the statement "(Customer designation) Originated Data" located at the bottom center of the page. If only a portion of the page is customer originated data, the Airline's designator will appear in the left margin of the page opposite the applicable data. Pages bearing either method of identification indicate that the information contained on that page has been prepared by and incorporated into the manual at the request of the customer. The Douglas Aircraft Company assumes no responsibility for data incorporated into this manual as a result of a customer originated change.

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RUNAWAY STABILIZER	1-10-0	1	18	All
SPOILER FLOAT	1-10-0	1	18	All
TAIL COMPT TEMP HIGH LIGHT ON	1-10-0	1	19	All
TWO ENGINE FLAMEOUT	1-10-0	1	22	All

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FLIGHT CREW OPERATING MANUAL

EMERGENCY PROCEDURES

AIR CONDITIONING SMOKE/FUMES

Oxygen Masks and Goggles. ON/100%/EMERGENCY

Smoke/Fumes Location. DETERMINE

Cockpit

L AIR CONDITIONING SUPPLY Switch. OFF

Smoke. OBSERVE

Stops

Continue flight with L AIR CONDITIONING SUPPLY switch OFF.

[END]

Continues

L AIR CONDITIONING SUPPLY Switch. AUTO

R AIR CONDITIONING SUPPLY Switch. OFF

[END]

Cabin

RECIRCULATING FAN CONTROL C/B (Upper EPC) PULL

Smoke. OBSERVE

Stops

Continue flight with RECIRCULATING FAN CONTROL circuit breaker pulled.

[END]

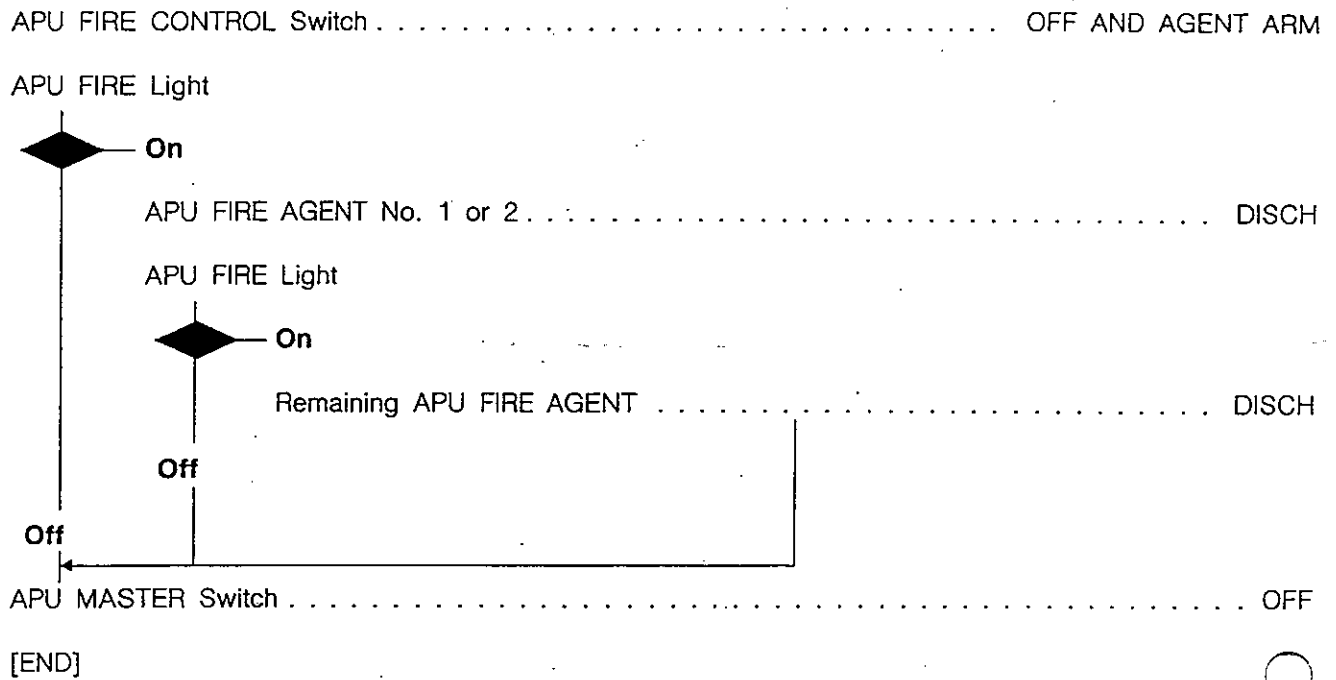
Continues

R AIR CONDITIONING SUPPLY Switch. OFF

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FLIGHT CREW OPERATING MANUAL

APU FIRE



COCKPIT SMOKE REMOVAL - UNPRESSURIZED

Oxygen Masks and Goggles ON/100%/EMERGENCY

Airspeed REDUCE TO 165 KIAS

Either Cockpit Clearview Window 1/2 TO 2/3 OPEN

CAUTION

Noise level with a window open will make communications difficult and may prevent crew from hearing landing gear warning horn.

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FLIGHT CREW OPERATING MANUAL

COMPLETE LOSS OF AC POWER

EMER PWR Switch ON

NOTES

AHRS (if installed) may require 45 seconds to erect after loss of AC power. At this time, the attitude will erect but the heading flags will remain in view until the airplane is wings level. The AHRS will erect in normal mode. If necessary, use the standby horizon indicator.

AC and DC EMER BUS OFF lights should go off.

BATT Switch CHECK ON

NOTES

Buses powered with BATT switch and EMER PWR switch on are: BATT DIR BUS, BATTERY BUS, DC TRANSFER BUS, EMERGENCY AC BUS, and EMERGENCY DC BUS. If these are not powered, reset BAT DIRECT BUS FEED circuit breaker (mechanical remote reset, lower left rear of center pedestal). Battery, if fully charged, will power all equipment listed on overhead emergency circuit breaker panel for approximately 30 minutes. Pilot should use only that equipment essential to flight. Flight instruments may take up to 3 minutes to erect before warning flags disappear. During this time, airplane should be flown straight and level.

Captain's and First Officer's instrument panel white incandescent floodlights come on automatically. At Captain's discretion and/or when time permits, intensity of illumination can be controlled by adjusting the WHITE floodlight controls (small knobs). Floodlights cannot be turned off with WHITE floodlight controls.

GALLEY Switch OFF
CABIN ALT Control Lever MANUAL
CKPT/CABIN TEMP Selectors MANUAL

(Continued)

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FLIGHT CREW OPERATING MANUAL

COMPLETE LOSS OF AC POWER (Continued)

AC BUS X TIE Switch OPEN

■ L GEN (or APU) Then R GEN (or APU) Switches RESET/CHECK/ON (NORMAL)

Move indicator selector to AC VOLT/FREQ. If voltage and frequency are within normal range, move L GEN switch to ON. Attempt to reset R GEN or APU GEN in same manner.

NOTE

A generator must be reset only once for a given fault. If fault trips generator after reset, fault should be located and corrected before attempting to place generator on its bus again.

Generator Operation CHECK

Abnormal

L and R GEN Switches OFF

APU (If Available) WINDMILL START

APU PWR AVAIL Light ON

NOTE

It may be necessary to move APU GEN switch to RESET then to NORM.

APU L and R BUS Switches (One At a Time) ON

NOTES

If left and right AC buses cannot be powered by any combination of generators, certain systems/indications will be affected as follows:

All stall warning systems (stick shaker, supplemental stall recognition system and post stall recovery system) will be inoperative.

Slats cannot be extended beyond mid position. Auto slat system will be inoperative.

SLAT DISAGREE light will be inoperative. Slats and flaps position cannot be verified from cockpit.

(Continued)

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FLIGHT CREW OPERATING MANUAL

COMPLETE LOSS OF AC POWER (Continued)

Generator Operation (Continued)

NOTES (Continued)

Stabilizer trim will be inoperative.

Anti-skid system will be inoperative.

Automatic ground spoilers will be inoperative. On airplanes with in-flight spoiler lockout mechanism, manual ground spoilers will be locked out until nose strut compression on landing (if flaps are extended beyond 8°).

For landing with this condition, refer to Section 3 – FLIGHT CONTROLS – STABILIZER INOPERATIVE INFLIGHT.

Prior to landing,

One AIR CONDITIONING SUPPLY Switch OFF

Either or both generators normal

NOTE

If FMA's are blank, push either autopilot release button to reset the digital flight guidance computer.

AC BUS X TIE Switch	AUTO
CABIN ALT Control Lever	AUTO
CKPT/CABIN TEMP Selectors	AUTO
EMER PWR Switch	OFF
GALLEY Switch (If Electrical Load Permits)	ON
Systems	MONITOR

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FLIGHT CREW OPERATING MANUAL

CRASH LANDING OR DITCHING

NOTE

If time and circumstances permit, direct crew to take appropriate crash landing or ditching action, initiate transmission of emergency messages and set ATC transponder.

NO SMOK/SEAT BELTS Switches ON

AIR CONDITIONING SUPPLY Switches OFF

NOTE

When air conditioning input is shut off, cabin altitude will ascend at approximately 4,000 feet per minute (at full differential pressure) until outflow valve goes full closed. When outflow valve is closed, rate of ascent will be approximately 1,000 feet per minute (depending on airplane configuration).

Cabin Pressurization DEPRESSURIZE MANUALLY

NOTES

Manual control wheel forces will be high unless airspeed is low.

Cabin is depressurized to ensure all doors and exits can be readily opened.

When depressurized,

CABIN ALT Control Wheel (FULL FORWARD) VALVE CLOSED

NOTE

This action closes pressurization nozzle and outflow valve in order to present a smoother fuselage surface during ditching, and to close openings to improve flotation. The outflow valve and nozzle will be below the water line following ditching.

RADIO RACK Switch FAN

NOTE

FAN position reduces size of venturi valve opening.

(Continued)

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FLIGHT CREW OPERATING MANUAL

CRASH LANDING OR DITCHING (Continued)

Type Of Touchdown (Ditching or Crash Landing) DETERMINE



Ditching

Gear Handle UP

NOTE

With gear up, pull CAWS, SSRS-1, LDG GEAR, T/O, A/P, CABIN ALT, SPD BRAKE C/B (lower EPC) to silence landing gear warning.

Crash landing

Gear Handle DOWN

NOTE

Landing gear is extended to absorb impact forces.

FLAP/SLAT Handle 28°/LAND

NOTE

28°/LAND position will provide best lift/drag ratio under both ditching and crash landing conditions for both two and single engine cases. The approach body angles will be slightly higher than a 40°/LAND approach.

Prior to touchdown,

EMER LTS Switch ON

NOTES

This will assure cabin emergency lights are on to assist in evacuation of the airplane.

After ditching, airplane assumes a slight taildown attitude (floor angle not more than 5° nose up). At high gross weights, wings will be awash, while at lower gross weights, the upper wing surface will be clear of water.

(Continued)

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FLIGHT CREW OPERATING MANUAL

CRASH LANDING OR DITCHING (Continued)

- When airplane has stopped, and if time permits,

ENG FIRE Handles PULL

■ FIRE AGENT (As Required) DISCHARGE

NOTE

BATT switch must be on to discharge fire extinguishing agent
as there is no generator or T/R power available.

[END]

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FLIGHT CREW OPERATING MANUAL

ELECTRICAL SMOKE OF UNKNOWN ORIGIN

Oxygen Masks and Goggles ON/100%/EMERGENCY

CABIN ALT Control Lever DOWN/MANUAL

EMER PWR Switch ON/CHECK

◆ Emergency power check is abnormal

Emergency power check is normal

L and R GEN and APU L and R BUS Switches OFF

Smoke OBSERVE

◆ Decreases

Nearest Suitable Airport. DETERMINE

◆ 30 minutes or less and subject to Captain's discretion

Proceed directly to airport and land.

CAUTION

Depressurize cabin prior to landing. Manual pressurization control forces may be high. Apply force as required.

[END]

More than 30 minutes

AC and DC BUS X TIE Switches OPEN

R GEN or APU R BUS Switch ON/CHECK

NOTE

DFGC 2 may be used after the electrical system check is completed.

(Continued)

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FLIGHT CREW OPERATING MANUAL

ELECTRICAL SMOKE OF UNKNOWN ORIGIN (Continued)

Smoke (Continued)

Smoke. OBSERVE



Does not reappear

EMER PWR Switch OFF

Land as soon as practicable.

[END]

Reappears

L GEN and APU L BUS Switches ON/CHECK

R GEN and APU R BUS Switches OFF

EMER PWR Switch OFF

Land as soon as practicable.

[END]

Increases or persists

L and R GEN Switches. ON/CHECK

CABIN ALT Control Lever AUTO (UP)

EMER LTS Switch. OFF

Locate and pull the following circuit breakers:

ALTERNATE EMER AC BUS FEED	(Upper EPC)
EMER AC BUS FEED	(Upper EPC)

DC TRANSFER BUS FEED	(Lower EPC)
EMERGENCY DC BUS FEED	(Lower EPC)

CHARGER & TRANSFER RELAY	(Overhead)
BATTERY RELAY	(Overhead)
EMERGENCY INVERTER	(Overhead)

(Continued)

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FLIGHT CREW OPERATING MANUAL

ELECTRICAL SMOKE OF UNKNOWN ORIGIN (Continued)

EMER PWR Switch OFF

BATT Switch OFF

NOTE

APU, if running, will shut down.

BATTERY CHARGER Circuit Breaker (Left Console) PULL

Smoke. OBSERVE



Increases or persists

At Captain's discretion, pull the BATT DIRECT BUS FEED circuit breaker (located in the E and E compartment, under the cockpit floor).

Reset the following circuit breakers:

ALTERNATE EMER AC BUS FEED
EMER AC BUS FEED
DC TRANSFER BUS FEED
EMERGENCY DC BUS FEED

EMER LTS Switch ARM

Land as soon as practicable.

[END]

Decreases

DC TRANSFER BUS FEED Circuit Breaker RESET

Smoke. OBSERVE



Does not reappear

Land as soon as practicable.

[END]

Reappears

DC TRANSFER BUS FEED Circuit Breaker PULL

(Continued)

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FLIGHT CREW OPERATING MANUAL

ELECTRICAL SMOKE OF UNKNOWN ORIGIN (Continued)

Reset the following circuit breakers:

ALTERNATE EMERGENCY AC BUS FEED
EMERGENCY AC BUS FEED
EMERGENCY DC BUS FEED

EMER LTS Switch ARM

Land as soon as possible.

CAUTION

After completing this procedure, if it has not or cannot be visibly verified that the source of the smoke has been eliminated, land immediately at the nearest suitable airport even though the smoke may be dissipating.

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FLIGHT CREW OPERATING MANUAL

EMERGENCY DESCENT

Throttles IDLE

NOTE

Autothrottle must be engaged in Clamp Mode or disengaged before moving throttles to idle.

Speed Brakes EXTEND

Descent Speed. ESTABLISHED (.80-.82 Mach/320-340 KIAS)

CAUTION

Speed profile is based on no loss of structural integrity and assumes smooth air conditions. Known failures affecting structural integrity and/or turbulence may dictate more conservative speed profiles or entry maneuver. Recommended speed with structural damage is .75-.79 Mach/275-285 KIAS.

NOTE

Descent not to exceed 10 degrees pitch or 30 degrees bank.

Altitude Preselect SET & ARM

Set and arm assigned descent or level-off altitude.

[END]

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FLIGHT CREW OPERATING MANUAL

ENGINE FAILURE/ INFLIGHT ENGINE SHUTDOWN

Throttle (Affected Engine) IDLE
FUEL Control Lever (Affected Engine) OFF

NOTE

After FUEL control lever is off, throttles should be used together.

PNEU X-FEED VALVE Lever (Affected Engine) CLOSE
AUX and TRANS HYD PUMP Switches AS REQUIRED
ENG IGN Selector/Switch AS REQUIRED
FUEL TANKS Pumps/FUEL X FEED Lever. AS REQUIRED

NOTE

Use fuel crossfeed as necessary to maintain fuel balance.

Electrical Loads CHECK

NOTE

Start APU (if available) to reduce electrical load on operating generator.

AIR COND SHUTOFF Switch. OVRD
ENG SYNC Selector OFF
AIR CONDITIONING SUPPLY Switch (Affected Engine). OFF

NOTE

Restricted rudder may result after applying maximum rudder due to asymmetric thrust. If RUDDER TRAVEL UNRESTRICTED light does not come on during deceleration, momentarily centering rudder pedals and rudder trim may allow rudder throw limiter to return to speed-scheduled position.

[END]

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FLIGHT CREW OPERATING MANUAL

ENGINE FIRE OR SEVERE DAMAGE OR SEPARATION

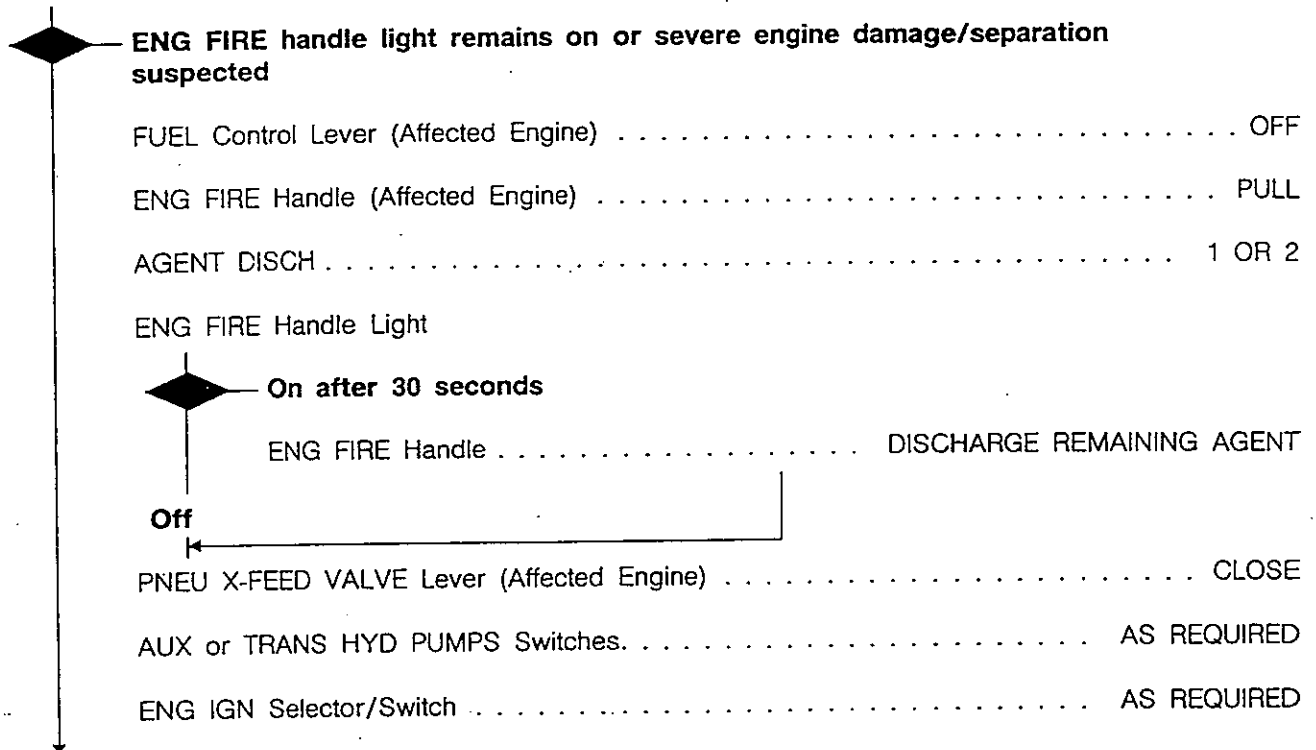
NOTES

A fire warning may or may not appear with severe engine damage or separation.

Indications of severe damage may include airplane vibration and, on affected side, N₁ and/or N₂ tachometers indicating 0%, rapid loss of hydraulic pressure and sudden loss of generator power.

Throttle (Affected Engine)	IDLE

Engine Indications



(Continued)

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FLIGHT CREW OPERATING MANUAL

ENGINE FIRE OR SEVERE DAMAGE OR SEPARATION (Continued)

Engine Indications (Continued)

FUEL TANKS Pumps Switches/FUEL X FEED Lever AS REQUIRED

NOTE

Use fuel crossfeed as necessary to maintain fuel balance.

Electrical Loads CHECK

When takeoff thrust is no longer required,

AIR COND SHUTOFF Switch. OVRD

ENG SYNC Switch OFF

AIR CONDITIONING SUPPLY Switch (Affected Engine). OFF

ENG FIRE handle light off and severe engine damage/separation not suspected

Continue idle engine operation at Captain's discretion.

NOTE

Restricted rudder may result after applying maximum rudder due to asymmetric thrust. If RUDDER TRAVEL UNRESTRICTED light does not come on during deceleration, momentarily centering rudder pedals and rudder trim may allow rudder throw limiter to return to speed-scheduled position.

[END]

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FLIGHT CREW OPERATING MANUAL

RAPID DECOMPRESSION

Oxygen Masks ON/100%/EMERGENCY

CABIN ALT Control Lever/Wheel MANUAL/FULL FWD

NOTE

Manual control wheel forces may be high. Apply force as required.

PNEU X-FEED VALVE Levers CLOSE

AIR CONDITIONING SUPPLY Switches AUTO

Passenger Oxygen Masks (If Required) DEPLOY

NOTE

If cabin altitude has exceeded 14,000 feet and passenger oxygen masks have not deployed, move PAX OXY MASK switch to EJECT.

Cabin Pressure



Controllable

CABIN ALT Control Wheel AS REQUIRED

[END]

Not controllable

Begin emergency descent,

Throttles IDLE

NOTE

Autothrottle must be engaged in Clamp Mode or disengaged before moving throttles to idle.

Speed Brakes EXTEND

Descent Speed. ESTABLISHED (320-340 KIAS/.80-.82 MACH)

CAUTION

Speed profile is based on loss of pressurization with no loss of structural integrity and assumes smooth air conditions. Known failures affecting structural integrity and/or turbulence may dictate more conservative speed profiles or entry maneuver. Recommended speed with structural damage is 275-285 KIAS/.75-.79 Mach.

NOTE

Descent not to exceed 10 degrees pitch or 30 degrees bank.

Altitude Preselect SET & ARM

Set and arm assigned descent or level-off altitude.

[END]

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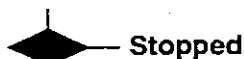
FLIGHT CREW OPERATING MANUAL

RUNAWAY STABILIZER

CAUTION

Avoid manual pitch inputs using the control column until the autopilot is disconnected.

Autopilot DISCONNECT
 STABILIZER TRIM (Red Guarded) Switch STOP
 LONG TRIM Indicator OBSERVE



Stopped

PRIMARY LONGITUDINAL TRIM C/B's (EPC Gen Bus Panel). OPEN (PULL)

Continue flight using alternate trim system. Allow for slower trim rate.

[END]

Continues to run away

STABILIZER TRIM Switch. NE

NOTE

Return stabilizer trim switch to normal. Utilize primary trim system to position longitudinal trim indicator to desired position.

AUTOPILOT AND ALTERNATE LONGITUDINAL TRIM C/B's (Upper EPC). OPEN (PULL)

Continue flight using primary trim system.

[END]

SPOILER FLOAT

NOTE

Rapid roll rate develops during extension of flaps beyond 28°.

FLAP/SLAT Handle RETRACT TO 28/L

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FLIGHT CREW OPERATING MANUAL

TAIL COMPT TEMP HIGH LIGHT ON

PNEU X-FEED VALVE Levers	CLOSED

AIR FOIL Anti-Ice Switch(es)	OFF

AIR CONDITIONING SUPPLY Switches	HP BLD OFF

Phase Of Flight DETERMINE

Final approach (5 minutes from touchdown)

Continue approach using minimum power settings.

[END]

Takeoff, climb, cruise, descent or initial approach

Left Throttle. IDLE

TAIL COMPT TEMP HIGH Light CHECK

Off (within 2 minutes)

L AIR CONDITIONING SUPPLY Switch OFF

Left Throttle. RESTORE POWER

TAIL COMPT TEMP HIGH Light CHECK

Off

R AIR CONDITIONING SUPPLY Switch AUTO

TAIL COMPT TEMP HIGH Light CHECK

Off

On

R AIR CONDITIONING SUPPLY Switch HP BLD OFF

L AIR CONDITIONING SUPPLY Switch AUTO

(Continued)

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FLIGHT CREW OPERATING MANUAL

TAIL COMPT TEMP HIGH LIGHT ON (Continued)

TAIL COMPT TEMP HIGH Light (Continued)

TAIL COMPT TEMP HIGH Light (Continued)

Restore airfoil ice protection from left engine if desired.

[END]

On

Left Throttle. IDLE

Continue at reduced thrust setting necessary to keep light off.

R AIR CONDITIONING SUPPLY Switch. AUTO

Restore airfoil ice protection from right engine if desired. If TAIL COMPT TEMP HIGH light comes on again, move AIR FOIL anti-ice switch(es) to OFF and minimize time in icing conditions. Refer to Section 3, Chapter 12, ICE AND RAIN PROTECTION, Abnormal Operation – AIRFOIL ICE PROTECTION INOPERATIVE.

[END]

On (after 2 minutes)

Left Throttle. RESTORE POWER

Right Throttle. IDLE

TAIL COMPT TEMP HIGH Light

Off (within 2 minutes)

R AIR CONDITIONING SUPPLY Switch. OFF

Right Throttle. RESTORE POWER

(Continued)

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FLIGHT CREW OPERATING MANUAL

TAIL COMPT TEMP HIGH LIGHT ON (Continued)

TAIL COMPT TEMP HIGH Light (Continued)

TAIL COMPT TEMP HIGH Light CHECK



Continue operation with right system off and isolated.

On

Right Throttle IDLE

Continue at reduced thrust setting necessary to keep light off.

L AIR CONDITIONING SUPPLY Switch AUTO

Restore airfoil ice protection from left engine if desired.

[END]

On (after 2 minutes)

Right Throttle RESTORE POWER

Land at nearest suitable airport.

NOTE

In order to maintain cabin pressurization during descent, it may be necessary to carry higher than normal power settings.

MD-80 FLIGHT CREW OPERATING MANUAL

TWO ENGINE FLAMEOUT

EMER PWR Switch	ON
ENG IGN Selector/Switch	OVRD
CABIN ALT Control Lever	MANUAL (DOWN)
Airspeed	MINIMUM MANEUVERING (NOT LESS THAN 170 KIAS)
Throttles	IDLE
ENG Anti-Ice Switches	ON
BATT Switch	ON/LOCKED
START PUMP Switch	ON
LEFT, CTR, RIGHT Fuel Boost Pump Switches (FWD, AFT)	ALL ON
GEN Switches	OFF
ENG HYD PUMP Switches	OFF
Fuel Control Levers	ON
FUEL X FEED Lever	OFF
Engine(s) Restarted	DETERMINE

 Neither

NOTE

If two engine flameout was caused by fuel starvation in left and right main tanks with fuel in center wing tank, optimum attitude for scavenging fuel out of the right main tank for APU or right engine is zero degrees pitch attitude and 1.5° right wing up.

APU MASTER Switch START/RELEASE

NOTE

Attempt APU start regardless of altitude and airspeed.

(Continued)

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FLIGHT CREW OPERATING MANUAL

TWO ENGINE FLAMEOUT (Continued)

Engine(s) Restarted (Continued)

APU MASTER Switch (Continued)

APU Condition OBSERVE

 Starts

L and R APU BUS Switches. ON

Does not start

Continue engine start attempts.

When one or both engines are started,

One or both

Electrical System. AS REQUIRED

ENG HYD PUMP Switches. AS REQUIRED

CABIN ALT Control Lever AUTO (UP)

START PUMP Switch OFF

ENG Anti-Ice Switches OFF

ENG IGN Selector/Switch AS REQUIRED

NOTE

Continue engine and/or APU start until at least two are running.

Land at nearest suitable airport.

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FLIGHT CREW OPERATING MANUAL

Section 2

CHECKLISTS

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AIR LIBERTE INDUSTRIES

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FLIGHT CREW OPERATING MANUAL

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
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Before Takeoff	1-40-0	46	5	All
Takeoff/Climb	1-40-0	46	5	All
Descent/Approach	1-40-0	46	5	All
Landing	1-40-0	46	6	All
After Landing	1-40-0	46	6	All
Parking	1-40-0	46	6	All
Before Leaving Airplane	1-40-0	46	7/8	All

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FLIGHT CREW OPERATING MANUAL

SECTION 2

CHECKLISTS

PREFACE

Section 2 contains detailed procedures necessary for conducting a normal flight in a safe and orderly manner with all airplane systems operational.

Procedures are listed in phase of flight sequence, starting with inspection and preparation of the airplane for flight, and extending through post-flight duties at destination.

The section is divided into 2 groups of documents; (1) Normal Procedures, (2) Checklists.

NORMAL PROCEDURES

The expanded procedures are intended to inform the trained operator of the normal procedures essential to the safe and orderly operation of the MD-80. All items, regardless of sequence are essential for thorough preparation of the airplane prior to the next flight phase. The order in which they are listed is the recommended completion sequence. To the extent practical, the sequence follows the established scan pattern.

All line items which are listed as challenge/response are identical to those in the appropriate checklist.

Certain line items do not have a response, and are not listed on the checklist, but will normally be accomplished during routine operation or by panel scan.

CHECKLISTS

Commands to execute a checklist are given by the Pilot Flying (PF) and executed by the Pilot Not Flying (PNF). In those instances of the First Officer being the PF, the Captain then becomes the PNF and performs those functions, however, the ultimate responsibility for the safe operation of the airplane always remains with the Captain. Preflight checklists operate as scan patterns and are accomplished by the "Do Verify" (accomplish then confirm accomplishment) method reading of the checklist by the First Officer. The remaining normal procedures "Pre-Takeoff" checklists are called for by the Captain and read by the First Officer using the "Do Verify" method. The "After Takeoff/Climb" checklist is a silent checklist and is accomplished by the PNF when commanded by the PF. Its completion will be reported to the PF. All other airborne checklists are accomplished by the "Do Verify" method with the following exceptions: Emergency and Abnormal checklists are accomplished by the "Challenge-Do-Verify" (direct, accomplish, then confirm accomplishment) method.

Those emergency situations requiring the PF to devote full attention to airplane control will require the PNF to actually determine the type of emergency and, after confirming with the PF, select the appropriate checklist. The PF will call out any required memory items and confirm the proper actions are taken. After completion of the memory items, the PNF will call out both challenge and reply, confirm with PF, and accomplish the remaining checklist items.

(Continued)

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FLIGHT CREW OPERATING MANUAL

CHECKLISTS (Continued)

Less urgent situations will be accomplished by the PNF after proper checklist selection is agreed upon by both pilots. The PNF will call out both challenge and reply, confirm with PF, then accomplish the remaining checklist items.

The checklist will be read out in a loud and clear voice. Responses should be equally loud and clear, normally answered as listed with the following exception: The terms SET or CHECKED used as a checklist response indicate equipment operation or settings which may vary according to prevailing conditions and/or equipment configuration. The term, AS REQUIRED, should not be used as a response. The verbal response to AS REQUIRED should be the actual switch or control position or actual indicator reading. For example: the response to IGNITION should be the actual ignition switch-selector position. The crewmember reading the checklist will re-read an item if no answer is obtained from the other crewmember. When practical, it is the readers responsibility to visually check that action taken agrees with the response. When a crewmember reading the checklist has ascertained that all items have been completed, he will announce that the appropriate checklist has been completed by stating, "____ checklist completed".

The various checklists are to be accomplished as follows:

"After Start" – When all engines have stabilized at idle and prior to brake release for taxi.

"Taxi" – When clear of the ramp and after flaps/slats have reached the takeoff position prior to reaching the runway.

"Before Takeoff" – Should be accomplished after final takeoff clearance has been received.

"After Takeoff/Climb" – Anytime after flap/slat retraction has been completed and climb power has been set.

"Descent/Approach" – After descent clearance has been received and when leaving cruise altitude for approach and landing. Items below the dotted line will be completed after passing transition altitude.

"Before Landing" – Following the command for landing flaps, the checklist will be read down to the item "Flaps/Slats". If the final flap selection for landing will be

Flaps 28°, the checklist will be completed after 28° of flaps have been called for, selected and checked.

Flaps 40°, the checklist will be completed after 40° of flaps have been called for, selected and checked.

"After Landing" – When the airplane has cleared the runway except when a taxi-back maneuver is required. In the latter case, the checklist should be delayed until completion of the 180° turn.

* Asterisk marked checklist items are through flight items.

(Continued)

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FLIGHT CREW OPERATING MANUAL

CHECKLISTS (Continued)

CREW COORDINATION

Crewmembers will normally adhere to their specific duties, as outlined herein. The greatest safety and proper crew coordination can only be achieved when each crewmember performs the duties and functions for which he is responsible.

When the First Officer is flying the airplane, the Captain will maintain his feet in a normal position on the rudder pedals and closely monitor all controls during the critical stages of takeoff/climb, approach and landing. The Captain will also perform those enroute procedural duties normally assigned to the First Officer. Any time the Captain desires to take over the controls he will call out, "My airplane", when he has the controls. The First Officer will then relinquish the controls and assume his normal duties.

The First Officer will repeat the Captain's commands to indicate understanding and compliance with the command.

After receipt and confirmation of any ATC clearance, the pilot flying will repeat aloud his understanding of the clearance to assure that the other crewmember is aware of the altitude and clearance limit to which the flight is cleared.

CREW SIGNALS

The cockpit/cabin chime signal is used for crew coordination through the following signals:

Two Chimes Interphone call originating from the cockpit or cabin.

Three Chimes Flight attendant report to cockpit.

A Series of Chimes
From Cockpit. An emergency exists in the cockpit.
The nearest flight attendant report
to cockpit immediately.

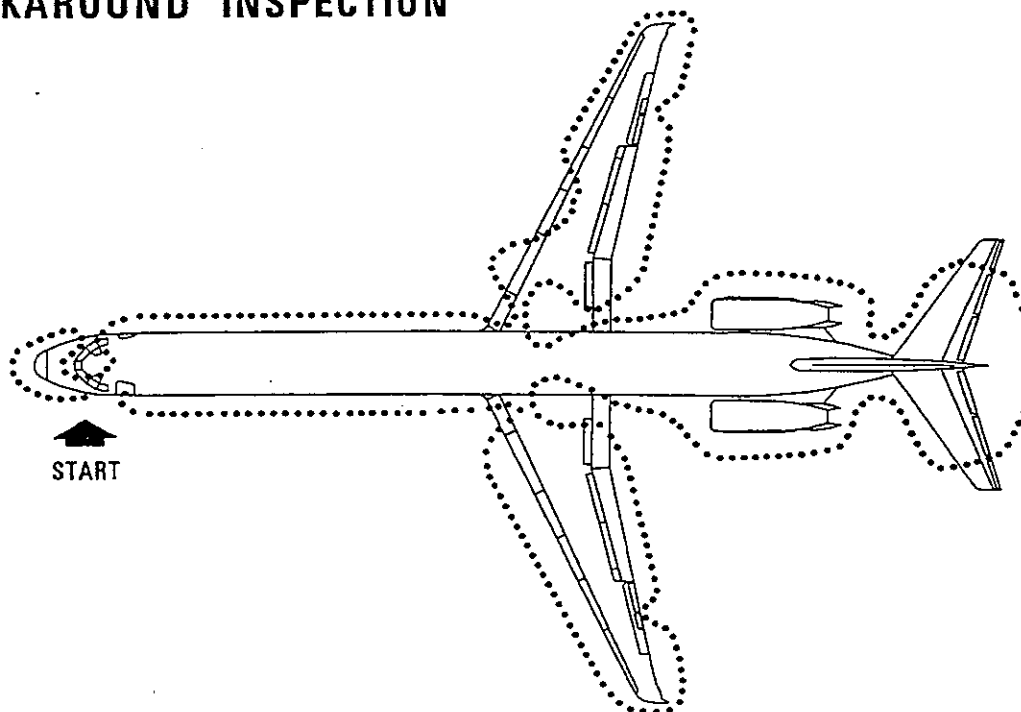
A Series of Chimes
From Cabin. An emergency exists in the cabin.
The flight attendant will transmit
when cockpit acknowledges.

When the seat belt sign is on and the cabin staff is still moving about the cabin, the cockpit will instruct the flight attendants, through the public address, to take the nearest seat when turbulence of moderate or greater intensity is anticipated.

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FLIGHT CREW OPERATING MANUAL

WALKAROUND INSPECTION



CAG(IGDS) CHANGE: New illustration.

RA1-525B

Start at left side strake, proceed in direction indicated and terminate at the forward entry door.

Left Side Strake	CONDITION GOOD
External Power Receptacle	CHECKED, WHEELWELL LIGHT SWITCH ON
Left Angle of Attack Vane	NO LEAK, CONDITION GOOD
Left, Right and Center Pitot Tubes	COVERS REMOVED, CONDITION AND ALIGNMENT GOOD
Windshield Wipers and Windshield	CONDITION GOOD
Rain Repellent Tubes	CONDITION GOOD
Radome	CONDITION GOOD, FASTENERS LOCKED
Nose Landing and Taxi Lights	SECURE, FILAMENT CONDITION GOOD

(Continued)

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FLIGHT CREW OPERATING MANUAL

WALKAROUND INSPECTION (Continued)

Nose Gear Tires CONDITION GOOD

Nose Gear Strut EXTENSION NORMAL, NO LEAKS

Steering Bypass Control and
Nose Gear Safety Pins AS REQUIRED

Hydraulic Leaks CHECKED

Forward Nose Gear Doors CLOSED, LATCHED

Nose Gear Fixed Doors and
Spray Deflectors SOLIDLY ATTACHED

Ground Shift Linkage CONNECTED AND SECURE

Electronic Compartment Access Door CLOSED AND LATCHED

Right Angle of Attack Vane NO LEAK, CONDITION GOOD

RAT Probe SECURE, CONDITION GOOD

Right Side Strake CONDITION GOOD

Oxygen Blowout Disc IN PLACE

Forward Service Door CLOSED

Forward Cargo Light and Door AS REQUIRED

Right Alternate Static Port CLEAR, CONDITION GOOD

Right Ground Floodlight CONDITION GOOD

Right Static Port Cluster CLEAR, CONDITION GOOD

Mid Cargo Light and Door AS REQUIRED

Right Wing Leading Edge Floodlight CONDITION GOOD

Right Brake Cooling Inlet CLEAR

Hydraulic or Fuel Leaks on Belly CHECKED

Gear Door Hydraulic Bypass STOWED

Vortilon CONDITION GOOD

(Continued)

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FLIGHT CREW OPERATING MANUAL

WALKAROUND INSPECTION (Continued)

Fuel Leakage Bottom of Wing	CHECKED
Wing Inboard Lower Surface	FREE OF FROST AND ICE
Slats	NOTE POSITION AND CONDITION GOOD
Defueling Valve Access Panel	CLOSED AND LATCHED
Refueling Panel	CLOSED AND LATCHED
Fuel Tank Vent.	CLEAR
Tip Ram Air Vent	CLEAR
Tip Lights	CHECKED, FAIRING INTACT
Landing Light.	CONDITION GOOD
Static Dischargers (7).	CONDITION GOOD
Upper Anti-Collision Light.	CONDITION GOOD
Emergency Exits	FLUSH
Horizontal Stabilizer Trim Motor Access	FAIRING DOWN, COVER LATCHED
Rudder Pitot Tube	CHECKED
Aileron and Tab	CONDITION GOOD
Spoiler Panels	DOWN, FAIRED
Flap Fairings	ATTACHMENT GOOD, NO LEAKS
Outer Gear Door.	SECURELY ATTACHED, CONDITION GOOD
Main Gear Tires	CONDITION GOOD
Hydraulic Shimmy Damper	LEVEL CHECKED, NO LEAKS, SECURELY ATTACHED
Strut	EXTENSION NORMAL, NO LEAKS
Spray Deflector	SECURELY ATTACHED, CONDITION GOOD

(Continued)

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FLIGHT CREW OPERATING MANUAL

WALKAROUND INSPECTION (Continued)

Gear Visual Indicator Stripes	CLEAN, CONDITION GOOD
Gear Safety Pin	AS REQUIRED
Spoiler Bypass Handle	SAFETIED ON
Right Wheelwell Door	CHECK POSITION AND CONDITION
Fuel Shroud Drain	CLEAR, NO DRIPS
Belly Anti-Collision Light	CONDITION GOOD
Emergency Light	CONDITION GOOD
Engine Nacelle Floodlight	CONDITION GOOD
Aft Cargo Light and Door	AS REQUIRED
Right Engine Inlet Cover	REMOVED
Bullet, PT ₂ Probe	CONDITION GOOD
Nacelle Fairing Doors	CHECKED, LATCHES FAIRED
Nacelle Inspection Doors	CLOSED, FASTENED
Nacelle Strake	CONDITION GOOD
Engine Pylon Ram Air Vent	CLEAR
APU Compartment Ventilation Exhaust	CLEAR
Tail Compartment Temperature Vent	CLEAR
Reverser Bypass Door	CLOSED, LATCHED
Right Aft Fuel Shroud Drain Mast	CLEAR, NO DRIPS
Tail Bumper and Strike Indicator	CHECKED, PARALLEL TO FUSELAGE
Leakage Check	NO DRIPS
Right Engine Exhaust Cover	REMOVED
Right Heat Exchanger Cooling Air Outlet	CLEAR

(Continued)

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FLIGHT CREW OPERATING MANUAL

WALKAROUND INSPECTION (Continued)

APU Exhaust and Shroud Cooling Outlet.	CLEAR
Elevator Augmentor Service Access Door	CLOSED, LATCHED
Tail Cone	CHECKED
Tail Compartment Access Door	CLOSED, LATCHED
Oil or Fuel Leakage Bottom of Tail	CHECKED
Tail Cone Static Dischargers (1).	CONDITION GOOD
Rudder and Tab	CONDITION GOOD
Horizontal Stabilizer	CONDITION GOOD, FAIRINGS IN PLACE
Elevator and Tabs	CONDITION GOOD
Elevator System Oil Leaks	CHECKED
Static Dischargers (7).	CONDITION GOOD
Tail Cone External Release.	STOWED
Left Heat Exchanger Cooling Air Outlet.	CLEAR
Left Engine Exhaust Cover	REMOVED
Left Aft Fuel Shroud Drain Mast.	CLEAR, NO DRIPS
Reverser Bypass Door	CLOSED, LATCHED
Tail Compartment Temperature Vent	CLEAR
Lavatory Service Door	CLOSED, NO LEAKS
Engine Pylon Ram Vent.	CLEAR
Nacelle Strake	CONDITION GOOD
Nacelle Fairing Doors	CHECKED, LATCHES FAIRED
Nacelle Inspection Doors	CLOSED, FASTENED
Leakage Check	NO DRIPS
Engine Inlet Cover.	REMOVED

(Continued)

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FLIGHT CREW OPERATING MANUAL

WALKAROUND INSPECTION (Continued)

Bullet, PT₂ Probe CONDITION GOOD

Cabin Pressure Outlet Assembly CLEAR, OPEN

Engine Nacelle Floodlight CONDITION GOOD

Aft Service Door CLOSED, CONDITION GOOD

Emergency Light CONDITION GOOD

Spoiler Bypass Handle SAFETIED ON

Left Wheelwell Door CHECK CONDITION

Gear Safety Pin AS REQUIRED

Gear Visual Indicator Stripes CLEAN, CONDITION GOOD

Shimmy Damper LEVEL CHECKED, NO LEAKS,
SECURELY ATTACHED

Strut EXTENSION NORMAL, NO LEAKS

Spray Deflector SECURELY ATTACHED, CONDITION GOOD

Main Gear Tires CONDITION GOOD

Outer Gear Door SECURELY ATTACHED, CONDITION GOOD

Spoiler Panels DOWN, FAIRED

Flap Fairings ATTACHMENT GOOD, NO LEAKS

Emergency Exits FLUSH

Aileron and Tabs CONDITION GOOD

Static Dischargers (7) CONDITION GOOD

Landing Light CONDITION GOOD

Tip Lights CHECKED, FAIRING INTACT

Tip Ram Air Vent CLEAR

Tank Fuel Vent CLEAR

(Continued)

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FLIGHT CREW OPERATING MANUAL

WALKAROUND INSPECTION (Continued)

Slats NOTE POSITION, CONDITION GOOD

Vortilon CONDITION GOOD

Wing Inboard Lower Surface FREE OF FROST AND ICE

Fuel Leakage, Bottom of Wing CHECKED

Left Brake Cooling Inlet CLEAR

Left Wing Leading Edge Floodlight CONDITION GOOD

Cabin Pressure Relief Valves (2) CLEAR, CONDITION GOOD

Cabin Pressure Relief Valve Static Ports (2) CLEAR

Static Port Cluster CLEAR, CONDITON GOOD

Water Service Panel CLOSED

Left Ground Floodlight CONDITION GOOD

Left Alternate Static Port CLEAR, CONDITION GOOD

Vertical Stabilizer Ram Air Inlet CLEAR

Radio Rack Venturi Outlet CLEAR

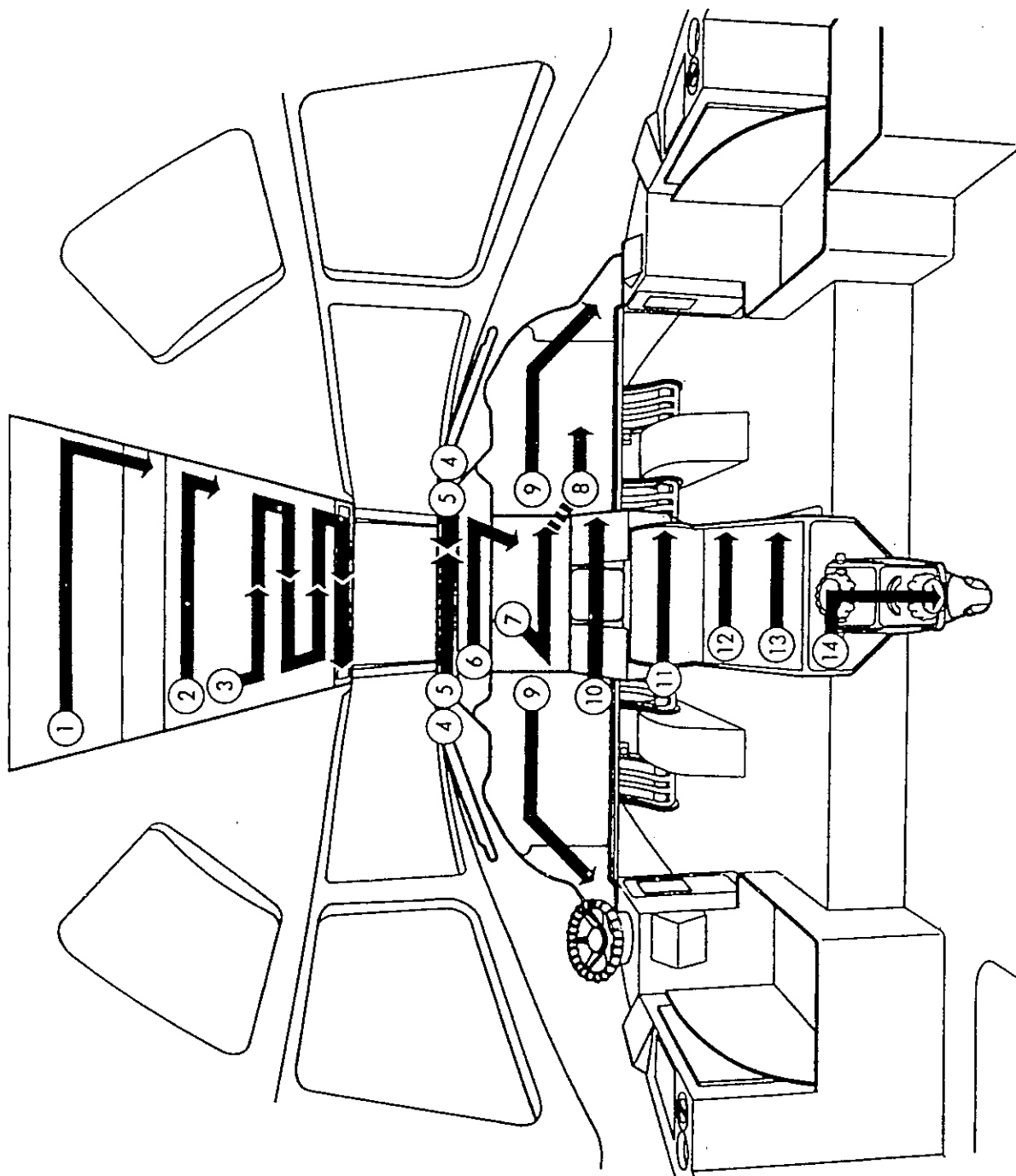
Forward Lavatory Drain COVER CLOSED, NO LEAKS

External Power Receptacle WHEELWELL LIGHT SWITCH OFF

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FLIGHT CREW OPERATING MANUAL

COCKPIT PRE-FLIGHT SCAN PATTERN



RA1-198A

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FLIGHT CREW OPERATING MANUAL

NORMAL PROCEDURES

BEFORE START EXPANDED PROCEDURES

Maintenance Log. CHECK/ON BOARD

Circuit Breakers CHECK

Verify circuit breakers on the overhead emergency panel, EPC, and Captain's/First Officer's consoles are set.

CAUTION

Indiscriminate pulling or resetting of circuit breakers for systems or components may cause unanticipated results because of systems relationships.

A tripped circuit breaker may be reset only once. If a circuit breaker trips after it has been reset, the cause should be determined and corrected before attempting a subsequent reset.

NOTE

When a circuit breaker trips, a 3-minute cooling period should be observed before reset.

BATT Switch ON/LOCK

Pull and move BATT switch to ON then rotate to horizontal. Rotate meter selector to BATT VOLT and check battery voltage is 25 volts or higher.

CAUTION

If battery voltage is less than 25 volts, move BATT switch to OFF. Battery must be replaced.

GROUND SERVICE ELEC PWR and MAINTENANCE INTERPHONE Switches OFF

If ground service electrical power is being used, check frequency and voltage. Move appropriate main bus power switches to ON and then move APU PWR or EXT PWR switch to OFF.

NOTES

If airplane is being serviced, MAINTENANCE INTERPHONE switch may be left in ON for maintenance communication.

(Continued)

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FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

NOTES (Continued)

If GROUND SERVICE ELEC PWR switches are not moved to OFF prior to engine start, control switching interaction in power system electronics may result in an AC crosstie lockout.

FLT RCDR Switch (Some Airplanes) NORM

Verify FLT RCDR switch is in NORM and guard is closed.

Observers OXYGEN REGULATOR -

Verify observers OXYGEN REGULATOR SUPPLY levers are in OFF and 100% OXYGEN.

ENG FIRE DETECT LOOPS Switches BOTH

Verify ENG LOOPS and APU LOOPS switches are in BOTH.

Electrical/Pneumatic/Air Conditioning SET

NOTES

Instrument panel flow indicator is a visual indication of air flow through instrument panel. Indicator position is significant only when on ground with normal electrical power applied and air conditioning off. Under above conditions, flow off indicates failure of instrument cooling fan.

When power is initially applied to airplane, DFGS performs a self-test of approximately 13 seconds duration. All DFGS displays go blank. At completion of test, all displays revert to previous or basic readouts.

Power Source



External

- Electrical - refer to Section 3, ELECTRICAL - Normal Operation
- Pneumatic and Air Conditioning

PNEU PRESS Gage NORMAL

Observe PNEU PRESS gage indicates in normal range.

CABIN ALT Control Lever AUTO/VALVE OPEN

Verify CABIN ALT control lever is in automatic (up) and indicator is at VALVE OPEN.

PNEU X-FEED VALVE Levers OPEN

Move PNEU X-FEED VALVE levers to OPEN.

(Continued)

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FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

Power Source (Continued)

AIR CONDITIONING SUPPLY Switches AUTO

Move AIR CONDITIONING SUPPLY switches to AUTO, one at a time, and observe associated PRESS gage indicates in normal range.

NOTE

Due to high electrical starting loads of heat exchanger cooling fans, they should be turned on one at a time.

CKPT/CABIN TEMP Selectors SET

Verify CKPT and CABIN TEMP selectors are set to AUTO.

[END]

APU

Start APU - refer to Section 3, APU - Normal Operation

- Electrical - refer to Section 3, ELECTRICAL - Normal Operation
- Pneumatic and Air Conditioning

CABIN ALT Control Lever AUTO/VALVE OPEN

Verify CABIN ALT control lever is in automatic (up) and indicator is at VALVE OPEN.

PNEU X-FEED VALVE Levers OPEN

Move PNEU X-FEED VALVE levers to OPEN.

APU AIR Switch SET

Set APU AIR switch as required, observe PNEU PRESS gage indicates in normal range.

(Continued)

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FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

NOTE

If cabin temperature is 75°F or higher, move APU AIR switch to AIR COND COLDER. If cabin temperature is below 75°F, move the APU AIR switch to ON.

AIR CONDITIONING SUPPLY Switches AUTO

If cabin temperature is 75°F or above, and APU is sole air source, move both AIR CONDITIONING SUPPLY switches to AUTO.

If cabin temperature is below 75°F, move right AIR CONDITIONING SUPPLY switch to AUTO and left AIR CONDITIONING SUPPLY switch to AUTO or OFF.

Observe associated PRESS gage indicates in the normal range.

NOTE

Due to high electrical starting loads of heat exchanger cooling fans, they should be turned on one at a time.

CKPT/CABIN TEMP Selectors SET

Verify CKPT and CABIN TEMP selectors are set to AUTO.

Instrument Selectors NORM

Verify CADC, FD CMD, and VERT GYRO selectors are in NORM.

NOTE

NORM position of VERT GYRO selector provides attitude outputs from vertical gyro 1 to Captain's systems and attitude outputs from vertical gyro 2 to First Officer's systems. Selection of L ON AUX substitutes auxiliary vertical gyro attitude outputs for vertical gyro 1 outputs and selecting R ON AUX substitutes auxiliary vertical gyro attitude outputs for vertical gyro 2. Do not select L ON AUX or R ON AUX if amber AUX GYRO INOP light is on.

COCKPIT VOICE RECORDER. CHECK

Momentarily push TEST button and observe test MONITOR meter needle deflects twice into white band and drops back again.

(Continued)

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FLIGHT CREW OPERATING MANUAL

TEMPORARY
REVISION

TEMPORARY REVISION 2-1605

FILING INSTRUCTIONS:

Insert this Temporary Revision in Volume II, Section 2, 1-30-0 BEFORE START EXPANDED PROCEDURES, COCKPIT EXPANDED PROCEDURES or SAFETY AND COCKPIT CHECK, as applicable and facing page as shown below

Retain this Temporary Revision until notified to remove it.

DESCRIPTION AND REASON:

This Temporary Revision replaces the existing CAUTION in the CIRCUIT BREAKERS line item with that shown below, and deletes the NOTE immediately following the CAUTION.

EFFECTIVITY:

AA, AM, AO, AR, AU, AY, AZ,
BW, CA, DAC, EF, FL, HA, IB,
IG, JD, JP, KE, LM, LO, LV,
ML, OHY, OS, OZ, RP, SI,
SK, SR, TW, US, WD, XA, XL,
XO, XR, XZ, YB, YI, YM, Z1,
Z3, Z4, Z5, Z6, Z9, ZC, ZD,
ZK, ZL, ZO, ZP, ZT, ZYU

Page 1

AS

Page 2

CAUTION

Do not reset any tripped fuel pump circuit breakers.

One reset of any other tripped circuit breaker may be attempted after a cooling period of approximately 2 minutes. If the circuit breaker trips again, do not attempt another reset.

Indiscriminate pulling or resetting of circuit breakers for systems or components may cause unanticipated results because of systems interrelationships.

Section 2
1-30-0

Apr 15/99

Temporary Revision 2-1605, Page 1 of 1

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FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

COMPASS/RADIO NAV Selectors NORM

Verify COMPASS and RADIO NAV selectors are in NORM.

NOTE

With either COMPASS or RADIO NAV selectors out of the NORM position, an amber COMP or NAV light will come on to indicate switching to the respective system has occurred.

ENG SYNC Selector OFF

Verify ENG SYNC selector is in OFF, and ENG SYNC ON light is off.

NOTE

ENG SYNC selector must be in OFF below 1500 feet AGL.

Ground Proximity Warning System CHECK/NORM

Move GND PROX WARN switch to TEST and observe GPWS, BELOW G/S and GPWS FAIL lights come on and aural warning sounds.

Flight Recorder (Some Airplanes) CHECK/SET/NORMAL

Move FLT RCDR switch to GND TEST, observe FLT RECORDER OFF is extinguished.

NOTE

FLT RCDR switch in GND TEST powers flight recorder.

Momentarily push TEST button and observe FDAU and DFDR fault lights and TEST light come on. Release TEST button and observe lights go off after a short delay.

NOTES

A fault light remaining on indicates a fault in associated unit. If TEST light remains on (except short delay) it indicates a fault in Flight Data Entry Panel.

If a fault exists, call maintenance.

Set TRIP, DAY, and LEG in readouts. After 10 seconds, push INSR button to insert data into the Digital Flight Data Recorder.

Return FLT RCDR switch to NORM and verify guard is closed. Observe FLT RECORDER OFF illuminates. Flight recorder system will begin operating when either fuel lever is on and parking brake is released.

(Continued)

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FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

Circuit Breaker and Standby Compass Lights -

Verify CKT BKR LT and STBY COMP LT switches are set to DIM or BRT as required.

Thunderstorm and Cockpit Flood Lights -

Verify THNDRSTRM LT switch is in OFF and CKPT FLOOD light switch is as required.

CSD Switches NORM

Verify both CSD switches are in NORM guarded position.

GEN Switches RESET & ON

Move both GEN switches to RESET then to ON. (GEN switches need not be reset after first flight of day.)

AC/DC BUS X TIE Switches AUTO/OPEN

Verify AC BUS X TIE switch is in AUTO and DC BUS X TIE switch is in OPEN.

Emergency Electrical Power CHECK/OFF

NOTE

During power check, VOR CRS select readout may be erratic. This is a normal condition resulting from an electrical phase difference when normal AC buses and emergency power are energized simultaneously.

Verify meter selector is in BATT VOLT and rotate EMER PWR switch to ON. Observe EMER PWR IN USE light comes on and AC EMER BUS OFF and DC EMER BUS OFF lights remain off.

NOTE

If EMER PWR IN USE light does not come on or AC EMER BUS OFF and DC EMER BUS OFF lights are not off, call maintenance.

Check appropriate flight instruments and observe no warning flags in view. Check battery voltage is 25 volts or higher. Rotate meter selector to BATT AMP and observe 10 to 50 amps to right.

(Continued)

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FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

Rotate EMER PWR switch to OFF, and observe EMER PWR IN USE light is off. Check battery amperage is charging in a pulsing mode to the left.

NOTES

If battery amperage indicates in a steady mode to the left, it may be the battery has not had sufficient time to charge. The crew may continue with the checklist through engine start and taxi. However, all requirements of the emergency electrical power check must be met before completing Before Takeoff Checklist.

The emergency electrical power check may be accomplished any time BATT switch is in ON and right AC bus or ground service bus is energized.

The battery switch must be on to enable battery charger to operate.

The electrical power indicator selector switch should be in BATT AMP except when checking other selected sources. The BATT AMP position allows continuous monitor of battery and battery charger condition. An indication of continuous charging must be corrected prior to flight.

Anti-Skid CHECK/ARM

Move ANTI-SKID switch to ARM, check ANTI-SKID lights are off. Hold TEST CKT switch to TEST and observe all ANTI-SKID lights come on. Release TEST CKT switch and observe all lights go off.

NOTE

If ANTI-SKID light(s) do not come on or fail to go off after test, release TEST CKT switch and move ANTI-SKID switch to OFF. Pull and reset ANTI-SKID TEST circuit breakers (AC & DC) and return ANTI-SKID switch to ARM. Re-test the system.

STALL TEST CHECK

Move STALL TEST switch to SYS 1 and observe stick shakers on both control columns operate, both intermittent STALL warning lights and both stick pusher PUSH TO INHIBIT lights on glareshield come on and stall warning horn sounds for one second followed by the word, "Stall".

Move STALL TEST switch to SYS 2 and observe same indications. Move STALL TEST switch to OFF.

(Continued)

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FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

Cabin Pressurization. SET

Verify system selector switch is in PRIMARY and STDBY ON and TRANSFR LOCKOUT lights are off.

NOTES

If STDBY ON and TRANSFR LOCKOUT lights are on, move system selector switch to STDBY then back to PRIMARY and push to reset TRANSFR LOCKOUT switch-light. If TRANSFR LOCKOUT light comes back on, or remains on, only single system automatic operation is available for dispatch.

Primary and standby systems are powered by separate electrical buses. Due to electrical transients during engine start, and when performing electrical system check, STDBY ON and TRANSFR LOCKOUT lights may come on. Move system selector switch to STDBY then back to PRIMARY and push to reset TRANSFR LOCKOUT switch-light.

(Continued)

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FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

Rotate LDG ALT knob to set destination field altitude. Rotate LDG BARO selector knob to set destination barometric pressure. Set RATE LIMIT control knob to index mark for normal operation. Push to test FLOW light.

NOTE

If destination barometric setting is not known, it can be set later prior to landing.

Fuel Tank/Aux Trans Pumps. CHECK/SET

NOTE

Verify ENG FIRE handles are in forward position and FUEL X FEED lever in OFF.

Check pumps one at a time, noting applicable L or R INLET FUEL PRESS LOW light goes off when each pump is operated and light in other system remains on. While checking one of the main tank boost pumps, move FUEL X FEED lever to ON and note INLET FUEL PRESS LOW light in opposite system goes off. Move FUEL X FEED lever to OFF and note light in opposite system comes back on. When checking center tank boost pump, observe L and R INLET FUEL PRESS LOW lights go off.

For airplanes with CENTER FUEL PRESS LO light (S/B 28-53 or production equivalent) and Center Fuel Pressure Low Indication Inhibit (S/B 28-63 or production equivalent), perform the following prior to the first flight of the day:

Verify both CTR fuel boost pump switches are in OFF, then move the CTR FWD fuel boost pump switch to ON. Observe the CENTER FUEL PRESS LO annunciation and MASTER CAUTION lights illuminate after approximately 22 seconds. Move the CTR FWD fuel boost pump switch to OFF and observe CENTER FUEL PRESS LO annunciation and MASTER CAUTION lights extinguish. Repeat the procedure for the CTR AFT fuel boost pump. This check may be performed in conjunction with the center tank fuel boost pump checks described above. Airplanes with the center fuel pressure low indication inhibit installed are identified with a decal on the fuel boost pump switch panel.

For airplanes with CENTER FUEL PRESS LO light (S/B 28-53 or production equivalent) only, no preflight check of the CENTER FUEL PRESS LO annunciation can be performed.

Move all fuel pump switches to ON and verify START PUMP switch is in OFF.

(Continued)

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FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

NOTES

L/R INLET FUEL PRESS LOW lights may take approximately 2 minutes to come on when engines are not running.

If center tank is empty, leave CTR tank pump switches in OFF.

When center tank contains fuel designated as ballast, a placard must be installed adjacent to CTR tank pump switches which states, "This tank contains ballast fuel and the quantity of fuel declared as ballast may not be used during flight."

For airplanes with usable fuel in auxiliary tanks, check the fuel transfer pumps by moving (one at a time) the FWD and AFT AUX TRANS switches to TEST. Note applicable AUX FUEL PUMP PRESS LOW light comes on momentarily then goes off. Failure of light to go off indicates a faulty pump. During the time switch is held in TEST, fuel is being transferred into center tank. Therefore, switches should not be held in TEST for extended periods of time. Switches should remain in OFF after check is completed.

Start Switches -

Verify ENG START switches are in OFF and guard is closed.

ENG IGN Selector OFF

Verify ENG IGN selector is in OFF.

FUEL HEAT Switches OFF

Verify FUEL HEAT switches are in OFF.

Emergency Lights CHECK/ARM

Move EMER LTS switch to ON, and observe EMER LIGHT NOT ARMED light is on.

NOTE

Operation of EMER LTS switch in ON should be limited to a maximum of one minute to preserve batteries and extend bulb life.

(Continued)

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FLIGHT CREW OPERATING MANUAL

BEFORE-START-EXPANDED PROCEDURES (Continued)

Move EMER LTS switch to ARM, observe EMER LIGHT NOT ARMED light is off.

NOTE

In ARM, a failure of DC emergency bus will automatically turn the emergency lights on, furnishing illumination of cockpit, cabin and exits.

NO SMOK/SEAT BELTS Switches AUTO/ON

Move NO SMOK switch to AUTO and SEAT BELTS switch to ON.

Pitot Heat CHECK/CAPT

Rotate METER SEL & HEAT selector to each position and observe HEATER CUR gage indication.

NOTE

RAT PROBE position will not indicate a current flow when airplane is on the ground.

Rotate the METER SEL & HEAT selector to CAPT.

NOTE

When in emergency power and battery is the only source of power, CAPT pitot will be the only position operable and meter will indicate current flow.

Observe PITOT/STALL HEATER OFF light is off.

AIR FOIL/ENG Anti-ice Switches OFF

Verify AIR FOIL anti-ice switch is in OFF and associated lights are off.

Verify ENG anti-ice switches are in OFF and associated lights are off.

NOTE

Both ENG anti-ice switches should be in OFF to prevent unnecessary engine bleed air extraction during engine starting.

WINDSHIELD ANTI-ICE/ANTI-FOG Switches ON/SET

Move WINDSHIELD ANTI-ICE switch to ON.

NOTE

When windshields have been cold soaked, they may require up to 30 minutes to warm up thoroughly.

(Continued)

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FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

If a "hand-feel" check of the three windshields is desired to verify operation of the anti-ice system, do not move ANTI-FOG switch to ON until check is complete.

Windshield Wipers PARK

NOTE

Do not operate wipers on dry glass. Do not operate wipers if repellent is inadvertently applied to a dry glass. Do not use rain repellent unless wipers are operating and there is moderate to heavy rain.

Verify windshield WIPER selector is in OFF and wipers are parked.

NOTES

If wipers are not parked, move windshield WIPER selector to PARK (momentary). Observe wipers move to park position. Release the selector.

Holding selector in PARK too long may cause motor to recycle or overheat.

Annunciator/Digital Lights CHECK

Push and hold ANNUN/DIGITAL LTS TEST switch and observe all annunciator panel lights (including blank positions), MASTER WARNING and MASTER CAUTION, all annunciators and segmented filament readouts on glareshield, Captain's, First Officer's, center, upper and overhead instrument panels, and pedestal come on.

Exterior Lights SET

Captain verify WING LDG LTS switches are in RET and NOSE LTS switch is OFF. First Officer verify POS/STROBE and ANTI COLLISION light switches are OFF, FLOOD LTS and WING/NACL light switches are set as required.

NOTE

BOTH position will activate only the position lights while airplane is on the ground. Strobe lights should not be on during ground operation.

(Continued)

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FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

Flight Guidance CHECK

FD Switches

Move FD switches to FD; observe FMA's display HDG HLD and ALT HLD and flight director command bars come into view and are centered.

NOTE

If FMA's remain blank, verify INSTR PANEL LTS DIGITAL switches are on. If FMA's are still blank, momentarily push AUTOPILOT REL button and wait approximately 10 seconds for flight guidance computer to reset. After 10 seconds, if FMA's are still blank, call maintenance.

SPD/MACH Readout

Push SPD/MACH select knob to first detent and set 250 knots.

Push SPD/MACH select knob full in and set desired climb mach. Push SPD/MACH knob full in again and release so speed readout will be primary in readout.

AUTO THROT Switch

Verify AUTO THROT switch is in OFF.

AUTO LAND Button

If use of autoland is anticipated, an autoland availability test should be completed. Refer to Section 3, AUTOMATIC FLIGHT - Normal Operations.

HDG Readout/Bank Angle

Rotate HDG control knob until runway magnetic heading or first turn after takeoff is set in readout.

Set bank limit selector to 15 degrees.

AP Switch

Verify autopilot switch is off (down).

Altitude Readout

Rotate altitude pre-select knob until readout displays first level-off altitude.

(Continued)

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FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

VHF NAV Radios SET

Captain and First Officer set desired VHF NAV frequency and course.

Brake Pressure. CHECK

Observe BRAKE PRESS gage indications are normal.

Fire Warning System (If Not Tested Previously). CHECK

Refer to Section 3, FIRE WARNING AND PROTECTION – Normal Operation.

ART Switch. AUTO

Verify ART switch is in AUTO. Observe READY, ART and ART INOP lights are off.

Gear Lights/Aural Warning CHECK

Observe gear green lights are on and GEAR DOOR OPEN light is off. Pull out on landing gear handle (while in DOWN position). Observe green lights go off, red lights come on and steady horn sounds for one second followed by words "Landing Gear". Release gear handle into DOWN detent and observe horn stops, red lights go off, and green lights come on.

NOTE

If aural warning does not sound during test, continue holding out and down on landing gear handle while advancing throttles to takeoff position and returning them to idle stop. The aural warning should sound when throttles are returned to idle stop.

TRI/RAT/SAT. CHECK

Push TEST button and observe 12 PLUS is displayed in RAT readout and 2.08 is displayed in EPR LIM readout. All lights, including NO MODE light, should be off. Release TEST button; thrust rating indicator will display ambient temperature; EPR readout will display fail flag and 2.00 EPR. The mode selector lights will be off and NO MODE light will be on.

Observe RAT and SAT temperature gages are approximately equal.

Fuel Quantity CHECK

Determine weight of fuel loaded and add this amount to value recorded prior to fueling. Compare this value against indicated instrument quantity. If difference between compared values is 1500 pounds or greater, magnetic stick readings should be considered as actual fuel on board.

(Continued)

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FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

Push TEST button and observe L MAIN, R MAIN, and CTR tank readouts change to 3000 LBS, TOTAL FUEL QTY readout indicates 15000 LBS, and GROSS WT readout displays whatever the zero fuel weight is plus 15000 LBS. Release button and observe readouts return to pre-test values.

If a blank appears in any tank readout, rotate the TEST button to opposite channel (A or B) and retest the system.

NOTE

The fuel quantity system can be operated on either channel.

If all 9's appear in any tank readout, call maintenance.

NOTE

All 9's indicate a tank indicator malfunction.

FUEL USED Counters RESET

Momentarily move FUEL USED RESET switch to RESET (up), observe FUEL USED counters go to zero.

ENG REVERSE THRUST Lights -

Check all ENG REVERSE THRUST lights are off.

NOTE

All ENG REVERSE THRUST lights should be off. Reverser levers must be fully down. However, if the systems have been depressurized by the maintenance crew, REVERSER ACCUMULATOR LOW lights may be on and hydraulic pressure must be provided to recharge accumulators.

CAUTION

If ENG REVERSE THRUST lights are on, reversers could be extended. Therefore, it is necessary to obtain ground clearance before pressurizing hydraulic system.

(Continued)

MD-80

FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

Engine Instruments. CHECK

Check EPR, N₁, EGT, N₂, OIL PRESS, and OIL TEMP gages for normal static indications.

Check OIL QUANTITY gage indication is normal.

NOTE

Between 12 and 16 quarts is normal indication for a full tank.

Hydraulic System CHECK/HI

NOTE

If engine hydraulic pumps are operating, they must be turned off during the following hydraulic system check.

Move AUX pump switch to OVRD and observe right HYD PRESS gage indicates a pressure increase. Move AUX pump switch to ON and observe right HYD PRESS gage indicates between 2800 and 3200 psi and R HYD PRESS LOW light is off.

Move TRANS pump switch to ON, observe left HYD PRESS gage indicates above 2000 psi and L HYD PRESS LOW light is off.

NOTES

Hydraulic pressure may fluctuate when operating transfer pump.

If either HYD PRESS LOW light is on and system pressure is normal, request ground crew to check the respective spoiler ground depressurization valve is in SPOILER ON.

If either HYD TEMP HI light is on, call maintenance.

Check HYD FLUID QUANTITY gages indicate an adequate supply of fluid.

NOTE

When hydraulic systems are pressurized, FLUID QUANTITY indication will decrease, but should remain above refill red arc.

Verify ENG HYD PUMPS switches are in HI.

(Continued)

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FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

GEAR DOOR OPEN Light. OFF

Verify GEAR DOOR OPEN light is off.

Brake Temperature CHECK/ALL

Observe OVHT light is off. Verify brake temperature selector is in ALL. Push brake temperature TEST button and observe BRAKE TEMP gage indicates between 425 and 475 degrees C and OVHT light comes on. Release brake temperature TEST button and observe BRAKE TEMP gage indication returns to pre-test value and OVHT light goes off.

Flight Instruments CHECK/SET

Standby Horizon Indicator

Observe flag is out of view. Pull knob to cage indicator, then release.

NOTE

If a 3 degree or more error in pitch or roll is apparent, call maintenance.

Altimeters

Rotate BARO set knob until desired setting is in MB/IN HG readouts. Check indicated altitude is approximately correct.

Radio Altimeters

Observe DH lights are off.

Push and hold SET TEST knob. Observe height scale indicates 40 feet, warning flag drops into view and both DH lights come on. Release SET TEST knob, observe pretest indications.

NOTES

DH lights are inhibited below 10 feet radio altitude.

If LOC TRK or G/S TRK is annunciated in the FMA, associated radio altimeter test is inhibited. Moving the FD switch to OFF and back to FD, if applicable, will enable the test.

ADI's

Push ADI TEST button. Observe ADI indicates climbing right turn, approximately 10 degrees pitch, 20 degrees bank, ATT flag in view. Release TEST button and observe ADI returns to pre-test position. Crosscheck inclinometers for agreement and normal indications.

(Continued)

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FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

MACH/AS Indicators

Observe MACH/AS indicator for normal indications.

NOTE

Normal static indications at sea level – airspeed pointer approximately 0, V_{MO} pointer approximately 340 knots, MACH readout 0.150, and no flags.

Clocks

Check and set clocks.

Standby Compass

Check standby compass indication to be within 10° of other compasses.

TAS/SAT Indicator (if installed)

Observe OFF flags are not in view.

Standby Altimeter/Airspeed Indicator

Rotate BARO set knob until desired settings are in MB/IN HG readouts, observe indications are normal. Observe airspeed indicator for normal indication.

Vertical Speed Indicators

Observe OFF flag is not in view and pointer is indicating approximately zero.

Compass Systems

Observe warning flags are out of view. If SYNC annunciator is not centered, rotate synchronization knob in appropriate direction to center SYNC annunciator.

Compare compass indicator and HSI headings with standby magnetic compass and make allowance for correction card.

NOTES

Proximity of trucks, metal buildings or electrical equipment to flux valve can cause out of tolerance compass errors. If suspected, check systems carefully during taxi.

During taxiing, turning, and rough air, it is normal for deviations of short term duration to exist.

(Continued)

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FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

STATIC AIR Selectors NORM

Verify STATIC AIR selectors are in NORM.

HSI Mode Selector Switch-Light (If Installed) RADIO

Verify HSI mode selector RADIO light is on.

ONS (If Installed) CHECK/SET

For Omega operation and test procedures, refer to Section 3, INSTRUMENTATION AND NAVIGATION – Normal Operation.

ADF(S) SET

Radar TEST

For radar operation and test procedures, refer to Section 3, INSTRUMENTS AND NAVIGATION, Normal Operation.

ATC TRANS ON/SET

Stabilizer CHECK

Verify STABILIZER TRIM (cut-off) switch is in NORM and guard is down.

NOTE

STABILIZER TRIM (cut-off) switch does not affect operation of alternate stabilizer trim system.

While observing stabilizer indicator, hold Captain's control wheel left trim switch to NOSE UP and then to NOSE DN momentarily.

CAUTION

Do not hold single switch position longer than 3 seconds.

NOTE

Stabilizer should not move and aural warning should not sound.

Repeat this check using Captain's control wheel right trim switch. Observe stabilizer does not move and aural warning does not sound.

Operate both Captain's control wheel trim switches in NOSE UP and then NOSE DN directions and note corresponding direction of stabilizer indicator and aural warning.

(Continued)

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FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

Operate both First Officer's control wheel trim switches and check stabilizer indicator and aural warning.

NOTE

Moving Captain's and First Officer's control wheel trim switches in opposite directions will stop the stabilizer movement. This is not a required test. If test is used, do not exceed 3-second limit.

Operate both LONG TRIM handles in the same direction and check for corresponding indicator movement and aural warning release handles to neutral.

Operate both ALT LONG TRIM switches and check for direction of travel at slower rate and for aural warning.

While observing horizontal trim indicator, momentarily operate each ALT LONG TRIM switch individually to NOSE UP and NOSE DN. Observe the stabilizer does not move and aural warning does not sound.

NOTES

To obtain maximum service life, do not maintain switch positions longer than necessary to check response. If there is no response, release switches and determine cause. Should any switch or control stick or hesitate in returning to neutral, it should be corrected before flight.

Any time LONG TRIM handles, control wheel trim switches, or ALT LONG TRIM (secondary) controls are used, they should be operated to their fully deflected position to assure both motor and brake circuits are actuated.

SPOILER Lever. DISARMED

Verify SPOILER lever is in forward RET (disarmed) position.

NOTE

Normally, 1/2 of red arming band will be visible with SPOILER lever in disarmed position.

RUD HYD CONT Lever. PWR

Move RUD HYD CONT lever to PWR and observe RUDDER CONTROL MANUAL light goes off.

(Continued)

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FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

Takeoff Warning/Throttles. CHECK/IDLE

NOTE

To test flap and slat function of the takeoff warning system, FLAP/SLAT handle should be in UP/RET, stabilizer in green band, spoilers retracted and parking brakes released.

Move both throttles towards full forward position and observe takeoff warning sounds. Move throttles to idle and observe warning is silenced.

NOTE

If takeoff warning does not sound, maintenance action is required prior to takeoff. Confirmation of takeoff warning system operation does not ensure that correct takeoff values for stabilizer trim, center of gravity or flap/slat position have been set.

FUEL Levers OFF

Verify FUEL levers are in OFF.

NOTE

FUEL levers must be in OFF before starting engines to prevent premature fuel flow and ignition.

FUEL X FEED Lever. OFF

Verify FUEL X FEED lever is in OFF.

NOTE

FUEL X FEED lever should be in OFF for all normal operations.

CABIN ALT Control Lever AUTO/VALVE OPEN

Verify CABIN ALT control lever is in automatic (up) position and indicator is at full alt VALVE OPEN.

FLAP/SLAT Handle UP/RET, LTS OFF

Observe FLAP/SLAT handle is in UP/RET detent, both flap position pointers are UP, and SLAT TAKEOFF, SLAT DISAGREE, AUTO SLAT and SLAT LAND lights are off.

(Continued)

MD-80 FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

WARNING

If handle is in any other position than UP/RET, contact ground crew for clearance before moving handle.

Communications CHECK/SET
ATC Transponder ON
Rudder/Aileron Trim SET

Check rudder and aileron trim for freedom of movement then verify RUDDER TRIM and AILERON TRIM control knobs are at zero trim position.

Gear Pins 3 ON BOARD
Emergency Equipment CHECK

Verify fire axe, fire extinguisher bottle, and smoke goggles are stowed.

Oxygen Cylinders CHECK/OPEN

Check crew oxygen cylinder supply valve is open. Rotate knob 1/2 turn toward CLOSE and return to full OPEN to verify valves are not jammed in closed position.

NOTE

Pressure gage on supply cylinder indicates cylinder pressure with supply valve open or closed.

Check cylinder pressure is adequate for scheduled flight.

NOTES

Pressure of 1800 psi is considered full.

If a cylinder pressure is less than 1800 psi, review oxygen required versus the time chart.

(Continued)

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FLIGHT CREW OPERATING MANUAL

BEFORE START EXPANDED PROCEDURES (Continued)

Check portable oxygen cylinder pressure is adequate.

NOTE

Should indicate at least 1620 psi to ensure 15 minutes of demand usage.

Oxygen Masks/Interphone CHECK

Verify supply toggle is lockwired ON. Verify diluter control is in 100 percent oxygen. Fit mask to face and inhale several times and observe oxygen flow blinker is operating. Move test/normal/emergency control to TEST MASK. While holding a back pressure on mask by forcibly exhaling, check for mask leakage.

Verify BOOM/MASK switch on jack panel is in MASK. Either select interphone button on audio panel and use control wheel mike switch, or move radio/interphone switch on audio panel to INT. Make test call and monitor.

Remove and stow mask. Return BOOM/MASK switch to BOOM.

Ships Papers ON BOARD/CHECK

Flight Data Entry Panel (Some Airplanes) CHECK/SET

Move FLT RCDR switch to GND TEST, observe FLT RECORDER OFF light is off.

NOTE

FLT RCDR switch in GND TEST powers flight recorder.

Momentarily push TEST button and observe FDAU and DFDR fault lights and TEST light come on. Release TEST button and observe lights go off after a short delay.

NOTES

A fault light remaining on indicates a fault in associated unit.
If TEST light remains on (except short delay) it indicates a fault in Flight Data Entry Panel.

If a fault exists, call maintenance.

Set TRIP, DAY, and LEG in readouts. After 10 seconds, push INSR button to insert data into the Digital Flight Data Recorder.

Return FLT RCDR switch to NORM and verify guard is closed. Observe FLT RECORDER OFF light comes on. Flight recorder system will begin operating when either fuel lever is on and parking brake is released.

(Continued)

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FLIGHT CREW OPERATING MANUAL

STABILIZER. SET ____°

Set LONG TRIM indicator to reading that appears in TAKE OFF CONDTN LONG TRIM readout.

NOTE

When set, LONG TRIM indicator should be directly opposite Long Trim Takeoff Position indicator. If indicators are not within a specified tolerance of each other or if FLAP/SLAT handle position (after takeoff flaps have been set) and FLAP readout are not within a specified tolerance of each other, aural warning will be activated when throttles are advanced for takeoff.

BEFORE START CHECKLIST. COMPLETE

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FLIGHT CREW OPERATING MANUAL

START EXPANDED PROCEDURES

Doors/Windows/Pilot Seats/Slides CLOSED/CHECKED/ARMED

Check door annunciator lights are off, and cockpit door and windows are closed.

Verify pilot seats are securely locked in their fore/aft position prior to airplane being moved.

NOTE

A marginally locked seat can be detected by simply shifting pilot's body weight back and forth in seat after it has been positioned. If seat remains firmly locked in place, locking integrity is considered acceptable for continued operation.

Verify galley door and passenger entrance door slides are armed.

Parking Brake AS REQUIRED

To set brakes, push and hold brake pedals. Pull on BRAKE LOCK knob and release brake pedals. Observe BRAKE PRESS continues to indicate in normal range. Observe PARKING BRAKE ON light comes on.

PNEU X-FEED VALVE Levers OPEN

HYD PUMPS HI/OFF

Verify ENG HYD PUMPS switches are in HI and HYD FLUID QUANTITY gages indicate approximately the same as during hydraulic system test.

Move AUX and TRANS pump switches to OFF.

NOTE

Auxiliary and transfer hydraulic pumps are turned off to allow hydraulic pressures to decay in preparation for monitoring of engine hydraulic pump pressures during engine start.

ANTI COLLISION LT Switch ON

NOTE

This will be an indication to ground crews in close proximity that engines are about to be started or are operating.

AIR CONDITIONING SUPPLY Switches OFF

(Continued)

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FLIGHT CREW OPERATING MANUAL

START EXPANDED PROCEDURES (Continued)

NOTE

AIR CONDITIONING SUPPLY switches are placed in OFF to provide maximum pneumatic supply capabilities for engine starting.

GALLEY Power Switch OFF
ENG IGN Selector SYS A OR SYS B
OR BOTH

NOTE

Use of BOTH position will mask the failure of one of the ignition systems.

PNEU PRESS Gage CHECK

Verify PNEU PRESS gage indicates a minimum of 36 psi at sea level.

NOTE

For each 1000 feet increase in pressure altitude, subtract 1 psi from recommended minimum.

START CHECKLIST COMPLETE

Start Engines.

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FLIGHT CREW OPERATING MANUAL

AFTER START EXPANDED PROCEDURES

AIR CONDITIONING SUPPLY Switches AUTO

Move AIR CONDITIONING SUPPLY switches to AUTO.

Ground Equipment. REMOVE

Verify engine generators are supplying the buses.

NOTE

If one or both generator(s) is not on, move GEN switch to RESET then ON.

If external pneumatic and/or electrical power was in use,

Move EXT PWR (L&R) BUS switches to OFF. Give ground crew clearance to remove carts.

Electrical System. CHECK/SET

If AC CROSSTIE LOCKOUT light is on after engine start,

Verify no other electrical system annunciator lights are on.

Verify APU PWR and EXT PWR switches on GROUND SERVICE ELEC PWR panel are in OFF.

AC CROSSTIE LOCKOUT RESET Switch. RESET

If AC CROSSTIE LOCKOUT light remains on or comes back on after reset, attempt another reset.

If AC CROSSTIE LOCKOUT light remains on or if any other electrical annunciator light(s) come on after second reset attempt, maintenance will be required prior to dispatch.

Perform electrical system crosstie check. Refer to Section 3, ELECTRICAL – Normal Operation.

GALLEY Power Switch ON

Move GALLEY power switch to ON.

(Continued)

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FLIGHT CREW OPERATING MANUAL

AFTER START EXPANDED PROCEDURES (Continued)

ENG IGN Selector OFF

Airfoil/Engine Anti-ice SET

Refer to Section 3, ICE & RAIN PROTECTION - Normal Operation.

Hydraulic System CHECK/HI/ON

Verify hydraulic pressures are between 2800 and 3200 psi and quantities are above red arc.

Move AUX and TRANS pump switches to ON.

NOTE

With AUX and TRANS pump switches on, an additional source of hydraulic pressure is provided in the event of engine failure during takeoff.

Check HYD PRESS LOW and HYD TEMP HI annunciator lights are off.

Annunciator Panel CHECK

Check annunciator panel lights are normal for conditions and all door lights are off.

JT8D-217C and -219 engines -

During sustained single engine operation with the engine generator carrying the total electrical load, monitor N₂ RPM as well as AC LOAD meter. If N₂ RPM drops below 46%, momentarily increase N₂ RPM to 65% in order to close start bleed valve. Once the start bleed valve is closed, it will remain closed until engine shutdown.

NOTE

For airplanes with -217C/-219 engines: If the engines have been shut down for more than 2 hours, it is recommended that the engines be warmed up for 5 minutes at low power settings (taxi thrust). However, it is not necessary to delay the takeoff to warm up the engines.

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FLIGHT CREW OPERATING MANUAL

TAXI EXPANDED PROCEDURES

NOTE

To preclude engine FOD, the recommended maximum taxi speed is 20 knots.

Clearance To Taxi -

Obtain clearance to taxi.

Lights -

Set lights as required.

Directional Control/Brakes -

Release parking brakes, start taxi, check brake operation and that BRAKE PRESS gage indication remains in normal range.

NOTE

At start of taxi, allow airplane to move forward prior to initiating any maximum nosewheel turning angle. Under conditions of uneven ramp surface, positioning of nosewheels to maximum turning angle prior to forward motion can result in nosewheels being forced beyond 82 degree steering range causing a mechanical overcenter steering lock condition; maintenance action is then required to reposition nosewheels within normal steering envelope. This condition can also occur if nosewheels are left at maximum towing angle when terminating a towing action.

Flaps/Slats ° T.O.

Move FLAP/SLAT handle to pre-selected takeoff flap detent. Observe SLAT TAKEOFF light is on, SLAT DISAGREE, AUTO SLAT and SLAT LAND lights are off and flap position pointers agree with pre-selected flap setting.

On ground, it is normal for AUTO SLAT light to come on momentarily when Flap/Slat handle is moved from UP/RET to any setting commanding a mid-slat position. AUTO SLAT light comes on to indicate slats have momentarily moved to fully extended position during a self test of system. AUTO SLAT FAIL light will come on to indicate system failure.

Flight Controls CHECK

Operate control wheel, column, and rudder pedals throughout full range of travel. Determine if controls are free and normal. Observe SPOILER DEPLOYED light is on as control wheel is rotated. When control column is full forward, observe ELEVATOR PWR ON light is on.

(Continued)

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FLIGHT CREW OPERATING MANUAL

TAXI EXPANDED PROCEDURES (Continued)

NOTES

Flight spoiler surfaces start to extend only after approximately 5 degrees control wheel throw.

During ground operation, when any spoiler panel is extended 10 degrees or more, spoiler deployed annunciator light will come on.

Occasionally, in gusty, quartering or tail winds, elevators and their control tabs may assume an asymmetric position fully against their mechanical stops. If this occurs, control columns will feel blocked and an elevator rollout cannot be performed. This condition is not abnormal, but will require that rollout be delayed until direction or velocity of airplane with respect to wind is changed. After heading airplane into wind (or taxiing fast enough to cancel any tail wind component), apply pull force to control column until it moves to full aft position. Forces required may be as high as 85 lbs. Determine ELEVATOR PWR ON light is off. Then apply full nose down push force to activate elevator augmentation system. ELEVATOR PWR ON light should come on during this part of check.

Takeoff Data/TRI/Airspeed Bugs SET/CROSS-CHECK

Determine engine power/thrust computer mode to be used.



Derated thrust

ART Switch OFF

Observe READY and ART lights are off and ART INOP light is on.

ASSUMED TEMP Selector SET

T.O. FLX Mode Button PUSH

Observe EPR LIM readout shows derated EPR for takeoff and EPR reference indices (chevrons) are driven to same setting as displayed in EPR LIM readout.

NOTE

If indices have not driven to the EPR LIM or readout is not in tolerance, manually set affected index to derated EPR for takeoff. Do not use autothrottles if EPR LIM readout is incorrect.

[END]

(Continued)

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FLIGHT CREW OPERATING MANUAL

TAXI EXPANDED PROCEDURES (Continued)

Determine engine power/thrust computer mode to be used. (Continued)



Normal thrust

ART Switch AUTO

Observe READY and ART lights are on and ART INOP light is off.

ASSUMED TEMP Selector 00

T.O. Mode Button PUSH

Observe EPR LIM readout shows normal EPR and EPR reference indices (chevrons) are driven to same setting as displayed in EPR LIM readout.

NOTE

If indices have not driven to the EPR LIM or readout is not in tolerance, manually set affected index to normal EPR for takeoff. The manually set indices will not drive to maximum EPR when ART is activated. Do not use autothrottles if EPR LIM readout is incorrect.

[END]

Maximum thrust

ART Switch OFF

Observe READY and ART lights are off and ART INOP light is on.

ASSUMED TEMP Selector 00

T.O. Mode Button PUSH

Observe EPR LIM readout shows maximum EPR for takeoff and EPR reference indices (chevrons) are driven to same setting as displayed in EPR LIM readout.

NOTE

If indices have not driven to the EPR LIM or readout is not in tolerance, manually set affected index to maximum EPR for takeoff. Do not use autothrottles if EPR LIM readout is incorrect.

(Continued)

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FLIGHT CREW OPERATING MANUAL

PROCEDURES (Continued)

ios SET

ance system and radios are set as required.

. COMPLETE

switches OFF/AS REQUIRED

switch to OFF.

NOTE

In flight, use of APU is restricted to electrical output only.

be used,

STER switch to OFF.

VE Levers SET

NOTES

PNEU X-FEED VALVE levers should be closed except when wing anti-ice has been selected. Refer to Section 3, ICE & RAIN PROTECTION – Normal Operation.

With pneumatic crossfeed valves closed, leakage through valves may cause an indication on PNEU PRESS gage. This is a normal condition.

DSS-CHECK

. OFF

equired.

. SET

on 3, FUEL, Fuel Management Schedule.

. PUSH

(Continued)

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FLIGHT CREW OPERATING MANUAL

TAKEOFF/CLIMB EXPANDED PROCEDURES

Takeoff Thrust -

Set takeoff thrust. Advance throttles to 1.4 EPR or 80% N_2 (throttles approximately vertical) and check that EPR's are approximately matched. If autothrottles are to be used for takeoff, move ATS switch to AUTO THROT. For manual takeoff, advance throttles in a rapid but smooth manner to takeoff EPR.

NOTES

If autothrottles are used for takeoff, refer to Section 3, AUTOMATIC FLIGHT - Select Flight Director/Autopilot Takeoff Mode.

When both engines are operating above 64% N_1 and ART system READY light is on, selecting alternate position on DFGC switch will activate ART system on both engines.

PNF will adjust throttles as necessary to set takeoff EPR's with final re-adjustment to static takeoff thrust by 60 knots.

Brakes/Directional Control -

Release brakes, maintain directional control by use of rudder pedals.

Monitor Engine Instruments -

PNF monitor engine instruments and back up throttles. Re-adjust throttles as necessary up to 60 knots. After 60 knots no further adjustment should be made except to maintain engine within limits.

V-Speeds -

PNF call V_1 and rotation speeds.

NOTES

V_1 speeds are selected such that within published takeoff field length: (1) if an engine failure is recognized at or above V_1 speed, takeoff may be continued with one engine inoperative, or (2) if an engine failure is recognized at or below V_1 speed, a stop can be made in available accelerate-stop distance on a dry, hard surface runway without aid of reverse thrust. Contaminated runway takeoff data do not consider engine failure.

(Continued)

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FLIGHT CREW OPERATING MANUAL

TAKEOFF/CLIMB EXPANDED PROCEDURES (Continued)

NOTES (Continued)

V_1 is decision speed based solely upon the airplane's performance as stipulated above. Decision to reject a takeoff is solely the responsibility of the Captain. When runway available is equal to runway required, or when runway is contaminated, a rejected takeoff becomes more critical as speed approaches V_1 . Therefore, the Captain may consider limiting rejected takeoff speed to V_1 minus 20 except in the event of engine failure or a condition that would render the airplane unflyable.

If Captain determines takeoff should be aborted, proceed as follows:

- Retard throttles to idle thrust while simultaneously applying maximum anti-skid braking.
- Immediately fully extend ground spoilers (pull spoiler lever up, aft and up).
- Apply reverse thrust as required within limits of directional control and runway conditions. Up to takeoff EPR is permissible if required.

Airplane Rotation –

PF place both hands on control wheel, at V_R rotate smoothly and continue rotation after lift-off to a maximum of 20° without hesitation. Normal rotation is 5 to 6 seconds from start of rotation. At lift-off, airplane will have 8° pitch.

NOTE

Abrupt control applications, particularly when using V_{RMIN} speeds and low takeoff flap settings must be avoided during lift-off in order to preclude striking the tail. Both early and late rotation will increase takeoff distance.

After lift-off, climb at V_2+10 . Speeds greater than V_2+10 may be required to keep the pitch attitude below 20° airplane nose up.

NOTES

If an engine failure occurs, maintain speed at engine failure or V_2+10 , whichever is less, but not less than V_2 . This may require a push-over to maintain airspeed. Retract gear when a positive rate of climb is established. When performance is a factor, start landing gear retraction within 3 seconds after lift-off.

(Continued)

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FLIGHT CREW OPERATING MANUAL

TAKEOFF/CLIMB EXPANDED PROCEDURES (Continued)

NOTES (Continued)

Due to autopilot trim rate (.1°/second) of approximately 1/3 of manual trim rate, the autopilot should not be engaged in large out-of-trim conditions.

Gear UP

On PF's command and after a positive rate of climb is established, PNF move landing gear handle to UP. Observe gear light indications are normal.

NOTE

After takeoff in slush or wet snow and when clear of obstacles, extending and retracting landing gear may reduce ice accumulation and possibility of gear door freeze-up.

Flaps/Slats UP/RET

At acceleration height, adjust pitch and accelerate to flap retract speed. PF call "Flaps up". PNF move FLAP/SLAT handle to 0.

Continue acceleration to slat retract speed and PF call "Slats retract". PNF move FLAP/SLAT handle to UP/RET. Observe SLAT TAKEOFF light goes off.

NOTE

If flaps and/or slats cannot be retracted, observe appropriate extended limit speed.

FLAP T.O. SElector -

Rotate FLAP T.O. SElector to STOW.

HYD PUMPS Switches LOW/OFF

Move ENG HYD PUMPS switches to LOW and TRANS and AUX pump switches to OFF.

■ ENG IGN Selector AS REQUIRED

Set ENG IGN selector as required.

NOTE

Ignition should be used to provide flameout protection when encountering inlet icing, severe turbulence or other unusual operating conditions. Observe recommended ignition duty cycle.

(Continued)

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FLIGHT CREW OPERATING MANUAL

TAKEOFF/CLIMB EXPANDED PROCEDURES (Continued)

NO SMOK/SEAT BELTS Switches SET

Verify NO SMOK switch is in AUTO and set SEAT BELTS switch as required.

Fuel -

Refer to Section 3, FUEL, Fuel Management Schedule.

ENG SYNC Selector -

Set as required.

NOTES

ENG SYNC selector may be rotated to N₁ or N₂ anytime airplane is above 1500 feet AGL. However, when auto-throttles are on, synchronization is provided with selector in OFF.

Due to limited authority of engine synchronizer system, engine thrust must be approximately equal when system is engaged.

If at any time the system fails to maintain synchronization, disengage autothrottles (if not already disengaged), rotate selector to OFF, wait approximately 20 seconds while manually adjusting throttles to N₁ or N₂, as desired.

ENG SYNC selector **must** be in **OFF** below 1500 feet AGL.

Cabin Pressurization -

Observe CABIN ALT RATE, CABIN ALT, and DIFF PRESS indicators show normal pressurization operation. Adjust RATE LIMIT as required.

NOTE

If a rapid airplane climb or descent becomes necessary during flight, adjust RATE LIMIT control so that desired cabin altitude can be reached prior to or at the same time airplane reaches intended flight altitude.

(Continued)

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FLIGHT CREW OPERATING MANUAL

TAKEOFF/CLIMB EXPANDED PROCEDURES (Continued)

Annunciator Panel CHECK

Observe annunciator panel light indications are normal.

■ After IAS exceeds approximately 200 knots, observe RUDDER TRAVEL UNRESTRICTED light is off.

NOTE

■ If RUDDER TRAVEL UNRESTRICTED light remains on, refer to Section 3, FLIGHT CONTROLS - RUDDER TRAVEL UNRESTRICTED LIGHT ON (ABOVE 180/200/191 KIAS).

If TAILCONE light is on, notify tower that tailcone may have deployed on runway. If tailcone has not deployed, it may deploy on subsequent landing when speed is less than 80 knots.

Landing Lights RET/OFF

When no longer required, move WING LDG LTS switches to RET and NOSE LTS switch to OFF.

NOTE

NOSE LTS are deactivated when landing gear handle is up.

PERF Mode Button -

After CL is selected in TRI, push PERF button on flight guidance panel to activate PMS.

TAKEOFF/CLIMB CHECKLIST COMPLETE

MD-80

FLIGHT CREW OPERATING MANUAL

DESCENT/APPROACH EXPANDED PROCEDURES

Pressurization. SET

ENG SYNC Switch OFF

Ice Protection. SET

Verify ice protection systems are set as required.

WINDSHIELD ANTI-FOG Switch AS REQUIRED

If descending into conditions of high humidity, move WINDSHIELD ANTI-FOG switch to ON.

Fuel Tank/Aux Trans Pumps. SET

Verify all left and right tank fuel pumps switches are ON.

NOTE

Both pumps in each main wing tank should be on for approach and landing to ensure fuel pressure to the engines in event of a pump failure. Center tank pumps may be AUTO (airplanes with S/B 28-58 or production equivalent) ON or OFF, as desired (OFF if tank is empty). Check FUEL QTY indicators to verify airplane does not exceed lateral unbalance limits.

SEAT BELTS Switch. ON

Hydraulic Pumps/Pressure ON/HI/CHECK

Move AUX and TRANS pump switches to ON.

Move ENG HYD PUMPS switches to HI, observe both HYD PRESS gages indicate between 2800 and 3200 psi and both quantity gages indicate above red arc.

Observe BRAKE PRESS gage indications are approximately the same pressure or higher than respective HYD PRESS gage.

(Continued)

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FLIGHT CREW OPERATING MANUAL

DESCENT/APPROACH EXPANDED PROCEDURES (Continued)

HSI Mode Selector Switch-Light (If Installed) RADIO

Verify HSI mode selector RADIO light is on.

PMS Descent -

Refer to Section 3, AUTOMATIC FLIGHT, PMS Operation.

Altimeters SET

Set Captain's, First Officer's, and standby altimeters. Set LDG BARO and verify proper LDG ALT is set on CABIN PRESSURE panel.

Landing Data/Briefing COMPLETE

Compute landing data and set speed bugs.

Complete landing briefing.

Speed Brakes -

Verify speed brakes are retracted.

NOTE

To provide safe stall margins during approach, speed brakes must be retracted before lowering flaps. Speed brakes should also be retracted before extending landing gear. A deflated nose gear strut can, upon gear extension, cause an errant, momentary shift of ground sensing mechanism. This would drive automatic spoiler motor to ground mode and cause possibility of mechanical interference which could prevent full speed brake retraction.

Maneuvering Flaps -

When desired, PF reduce speed to below flap limit speed and call FLAPS ____*.

PNF move FLAP/SLAT handle to requested position, observe flaps extend as selected and the SLAT TAKEOFF light comes on.

APPROACH CHECKLIST COMPLETE

MD-80

FLIGHT CREW OPERATING MANUAL

LANDING EXPANDED PROCEDURES

ENG IGN Selector SYS A OR SYS B

ENG SYNC Selector OFF

Cabin Pressurization

Observe cabin altitude is approximately equal to airport altitude.

Landing Gear DOWN

On PF's command, move landing gear handle to DOWN and observe 3 green gear lights come on, red gear unsafe lights are off, and GEAR DOOR OPEN light is off.

Annunciator Lights CHECK

Check annunciator panel and observe lights are normal for conditions. Observe RUDDER TRAVEL UNRESTRICTED light is on and AUTO SPOILER DO NOT USE light is off.

NOTES

If RUDDER TRAVEL UNRESTRICTED light remains off at speeds below 165 knots, refer to Section 3, FLIGHT CONTROLS - RUDDER RESTRICTED DURING LANDING.

If AUTO SPOILER DO NOT USE light is on, do not arm automatic spoilers. Refer to Section 3, FLIGHT CONTROLS - AUTO SPOILER DO NOT USE LIGHT ON OR UNABLE TO ARM AUTO SPOILERS.

SPOILER Lever ARM

NOTE

Do not arm spoiler lever until landing gear has been extended. This will preclude possible in flight deployment due to errant ground shift signal.

(Continued)

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FLIGHT CREW OPERATING MANUAL

LANDING EXPANDED PROCEDURES (Continued)

Observe AUTO SPOILER DO NOT USE light is off. Lift spoiler lever, observe lever remains up when released and red armed placard is visible at base of lever.

NOTE

If lever cannot be lifted into arm position or will not remain armed, automatic spoiler extension is inoperative, refer to Section 3 FLIGHT CONTROLS - AUTO SPOILERS DO NOT USE LIGHT ON OR UNABLE TO ARM AUTO SPOILERS.

CAUTION

Ensure that spoilers are not deployed until airplane is on the ground.

Flaps/Slats °/LAND

NOTE

In icing conditions, tail de-ice should be activated approximately one minute prior to extending landing flaps.

When landing with 28° flaps and when glideslope is captured, PF call "Flaps 28 degrees, landing checklist". PNF move FLAP/SLAT handle to 28° flap position. Observe flap position pointers agree with flap position selected and SLAT LAND light is on.

Use 40° flaps when runway is contaminated.

When landing with 40° flaps and when one dot below glideslope, PF call "Flaps 28 degrees". When glideslope is captured, PF call "Flaps 40 degrees, landing checklist". PNF move FLAP/SLAT handle on command and observe proper flap/slat indications.

Guidelines for V_{REF} additives:

Landing on a runway with a braking action of "poor" is undesirable and should not be planned unless other factors make this imperative.

Observe 10 knot tail wind component limitation.

A minimum additive of 5 knots is to be applied to V_{REF} (1.3 V_S) for all normal configuration approaches.

Maximum additive for steady state or gust conditions is 20 knots.

Add all of the gust to V_{REF} speed (1.3 V_S).

Add 1/2 of the steady state wind above 20 knots to V_{REF} speed (1.3 V_S).
Example: Wind steady at 30 knots; 30 - 20 = 10; 10 X 1/2 = 5; add 5 knots to V_{REF}.

(Continued)

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FLIGHT CREW OPERATING MANUAL

LANDING EXPANDED PROCEDURES (Continued)

When both steady state and gust condition additives are to be considered, add only the greater of the two.

Maintain resulting speed (V_{REF} plus additive) until initiation of landing flare.

Increased landing distances may result when speed additives are used, depending on headwind component. This effect should be considered in respect to allowing airplane to float. Do not fail to apply appropriate deceleration for existing conditions, utilizing maximum deceleration procedures when necessary. Establish required deceleration as quickly as possible.

Manual or coupled pitch control:

If autothrottles are not engaged, set airspeed command bug on desired speed (V_{REF} plus additive) and manually adjust power to maintain that speed.

If autothrottles are engaged, ATS will reference to alpha floor ($1.3 V_S$ in landing configuration) or speed selected, whichever is greater. During gust conditions, automatic gust protection will be provided up to a maximum of an additional 5 knots to autothrottle reference speed in use. Therefore, during gust conditions, select a speed 5 knots less than required speed (V_{REF} plus additive). When alpha speed is greater than selected speed, ALFA will be annunciated in autothrottle FMA. With this condition, FAST/SLOW indicator and ATS will control speed to gust integrated alpha speed. In steady state wind conditions which require an additive, selected speed should be required speed since ATS does not measure steady state wind velocity.

Autoland pitch control:

With autoland/autothrottles engaged, select V_{REF} ($1.3 V_S$) plus 5 knots regardless of gust or steady state wind condition. When conditions require gust additives greater than 10 knots or steady state additives greater than 5 knots, autoland operations should be curtailed.

TRI..... GA

Push GA mode button and observe GA light comes on.

Landing Lights -

Move WING LDG LTS switch to EXT ON, and NOSE LTS switch to ON.

LANDING CHECKLIST..... COMPLETE

(Continued)

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FLIGHT CREW OPERATING MANUAL

LANDING EXPANDED PROCEDURES (Continued)

Approach Progress (Autoland) -

NOTE

When configured for autoland, refer to Section 3, AUTOMATIC FLIGHT - Normal Operation.

Monitor:

- Altitude/speed/rate of descent
- Glideslope capture
- Autoland operation
- Localizer/marker passage

Prior to landing, PNF call radio altitudes.

NOTE

On airplanes prior to incorporation of Service Bulletin 22-65 (or production equivalent), the autopilot must be disengaged before reaching 50 feet AGL.

If go-around is required,

Set maximum go-around thrust. The TRI provides the EPR limit for maximum go-around thrust when go-around is selected.

NOTE

For each use of maximum go-around thrust, make a log entry. If maximum go-around thrust is not attained during a go-around as a result of reducing power before the engine accelerates to maximum go-around thrust, a log entry is not required.

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FLIGHT CREW OPERATING MANUAL

LANDING ROLL EXPANDED PROCEDURES

Throttles –

PF move throttles to idle.

Spoiler Operation –

When main gear is on runway, PNF observe spoiler lever moves aft to EXT position.

NOTES

For auto deployment of inboard (ground) spoilers, throttles must be at idle. If throttles are above idle at touchdown, outboard and inboard flight spoilers may deploy and retract.

If spoiler lever does not move aft or does not remain at EXT position, PNF call "No spoilers," PF move lever aft to full extend position and up to latched position.

Reverse Thrust –

After main gear contact, and after nose lowering has commenced, thrust reversers may be deployed to reverse idle detent. Upon nosewheel touchdown, normal reversing techniques and limits should be used.

WARNING

After reverse thrust is initiated, a full stop landing must be made.

NOTE

Lower thrust reverser buckets may contact runway if pitch attitude is in excess of 8 degrees.

When nose gear is firmly on runway, apply sufficient down elevator after nose gear contact to increase weight on the nosewheel for improved steering effectiveness. (An excessive amount of down elevator will unload the main gear and reduce braking efficiency.) Apply reverse thrust to idle reverse thrust detent. After reverse thrust is verified, observe the following limitations:

- On a dry runway, reverse thrust of no more than 1.6 EPR should be used, except in an emergency.
- On wet or contaminated runways and without Intermediate Reverse Thrust Detent installed, reverse thrust of no more than 1.3 EPR should be used, except in an emergency.

(Continued)

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FLIGHT CREW OPERATING MANUAL

LANDING ROLL EXPANDED PROCEDURES (Continued)

- On wet or contaminated runways and with Intermediate Reverse Thrust Detent installed, reverse thrust of no more than Intermediate Reverse Thrust Detent should be used, except in an emergency.
- In the event of an emergency, maximum available reverse thrust may be used.

At 80 knots (or higher if necessary), reduce reverse thrust to achieve idle reverse thrust by 60 knots.

CAUTION

In order to minimize possibility of FOD, do not use more than reverse idle thrust at speeds below 60 knots.

NOTES

If difficulty in maintaining directional control is experienced during reverse thrust operation, reduce thrust as required and select forward idle, if necessary, to maintain or regain directional control. Do not attempt to maintain directional control by using asymmetric reverse thrust.

When reverse thrust is applied, AUTO THROT switch drops to OFF position, and ATS FMAs go blank. Red ATS fail lights will not come on.

Maintain directional control.

Brakes –

Apply wheel brakes as required.

NOTE

If brakes do not function normally, release brake pedals and move ANTI-SKID switch to OFF. Reapply brakes and increase reverse thrust as required.

Thrust –

When reverse thrust is no longer required, move reverser levers to forward idle, observe ENG REVERSE THRUST and ENG REVERSE UNLOCK lights go off.

NOTES

When using reverse thrust above interlock stop position, rapid selection to forward thrust may result in undesirable forward thrust levels while engine is decelerating to idle RPM.

Reverse thrust during taxi is not recommended or when stopped if possibility of ingestion of debris exists.

(Continued)

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FLIGHT CREW OPERATING MANUAL

LANDING ROLL EXPANDED PROCEDURES (Continued)

DFGS –

A DFGS self-test of approximately 13 seconds duration will be performed after every landing when the following conditions exist:

IAS less than 60 knots.

Autopilot and autothrottles off.

Flight director not in takeoff mode.

EPR less than 1.1.

Airplane on ground from two to four minutes.

TAILCONE Light –

If TAILCONE light is on, notify tower that tailcone may have deployed on runway.

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FLIGHT CREW OPERATING MANUAL

AFTER LANDING EXPANDED PROCEDURES

NOTE

To preclude engine FOD, the recommended maximum taxi speed is 20 knots.

Spoilers RETRACTED

Push down on spoiler lever and observe that it moves forward to RET.

Flaps/Slats 15/T.O. EXT

Move FLAP/SLAT handle to 15/T.O. EXT.

APU START

If APU operation is required, start APU. Refer to Section 3, APU – Normal Operation.

After APU is started, move PNEU X-FEED VALVE levers to OPEN (or as required) and move APU AIR switch to ON.

ENG IGN Selector OFF

Pitot Heat/Ice Protect OFF

Rotate PITOT METER SEL & HEAT selector to OFF and verify AIR FOIL and ENG ICE PROTECT switches are OFF.

Landing Lights SET

Radar OFF

AFTER LANDING CHECKLIST COMPLETE

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FLIGHT CREW OPERATING MANUAL

**PARKING
EXPANDED PROCEDURES**

Parking Brake AS REQUIRED

If brakes are hot, ensure chocks are installed and leave parking brake off.

NOTE

When parking, it is recommended that nosewheels be approximately center position before forward motion is stopped.

If parking brakes are to be set, observe PARKING BRAKE ON light is on and BRAKE PRESS gage indication is normal.

Flaps/Slats UP/RET

Move FLAP/SLAT handle to UP/RET. Observe flap handle indicators move to 0 and SLAT LAND, AUTO SLAT, SLAT DISAGREE and SLAT TAKEOFF lights are off.

NOTE

A feedback force will be felt on the FLAP/SLAT handle when it is moved to UP/RET before flaps are fully retracted. When flaps reach retracted position, a metallic "click" sound may be heard.

Slides DISARMED

APU/External Power. CHECK/ON

Determine electrical power to be used,



External

EXT PWR AVAIL Light CHECK ON

EXT PWR VOLT/FREQ Meter CHECK NORMAL

EXT PWR BUS Switches ON

External Power In Use Lights ON

Observe that respective external power in use light comes on when engine and/or APU electrical power is disconnected from bus.

[END]

APU

APU PWR AVAIL Light CHECK ON

(Continued)

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FLIGHT CREW OPERATING MANUAL

PARKING EXPANDED PROCEDURES (Continued)

APU VOLT/FREQ Meter. CHECK NORMAL

APU BUS Switches ON

APU Power In Use Lights ON

Observe that respective APU power in use light comes on when engine generators are disconnected from bus.

FUEL Levers OFF

Confirm fuel flows drop to zero when levers are moved to OFF and observe corresponding decrease in N_1 , EGT, and N_2 .

SEAT BELTS Switch. OFF

Fuel Tank/Aux Trans Pumps. SET

Move FUEL TANKS pump switches to OFF except for a fuel pressure source for APU (if operating).

ANTI COLLISION LT Switch OFF

HYD PUMPS Switches HI

Verify ENG HYD PUMPS switches are in HI. Move AUX and TRANS HYD PUMPS switches to OFF.

PARKING CHECKLIST. COMPLETE

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FLIGHT CREW OPERATING MANUAL

BEFORE LEAVING AIRPLANE

GROUND SERVICE ELEC PWR Panel SET

If ground service electrical power is required,

APU or EXT PWR AVAIL Light. CHECK ON

Associated VOLTS and FREQUENCY Meter CHECK NORMAL

APU or EXT PWR Switch. ON/AS REQUIRED

Associated Power In Use Light CHECK ON

When power is removed from right AC distribution system, observe associated (APU or EXT) power in use light comes on.

EMER LTS Switch OFF

NOTE

DC emergency bus must be powered. If normal electrical power is inadvertently turned off with EMER LTS switch in ARM, all emergency lights will come on and cannot be turned off until power is restored to DC emergency bus.

Move EMER LTS switch to OFF and observe emergency lights (top of overhead panel) are off.

AIR CONDITIONING SUPPLY Switches SET

NOTE

Unless system is to be used, move AIR CONDITIONING SUPPLY switches to OFF to prevent inadvertent cabin pressurization if outflow valve and all exits are closed.

GALLEY Power Switch OFF

Fuel Pumps. SET

Set fuel pumps as required. If APU is to remain in operation, leave one pump on as a source of fuel for APU operation.

(Continued)

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FLIGHT CREW OPERATING MANUAL

BEFORE LEAVING AIRPLANE (Continued)

WINDSHIELD ANTI-ICE/ANTI-FOG Switches OFF

FD Switches OFF

Exterior Lights SET

RUD HYD CONT Lever MAN

CABIN ALT Control Lever SET

During inclement weather, closing cabin air outflow valve will prevent entry of rain or snow into fuselage. To close valve, move CABIN ALT CONTROL lever to manual (down) position. Push and rotate controller wheel until VALVE OPEN position indicator is at full forward VALVE CLOSE position, (air conditioning systems not operating).

ATC Transponder/ADF's/HF Radios OFF

Cockpit Lights OFF

Oxygen Cylinder CLOSED

AC BUS PWR Switches SET

If not required,

Move APU BUS and/or EXT PWR BUS switches (main distribution system) to OFF.

APU SET

BATT Switch SET

If APU is operating, leave BATT switch ON.

BEFORE LEAVING AIRPLANE CHECKLIST COMPLETE

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FLIGHT CREW OPERATING MANUAL

CHECKLISTS

BEFORE START

- * MAINTENANCE LOG CHECKED/ON BOARD
- * CIRCUIT BREAKERS CHECKED
- * BATT SWITCH ON/LOCKED
- GROUND SERVICE ELEC PWR AND MAINTENANCE INTERPHONE SWITCHES OFF
- FLT RCDR SWITCH (Some Airplanes) NORM
- ENG FIRE DETECT LOOPS BOTH
- ELEC/PNEU/AIR CONDITIONING SET

IF APU POWER IS TO BE USED

- BATT SWITCH ON/LOCKED
- FIRE WARNING CHECKED
- APU FIRE CONTROL SWITCH NORM
- APU DOORS SWITCH AUTO
- APU AIR SWITCH OFF
- APU MASTER SWITCH OFF
- START PUMP SWITCH (IF AC ELEC PWR NOT AVAILABLE) ON
- APU MASTER SWITCH START/RELEASE

AFTER APU START

- VOLTS/FREQUENCY CHECKED
- APU L & R BUS PWR ON
- RIGHT MAIN OR CTR WING PUMP ON
- START PUMP SWITCH OFF

APU AIR CONDITIONING

- CABIN ALT CONTROL LEVER AUTO/VALVE OPEN
- PNEU X-FEED VALVE LEVERS OPEN
- APU AIR SWITCH SET
- AIR CONDITIONING SUPPLY SWITCHES AUTO
- CKPT/CABIN TEMP SELECTORS SET

IF EXTERNAL POWER USED

- VOLTS/FREQUENCY CHECKED
- EXT PWR AVAIL LIGHT ON
- EXT PWR L & R BUSES ON
- INSTRUMENT SELECTORS NORM
- COCKPIT VOICE RECORDER CHECKED

(Continued)

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FLIGHT CREW OPERATING MANUAL

Before Start (Continued)

COMP/RADIO NAV SELECTORS (IF INSTALLED)	NORM
* ENG SYNC SELECTOR	OFF
GROUND PROXIMITY WARNING SYSTEM	CHECKED/NORM
FLIGHT RECORDER (Some Airplanes)	CHECKED/SET/NORMAL
CSD's	NORM
GENERATORS	ON
AC/DC X-TIE	AUTO/OPEN
EMER ELEC PWR	CHECKED/OFF
* ANTI-SKID	CHECKED/ARMED
* STALL TEST	CHECKED
MAX SPD WARN TEST	CHECKED
MACH TRIM COMP	NORM
YAW DAMP SWITCH	ON
RADIO RACK	FAN
AIR COND SHUTOFF	AUTO
RAM AIR	OFF
* CABIN PRESSURIZATION	SET
* FUEL TANK/AUX TRANS PUMPS	CHECKED/SET
ENG IGN	OFF
FUEL HEAT	OFF
EMERGENCY LIGHTS	CHECKED/ARM
* NO SMOK/SEAT BELTS	AUTO/ON
* PITOT HEAT	CHECKED/CAPT
AIR FOIL/ENG ANTI-ICE	OFF
WINDSHIELD ANTI-ICE/ANTI-FOG	ON/SET
WINDSHIELD WIPERS	PARK
* ANNUNCIATOR/DIGITAL LTS	CHECKED
* EXTERIOR LIGHTS	SET
FLIGHT GUIDANCE	CHECKED
VHF NAV RADIOS	SET
BRAKE PRESS	CHECKED
* FIRE WARNING	CHECKED
* ART SWITCH	AUTO
GEAR LTS/AURAL WARNING	CHECKED
TRI/RAT/SAT	CHECKED
* FUEL QTY	CHECKED
* FUEL USED	RESET
* ENGINE INSTRUMENTS	CHECKED
HYDRAULIC SYSTEM	CHECKED/HI
GEAR DOOR OPEN LIGHT	OFF
BRAKE TEMP	CHECKED/ALL
* FLT INSTRUMENTS	CHECKED/SET
STATIC AIR	NORM
HSI MODE SELECTOR (If Installed)	RADIO
ONS (If Installed)	CHECKED/SET
ADF(S)	SET
RADAR	TESTED

(Continued)

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FLIGHT CREW OPERATING MANUAL

Before Start (Continued)

ATC TRANS	SET
STABILIZER	CHECKED
* SPOILER LEVER	DISARMED
RUD HYD CONT.	PWR
* TAKEOFF WARNING/THROTTLES	CHECKED/IDLE
FUEL LEVERS	OFF
FUEL X-FEED	OFF
CABIN ALT CONTROL	AUTO/ VALVE OPEN
FLAPS/SLATS	UP RET/LTS OFF
COMMUNICATIONS	CHECKED/SET
ATC TRANSPONDER	CHECKED/SET
* RUDDER/AILERON TRIM	SET
* GEAR PINS	3 ON BOARD
EMER EQUIPMENT	CHECKED
OXYGEN CYLINDERS	CHECKED/OPEN
OXYGEN MASKS/INTERPHONE	CHECKED

* SHIPS PAPERS	ON BOARD/CHECKED
* FLT DATA ENTRY PANEL (Some Airplanes)	CHECKED/SET
* ZERO FUEL WT	SET
PMS	CHECKED/SET
* TAKEOFF DATA	SET
* ASSUMED TEMP	SET
* FLAP T.O. SELECTOR	SET
* STABILIZER TAKEOFF POSITION DISPLAY	SET
* STABILIZER	SET ____°
BEFORE START CHECKLIST	COMPLETED
* Through Flight Items	

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FLIGHT CREW OPERATING MANUAL

START

DOORS/WINDOWS/PILOT SEATS/SLIDES CLOSED/CHECKED/ARMED
PARKING BRAKE AS REQUIRED
PNEU X-FEED LEVERS OPEN
HYD PUMPS HI/OFF
ANTI-COLLISION LT ON
AIR CONDITIONING SUPPLY OFF
GALLEY POWER OFF
ENG IGN SYS A OR SYS B OR BOTH
PNEU PRESS. CHECKED
START CHECKLIST COMPLETED

AFTER START

AIR CONDITIONING SUPPLY AUTO
GROUND EQUIPMENT REMOVED
ELECTRICAL SYSTEM CHECKED/SET
GALLEY POWER ON
ENG IGN AS REQUIRED
AIRFOIL/ENG ANTI-ICE SET
HYD SYS. CHECKED/HI/ON
ANNUN PANEL CHECKED
AFTER START CHECKLIST COMPLETED

TAXI

FLAPS/SLATS ____°/TO
FLIGHT CONTROLS CHECKED
TAKEOFF DATA/TRI CONFIRMED/SET
FLIGHT GUIDANCE/RADIOS SET
TAKEOFF BRIEFING COMPLETE
APU AIR & MASTER SWITCHES OFF/AS REQUIRED
PNEU X-FEED LEVERS SET
TAXI CHECKLIST COMPLETED

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FLIGHT CREW OPERATING MANUAL

BEFORE TAKEOFF

ENG IGN	SYS A OR SYS B
ANNUN PANEL	CHECKED
LANDING LTS	ON
BRAKE TEMP	CHECKED
CABIN CALL	COMPLETED
BEFORE TAKEOFF CHECKLIST	COMPLETED

TAKEOFF/CLIMB

GEAR	UP
FLAPS/SLATS	UP/RET
HYD PUMPS SWITCHES	LOW/OFF
ENG IGN	SET
NO SMOK/SEAT BELTS	SET
ANNUN PANEL	CHECKED
LANDING LTS	RET/OFF
TAKEOFF/CLIMB CHECKLIST	COMPLETED

DESCENT/APPROACH

PRESSURIZATION	SET
ENG SYNC	OFF
ICE PROTECTION	SET
WINDSHIELD ANTI-FOG	AS REQUIRED
FUEL TANK/AUX TRANS PUMPS	SET
SEAT BELTS SWITCH	ON
HYD PUMPS & PRESS	ON/HI/CHECKED
HSI MODE SELECTOR (If Installed)	RADIO
ALTIMETERS	SET
LANDING DATA & BRIEFING	COMPLETED
APPROACH CHECKLIST	COMPLETED

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FLIGHT CREW OPERATING MANUAL

LANDING

ENG IGN	SYS A OR SYS B
ENG SYNC	OFF
LANDING GEAR	DOWN
ANNUN LTS	CHECKED
SPOILER LEVER	ARMED
FLAPS/SLATS	_____/LAND
TRI	GA
LANDING CHECKLIST	COMPLETED

AFTER LANDING

SPOILERS	RETRACTED
FLAPS/SLATS	15/T.O. EXT
APU	START
ENG IGN	OFF
PITOT HEAT/ICE PROTECTION	OFF
LANDING LTS	SET
RADAR	OFF
AFTER LANDING CHECKLIST	COMPLETED

PARKING

PARKING BRAKE	AS REQUIRED
FLAPS/SLATS	UP/RET
SLIDES	DISARMED
APU/EXT PWR	CHECKED/ON
FUEL LEVERS	OFF
SEAT BELTS SWITCH	OFF
FUEL TANKS/AUX TRANS PUMPS	SET
ANTI-COLLISION LT	OFF
HYD PUMPS	HI/OFF
PARKING CHECKLIST	COMPLETED

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FLIGHT CREW OPERATING MANUAL

Chapter 1

AIRPLANE GENERAL

TABLE OF CONTENTS

AIR LIBERTE INDUSTRIES

(SERIES 80)

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
LIMITATIONS	1-10-0	1	1/2	All
NORMAL OPERATION				
Crew Oxygen Cylinder Pressure Requirements For Dispatch To 10,000 Feet Or Higher	1-20-0	3/4	1/2	Use CODE 3 for all FSN's except 49662 Use CODE 4 for FSN 49662
Passenger Aft Stairway	1-20-5	1	1	All
Passenger Forward Stairway - Handrail	1-20-5	1	2	All
Passenger Forward Stairway	1-20-5	1	3	All
Passenger Forward Stairway Operation Using Battery Power	1-20-5	1	4	All
Passenger Forward Stairway - Manual Operation	1-20-5	1	5	All
ABNORMAL OPERATION				
Cockpit Preparation For Passenger Evacuation	1-30-0	1	1	All
Passenger Cabin Smoke Or Fume Evacuation	1-30-0	1	2	All
Digital Lights Failure	1-30-5	1	1/2	All

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FLIGHT CREW OPERATING MANUAL

AIRPLANE GENERAL - LIMITATIONS

WING LANDING LIGHTS	
Extend/retract duty cycle	Wing landing light motors should be allowed to cool for 1-1/2 minutes after initial extension or retraction and 3-1/2 minutes after each subsequent extension or retraction.
Lamp duty cycle	Lamps should not be operated in still, ambient air for periods of over 10 minutes, due to excessive heat build-up.

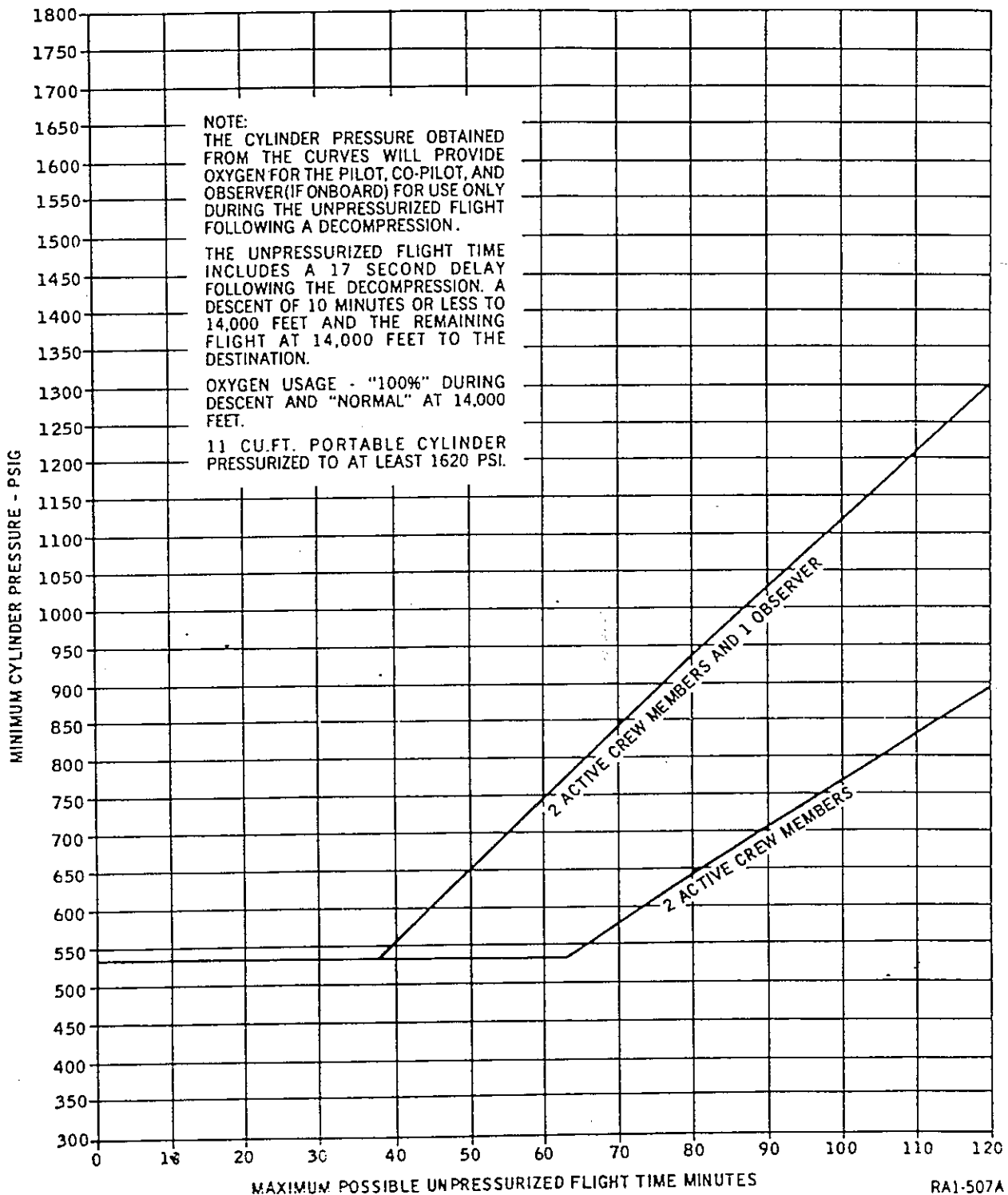
PASSENGER FORWARD STAIRWAY	
Extend/retract duty cycle	To prevent overheating stairway actuators, allow minimum of 3 minutes between each cycle (one extension and retraction) of actuator, and maximum of six cycles in any 18 minute period. Allow 45 minutes between periods.

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FLIGHT CREW OPERATING MANUAL

AIRPLANE GENERAL - NORMAL OPERATION

Crew oxygen cylinder pressure requirements for
dispatch to 10,000 feet or higher (48 cubic foot cylinder)



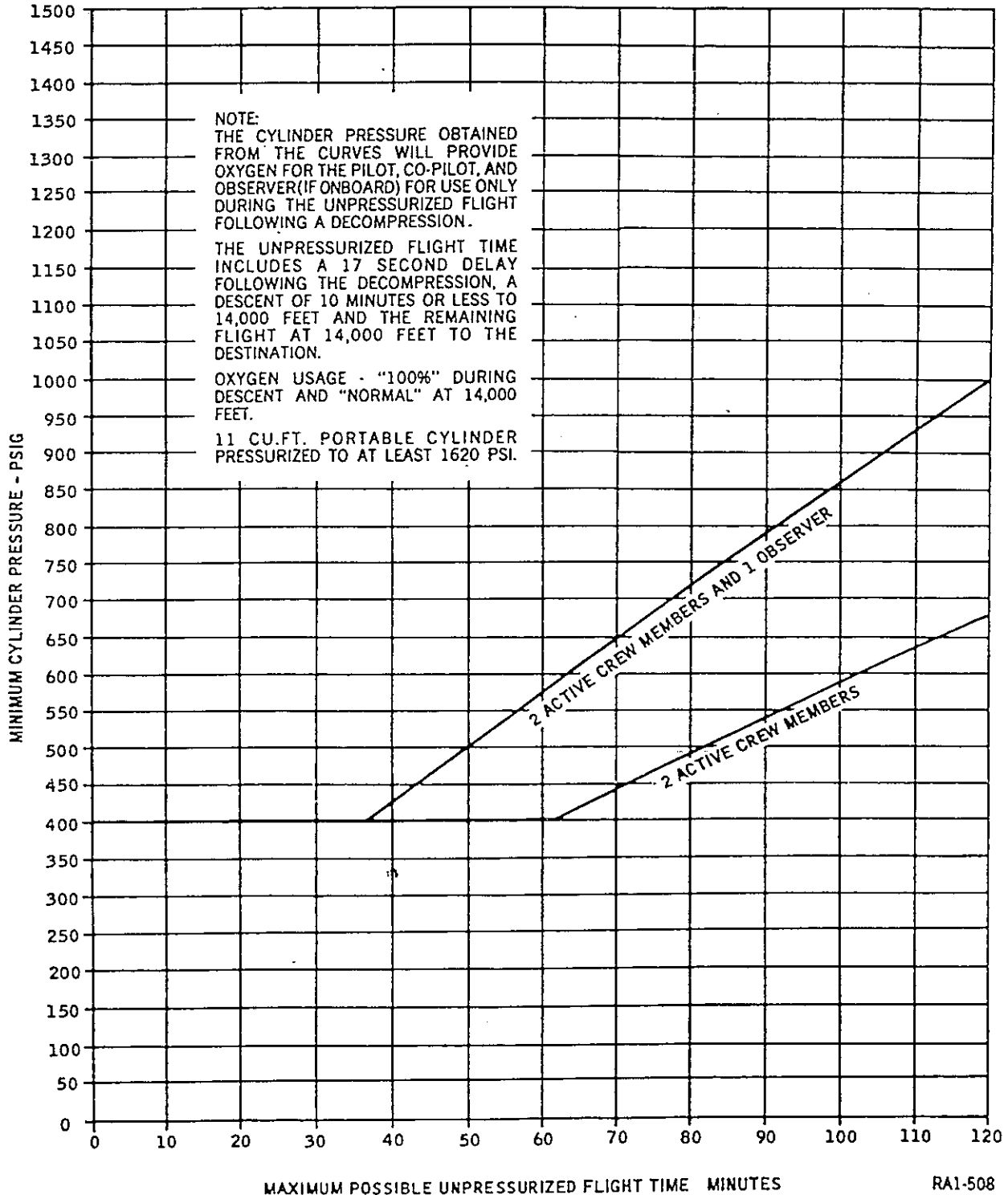
RA1-507A

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FLIGHT CREW OPERATING MANUAL

AIRPLANE GENERAL - NORMAL OPERATION

Crew oxygen cylinder pressure requirements for
dispatch to 10,000 feet or higher (64 cubic foot cylinder)



RA1-508

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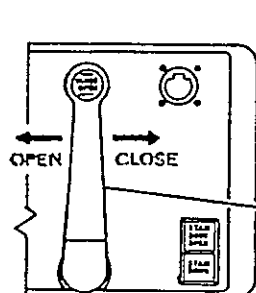
FLIGHT CREW OPERATING MANUAL

AIRPLANE GENERAL - NORMAL OPERATION

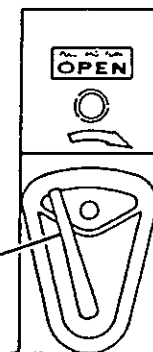
Passenger aft stairway

NOTE: Airplane hydraulic pressure is required to operate the aft stairway.

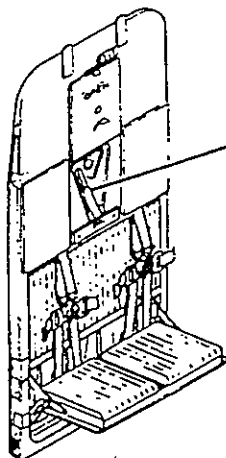
TO RETRACT PASSENGER AFT STAIRWAY FROM THE INTERIOR CONTROL PANEL (For airplanes with stairway control handle installed.)



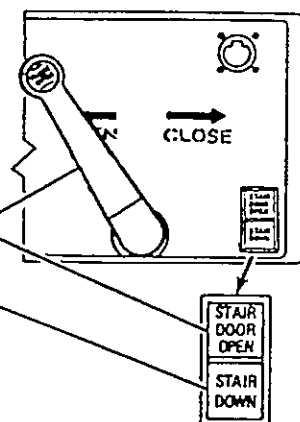
1. Place and hold aft entrance stairway control in the CLOSE position. STAIR DOWN light (green) should go off.
2. When stairway is retracted STAIR DOOR OPEN light (amber) should go off.
3. Verify stairway control handle is in neutral (vertical) position after operation
4. Close and lock aft entrance door.



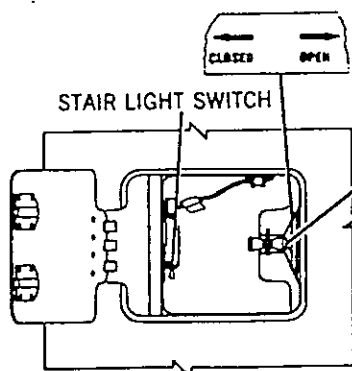
TO EXTEND PASSENGER AFT STAIRWAY FROM THE INTERIOR CONTROL PANEL (For airplanes with stairway control handle installed.)



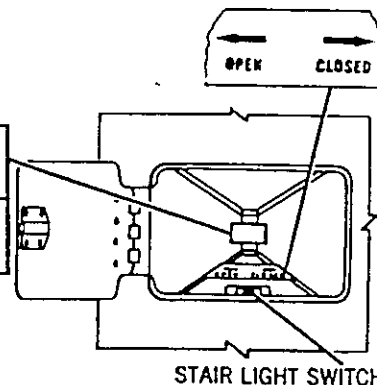
1. Unlock and open aft entrance door. If the automatic feature of the seat bottom malfunctions, make certain seat bottom is folded into door recess before opening door.
2. Place and hold aft entrance stairway control in the OPEN position. The STAIR DOOR OPEN light (amber) should come on.
3. When stairway is extended STAIR DOWN light (green) will come on.
4. Verify stairway control handle is in neutral (vertical) position after operation



TO EXTEND PASSENGER AFT STAIRWAY FROM EXTERIOR CONTROL LOCATION (Aft stairway control panel may be either type pictured.)



1. Move and hold stairway control handle to the OPEN position.
2. Verify stairway control handle is in neutral (center) position after operation.



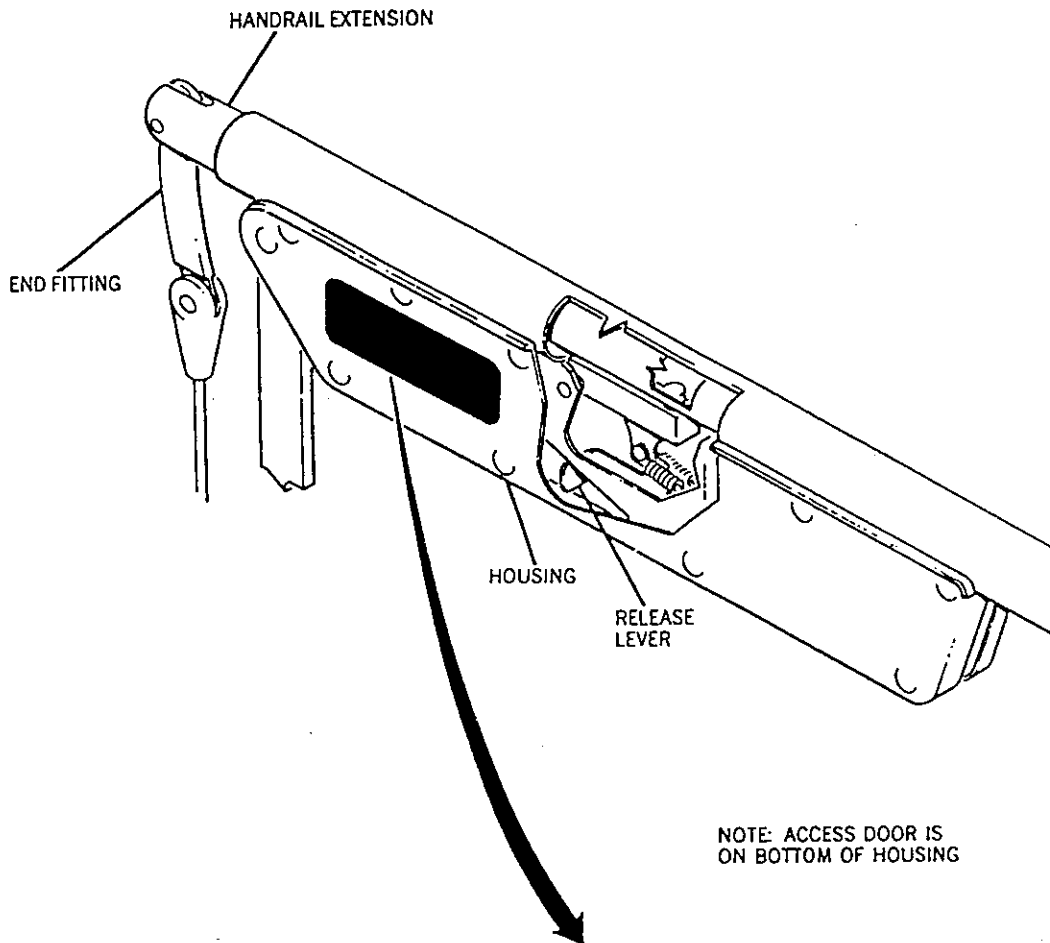
RA1-203A

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FLIGHT CREW OPERATING MANUAL

AIRLINE GENERAL - NORMAL OPERATION

Passenger forward stairway - Handrail, manual operation



HANDRAIL OPERATING INSTRUCTIONS

TO EXTEND HANDRAIL:

1. OPEN ACCESS DOOR ON BOTTOM OF HOUSING AND PRESS RELEASE LEVER TOWARD FUSELAGE.
2. MOVE HANDRAIL EXTENSION TOWARD FUSELAGE. AFTER MOVING RAIL A FEW INCHES, LET GO OF LEVER.
3. EXTEND RAIL UNTIL LATCHED IN EXTENDED POSITION. CHECK FOR POSITIVE LATCHING BY TRYING TO MOVE HANDRAIL EXTENSION. (NOTE: WHEN PROPERLY ENGAGED, LATCH CANNOT BE DISENGAGED WITHOUT FIRST MOVING RAIL OUT).
4. CABIN ATTENDANT PANEL "STAIR DOWN" LIGHT IS "ON" WHEN BOTH RAILS ARE EXTENDED.

TO RETRACT HANDRAIL:

1. OPEN ACCESS DOOR AND PRESS RELEASE LEVER TOWARD FUSELAGE.
2. MOVE HANDRAIL EXTENSION TOWARD FUSELAGE UNTIL LATCH DISENGAGES. RESTRAINING RAIL, ALLOW IT TO RETRACT SLOWLY. AFTER A FEW INCHES OF RETRACTION, LET GO OF LEVER.
3. PUSH EXTENSION (AWAY FROM FUSELAGE) UNTIL LATCHED. CHECK FOR LATCH ENGAGEMENT BY PULLING ON RAIL.
4. DO NOT STOW STAIRWAY UNTIL BOTH HANDRAILS ARE RETRACTED AND LATCHED.

WARNING: DURING LAST TWO FEET OF RETRACTION KEEP FINGERS OUT OF AREA BENEATH HANDRAIL EXTENSION AND RESTRAIN RAIL BY HOLDING ON TO END FITTING.

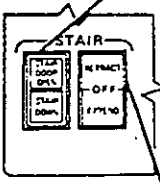
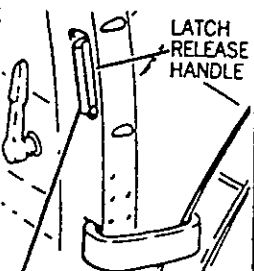
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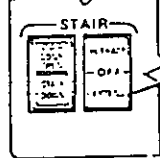
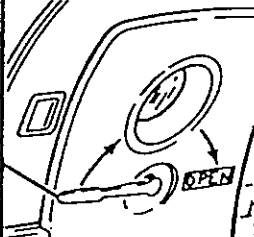
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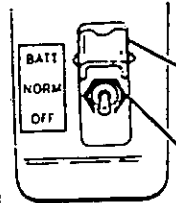
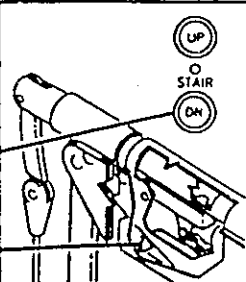
FLIGHT CREW OPERATING MANUAL

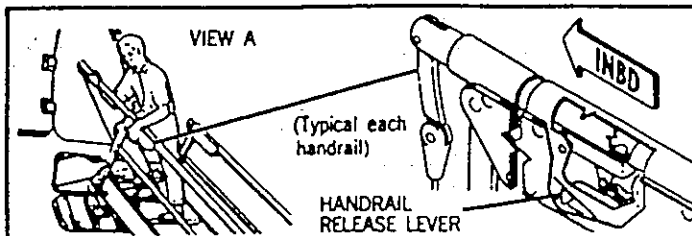
AIRPLANE GENERAL -- NORMAL OPERATION -

Passenger forward stairway

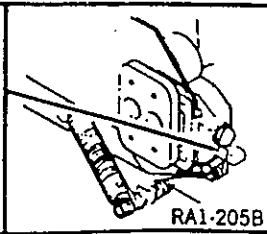
TO RETRACT PASSENGER FORWARD STAIRWAY FROM FORWARD ATTENDANT'S PANEL		
	1. Prior to retraction of handrails, verify green STAIR DOWN light is on, amber STAIR DOOR OPEN light is on, and stairway step lights are on.	
	NOTE: If green STAIR DOWN light is not on when stairway is down and handrails are extended, notify maintenance.	
	2. Push (inboard) handrail manual release lever, pull handrail up approximately 1/4-inch to disengage detent, then manually retract handrails. Hold handrail while retracting to prevent a sudden retraction. STAIR DOWN light will go off when rails start to retract. (See View A).	
	WARNING: During last two feet of retraction keep fingers out of area beneath handrail extension and restrain rail by holding on to end of fitting.	
	NOTE: Stairwell door latch handle must be in the full up (unlatched) position before retracting stairway.	
	3. Hold stair switch in RETRACT position until stairs are fully retracted.	
	4. Place stairwell door latch handle to full down (latched) position. STAIR DOOR OPEN light will go off.	
	5. Unlatch passenger forward entrance door from the latched open position, close door and latch.	

TO EXTEND PASSENGER FORWARD STAIRWAY FROM FORWARD ATTENDANT'S PANEL		
	1. Unlatch passenger forward entrance door.	
	2. Move stairwell door handle to full up (unlatched) position. STAIR DOOR OPEN light will come on.	
	3. Hold stair switch in EXTEND position until stairs are fully extended.	
	4. Open and latch open forward passenger entrance door.	
	5. Push handrail manual release lever (one on each handrail) and manually extend each handrail until detent is engaged. STAIR DOWN light will come on. (See View A).	

TO EXTEND PASSENGER FORWARD STAIRWAY FROM EXTERNAL CONTROL LOCATION		
	NOTE: The forward passenger entrance door must be unlatched to operate stairway.	
	1. Place external handle to full up (unlatched) position to unlatch stairwell door.	
	2. Hold power switch in BATT position (if external or airplane power is not available).	
	3. Press stair DN button until stairs are fully extended.	
	4. Release power switch from BATT position. Switch will return to NORM.	
	5. Push handrail manual release lever (one on each handrail) and manually extend handrails after entrance door has been latched to the open position	



NOTE: With the stairway extended, lockable detent latch must be in the locked position if DC power is removed or not available. Place latch in unlocked position to operate stairway electrically.



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FLIGHT CREW OPERATING MANUAL

AIRPLANE GENERAL - NORMAL OPERATION

Passenger forward stairway operation using battery power

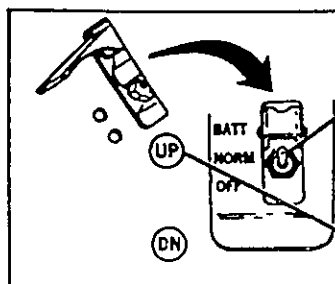
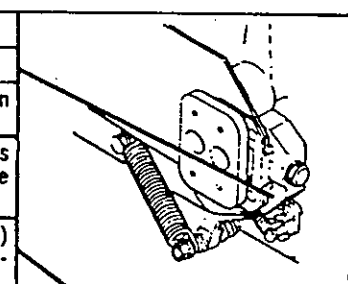
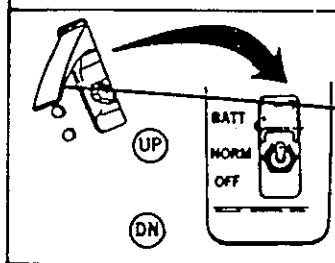
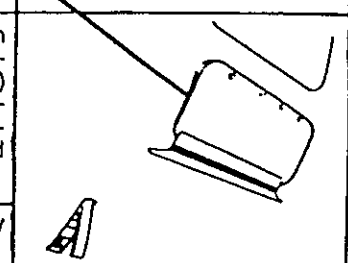
NOTE: Stairway step lights will not come on without AC power on the airplane.

CONDITION

AIRPLANE ELECTRICAL SYSTEM NOT POWERED (DC Transfer bus de-energized)

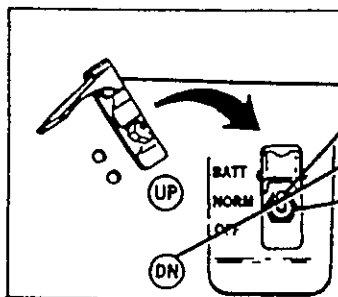
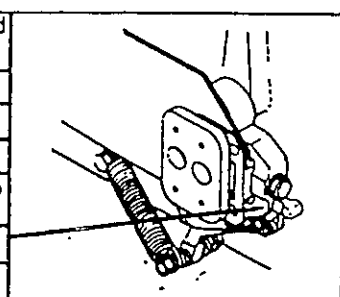
TO RETRACT PASSENGER FORWARD STAIRWAY FROM EXTERNAL CONTROL STATION

ACTION

	1. If extended, retract handrails in the normal manner. 2. Place detent latch in unlocked position. 3. Lift switch guard, place power switch in BATT (momentary) position and hold. NOTE: Do not release power switch from BATT position until stair is fully retracted/extended. This would remove power from the system, allowing stair to fall. 4. Press the UP button (while holding power switch in BATT position) and hold until stairs are retracted and stairwell door is within 1/2-inch of closed.	
	5. Remove hand from UP switch while still holding the power switch in BATT position. Continue to hold the power switch in the BATT position and place the external stairwell latch in the halfway (approx.) down position until the door latches are engaged. The latch engagement is apparent when the door starts moving into the closed position. When latches are engaged, remove hand from power switch and close latch until door and latch are faired to the fuselage. 6. Visually verify from electrical/electronic compartment that stairway door is closed and latched properly.	

TO EXTEND PASSENGER FORWARD STAIRWAY FROM EXTERNAL CONTROL STATION

ACTION

	NOTE: The passenger forward entrance door must be unlatched before the stair can be extended. 1. Lift external handle to unlatch stairwell door. 2. Place power switch in BATT (momentary) position and hold. 3. Press stair DN button until stairs are fully extended. 4. Release power switch from BATT position. Switch will return to NORM. 5. Place detent latch in locked position. 6. Manually extend handrails into doorway.	

TO OPERATE PASSENGER FORWARD STAIRWAY FROM FORWARD ATTENDANTS PANEL

ACTION

1. Place BATT switch on Forward Overhead Switch Panel to ON position and operate stair. Operation is identical to normal operation.

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FLIGHT CREW OPERATING MANUAL

AIRPLANE GENERAL - NORMAL OPERATION - Passenger forward stairway (sheet 1)

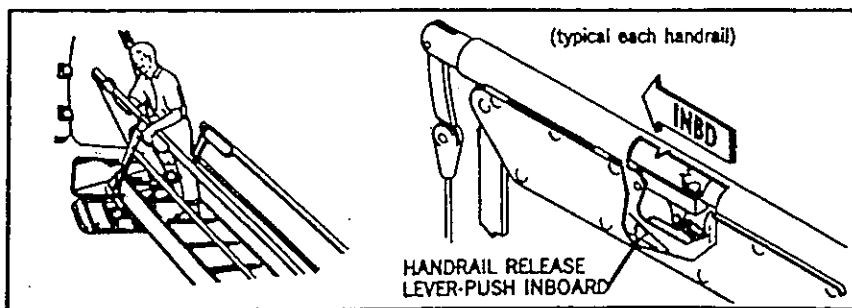
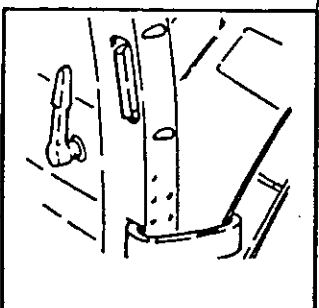
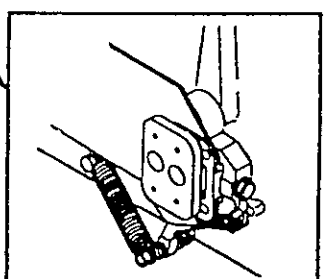
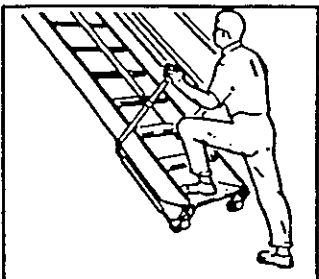
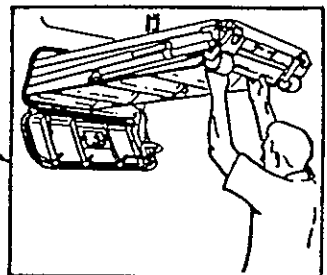
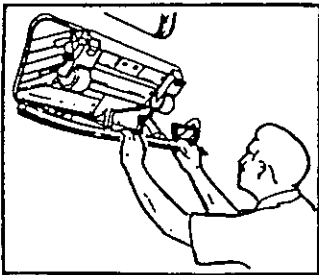
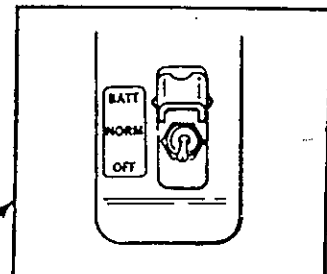
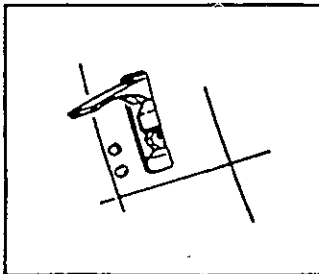
NOTE: Passenger forward entrance door must be unlatched before stairwell door can be unlatched.

CONDITION
MANUAL OPERATION OF STAIRWAY IF NO ELECTRICAL POWER IS AVAILABLE OR IF STAIRWAY ELECTRICAL SYSTEM MALFUNCTIONS

TO MANUALLY EXTEND PASSENGER FORWARD STAIRWAY

ACTION

1. Lift external handle to unlatch stairwell door.
2. Place power switch to OFF (located under external handle).
3. Pull out on stairwell door until top step is accessible.
4. Pull stairway out horizontally until fully extended, then pull down until rollers touch the ground.
5. Step on bottom step and push handrail toward doorway until stairway is fully extended.
6. Place detent latch in locked position.
7. Latch passenger forward entrance door open.
8. Push handrail manual release lever (one on each handrail) and extend handrail into doorway until detent is engaged.



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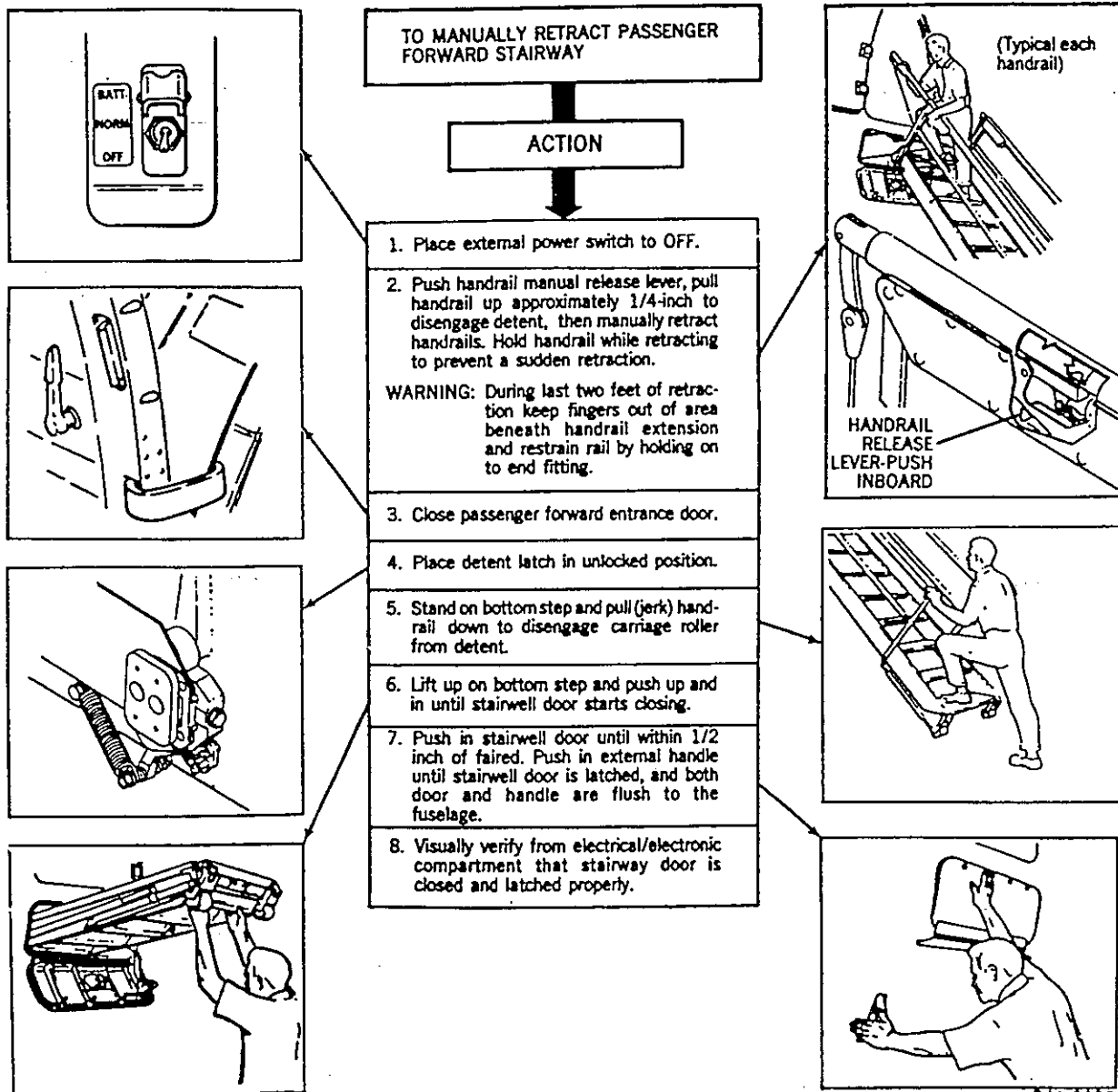
FLIGHT CREW OPERATING MANUAL

AIRPLANE GENERAL - NORMAL OPERATION -

Passenger forward stairway (sheet 2)

CONDITION

MANUAL OPERATION OF STAIRWAY IF NO ELECTRICAL POWER IS AVAILABLE OR IF STAIRWAY ELECTRICAL SYSTEM MALFUNCTIONS.



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FLIGHT CREW OPERATING MANUAL

AIRPLANE GENERAL - ABNORMAL OPERATION

**COCKPIT PREPARATION FOR
PASSENGER EVACUATION**

Cabin Attendants. ALERT

If time permits,

Alert ATC and ground crew.

Phase Of Flight



In flight

Just prior to landing,

Pressurization System. DEPRESSURIZE

NOTE

Manual control wheel forces will be high unless airspeed is low.

On ground

EMER LTS Switch. ON

After stopping,

Parking Brakes. SET

SPD BRK Lever RET

FLAP/SLAT Handle 28/LAND

NOTE

Flap position is for unobstructed egress from airplane. If airplane is at gate and ramp is congested with service vehicles, use good judgment to ensure maximum safety of passengers.

EMER PWR Switch (For VHF-1 Comm and PA) ON

FUEL Levers OFF

ENG FIRE Handles PULL

NOTE

If required, discharge fire agent.

Evacuation Command INITIATE

Initiate evacuation command on PA.

BATT Switch OFF

Section 3

1-30-0

ZL-CODE 1

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FLIGHT CREW OPERATING MANUAL

PASSENGER CABIN SMOKE OR FUME EVACUATION

Oxygen Masks and Smoke Goggles ON/100%

Combat smoke or fume source locally if practical.

Cockpit Air Outlets. ALL FULL OPEN

NO SMOKE/SEAT BELTS Switches ON

Descent To 9000 FT (terrain and conditions permitting) START

CABIN PRESSURE LDG ALT Selector Knob LDG ALT 10,000 FT

CABIN PRESSURE RATE LIMIT Control Knob MAX RATE

When airplane is below 10,000 feet,

CABIN ALT Control Lever/Wheel MAN/DEPRESSURIZED (VALVE OPEN)

Airspeed (Flaps and Slats as required) 160 to 250 KIAS

Right Forward Service Door Girt Bar DISENGAGE/STOW

Loose Items STOW

Remove all loose items within 3 feet of the door.

Passengers SEAT BELTS FASTENED

Verify all passengers are seated and seat belts are fastened.

Right Forward Service Door UNLATCHED

NOTE

High handle loads are required to unlatch the door. When unlatched, allow door to seek its own position against airstream. The door will remain centered over the opening.

(Continued)

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FLIGHT CREW OPERATING MANUAL

PASSENGER CABIN SMOKE OR FUME EVACUATION (Continued)

Passenger Aft Entrance Door UNLOCK/OPEN

CAUTION

Do not use emergency exit handle to open aft entrance door, as this action unlocks latches, jettisons tail cone and inflates escape slide.

NOTES

Position moveable headrest to up position, covering emergency exit handle. Use normal handle to open.

Moderately high handle loads are required to unlock door. Door will open inward and airflow will sweep smoke forward.

Smoke Origin/Severity DETERMINE

Eliminated

Right Forward Service Door CLOSE/LATCH

NOTE

It may be necessary to pull aft edge of door inward slightly to engage latch properly.

Right Forward Service Door Girt Bar ENGAGE

Passenger Aft Entrance Door CLOSE/LATCH

NOTE

Position moveable headrest to down position, exposing the emergency exit handle.

[END]

Not eliminated

Land as soon as practical.

Determine advisability and capability of closing right forward service door and engaging girt bar. If unsuccessful, plan to use other passenger exits in event emergency evacuation is required.

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FLIGHT CREW OPERATING MANUAL

DIGITAL LIGHTS FAILURE

NOTE

A short-to-ground failure of the ANNUN/DIGITAL LTS TEST button will result in all self-illuminated digital displays to read starbursts or 8's. Displays affected are:

Fuel Quantity

Flight Guidance Control Panel

VHF Nav Control Panels

Flight Mode Annunciators

WARNING LIGHT & TEST C/B (Lower EPC DC Bus Panel) PULL

[END]

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FLIGHT CREW OPERATING MANUAL

Chapter 2

AIR CONDITIONING AND PRESSURIZATION

TABLE OF CONTENTS

AIR LIBERTE INDUSTRIES

(SERIES 80)

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
LIMITATIONS	2-10-0	1	1/2	All
NORMAL OPERATION				
Air Conditioning On Ground, Engines Not Running And Using APU For Air Conditioning	2-20-0	1	1	All
Air Conditioning On Ground With Engines Running And Using APU For Supplemental Air Conditioning	2-20-0	1	2	All
Air Conditioning (Flight Or Ground) Using Engine Bleed Only	2-20-0	1	2	All
Ground Ventilation	2-20-0	1	3	All
Pressurization - Prior To Start	2-20-0	1	3	All
Pressurization - After Takeoff	2-20-0	1	4	All
Pressurization - Descent	2-20-0	1	4	All
Cabin Altitude And Differential Pressure (Chart)	2-20-0	1	5	All
Takeoff With Air Conditioning Packs Off	2-20-0	1	6	All

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FLIGHT CREW OPERATING MANUAL

Chapter 2

AIR CONDITIONING AND PRESSURIZATION

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AIR LIBERTE INDUSTRIES

(SERIES 80)

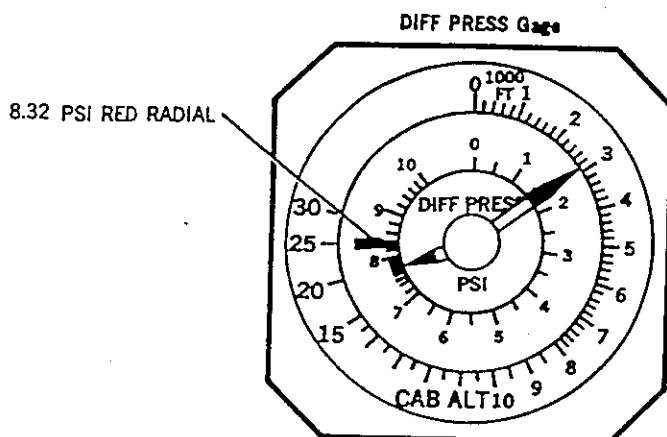
Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
LIMITATIONS	2-10-0	1	1/2	All
NORMAL OPERATION				
Air Conditioning On Ground, Engines Not Running And Using APU For Air Conditioning	2-20-0	1	1	All
Air Conditioning On Ground With Engines Running And Using APU For Supplemental Air Conditioning	2-20-0	1	2	All
Air Conditioning (Flight Or Ground) Using Engine Bleed Only	2-20-0	1	2	All
Ground Ventilation	2-20-0	1	3	All
Pressurization - Prior To Start	2-20-0	1	3	All
Pressurization - After Takeoff	2-20-0	1	4	All
Pressurization - Descent	2-20-0	1	4	All
Cabin Altitude And Differential Pressure (Chart)	2-20-0	1	5	All
Takeoff With Air Conditioning Packs Off	2-20-0	1	6	All

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FLIGHT CREW OPERATING MANUAL

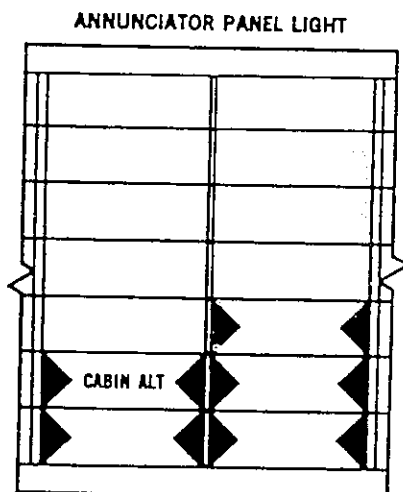
AIR CONDITIONING AND PRESSURIZATION - LIMITATIONS

TAKEOFF AND LAND UNPRESSURIZED



Normal Maximum Differential Pressure 7.77 (± 3) psi
 Maximum Relief Valve Differential pressure 8.32 psi

Cabin Pressure Rate Controller .. Min. 40 FPM Max. 860 FPM Descent
 Min. 100 FPM Max. 2000 FPM Climb



CABIN ALT (RED) 9,500 (+500,-0) feet Cabin altitude

Supply Air Pressure Max. Regulating 27 $\pm$ 2 psi (engine supply)
 31 - 40 psi (APU supply with engine throttles in idle)
 HP Bleed Regulating (air conditioning) 21 $\pm$ 2 psi

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FLIGHT CREW OPERATING MANUAL

AIR CONDITIONING AND PRESSURIZATION - NORMAL OPERATION

**AIR CONDITIONING ON GROUND,
ENGINES NOT RUNNING AND USING
APU FOR AIR CONDITIONING**

CABIN ALT Control Lever AUTO/VALVE OPEN
PNEU X-FEED VALVE Levers OPEN
APU AIR Switch SET

NOTE

If cabin temperature is 75°F or higher, move APU AIR switch to AIR COND COLDER. If cabin temperature is below 75°F, move APU AIR switch to ON.

AIR CONDITIONING SUPPLY Switches AUTO

NOTES

Due to high electrical loads of heat exchanger cooling fans, they should be turned on one at a time.

When using APU generator for electrical power, two air conditioning units on may exceed 100% limit on APU generator.

If AIR CONDITIONING PRESS gages indicate less than 12 psi, operate only one air conditioning system.

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FLIGHT CREW OPERATING MANUAL

AIR CONDITIONING ON GROUND WITH ENGINES RUNNING AND USING APU FOR SUPPLEMENTAL AIR CONDITIONING

PNEU X-FEED VALVE Levers LEFT OPEN/RIGHT CLOSE
CABIN ALT Control Lever AUTO
Outflow Valve Position Indicator VALVE OPEN
AIR CONDITIONING SUPPLY Switches AUTO
APU AIR Switch ON

NOTE

Do not select AIR COND COLDER position. ON position provides best combination of air flow and refrigeration for this condition.

CKPT and CABIN TEMP Selectors AUTO (DOT)

Adjust temperature selectors as desired.

AIR CONDITIONING (FLIGHT OR GROUND) USING ENGINE BLEED ONLY

AIR CONDITIONING SUPPLY Switches AUTO
CKPT and CABIN TEMP Selectors AUTO (DOT)

Adjust temperature selectors as desired.

NOTE

To obtain maximum refrigeration during ground operations, gradually advance engine power until supply pressures cease to rise (Approximately 21 psi).

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FLIGHT CREW OPERATING MANUAL

GROUND VENTILATION

NOTE

This procedure may be used to provide ventilation when pneumatics are not available.

CABIN ALT Control Lever AUTO
Outflow Valve Position Indicator VALVE OPEN
Right AIR CONDITIONING SUPPLY Switch AUTO OR HP BLD OFF
RAM AIR Switch ON

PRESSURIZATION - PRIOR TO START

CABIN ALT Control Lever AUTO
Outflow Valve Position Indicator VALVE OPEN
CABIN PRESSURE System Selector Switch PRIMARY
STDBY ON and TRANSFR LOCKOUT Lights OFF

NOTES

Occasional system transfers may occur on the ground during electrical checks and/or power transfers and both the TRANSFR LOCKOUT and STDBY ON lights will be on. This is normal. To turn the lights off, move the system selector switch to STDBY then back to PRIMARY and push to reset the TRANSFR LOCKOUT switch-light.

If light(s) remain on, only single system operation is available.

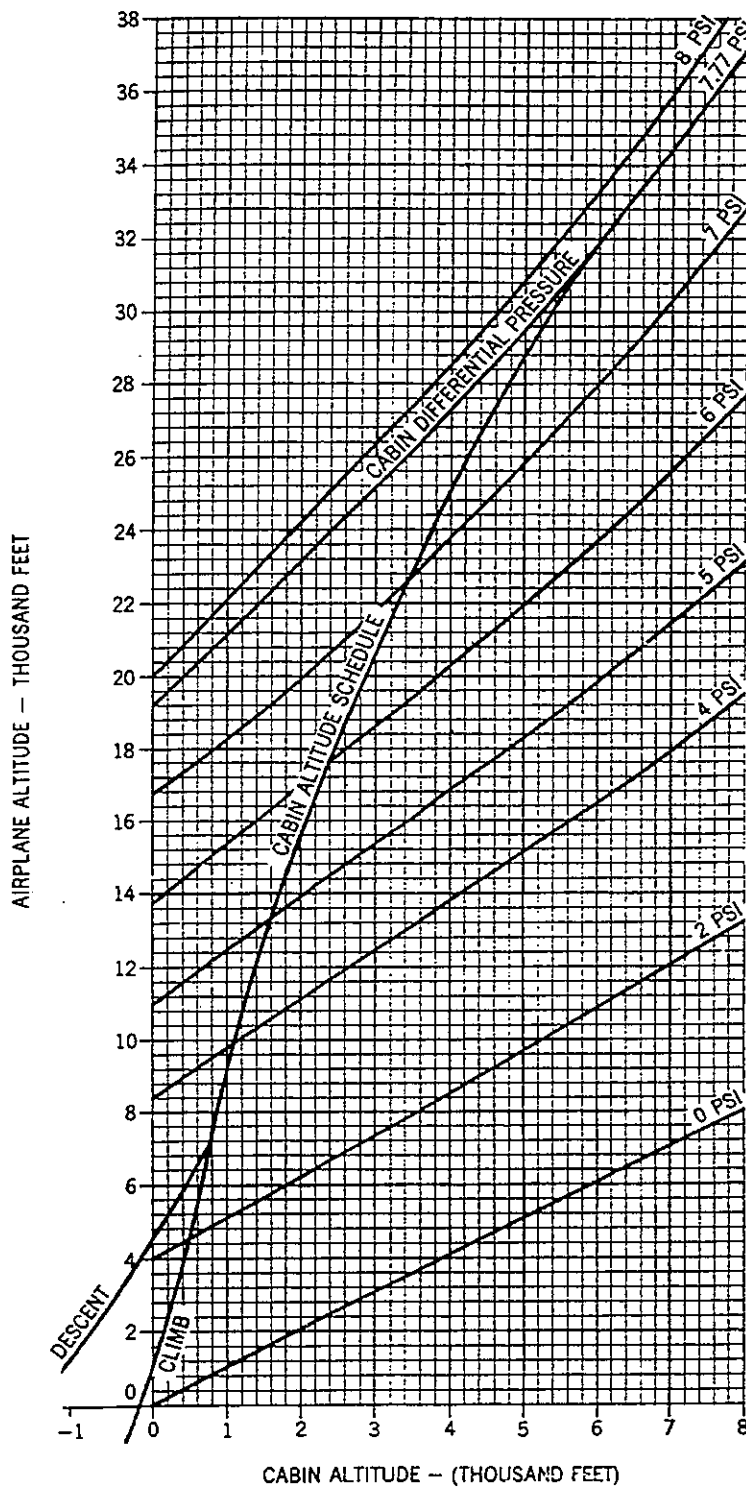
LDG ALT SET DESTINATION AIRPORT ALTITUDE
LDG BARO SET DESTINATION
ALTIMETER SETTING
(WHEN KNOWN)
RATE LIMIT SET AT INDEX MARK

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FLIGHT CREW OPERATING MANUAL

AIR CONDITIONING AND PRESSURIZATION - NORMAL OPERATION

CABIN ALTITUDE AND DIFFERENTIAL PRESSURE



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FLIGHT CREW OPERATING MANUAL

TAKEOFF WITH AIR CONDITIONING PACKS OFF

NOTE

This procedure is based upon use of Airport Analysis Charts for takeoff with both air conditioning packs off. It allows for extra gross weight for takeoff.

Prior to takeoff,

AIR CONDITIONING SUPPLY Switches OFF

After takeoff (not below 400 feet AGL),

AIR CONDITIONING SUPPLY Switches AUTO

NOTE

AIR CONDITIONING SUPPLY switches must be in Auto prior to selecting climb power to prevent NO MODE light from illuminating.

[END]

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FLIGHT CREW OPERATING MANUAL

AIR CONDITIONING AND PRESSURIZATION - ABNORMAL OPERATION

AIR COND SUPPLY TEMP HI LIGHT ON

Associated PNEU X-FEED VALVE Lever CLOSE

NOTE

With CL selected on TRI, NO MODE light will come on and EPR LIM flag will come into view. Selecting MCT or CR will cause NO MODE light to go off and will remove EPR LIM flag.

Associated AIR CONDITIONING SUPPLY Switch HP BLD OFF

After one minute,

AIR COND SUPPLY TEMP HI Light CHECK



On

Continue flight in established configuration.

AIR CONDITIONING PRESS Gage MONITOR



Normal

[END]

Goes to zero (confirms pack overheat and automatic shutdown)

Associated AIR CONDITIONING SUPPLY Switch OFF

[END]

Off

Continue flight in established configuration.

For airplanes without S/B 21-130 or production equivalent,

NOTES

AIR COND SUPPLY TEMP HI light may come on, when no problem exists, at altitudes above 35,000 feet or at other altitudes when selecting engine anti-ice without simultaneously selecting airfoil anti-ice.

When below 30,000 feet, attempt to restore automatic operation.

If automatic operation can be restored, system operation is normal.

If automatic operation cannot be restored to at least one pack, it may be necessary to advance throttle(s) to maintain normal cabin pressure.

[END]

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FLIGHT CREW OPERATING MANUAL

CABIN DIFFERENTIAL PRESSURE UNCONTROLLABLE, OFF SCHEDULE OR OSCILLATES

System Selector Switch. STDBY

Pressurization Condition. DETERMINE



Normal

Continue flight in standby.

[END]

Uncontrollable

CABIN ALT Control Lever MANUAL

NOTE

Be prepared to hold CABIN ALT control wheel firmly. Control wheel and indicator will move forward toward VALVE CLOSE position with varying force depending on cabin differential pressure. This force is high when differential pressure is at maximum.

Push in and attempt to move CABIN ALT control wheel.



CABIN ALT control wheel and indicator move

Refer to Abnormal Procedures, Air Conditioning and Pressurization -
MANUAL PRESSURIZATION CONTROL.

[END]

CABIN ALT control wheel and indicator jammed

NO SMOK Switch ON

NOTE

This will help to reduce cabin air contamination during
remainder of the flight.

Terrain and conditions permitting,

Descent (TO BELOW 10,000 FT) INITIATE

(Continued)

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FLIGHT CREW OPERATING MANUAL

CABIN DIFFERENTIAL PRESSURE UNCONTROLLABLE, OFF SCHEDULE OR OSCILLATES (Continued)

AIR CONDITIONING SUPPLY Switch ONE OFF

Maintain a comfortable cabin rate of descent by varying throttle position
on side of operating air conditioning system.

When below 10,000 feet,

AIR CONDITIONING SUPPLY Switches BOTH OFF

NOTE

Cabin altitude may be below sea level. When cabin altitude
indicates 2000 feet above destination altitude, continue
descent, approach and landing.

RAM AIR Switch ON

NOTE

Cabin altitude and airplane altitude will descend at same
rate.

After landing,

Clearview Window(s) OPEN

NOTES

Air conditioning may be resumed for passenger comfort.

Do not close clearview windows after restarting air
conditioning systems.

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FLIGHT CREW OPERATING MANUAL

DISPATCH FOR FLIGHT UNPRESSURIZED

CABIN PRESSURE CONTROL C/B's (4)
(Upper and Lower EPC)

PULL

CABIN ALT Control Lever MANUAL

Move CABIN ALT control lever to manual (down) position

Outflow Valve Position Indicator VALVE OPEN

Push in and rotate CABIN ALT control wheel until valve position indicator
moves to VALVE OPEN.

NOTE

Valve position indicator should remain in this position
throughout flight.

Use normal air conditioning procedures.

NOTE

Flight altitude must be limited to 10,000 feet. At altitudes
above 9500 feet, expect vocal warning and horn to sound
and CABIN ALT and MASTER WARNING lights to come on.

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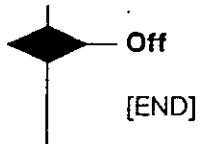
FLIGHT CREW OPERATING MANUAL

FLOW LIGHT ON

Throttles (If At Low Power). ADJUST

If throttles are at low power (conditions permitting) advance throttles until air conditioning supply pressure ceases to rise (approximately 21 psi).

FLOW Light



On and cabin continues to depressurize

Descend to an altitude where normal pressurization can be maintained.

[END]

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FLIGHT CREW OPERATING MANUAL

MAINTAINING CABIN DIFFERENTIAL PRESSURE DURING IDLE DESCENT WITH ONE HIGH PRESSURE BLEED

Number of Operational AIR CONDITIONING Systems



Both

PNEU X-FEED VALVE Levers OPEN

[END]

One

Throttle (Engine Supplying Bleed Air) SLOWLY ADVANCE

Slowly advance throttle until AIR CONDITIONING SUPPLY PRESS gage indicator ceases to rise (approximately 21 psi). Adjust as required.

Speed Brakes AS REQUIRED

[END]

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FLIGHT CREW OPERATING MANUAL

MANUAL PRESSURIZATION CONTROL

CABIN ALT Control Lever MANUAL

Move cabin altitude control lever to manual (down) position

Outflow Valve Position Indicator VALVE OPEN

Push in and rotate CABIN ALT control wheel until outflow valve position indicator moves to VALVE OPEN.

NOTE

Prior to moving AIR CONDITIONING SUPPLY switches to AUTO, check manual operation of CABIN ALT control wheel and outflow valve position indicator by pushing in and rotating wheel to position outflow valve position indicator to VALVE CLOSE then return to VALVE OPEN.

Altitude Scheduled Placard CHECK

Determine cabin altitude from cabin versus airplane altitude scheduled placard on cabin pressure selector panel.

NOTE

Cabin pressure must be manually controlled to maintain desired cabin altitude. Lower altitude values at cruise will result in excessive differential pressures which will activate relief valves.

Air Conditioning AS REQUIRED

Use normal air conditioning procedures.

After takeoff (as soon as practical),

Outflow Valve Position Indicator 1/3 VALVE CLOSE

Push in and rotate CABIN ALT control wheel to position outflow valve position indicator 1/3 of quadrant toward VALVE CLOSE then release.

After clean up during climb,

Outflow Valve Position Indicator ADJUST 500 FPM CLIMB

(Continued)

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FLIGHT CREW OPERATING MANUAL

MANUAL PRESSURIZATION CONTROL (Continued)

NOTES

Throughout flight, prior to engine power changes, CABIN ALT control wheel and outflow valve position indicator position should be coordinated with throttle movement.

Hold CABIN ALT control wheel firmly when adjusting as it will tend to move toward VALVE CLOSE at varying force depending on cabin differential pressure.

At cruise cabin altitude,

Outflow Valve Position Indicator ADJUST TO
ZERO RATE

At start of descent,

Outflow Valve Position Indicator ADJUST TO
300 FPM
DESCENT

Hold CABIN ALT control wheel firmly and be prepared to control rate of change to zero. Reduce engine power slowly, and move wheel toward VALVE CLOSE to compensate for bleed air reduction.

When engine power is reduced to desired level, adjust CABIN ALT control wheel to obtain a 300 FPM rate-of-descent. Monitor cabin rate-of-descent closely and be prepared to make adjustments during engine power changes.

When cabin altitude is 2000 feet above destination field elevation,

Outflow Valve Position Indicator VALVE OPEN

Maintain cabin rate at zero until cabin altitude equals airplane altitude. Slowly move CABIN ALT control wheel to position outflow valve position indicator to VALVE OPEN. Wheel and indicator should remain in this position for remainder of flight.

NOTE

During approach and landing, cabin altitude will decrease at same rate as airplane altitude.

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FLIGHT CREW OPERATING MANUAL

RADIO FAN OFF LIGHT ON

Inflight,

RADIO RACK Switch VENTURI

NOTE

If only one engine system is supplying cabin pressure, it may not be possible to hold desired differential pressure. If so, move RADIO RACK switch to FAN.

After parking,

Electrical Power AS REQUIRED

NOTES

After landing, RADIO FAN OFF light will come on.

Prolonged use of airplane electrical systems for ground operations will cause overheating of radio and electronic equipment.

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FLIGHT CREW OPERATING MANUAL

TRANSFR LOCKOUT AND STDBY ON LIGHTS ON

NOTES

STDBY ON light on indicates pressurization system has automatically transferred to standby mode.

TRANSFR LOCKOUT light on indicates pressurization system automatic transfer feature is locked out.

Do not push to reset TRANSFR LOCKOUT and STDBY ON lights if both are on.

System Selector Switch. STDBY THEN PRIMARY

STDBY ON Light. OBSERVE



NOTE

TRANSFR LOCKOUT light will also be on.

No further action is required. Pressurization system is now limited to one normal system with no standby capability.

[END]

Off

TRANSFR LOCKOUT Light. PUSH

Push to reset TRANSFR LOCKOUT light.

TRANSFR LOCKOUT Light. OBSERVE



Continue normal operation.

[END]

On

No further action required. Pressurization system is now limited to one normal system with no standby capability.

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FLIGHT CREW OPERATING MANUAL

TRANSFR LOCKOUT LIGHT ON

System Selector Switch. STDBY THEN PRIMARY

Move selector switch to STDY then back to PRIMARY.

TRANSFR LOCKOUT Light PUSH

Push to reset TRANSFR LOCKOUT light

TRANSFR LOCKOUT Light OBSERVE



Off

Continue normal operation.

[END]

On

No further action required. Pressurization system is now limited to one normal system with no standby capability.

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FLIGHT CREW OPERATING MANUAL

SUPPLY PRESSURE DROPS TO ZERO

Applicable AIR CONDITIONING SUPPLY Switch. OFF

NOTE

Selecting OFF will allow pack temperatures to decrease to normal values to allow reinstating system. Allow sufficient time for cooling.

■ Applicable TEMP CONTROL VALVE Indicator

Indicates in HOT range

Rotate TEMP selector toward COLD.

Indicates in COLD range

■ Rotate TEMP selector toward HOT.

Applicable AIR CONDITIONING SUPPLY Switch. AUTO

■ Supply Pressure

Pressure remains at zero

Pack is inoperative.

[END]

Pressure increasing

Applicable TEMP Selector AS DESIRED

Rotate TEMP selector to desired position. Monitor VALVE position indicator for response. If no response is observed, take over manual operation of system.

[END]

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FLIGHT CREW OPERATING MANUAL

Chapter 3

AUTOMATIC FLIGHT

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AIR LIBERTE INDUSTRIES

(SERIES 80)

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
LIMITATIONS	3-10-0	3	1	All
NORMAL OPERATION				
Profiles				
Takeoff and Climb	3-20-0	17/23	1	Use CODE 17 for FSN's 49576 and 49662
Turbulence/Severe Rain/ Ice Penetration	3-20-0	17/23	3	Use CODE 23 for all FSN's except 49576 and 49662
Altitude Preselect and Advisory	3-20-0	17/23	4	
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Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
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Select Flight Director/ Autopilot Takeoff Mode	3-20-5	29/44	2	Use CODE 44 for all FSN's except 49576
Noise Abatement Climb Segment	3-20-5	29/44	5	
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FLIGHT CREW OPERATING MANUAL

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
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Plan	3-20-10	5	1	All
Plan (POA Inactive)	3-20-10	5	8	All
Climb	3-20-10	5	9	All
Climb (POA Inactive)	3-20-10	5	13	All
Cruise	3-20-10	5	14	All
Cruise (POA Inactive)	3-20-10	5	22	All
Descent	3-20-10	5	23	All
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FLIGHT CREW OPERATING MANUAL

AUTOMATIC FLIGHT - LIMITATIONS

AUTOMATIC RESERVE THRUST (ART)

ART system must be off when using takeoff flex mode of thrust rating system.

MACH TRIM COMPENSATOR

Maximum airspeed with an inoperative or malfunctioning mach trim compensator is 0.78 M or (0.76 M MD-87's).

AUTOPILOT

During takeoff, do not engage autopilot below 200 feet AGL.

For airplanes with DFGC's prior to -930, autopilot must be disconnected if an engine failure is encountered while in the autopilot takeoff mode. Autopilot may be re-engaged after airplane is retrimmed.

Do not conduct an auto coupled (ILS or autoland) approach if AP TRIM light comes on and remains on longer than three seconds after airplane is stabilized and tracking glideslope.

AHRS COMPASS CONTROLLERS (If Installed)

Compass Controllers should not be used to slew the heading in flight after an in-flight align as this may result in attitude errors.

AUTOLAND

An autoland preflight test must be completed if use of autoland is anticipated for that flight.

Do not conduct autoland operations if:

Align (ALN) mode is not annunciated on an FMA by 100 feet radio altitude.

Either engine becomes inoperative at an altitude of greater than 50 feet above runway.

Any unusual control position or other abnormal conditions exist in manual flight control system.

Autoland system is limited to following wind conditions:

Headwinds to 25 knots.

Tailwinds to 10 knots.

Crosswinds to 15 knots.

REDUCED VERTICAL SEPARATION MINIMUMS (RVSM)

Manual switching to the alternate static system is prohibited for RVSM operation.

(Continued)

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FLIGHT CREW OPERATING MANUAL

PERFORMANCE MANAGEMENT SYSTEM (PMS) (If Installed)

The accuracy of PMS has not been demonstrated, therefore, airplane range calculations and fuel management must not be predicated on its use.

PMS with the -002 program is not approved for engine out configuration.

WINDSHEAR GUIDANCE (If installed)

Use of windshear guidance with one engine inoperative has not been demonstrated.

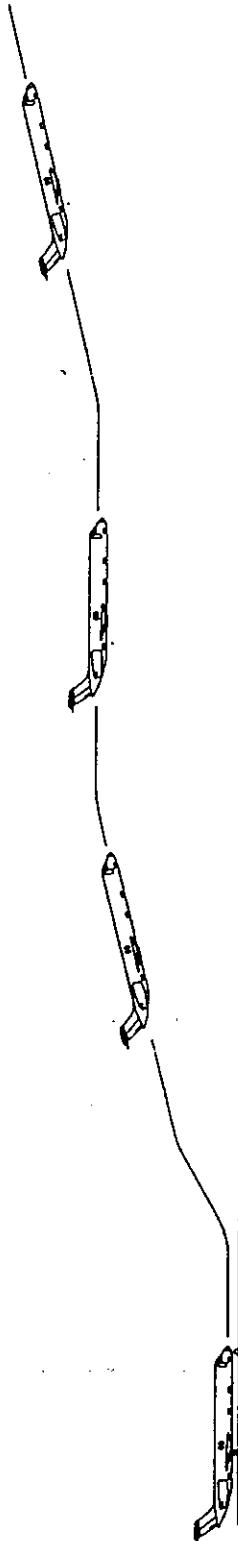
During sustained banks greater than 15 degrees or during flap configuration changes, the Honeywell Windshear Detection and Recovery Guidance System (WSS) is desensitized and alerts resulting from encountering windshear conditions will be delayed.

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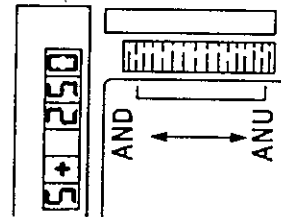
FLIGHT CREW OPERATING MANUAL

TAKEOFF AND CLIMB

EXAMPLE: ATC clears to FOXTROT VOR, climb and maintain FL 350, maintain runway heading for VECTORS.



PRIOR TO TAKEOFF	1500 FOOT - CLIMB POWER	3000 FOOT SEGMENT FLAP/SLAT RETRACTION AND ACCELERATION	ENROUTE CLIMB SEGMENT BELOW 10,000 FEET
CLMP TAK OFF TAK OFF ALT	EPR CL HDG SEL ALT TAK OFF	EPR CL HDG SEL ALT IAS	EPR CL HDG SEL ALT IAS
T.O. or T.O. FLX Mode Button PUSH FD Sw FD SPD/MACH Readout SET (Rotate to 250) Heading Readout SET (Rotate to runway heading) Bank Limit Sel SET 15° TO/GA Button PUSH (TAK OFF will be displayed in roll and pitch FMAs) ALT Readout SET 35,000 Throttles VERTICAL Advance throttles to 1.4 EPR or 80% N₂ (throttles to approximately vertical) and check to see that EPR's are approximately matched. ATS Sw AUTO THROT Throttles advance to EPR LIM as displayed on TRI. (EPR TO will be displayed in ATS FMAs) ATS Clamp (CLMP) Mode will engage at 60 knots and ATS FMAs will change from EPR TO to CLMP. Airplane airborne: AP Sw AP ON	CL Mode Button PUSH (Disengages CLMP Mode and establishes EPR Climb limit. CLMP Mode of ATS can be disengaged after takeoff by pressing the MCT, CR, CL, or GA button on the TRP.) EPR CL is displayed in the autothrottle FMA. If a heading change is required, rotate heading bug to desired heading and pull Heading Select Knob. HDG SEL is displayed in the roll FMA.	IAS/MACH Button PUSH Push IAS/MACH button. Pitch readout will display "S" followed by the numeric indicated airspeed, and IAS will be displayed in the pitch window of the FMA. Adjust the pitch wheel to set the desired IAS (normally 250 kts). The digital flight guidance computer will automatically adjust autopilot/flight director pitch commands to maintain desired airspeed.	Flaps/Slats RETRACT Retract flaps and slats when on the required airspeed.



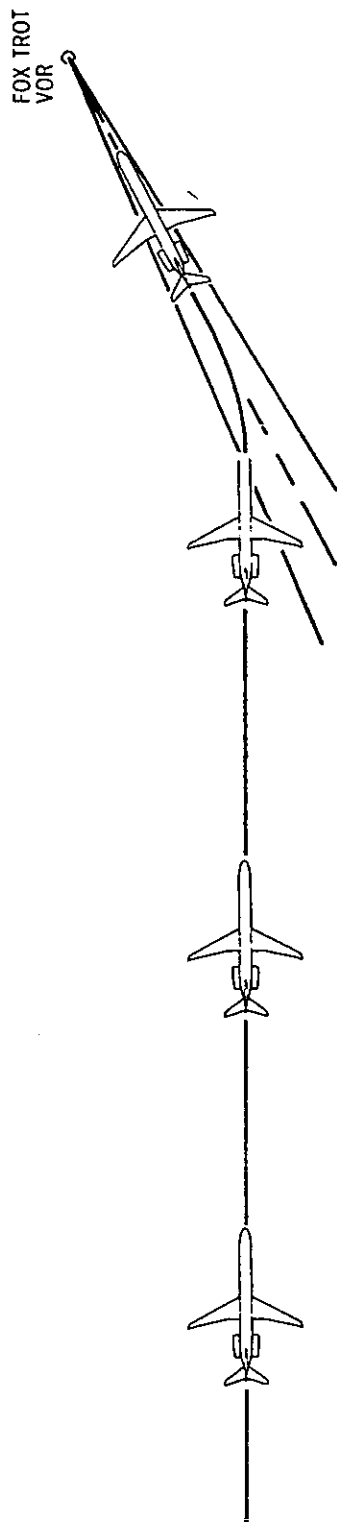
CAG(IIGDS)

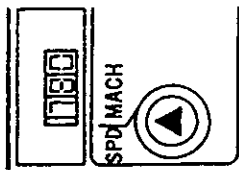
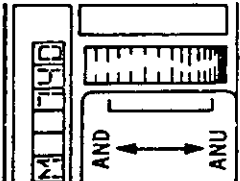
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FLIGHT CREW OPERATING MANUAL

TAKEOFF AND CLIMB (Continued)



TRANSITION 10,000 FEET	ENROUTE CLIMB	ENROUTE CLIMB (Continued)	CRUISE
EPR CL HDG SEL IAS	EPR CL HDG SEL IAS	EPR CL VOR ALT HDG SEL MACH	MACH 780 VOR TRK ALT HLD
Rotate pitch wheel toward AND at 10,000 feet and set the next climb airspeed in pitch readout. The EGS will now respond to new airspeed and will adjust pitch as required to maintain it. (Autopilot sw in AP ON).	SPD/MACH Readout SET Speed is presently primary in SPD MACH readout. MACH is desired for cruise. Push SPD MACH knob to maximum detent. Last used Mach value is now present in SPD MACH readout. Rotate knob to set desired Mach number. Release SPD MACH knob to normal position. Mach is now primary in SPD MACH readout. 	IAS/MACH Button PUSH Observe pitch FMAs change to MACH. Pitch readout will display "M" followed by numeric indicated climb mach.  VHF NAV Readout SET Set required VOR frequency and identify CRS Readout SET Set desired VOR course in CRS readout. VOR LOC Button PUSH Observe VOR appears in arm FMAs.	As airplane enters VOR capture zone the arm FMAs go blank and VOR CAP appears in roll FMAs. After acquiring course center-line, roll FMAs change to VOR TRK. When Altitude Capture (ALT CAP) mode engages, the ATS FMAs will change from EPR CL mode to MACH mode for cruise. Note that the selected Mach number is displayed below MACH in the FMAs. When on selected altitude, pitch FMAs will engage into altitude hold mode. CR Mode Button PUSH Establishes maximum EPR limit for cruise.

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FLIGHT CREW OPERATING MANUAL

TURBULENCE/SEVERE RAIN/ICE PENETRATION

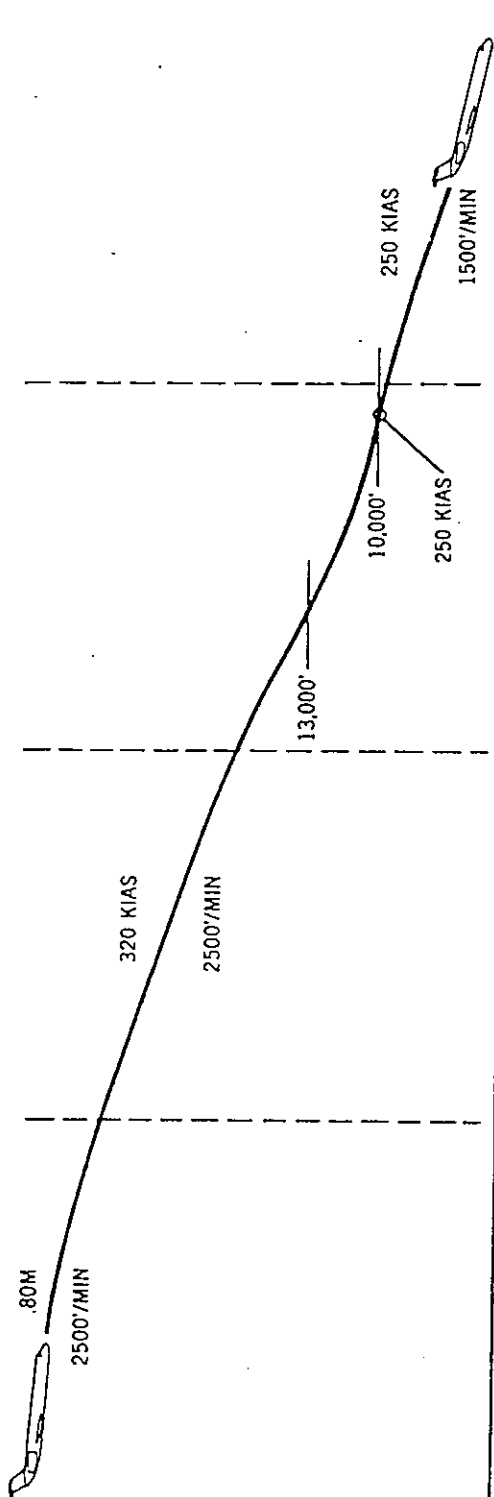
INITIAL CRUISE CONDITION	PENETRATION	RESUMING NORMAL CRUISE CONDITION
MACH 780 VOR TRK ALT HLD	WNG LVL TURB	MACH 780 HDG HLD ALT HLD
FD Sws ED AP Sw AP ON ATS Sw AUTO THROT SPD MACH Readout SET AS REQD	TURB Button PUSH Observe the following: Autothrottle sw drops to OFF and red flashing ATS lights come on. SPD MACH reference remains the same. Pitch reference is now displayed in pitch readout. "P" followed by a "+" or "-" followed by the degrees pitch being commanded on flight director command bars. Rotation of pitch wheel varies value displayed in readout. Command bars provide wings level and pitch commands. Autopilot remains engaged. FAST/SLOW pointer displays speed deviation from reference value. Auto pitch trim inhibited while in TURB Mode. FMA's display WNG LVL in roll and TURB in pitch.	Arming or engaging any FGS roll or pitch mode will disengage the TURB Mode. When TURB Mode is no longer desired: ALT HOLD Button PUSH When on desired altitude, push ALT HOLD button and observe FMA's display HDG HLD and ALT HLD. ATS Sw AUTO THROT Observe ATS engage into MACH SEL Mode and display the last selected mach number.

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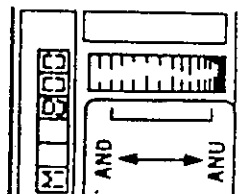
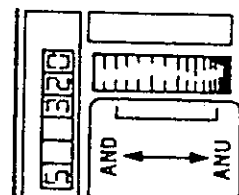
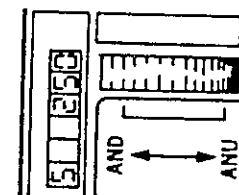
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FLIGHT CREW OPERATING MANUAL

DESCENT



MACH SPEED SCHEDULE	IAS SPEED SCHEDULE	TRANSITION TO 250 KIAS	DESCENT AT 250 KIAS
CLMP ALT HDG SEL MACH FD Sws AUTO THROT ATS Sw AP ON ALT Readout SET/ARM For cleared altitude. Pitch Wheel SELECT Verify throttle in idle. IAS/MACH Button PUSH Observe ATS FMAs change to CLMP and flash 5 seconds and pitch FMAs change to MACH. Verify throttles are in idle after CLMP is annunciated. Pitch Profile will display "M" followed by numeric indicated mach.	CLMP ALT HDG SEL IAS SPD/MACH Readout SET Upon intercepting 320 KNOTS, IAS/MACH Button PUSH Observe pitch FMAs change to IAS. Pitch readout will display "S" followed by 320.	CLMP ALT HDG SEL IAS At 13,000 feet, Rotate pitch wheel until pitch readout displays "S" followed by 250. Above action will cause airplane to pass thru 10,000 feet at 250 knots.	CLMP ALT HDG SEL IAS SPD MACH Readout SET Adjust as required for flap/slat configurations. ATS FMA's will change automatically to speed set in SPD/MACH readout at altitude capture. Automatic altitude capture will occur when reference altitude is reached.

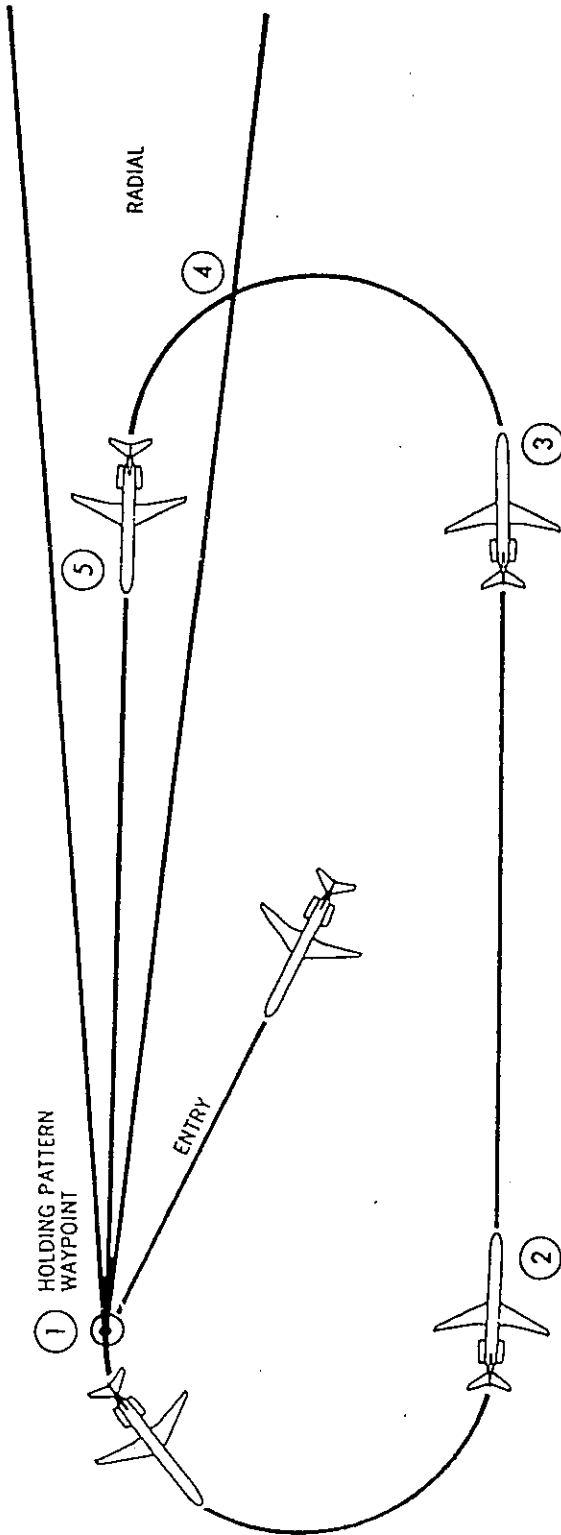


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FLIGHT CREW OPERATING MANUAL

HOLDING PATTERN



1 CROSSING FIX	2 OUTBOUND LEG	3 TURNING INBOUND WITH ALTITUDE CHANGE	4 INTERCEPTING INBOUND LEG	5 INBOUND LEG
SPD 210 ALT HLD HDG SEL VOR ALT FGS tracks inbound track and at selected altitude ALT CAP and then ALT HLD will be displayed in pitch FMAs.	SPD 210 ALT HLD HDG SEL VOR ALT FGS captures inbound track.	SPD 210 ALT HLD HDG SEL VOR ALT FGS tracks inbound track and at selected altitude ALT CAP and then ALT HLD will be displayed in pitch FMAs.	SPD 210 ALT HLD HDG SEL VOR ALT FGS captures inbound track.	SPD 210 ALT HLD HDG SEL VOR ALT FGS tracks inbound track and at selected altitude ALT CAP and then ALT HLD will be displayed in pitch FMAs.

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FLIGHT CREW OPERATING MANUAL

A line drawing of a ship's hull and propeller assembly. The drawing shows the hull, the propeller, and the rudder. The hull is shown in profile, with the propeller and rudder extending from the stern. The drawing is oriented vertically, with the hull at the top and the propeller and rudder at the bottom. The drawing is a simple line drawing, with no shading or color.

APPROACH				TO/GA BUTTON PUSHED AT DECISION HEIGHT			GO-AROUND MANEUVER			MISSED APPROACH PROCEDURE			
SPD 145	FB GA	LOC TRK	G/S TRK	EPR GA	GO RND	GO RND	EPR GA	GO RND	GO RND	EPR CL	ALT HLD	HDG HLD	VERT SPD
FD Sws			ON										
AP Sw			OFF										
ATS Sw			ON										
ALT Readout			SET										
Flaps			FINAL APPROACH SETTING										

ALT Preselect Mode ARM
Pitch Wheel ROTATE
Rotate as required for guidance to
accelerate for flap/slat retraction.
CL Mode Button PUSH
SPD/MACH READOUT SET
AS DESIRED

If an immediate climbing turn is
required, engage HDG SEL Mode and
maintain GA in pitch axis (Bank angle
limit set 15°)

Example:

Flight director command bars command
fly up (Maximum 20° ANU).
FD command bars command go-around
speed for two engines operating, wings
level and then maintains heading existing
when roll attitude is less than 3°.
Pilot maneuvers airplane to satisfy pitch
and roll commands.

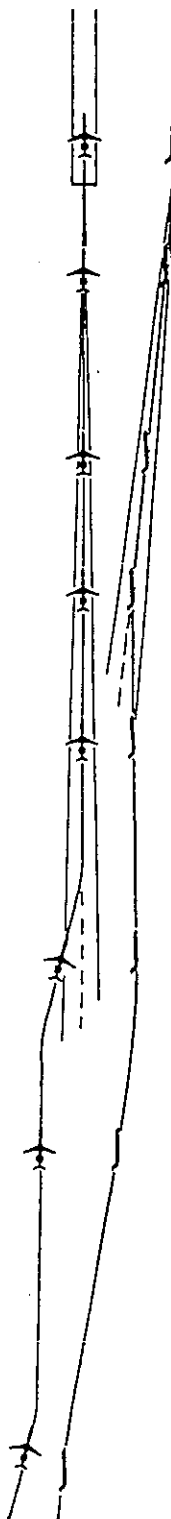
EPR GA ALT HDG SEL GO RND

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Section 3
3-20-0
ZL-CODE 17
Page 7

AUTOLAND



INITIAL CONDITION	MANEUVERING	INTERCEPT	LOC/TRACK	ALIGN 150° RADIO ALT.	TOUCH DOWN (WHEELS SPIN-UP)
FD SWS ON AP SW ON AP SW AP ON HDG SEL ENGAGED Mode GA Mode PUSH Burton SET DH Bug SET	SPY 165 [] ALT MLD [] MMA SEL SPY [] ALT [] ILS frequency and course tuned and identified. ALTN SET/ARM Readout For initial approach altitude Pitch Wheel ... ROTATE As required for descent. HDG Select as required for maneuvering.	SPY 165 [] HDG SEL [] ALT MLD [] LWR [] Airplane has captured selected altitude. SPD MACH Readout SET AS DESIRED HDG Select AS REQ'D To intercept localizer AUTO/LAND Button PUSH	SPY 135 [] LOC TRK MLD [] LWR [] After localizer track logic is satisfied, LOC TRK is displayed in roll FMAs. SPD MACH Readout SET Final approach speed.	SPY 135 [] ALN 150 [] ALT LND [] ALN is displayed indicating yaw and roll channels are performing forward slip maneuver to remove crab if necessary to align with center of localizer	RET D [] OUT [] Main gear spin-up ROL OUT (Roll Out) is displayed in the roll and pitch FMAs. Go-around is disarmed. NOSE GEAR STRUT COMPRESSION [] [] [] Airplane not certified for auto-roll. Five seconds after nose gear compression the autopilot automatically disconnects. Reverse thrust, the autothrottle system disconnects (no lights) ATS FMAs go blank. Roll and pitch FMA's change to HDG HLD and ALT HLD.
		SPY 165 [] LWR [] HDG SEL [] ALT MLD [] LOC CAP [] LOC CAP mode engages ALTN Readout SET For missed approach altitude.	SPY 135 [] AUT CL [] AUT LND [] PITCH FMAs will display G/S CAP as airplane maneuvers to get on glideslope center-line. When glideslope track logic is satisfied, pitch FMAs will change to G/S TRK. Any airplane or land based malfunction that affects ILS TRK mode will cause respective mode to disconnect and EGS will engage into its basic mode. Airplane below 1500 feet (R/A) and logic satisfied, AUT GA mode will engage. When autoland logic is complete, AUT/LND will be displayed in roll and pitch FMAs. NOTE: Parallel rudder failure while in Auto Land mode will result in autopilot disconnect.	RET D [] AUT CL [] ALT LND [] Retard (RETD) mode engages at approximately 50 feet. Throttles are automatically programmed to retard. Autopilot begins flare maneuver.	[] [] [] Altitude indicator set to 1500 feet. Autopilot disconnects. Reverse thrust, the autothrottle system disconnects (no lights) ATS FMAs go blank. Roll and pitch FMA's change to HDG HLD and ALT HLD.

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AUTOLAND ROLLOUT GUIDANCE

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FLIGHT CREW OPERATING MANUAL

 AUTOLAND

INITIAL CONDITION	MANEUVERING	INTERCEPT	LOC/TRACK	ALIGN 150' RADIO ALT.	TOUCH DOWN (WHEELS SPIN-UP)
FD Sws ON ATS Sw ON AP Sw AP ON HDG SEL ENGAGED Mode GA Mode PUSH DH Bug SET	ILS frequency and course tuned and identified. ALT Readout SET/ARM For initial approach altitude Pitch Wheel ... ROTATE As required for descent. HDG Select as required for maneuvering.	Airplane has captured selected altitude. SPD MACH Readout SET AS DESIRED HDG Select AS REQD To intercept localizer AUTO/LAND Button PUSH LOC CAP mode engages ALT Readout SET For missed approach altitude.	Alter localizer track logic is satisfied, LOC TRK is displayed in roll FMAs. SPD MACH Readout SET Final approach speed.	ALN is displayed indicating yaw and roll channels are performing forward slip maneuver to remove crab if necessary to align with center of localizer.	Main gear spin-up ROL OUT (Roll Out) is dis- played in the roll and pitch FMAs. Go-around is dis- armed.
			G/S TRACK Pitch FMAs will display G/S CAP as airplane maneuvers to get on glideslope center-line. When glideslope track logic is satisfied, pitch FMAs will change to G/S TRK. Any airplane or land based malfunction that affects ILS TRK mode will cause respective mode to dis- engage and FGS will engage into its basic mode. Airplane below 1500 feet (R/A) and logic satisfied, AUT GA mode will engage. When autoland logic is complete, AUT/LND will be displayed in roll and pitch FMAs. NOTE: Parallel rudder failure while in Auto Land mode will result in autopilot disconnect.	RETARD/FLARE 50' RADIO ALT. Retard (RET/D) mode engages at approximately 50 feet. Thrusts are automatically programmed to retard. Autopilot begins flare maneuver.	NOSE GEAR STRUT COMPRESSION Reverse thrust, the autothrottle system dis- connects (no lights) ATS FMAs go blank. Autopilot maintains air- plane position on runway centerline. The roll bars provide steering guidance.
					END OF LANDING ROLL Disengage autopilot. Roll and pitch FMAs change to HDG HLD and ALT HLD.

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FLIGHT CREW OPERATING MANUAL

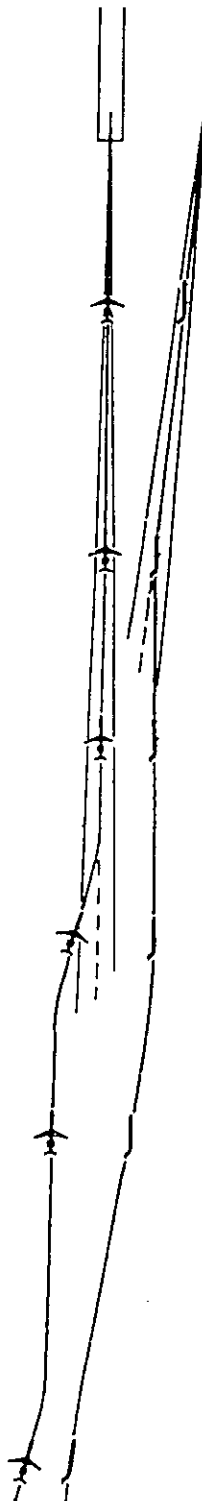
FLIGHT DIRECTOR MANUAL ILS APPROACH

INITIAL CONDITION	MANEUVERING	INTERCEPT	LOC CAP/TRK	GS CAP/TRK
SPD 210 HDG SEL ALT HLD FD SWS ON ATS Sw AUTO/THROT HDG SEL Mode ENGAGED DH Bug SET	SPD 210 ALT HDG SEL VERT SPD ILS frequency and course tuned and identified ALT Readout SET/ARM For initial approach altitude. Pitch Wheel ROTATE As required for descent HDG Select AS REQD For maneuvering. Airplane is manually flown to flight director commands.	SPD 210 ILS HDG SEL ALT HLD Airplane has captured selected altitude and flight director commands turn to final intercept heading. ALT Readout SET Set (but not armed) for missed approach altitude. The altitude advisory system is inhibited when flaps are extended beyond 30". GA MODE Button PUSH (Establishes maximum EPR limit for go-around) ILS Button PUSH	SPD 210 ILS LOC CAP ALT HLD At capture, LOC CAP is displayed in roll FMAs and flight director command bars command turn on course. ALFA SPD ILS LOC TRK ALT HLD When established on localizer, roll FMAs change to LOC TRK. SPD MACH Readout ... SET Final approach speed. ALFA SPD replaces SPD in ATS FMAs until flaps are in final approach setting.	SPD 145 ILS LOC TRK G/S TRK Glideslope Track logic is satisfied, and G/S TRK is displayed in the pitch FMAs. SPD 145 FD GA LOC TRK G/S TRK If flight director go-around logic is satisfied, FD GA is displayed in arm FMAs. If FD GA is not valid, MAN GA will be displayed. RETD FD GA LOC TRK G/S TRK Retard mode engages and RETD is displayed in ATS FMAs when radio altimeter senses retard altitude. RETD LOC TRK G/S TRK Main gear spin-up; go-around is disarmed, and arm FMAs are blanked. Reverse thrust. ATS disconnects (No lights) and ATS FMAs go blank. FD switches to OFF.

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FLIGHT CREW OPERATING MANUAL

AUTOPILOT COUPLED ILS APPROACH



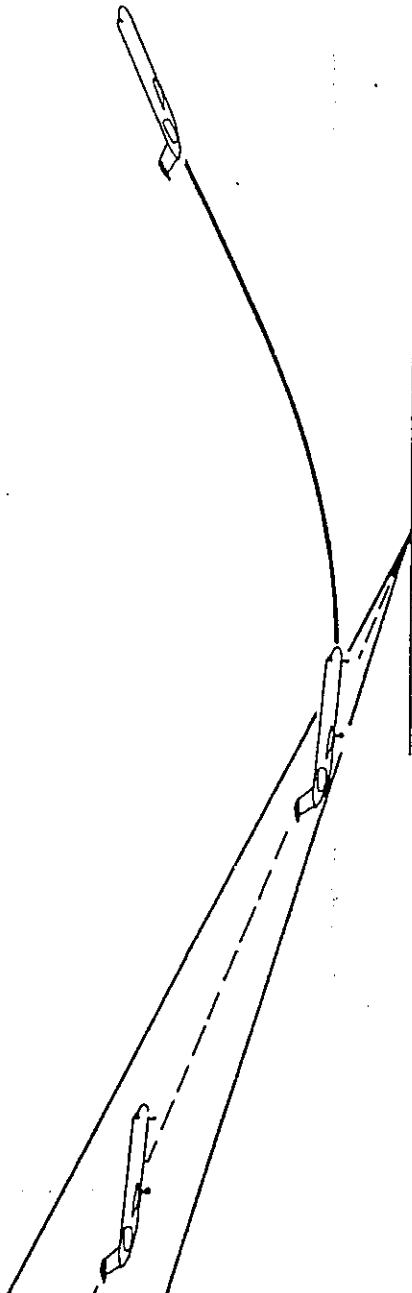
INITIAL CONDITION				MANEUVERING				INTERCEPT				LOC CAP/TRK				GS CAP/TRK								
FD SWS	ATS SW	AP SW	H/G Select Mode	FD SWS	ATS SW	AP SW	H/G Select Mode	FD SWS	ATS SW	AP SW	H/G Select Mode	FD SWS	ATS SW	AP SW	H/G Select Mode	FD SWS	ATS SW	AP SW	H/G Select Mode					
ON	AUTO/THROT	AP ON	ENGAGED	ILS frequency and course tuned and identified.	ALT Readout	SET/ARM	For initial approach altitude.	Autopilot has captured selected altitude and has placed airplane on intercept heading.	ALT Readout	Set (but not armed) for missed approach altitude. The altitude advisory system is inhibited when flaps are extended beyond 30°.	GA MODE Button	Establishes maximum EPR limit for go around.	ILS Button	Push	At capture, LOC CAP is displayed in roll FMAs, and autopilot automatically maneuvers the airplane to secure localizer center-line.	When established on localizer center-line the roll FMAs change to LOC TRK.	ALFA SPD	ILS	LOC TRK	ALT HLD	SPD 145	AUT GA	LOC TRK	G/S TRK
FD SWS	ATS SW	AP SW	H/G Select Mode	ILS frequency and course tuned and identified.	ALT Readout	SET/ARM	For initial approach altitude.	Autopilot has captured selected altitude and has placed airplane on intercept heading.	ALT Readout	Set (but not armed) for missed approach altitude. The altitude advisory system is inhibited when flaps are extended beyond 30°.	GA MODE Button	Establishes maximum EPR limit for go around.	ILS Button	Push	At capture, LOC CAP is displayed in roll FMAs, and autopilot automatically maneuvers the airplane to secure localizer center-line.	When established on localizer center-line the roll FMAs change to LOC TRK.	ALFA SPD	ILS	LOC TRK	ALT HLD	SPD 145	AUT GA	LOC TRK	G/S TRK
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FD SWS	ATS SW	AP SW	H/G Select Mode	ILS frequency and course tuned and identified.	ALT Readout	SET/ARM	For initial approach altitude.	Autopilot has captured selected altitude and has placed airplane on intercept heading.	ALT Readout	Set (but not armed) for missed approach altitude. The altitude advisory system is inhibited when flaps are extended beyond 30°.	GA MODE Button	Establishes maximum EPR limit for go around.	ILS Button	Push	At capture, LOC CAP is displayed in roll FMAs, and autopilot automatically maneuvers the airplane to secure localizer center-line.	When established on localizer center-line the roll FMAs change to LOC TRK.	ALFA SPD	ILS	LOC TRK	ALT HLD	SPD 145	AUT GA	LOC TRK	G/S TRK
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FD SWS	ATS SW	AP SW	H/G Select Mode	ILS frequency and course tuned and identified.	ALT Readout	SET/ARM	For initial approach altitude.	Autopilot has captured selected altitude and has placed airplane on intercept heading.	ALT Readout	Set (but not armed) for missed approach altitude. The altitude advisory system is inhibited when flaps are extended beyond 30°.	GA MODE Button	Establishes maximum EPR limit for go around.	ILS Button	Push	At capture, LOC CAP is displayed in roll FMAs, and autopilot automatically maneuvers the airplane to secure localizer center-line.	When established on localizer center-line the roll FMAs change to LOC TRK.	ALFA SPD	ILS	LOC TRK	ALT HLD	SPD 145	AUT GA	LOC TRK	G/S TRK
FD SWS	ATS SW	AP SW	H/G Select Mode	ILS frequency and course tuned and identified.	ALT Readout	SET/ARM	For initial approach altitude.	Autopilot has captured selected altitude and has placed airplane on intercept heading.	ALT Readout	Set (but not armed) for missed approach altitude. The altitude advisory system is inhibited when flaps are extended beyond 30°.	GA MODE Button	Establishes maximum EPR limit for go around.	ILS Button	Push	At capture, LOC CAP is displayed in roll FMAs, and autopilot automatically maneuvers the airplane to secure localizer center-line.	When established on localizer center-line the roll FMAs change to LOC TRK.	ALFA SPD	ILS	LOC TRK	ALT HLD	SPD 145	AUT GA	LOC TRK	G/S TRK
FD SWS	ATS SW	AP SW	H/G Select Mode	ILS frequency and course tuned and identified.	ALT Readout	SET/ARM	For initial approach altitude.	Autopilot has captured selected altitude and has placed airplane on intercept heading.	ALT Readout	Set (but not armed) for missed approach altitude. The altitude advisory system is inhibited when flaps are extended beyond 30°.	GA MODE Button	Establishes maximum EPR limit for go around.	ILS Button	Push	At capture, LOC CAP is displayed in roll FMAs, and autopilot automatically maneuvers the airplane to secure localizer center-line.	When established on localizer center-line the roll FMAs change to LOC TRK.	ALFA SPD	ILS	LOC TRK	ALT HLD	SPD 145	AUT GA	LOC TRK	G/S TRK
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FD SWS	ATS SW	AP SW	H/G Select Mode	ILS frequency and course tuned and identified.	ALT Readout	SET/ARM	For initial approach altitude.	Autopilot has captured selected altitude and has placed airplane on intercept heading.	ALT Readout	Set (but not armed) for missed approach altitude. The altitude advisory system is inhibited when flaps are extended beyond 30°.	GA MODE Button	Establishes maximum EPR limit for go around.	ILS Button	Push	At capture, LOC CAP is displayed in roll FMAs, and autopilot automatically maneuvers the airplane to secure localizer center-line.	When established on localizer center-line the roll FMAs change to LOC TRK.	ALFA SPD	ILS	LOC TRK	ALT HLD	SPD 145	AUT GA	LOC TRK	G/S TRK

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FLIGHT CREW OPERATING MANUAL

GO-AROUND FROM AUTOLAND



APPROACH	TO/GA BUTTON PUSHED AT DECISION HEIGHT	GO AROUND MANEUVER	MISSED APPROACH PROCEDURE
SPD 135 FD Svs ON AP Sw AP ON ATS Sw ON ALT Readout SET For missed approach. Flaps Out of UP detent	EPR GA GO RND GO RND GO RND	EPR GA GO RND GO RND GO RND	EPR CL ALT HDG HLD VERT SPD
Pilot manually advances throttles and pushes TO/GA button. (After releasing pressure on throttles, ATS will refine GA thrust setting.) Thrust Rating Computer automatically switches to GA EPR if not previously selected.			
Pilot monitors autopilot performance. Autopilot rolls airplane to wings level and rotates it to a pitch attitude to maintain go-around speed for two engines operating. (Maximum pitch attitude is 20 ANU.) The airplane will maintain the heading existing when roll attitude is less than 3°. Airplanes without EFIS Fast/Slow indicator on each ADI will provide speed guidance during go around. Airplanes with EFIS Fast/Slow indicator on each PFD will provide speed guidance during go around.			
ALT Preselect Mode ARM Pitch wheel ROTATE As required to accelerate for flap/slat retraction. CL MODE Button PUSH SPD MACH Readout SET If an immediate climbing turn is required, engage HDG SEL Mode and maintain GA in pitch axis. (Bank angle limit set 15°). Example:			
EPR GA ALT HDG SEL GO RND			

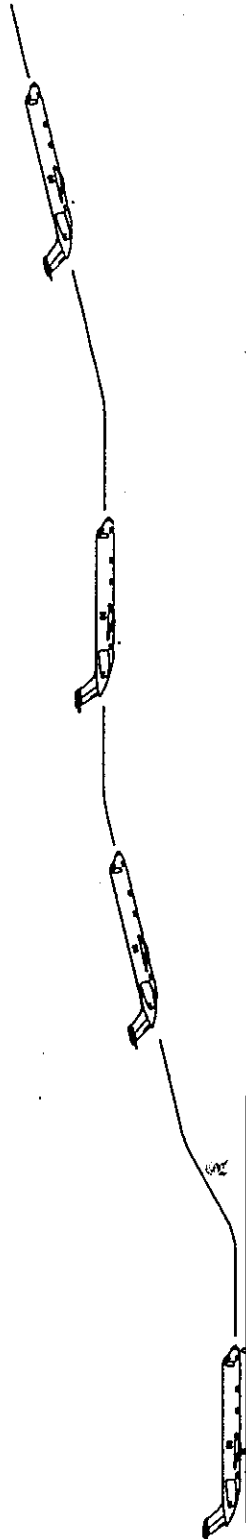
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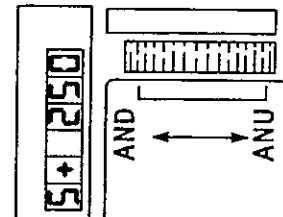
FLIGHT CREW OPERATING MANUAL

TAKEOFF AND CLIMB

EXAMPLE: ATC clears to FOXTROT VOR, climb and maintain FL 350, maintain runway heading for VECTORS.



PRIOR TO TAKEOFF	1500 FOOT - CLIMB POWER	3000 FOOT SEGMENT FLAP/SLAT RETRACTION AND ACCELERATION	ENROUTE CLIMB SEGMENT BELOW 10,000 FEET
CLMP TAK OFF TAK OFF ALT	EPR CL HDG SEL ALT TAK OFF	EPR CL HDG SEL ALT IAS	EPR CL HDG SEL ALT IAS
I.O. or I.O. FLX Mode Button PUSH FD Sw FD SPD/MACH Readout SET (Rotate to 250) Heading Readout SET (Rotate to runway heading) Bank Limit Sel SET 15° TO/GA Button PUSH (TAK OFF will be displayed in roll and pitch FMAs) ALT Readout SET 35,000 Throttles VERTICAL Advance throttles to 1.4 EPR or 80% N₂ (throttles to approximately vertical) and check to see that EPR's are approximately matched. ATS Sw AUTO THROT Throttles advance to EPR LIM as displayed on TRI. (EPR TO will be displayed in ATS FMAs) ATS Clamp (CLMP) Mode will engage at 60 knots and ATS FMAs will change from EPR TO to CLMP. Airplane airborne: AP SW AP ON	CL Mode Button PUSH (Disengages CLMP Mode and establishes EPR Climb limit. CLMP Mode of ATS can be disengaged after takeoff by pressing the MCT, CR, CL, or GA button on the TRP.) EPR CL is displayed in the autothrottle FMA. If a heading change is required, rotate heading bug to desired heading and pull Heading Select Knob. HDG SEL is displayed in the roll FMA.	IAS/MACH Button PUSH Push IAS/MACH button. Pitch readout will display "S" followed by the numeric indicated airspeed, and IAS will be displayed in the pitch window of the FMA. Adjust the pitch wheel to set the desired IAS (normally 250 kts). The digital flight guidance computer will automatically adjust autopilot/flight director pitch commands to maintain desired airspeed.	Flaps/Slats RETRACT Retract flaps and slats when on the required airspeed.



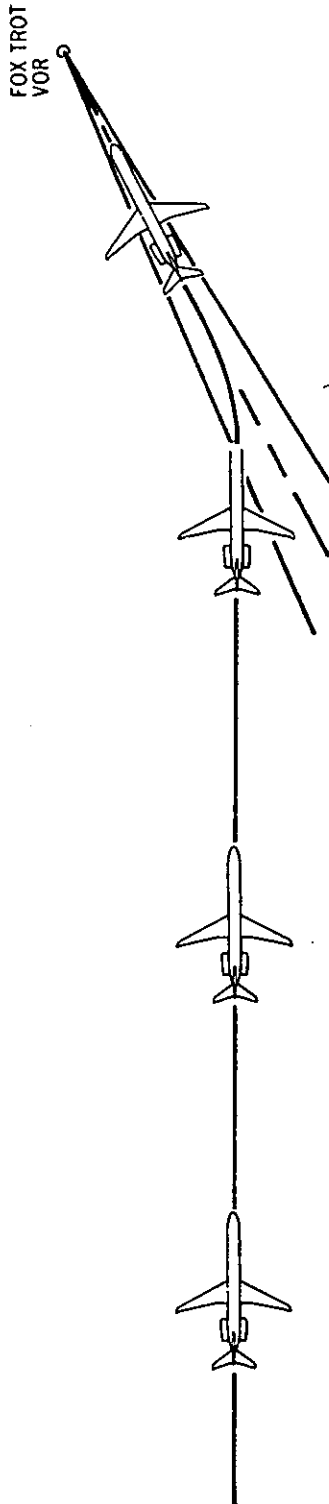
CAG(IIGDS)

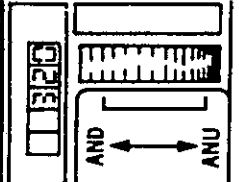
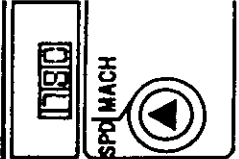
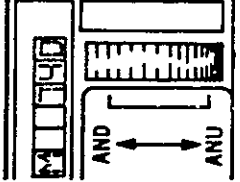
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FLIGHT CREW OPERATING MANUAL

TAKEOFF AND CLIMB (Continued)



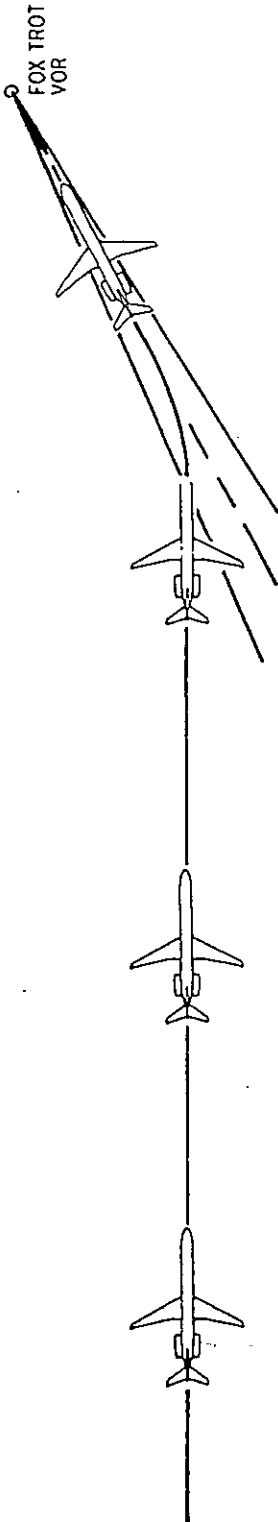
TRANSITION 10,000 FEET	ENROUTE CLIMB	ENROUTE CLIMB (Continued)	CRUISE
EPR CL ALT HDG SEL IAS Rotate pitch wheel toward AND at 10,000 feet and set the next climb airspeed in pitch readout. The FGS will now respond to new airspeed and will adjust pitch as required to maintain it. (Autopilot sw in AP ON). 	EPR CL ALT HDG SEL IAS SPD/MACH Readout SET Speed is presently primary in SPD MACH readout. MACH is desired for cruise. Push SPD MACH knob to maximum detent. Last used Mach value is now present in SPD MACH readout. Rotate knob to set desired Mach number. Release SPD MACH knob to normal position. Mach is now primary in SPD MACH readout. 	EPR CL VOR ALT HDG SEL MACH IAS/MACH Button: PUSH Observe pitch FMAs change to MACH. Pitch readout will display "M" followed by numeric indicated climb mach.  VHF NAV Readout SET Set required VOR frequency and identify CRS Readout SET Set desired VOR course in CRS readout. VOR LOC Button PUSH Observe VOR appears in arm FMAs.	MACH 780 VOR TRK ALT HLD As airplane enters VOR capture zone the arm FMAs go blank and VOR CAP appears in roll FMAs. After acquiring course center-line, roll FMAs change to VOR TRK. When Altitude Capture (ALT CAP) mode engages, the ATS FMAs will change from EPR CL mode to MACH mode for cruise. Note that the selected Mach number is displayed below MACH in the FMAs. When on selected altitude, pitch FMAs will display ALT HLD. CR Mode Button PUSH Establishes maximum EPR limit for cruise.

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FLIGHT CREW OPERATING MANUAL

TAKEOFF AND CLIMB (Continued) (ONS ENGAGEMENT)



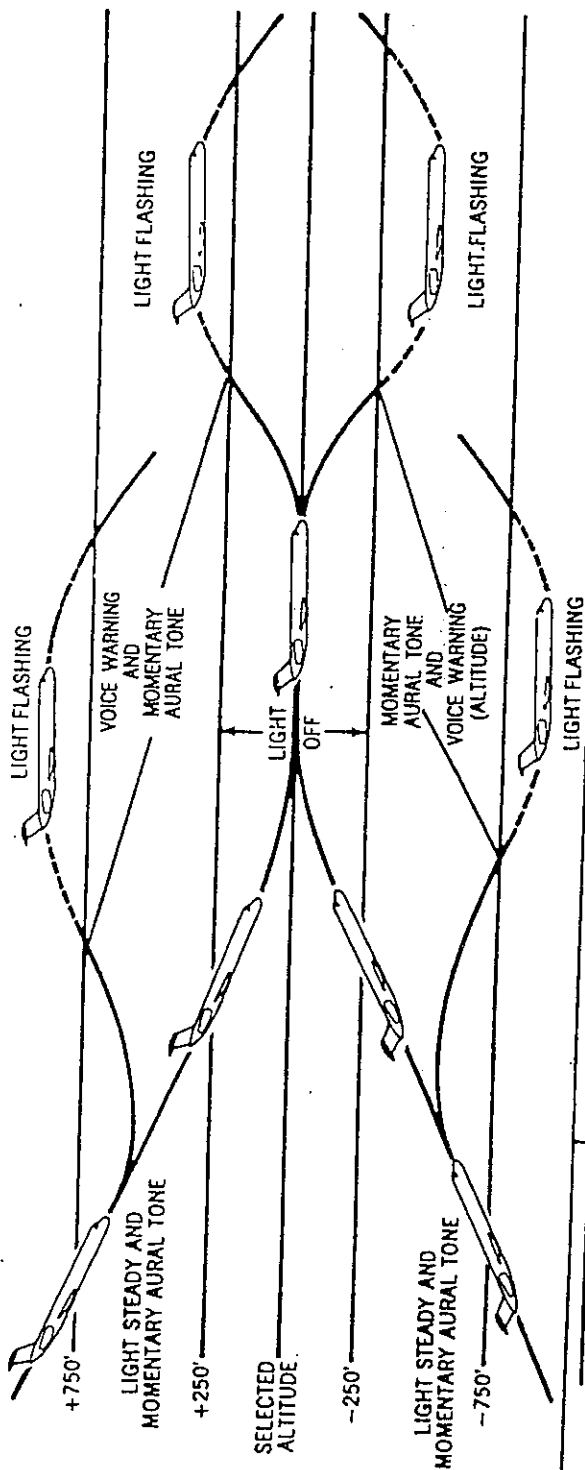
TRANSITION 10,000 FEET	ENROUTE CLIMB	ENROUTE CLIMB (Continued)	CRUISE
EPR CL ALT HDB SEL IAS Rotate pitch wheel toward AND at 10,000 feet and set the next climb airspeed in pitch readout. The FGS will now respond to new airspeed and will adjust pitch as required to maintain it. (Autopilot sw in AP ON). 1320 AND ANU	EPR CL ALT HDB SEL IAS SPD/MACH Readout SET Speed is presently primary in SPD MACH readout. MACH is desired for cruise. Push SPD MACH knob to maximum detent. Last used Mach value is now present in SPD MACH readout. Rotate knob to set desired Mach number. Release SPD MACH knob to normal position. Mach is now primary in SPD MACH readout. 1750 SPD MACH AND ANU	EPR CL ALT NAV TRK MACH IAS/MACH Button PUSH Observe pitch FMAs change to MACH. Pitch readout will display "M" followed by numeric indicated climb mach. 1750 AND ANU CDU Mode Selector A or M TK CHG Key PUSH Verify TK CHG and ENT key lights come on. STA/O Key PUSH Push STA/O key, then push numbered key representing desired waypoint. Verify 0 followed by selected waypoint number appear in From/To indicator display. Verify desired track is reasonable. ENT Key PUSH Verify ENT and TK CHG key lights go off. NAV Button PUSH Observe NAV/TRK appears in roll FMAs.	MACH 780 NAV TRK ALT HLD When Altitude Capture (ALT CAP) mode engages, the ATS FMAs will change from EPR CL mode to MACH mode for cruise. Note that the selected Mach number is displayed below MACH in the FMAs. When on selected altitude, pitch FMAs will display ALT HLD. CR Mode Button PUSH Establishes maximum EPR limit for cruise.

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FLIGHT CREW OPERATING MANUAL

ALTITUDE PRESELECT AND ADVISORY



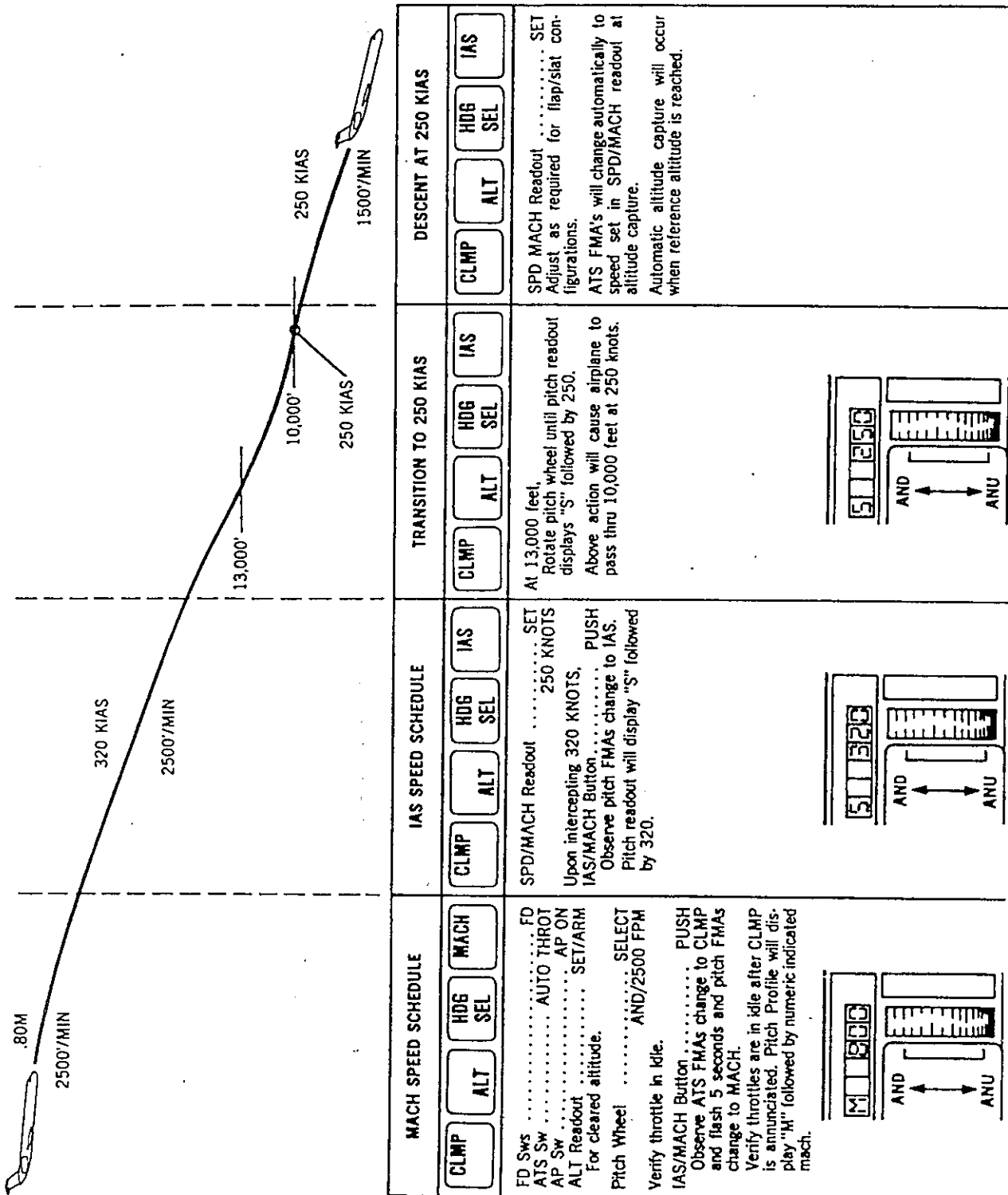
EPR CL ALT HDG SEL MACH 784	ALT HDG SEL MACH 784	ALT HDG SEL MACH 784	ALT HDG SEL MACH 784	ALT HDG SEL MACH 784
A steady amber advisory light comes on and a 1 second aural tone will sound no closer than 750' from preselected altitude. The advisory light will flash, a momentary aural tone and a voice alert (if installed) will sound if airplane deviates from 750' prior to reaching 250' of preselected altitude.	The advisory light goes off 250' prior to reaching preselected altitude. The pitch FMAs change to ALT CAP when level off point is reached.	As airplane levels (manually or automatically) at preselected altitude, pitch FMAs change to ALT HLD.	The aural tone, voice alert (if installed), and advisory light remains off provided airplane maintains selected altitude $\pm 250'$.	A momentary aural tone and a voice alert (if installed) sounds and an advisory light flashes if airplane deviates more than $\pm 250'$ from selected altitude. Light will go out when airplane returns within the $\pm 250'$ band or by selecting a new reference altitude.

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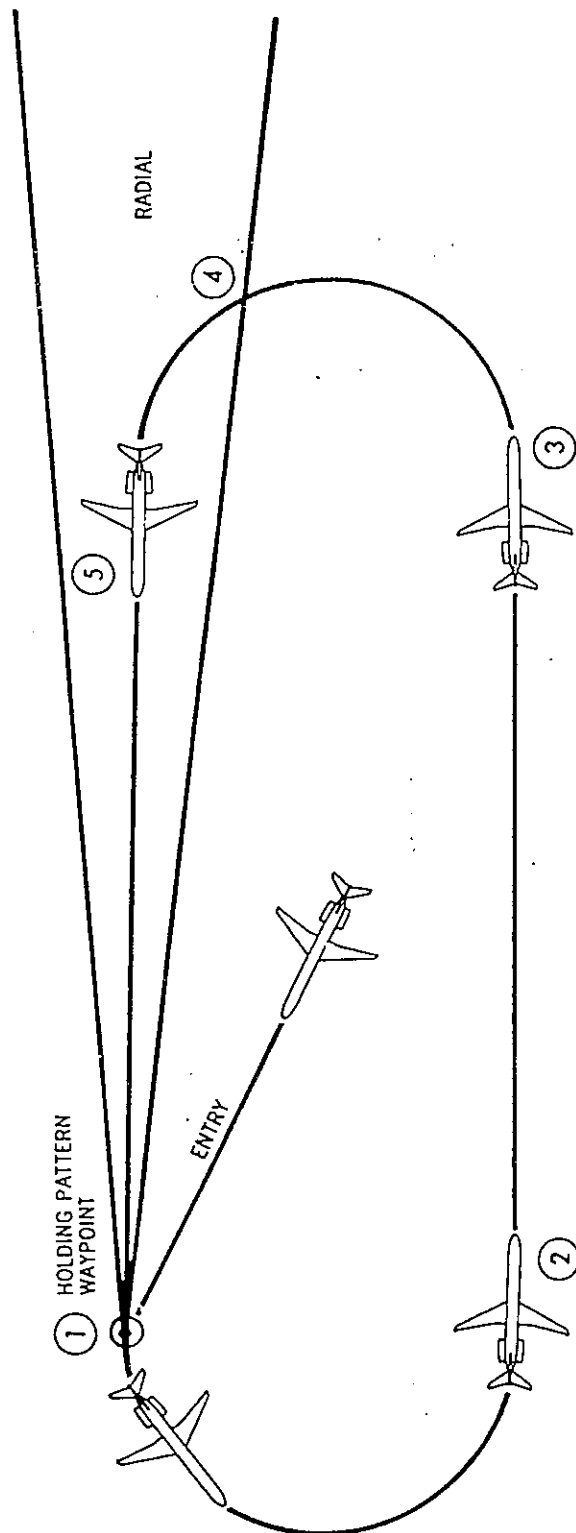
FLIGHT CREW OPERATING MANUAL

DESCENT



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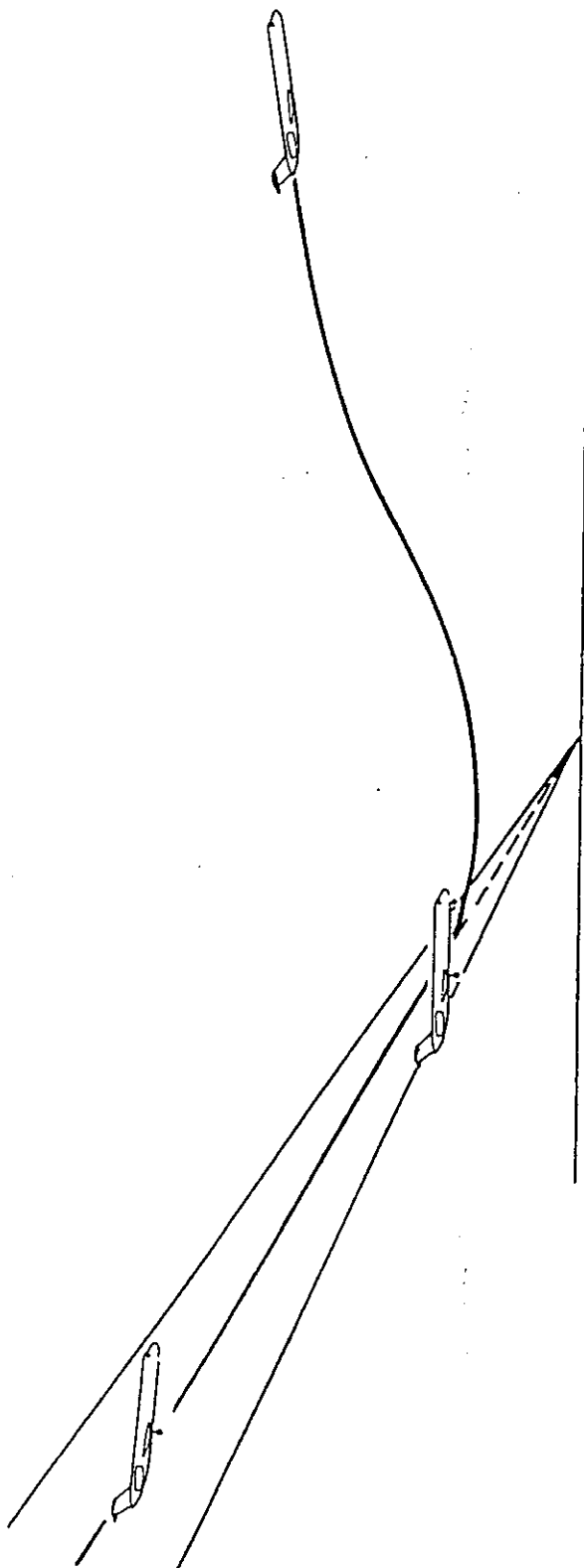
HOLDING PATTERN



1 CROSSING FIX	2 OUTBOUND LEG	3 TURNING INBOUND WITH ALTITUDE CHANGE	4 INTERCEPTING INBOUND LEG	5 INBOUND LEG
SPD 210 HDG SEL ALT HLD FD SWS ON AP SW AP ON ATS SW ON HDG SEL Mode ENGAGE To turn to outbound heading (do not select reciprocal heading until after airplane is established in turn). SPD/MACH Readout .. SET Set desired speed	SPD 210 HDG SEL ALT HLD Airplane flies selected heading.	SPD 210 VOR ALT HDG SEL VERT SPD HDG Select AS REQD Begin turn to an intercept heading to inbound leg. ALT Readout SET/ARM For new altitude. Pitch Wheel ROTATE As reqd to descend VOR LOC Button PUSH	SPD 210 VOR CAP VERT SPD FGS captures inbound track.	SPD 210 VOR TRK ALT HLD FGS tracks inbound track and at selected altitude ALT CAP and then ALT HLD will be displayed in pitch FMAs.

RA1-144B

GO AROUND FROM FD APPROACH



APPROACH				TO/GA BUTTON PUSHED AT DECISION HEIGHT			GO-AROUND MANEUVER			MISSED APPROACH PROCEDURE			
SPD 145	FD GA	LOC TRK	G/S TRK	EPR GA		GO RND	EPR GA		GO RND	EPR CL	ALT	HDG HLD	VERT SPD
FD Sws ON AP Sw OFF ATS Sw ON ALT Readout SET Flaps FINAL APPROACH SETTING				Pilot manually advances throttles and pushes TO/GA button. (If ATS is on, after releasing pressure on throttles, ATS EPR mode will refine GA thrust setting. Thrust rating computer automatically changes to GA EPR if not previously selected.			FD command bars command fly up (Maximum 20° ANU). FD command bars command go-around speed for two engines operating, wings level and then maintains heading existing when roll attitude is less than 3°.			ALT Preselect Mode ARM Pitch Wheel ROTATE Rotate as required for guidance to accelerate for flap/slat retraction. CL Mode Button PUSH SPD/MACH READOUT SET AS DESIRED If an immediate climbing turn is required, engage HDG SEL Mode and maintain GA in pitch axis (Bank angle limit set 15°) Example:			
				EPR GA		GO RND	EPR GA		GO RND	EPR CL	ALT	HDG SEL	GO RND

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AUTOLAND

RA1-1733A

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FLIGHT CREW OPERATING MANUAL

FLIGHT DIRECTOR MANUAL ILS APPROACH

INITIAL CONDITION	MANEUVERING	INTERCEPT	LOC CAP/TRK	GS CAP/TRK
SPD 210 HDG SEL ALT HLD FD Sws ON ATS Sw AUTO/THROT HDG SEL Mode ENGAGED DH Bug SET	SPD 210 ALT HDG SEL VERT SPD ILS frequency and course tuned and identified ALT Readout SET/ARM For initial approach altitude. Pitch Wheel ROTATE As required for descent HDG Select AS REQD For maneuvering. Airplane is manually flown to flight director commands.	SPD 210 ILS HDG SEL ALT HLD Airplane has captured selected altitude and flight director commands turn to final intercept heading. ALT Readout SET Set (but not armed) for missed approach altitude. The altitude advisory system is inhibited when flaps are extended beyond 30... GA MODE Button PUSH (Establishes maximum EPR limit for go-around) ILS Button PUSH	SPD 210 ILS LOC CAP ALT HLD At capture, LOC CAP is displayed in roll FMAs and flight director command bar commands turn on course. ALFA SPD ILS LOC TRK ALT HLD When established on localizer, roll FMAs change to LOC TRK. SPD MACH Readout ... SET Final approach speed, ALFA SPD replaces SPD in ATS FMAs until flaps are in final approach setting.	SPD 145 ILS LOC TRK G/S TRK Glideslope Track logic is satisfied, and G/S TRK is displayed in the pitch FMAs. SPD 145 FD GA LOC TRK G/S TRK If flight director go-around logic is satisfied, FD GA is displayed in arm FMAs. If FD GA is not valid, MAN GA will be displayed. RETD FD GA LOC TRK G/S TRK Retard mode engages and RETD is displayed in ATS FMAs when radio altimeter senses retard altitude. RETD LOC TRK G/S TRK Main gear spin-up; go-around is disarmed, and arm FMAs are blanked. Reverse thrust. ATS disconnects (No lights) and ATS FMAs go blank. FD switches to OFF.

RA1-147D

FLIGHT CREW OPERATING MANUAL

AUTOPILOT COUPLED ILS APPROACH

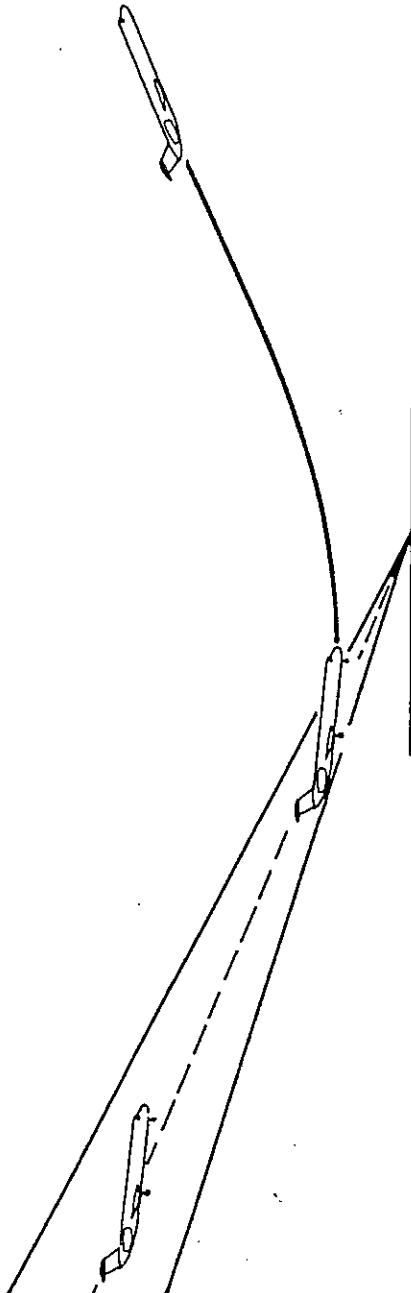
INITIAL CONDITION	MANEUVERING	INTERCEPT	LOC CAP/TRK	GS CAP/TRK
SPD 210 ALT HLD HDG SEL AUTO/THROT AP ON HDG Select Mode ENGAGED DH Bug SET	SPD 210 ALT HDG SEL VERT SPD ILS frequency and course tuned and identified. ALT Readout SET/ARM For initial approach altitude. Pitch Wheel ROTATE As required for descent. HDG Select AS REQD For maneuvering. Airplane automatically responds to selected inputs. Flight directors monitor autopilot performance.	SPD 210 ILS HDG SEL ALT HLD Autopilot has captured selected altitude and has placed airplane on intercept heading. ALT Readout SET Set (but not armed) for missed approach altitude. The altitude advisory system is inhibited when flaps are extended beyond 30°. GA MODE Button PUSH Establishes maximum EPR limit for go around. ILS Button PUSH	SPD 210 ILS LOC CAP ALT HLD At capture, LOC CAP is displayed in roll FMAs, and autopilot automatically maneuvers the airplane to secure localizer center-line. When established on localizer center-line the roll FMAs change to LOC TRK.	SPD 145 AUT GA LOC TRK G/S TRK When maneuvering begins to capture glide slope, G/S CAP is displayed. Upon settling onto center-line, G/S TRK is displayed. AUT G/A is displayed in arm FMAs when altitude is less than 1500 feet and rudders are in parallel mode. SPD 145 FD BA LOC TRK NO FLR Disengage AP at required DH. Observe arm FMAs change to FD GA. If autopilot remains engaged at 100 feet R/A, NO FLR is flashed in pitch FMAs. RETD LOC TRK G/S TRK Retard mode engages at required R/A. RETD is displayed in ATS FMAs. Main gear spin-up, arm FMAs go blank. At reverse thrust, ATS automatically disengages (no lights) and ATS FMAs go blank. FMAs go blank when FD switches are moved to OFF.

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FLIGHT CREW OPERATING MANUAL

GO-AROUND FROM AUTOLAND



APPROACH	TO/GA BUTTON PUSHED AT DECISION HEIGHT	GO AROUND MANEUVER	MISSED APPROACH PROCEDURE
SPD 135 AP Sw ON AP Sw ON ATIS Sw ON ALT Readout SET For missed approach. Flaps Out of UP detent	EPR GA GO RND GO RND GO RND	EPR GA GO RND GO RND GO RND	EPR CL ALT HDG HLD VERT SPD
Pilot manually advances throttles and pushes TO/GA button. (After releasing pressure on throttles, ATS will refine GA thrust setting.) Thrust Rating Computer automatically switches to GA EPR if not previously selected.	Pilot monitors autopilot performance. Autopilot rolls airplane to wings level and rotates it to a pitch attitude to maintain go-around speed for two engines operating. (Maximum pitch attitude is 20 ANU.) The airplane will maintain the heading existing when roll attitude is less than 3°.	Airplanes without EFIS Fast/Slow Indicator on each ADI will provide speed guidance during go around.	ALT Preselect Mode ARM Pitch wheel ROTATE As required to accelerate for flap/slat retraction. CL MODE Button PUSH SPD MACH Readout SET If an immediate climbing turn is required, engage HDG SEL Mode and maintain GA in pitch axis. (Bank angle limit set 15°). Example: EPR GA ALT HDG SEL GO RND
		Airplanes with EFIS Fast/Slow Indicator on each PFD will provide speed guidance during go around.	

RA1-4058

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FLIGHT CREW OPERATING MANUAL

AUTOMATIC FLIGHT - NORMAL OPERATION - PROCEDURES

AUTOLAND AVAILABILITY TEST

NOTE

Test must be performed while airplane is on ground.

VHF NAV Radios SET

Set both VHF NAV radios to an ILS frequency.

AUTOLAND Button. PUSH

Push AUTOLAND button and observe the following:

NO AUTOLAND legend light flashing continuously.

Autothrottle, arm, roll and pitch mode annunciators display AUTO
LND/PRE/FLT/TEST.

Radio altimeters, ADI's and ILS indications display self-test functions.

After approximately 50 seconds, flight mode annunciator goes blank or reverts
to previous display and NO AUTOLAND legend light goes off indicating a valid
test.

NOTE

If test is invalid, NO AUTOLAND legend light remains on until
RESET button is pushed.

Move DFGC 1-2 switch to opposite position and repeat test.

VHF NAV Radios SET

■ Captain and First Officer set desired departure VHF NAV frequency and course.

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FLIGHT CREW OPERATING MANUAL

SELECT FLIGHT DIRECTOR/ AUTOPILOT TAKEOFF MODE

NOTES

This procedure describes steps necessary to make a flight director takeoff, including autopilot engagement immediately after lift-off. On ground, takeoff mode is flight director only. In flight, takeoff mode is both flight director and autopilot.

During flight director operation with autopilot off and autothrottles engaged, two possible incompatible modes may be displayed if non-normal sequence of autopilot and autothrottle modes is selected. These incompatible mode displays are speed on throttle (IAS or MACH SEL) and speed on pitch (IAS or MACH HOLD). Incompatibility will be displayed on non-selected side FMA. For example: With AP off and autothrottles engaged, if DFGC switch is in 1, pushing IAS/MACH mode button then pushing SPD SEL or MACH SEL mode button will cause Captain's FMA to display "SPD _ _ _" or "MACH _ _ _" (value set in SPD/MACH readout) and "VERT SPD". F/O's FMA will display "SPD _ _ _" or "MACH _ _ _" and "IAS" or "MACH".

FD Switches FD
SPD/MACH Select Knob PUSH

Push SPD/MACH select knob to first detent (fast slew) and set 250 knots or minimum maneuvering speed, whichever is higher. Push SPD/MACH select knob full in and set desired cruise Mach number. Observe SPD/MACH readout continues to display selected Mach number after knob is released from maximum detent. If a speed (IAS) reference is desired in SPD/MACH readout, push SPD/MACH select knob to maximum detent and release.

NOTE

Initial SPD/MACH readout on ground, after electrical power application is a speed reference value (100 knots).

HDG Readout SET

Rotate HDG selector knob until runway magnetic heading or first heading after takeoff appears in HDG readout.

Bank Angle Limit Selector 15 DEGREES

(Continued)

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FLIGHT CREW OPERATING MANUAL

SELECT FLIGHT DIRECTOR/AUTOPILOT TAKEOFF MODE (Continued)

ALT Readout SET

Rotate ALT set knob until first level-off altitude is displayed in ALT readout.

Thrust Computer SET

Push T.O. or T.O./FLX on thrust computer indicator and observe maximum limit indexes on EPR gages indicate same value as displayed on thrust computer indicator readout.

NOTE

If T.O./FLX is not used for takeoff, set 00°C in ASSUMED TEMP readout.

After engine start,

TO/GA Button PUSH

Push either TO/GA button. Observe roll and pitch FMA's display TAK OFF. Flight director command bars will command wings level and slight pitch up displacement. Fast/Slow indicators will show full slow. Flight director command bars and Fast/Slow indicators are not valid until after rotation.

When using HDG SEL mode for takeoff, verify runway magnetic heading is set in HDG readout. Pull HDG selector knob and observe roll FMA's display HDG SEL. Verify bank angle limit selector is set to 15 degrees and ALT readout displays desired altitude.

Arm altitude preselect mode by pulling ALT set knob.

NOTES

ALT will be displayed in arm FMAs.

When capture threshold is reached, selected altitude will be captured automatically if autopilot is engaged, or by flight director pitch guidance if autopilot is disengaged. Pitch profile readout will display existing vertical speed during ALT CAP phase.

When ready for takeoff, if autothrottles are to be used, advance throttles to 1.4 EPR or 80% N₂ and verify EPR's are matched.

(Continued)

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FLIGHT CREW OPERATING MANUAL

SELECT FLIGHT DIRECTOR/AUTOPILOT TAKEOFF MODE (Continued)

AUTO THROT Switch ON

Observe autothrottle system FMA's display EPR/T.O. and throttles advance to selected EPR limit.

NOTES

At 60 knots, autothrottle system clamp (CLMP) mode will engage, removing power from autothrottle system servo. Selecting a thrust rating mode other than T.O. or T.O. FLX will disengage CLMP mode.

If, while in autothrottle system EPR mode, flap limit airspeed is exceeded, autothrottle system will disengage.

EPR synchronization will be provided when autothrottles are in any mode except CLMP.

CAUTION

Autothrottle system CLMP mode engages on takeoff when CADC senses 60 knots airspeed. If takeoff is made in head wind, CLMP mode will engage sooner and it may not be possible for autothrottle system to set takeoff EPR.

Rotate airplane to satisfy flight director pitch commands and Fast/Slow indicator. Cross check pitch attitude being commanded with primary airspeed indicator.

If desired after gear retraction, engage autopilot by moving AP switch to AP ON. Observe AP1 or AP2 light on, as appropriate.

NOTES

While autopilot is engaged, if maneuvering about pitch axis results in IAS at or below minimum maneuvering speed, pitch FMA's will alternately display SPD LOW and VERT SPD until corrective action is taken by the pilot.

If autopilot is engaged during a turn, airplane will roll smoothly to wings level. Autopilot will maintain airplane on heading existing at moment bank angle reduces to 3 degrees. Autopilot will also maintain vertical speed existing at time of engagement.

ATS will automatically advance throttles to go-around EPR limit if an engine failure should occur above 500 feet while in the flight director and/or autopilot takeoff mode provided thrust was set or reduced below GA EPR prior to engine failure.

MD-80

FLIGHT CREW OPERATING MANUAL

NOISE ABATEMENT CLIMB SEGMENT

At 1500 feet above ground,

Climb Power ESTABLISH

PF command, "Climb power." PNF push CL mode button on thrust computer indicator and observe light (in button) is on, autothrottle CLMP mode disengages, and autothrottle system FMA's display EPR/CL.

NOTES

Selection of CL provides a climb EPR limit.

Autothrottle system CLMP mode can be disengaged by pushing MCT, CR, CL or GA mode button on TRI.

At 3000 feet above ground,

Pitch Profile Readout SET

Rotate pitch wheel to decrease existing vertical speed by one-half.

NOTE

This action will disengage flight director TAK OFF mode, and pitch FMA's will display VERT SPD. If roll FMA's were in TAK OFF prior to mode disengagement, they will now display HDG HLD.

When reaching required airspeed, retract flaps and slats and accelerate to desired climb speed.

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FLIGHT CREW OPERATING MANUAL

AUTOMATIC ALTITUDE CAPTURE

AP Switch. AP ON

ALT Readout SET

Rotate ALT set knob until desired altitude is displayed in ALT readout.

Altitude Preselect Mode. ARM

Pull ALT set knob to engage altitude preselect mode. Observe ALT is displayed in arm FMA's.

NOTES

Altitude preselect mode provides automatic capture of a preselected altitude. Flight guidance system may be in any available pitch mode.

Approximately 750 feet from preselected altitude, a steady amber light on each primary altimeter will come on. Light will go off when 250 feet from selected altitude. When capture threshold is reached, ALT CAP mode will engage and pitch profile readout will read existing vertical speed. When ALT HLD mode engages, pitch profile readout will display zeros.

Deviation greater than 250 feet above or below selected altitude causes ALT ADVISORY lights to flash, and two-second tone to sound and a voice alert. Selecting a new reference altitude or flying back to within 250 feet of selected altitude will extinguish flashing lights and silence voice warning.

Altitude preselect mode will disarm if turbulence mode is selected or glideslope is captured.

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FLIGHT CREW OPERATING MANUAL

AUTOMATIC AUTOTHROTTLE MODE CHANGE

During climb, before reaching preselected altitude,

SPD MACH Readout SET

Rotate SPD MACH select knob until required speed or mach is displayed in SPD
MACH readout.

NOTES

When ALT CAP mode engages, autothrottle system will
automatically switch from EPR/CL mode to airspeed or mach
displayed in primary SPD MACH readout.

Pushing ALT HLD button or selecting ALT HLD mode by
rotation of pitch select wheel will also cause automatic
switching from EPR mode to SPD/MACH mode.

If primary SPD/MACH display is not as desired for cruise prior to ALT CAP mode
engagement,

SPD/MACH Knob PUSH/RELEASE

Observe new primary display.

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FLIGHT CREW OPERATING MANUAL

FLIGHT DIRECTOR/AUTOPILOT ONS MODE (FOR MARCONI-OMEGA EQUIPPED AIRPLANES)

With flight director and/or autopilot engaged and airplane heading within 90 degrees of desired track,

NAV Button. PUSH

Push NAV button on FGS panel and observe arm FMAs display NAV. As airplane captures Omega course, arm FMA's will go blank and roll FMA's will display NAV CAP. After airplane is established on course, roll FMA's will display NAV TRK.

NOTE

Once engaged, autopilot will remain in ONS mode regardless of subsequent HSI switching.

MD-80 FLIGHT CREW OPERATING MANUAL

FLIGHT DIRECTOR/AUTOPILOT TURBULENCE MODE

ENG IGN Selector SYS A OR SYS B

TURB Mode Button PUSH

Push TURB mode button and observe autothrottle system disengages. Push ATS disconnect button (on throttle) to turn off flashing red lights. If system does not disengage, move AUTO THROT switch to OFF and push TURB mode button again. Verify YAW DAMP switch is in ON.

Adjust throttles manually for desired airspeed. Change only for large airspeed variations. Do not chase airspeed.

NOTES

Pitch mode annunciator displays TURB and roll annunciator displays WNG LVL. Flight director command bars provide guidance to maintain pitch profile selected in pitch profile readout. Command bars command wings level. Autothrottle system will disengage and THROTTLE off warning lights will flash. Pushing ATS disconnect button (on throttle) will turn off lights. FAST/SLOW indicators display deviation from reference airspeed displayed in SPD MACH readout.

Automatic pitch trim function is inhibited when in TURB mode.

Recommended rough air speed is 275 to 285 KIAS or Mach .75 to .79 (whichever is lower). At 10,000 feet and below, minimum recommended speed is 250 KIAS or minimum maneuvering (whichever is greater). Do not fly less than minimum maneuvering speed for existing configuration.

When flying PMS (if installed), disengage when turbulence exceeds moderate then fly to recommended speed schedule.

YAW DAMP Switch ON

Verify YAW DAMP switch is in ON.

If flying flight director (autopilot off), fly attitude indicator as primary pitch reference. Sacrifice altitude to maintain attitude. Do not chase altitude. Descend if necessary to improve buffet margin.

When turbulence mode is no longer desired, select any roll or pitch mode. Autopilot or flight director will engage into basic HDG HLD (heading hold) and ALT HLD (altitude hold) mode or VERT SPD (vertical speed).

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FLIGHT CREW OPERATING MANUAL

DESCENT INITIATION VERTICAL SPEED MODE

With FD switches in ON, AP switch in ON, AUTO THROT switch on (up), and in MACH SEL mode,

ALT Readout SET

PNF rotate ALT set knob until level-off altitude is displayed in ALT readout.

Altitude Preselect Mode ARM

PNF pull ALT set knob to engage altitude preselect mode.

SPD/MACH Knob SET

Rotate the SPD/MACH knob until desired descent MACH is set. Push full in on knob and set indicated airspeed to be used later in approach. Release knob and observe FMA's display selected MACH.

Pitch Profile Readout SET

Rotate pitch wheel toward AND to initiate descent until V-2500 appears in pitch profile readout. VERT SPD will be displayed in pitch FMA's.

When desired airspeed is attained,

SPD SEL Button PUSH

Observe autothrottle system FMA's display SPD.

SPD Readout SET

Rotate SPD/MACH knob to set 250 knots in SPD readout. Observe throttles retard to idle.

NOTE

Setting 250 initially in SPD/MACH readout assures throttles remain in idle and maintains a safe airspeed in event of level off requirements. Adjust pitch wheel to maintain 0.80 Mach until 320 knots is attained. Maintain 320 knots to 3000 feet above speed limiting altitude.

(Continued)

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FLIGHT CREW OPERATING MANUAL

DESCENT INITIATION VERTICAL SPEED MODE (Continued)

At 3000 feet above speed limiting altitude,

Pitch Profile Readout SET

Rotate pitch wheel toward ANU to reduce rate of descent until V-1500 appears in pitch profile readout. Observe airplane decelerate so as to pass speed limiting altitude indicating required airspeed. Adjust pitch wheel as required for remainder of descent.

As flap/slat configuration changes,

SPD Readout. SET

Rotate SPD/MACH knob to set desired airspeed in SPD readout.

Nearing initial approach altitude (no closer than 750 feet from selected level-off altitude), observe steady amber altitude advisory light come on. Observe light goes off when within 250 feet of selected altitude.

NOTES

Deviation from selected altitude is indicated by flashing altitude advisory light, and a two-second tone and voice warning, "Altitude".

Returning to within 250 feet of reference altitude or selecting new reference altitude will turn off flashing lights and silence voice warning.

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FLIGHT CREW OPERATING MANUAL

FLIGHT DIRECTOR/AUTOPILOT VOR MODE

VHF NAV Readouts SET

Set and identify desired VOR frequency.

CRS Readouts SET

Set desired VOR course.

HDG Readout SET

Rotate HDG selector knob until desired intercept heading appears in HDG readout.

NOTE

If not already in HDG SEL mode, pull HDG selector knob and observe roll FMA's display HDG SEL.

VOR/LOC Button. PUSH

Observe arm FMA's display VOR.

NOTES

Roll control responds to selected heading and with autopilot engaged, VOR radial will be captured automatically. On HSI, at approximately 2 dots on the Course Deviation Indicator (CDI), VOR capture mode will engage and VOR CAP will be displayed in roll FMA's.

At approximately one-half dot CDI deviation, roll FMA's will display VOR TRK. Crosswind correction will be provided to maintain beam centerline. CDI will display any beam deviation.

FLIGHT CREW OPERATING MANUAL

ILS OR LOC ONLY APPROACH

NOTE

Autopilot may be engaged for a coupled approach or off for a flight director approach.

VHF NAV Radios SET

Set and identify desired ILS station frequency.

Front Inbound ILS Course SET

Set same ILS front inbound course in both course readouts.

SPD MACH Readout SET

Rotate SPD MACH select knob to set desired IAS in SPD readout.

NOTE

If autothrottle system is desired, verify AUTO THROT switch is in on (up) position.

HDG Readout SET

Verify required localizer intercept heading is set in HDG readout.

ILS Button PUSH

Push ILS button and observe arm FMA's display ILS.

NOTES

If localizer only mode is desired, push VOR/LOC button. Glideslope logic will be inhibited.

Arm FMA's will display LOC. During localizer capture, arm FMA's will go blank and roll FMA's display LOC CAP. When airplane is on centerline, FMA's will switch from LOC CAP to LOC TRK.

Pitch Profile Readout SET

Rotate pitch wheel as required to position airplane at initial approach altitude.

Monitor localizer capture and tracking.

(Continued)

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FLIGHT CREW OPERATING MANUAL

ILS OR LOC ONLY APPROACH (Continued)

NOTE

Direction and amount of crab angle will be displayed on HSI as angular difference between airplane heading and setting on course select pointer.

When glideslope pointer becomes active, extend landing gear. When one dot below glideslope, select 28° flaps.

SPD MACH Readout SET

Rotate SPD/MACH select knob to set final approach speed in SPD readout.

NOTES

If SPD MACH readout is set prior to selecting final approach flaps, autothrottle system FMA's will display ALFA SPD (minimum maneuvering airspeed).

ALFA SPD mode is automatically engaged and annunciated when SPD/MACH readout is set to a value less than alpha speed reference, and SPD SEL or MACH SEL autothrottle mode are engaged.

Monitor glideslope capture.

NOTE

As airplane reaches capture threshold, pitch mode annunciators change to G/S CAP. Capture point is variable and is function of rate of beam closure, plus beam deviation. Glideslope can be captured from above or below.

If 40 degrees flaps are used for landing, move FLAP/SLAT handle to 40 degree detent at glideslope intercept.

Monitor glideslope track.

NOTE

When the airplane is on beam centerline, pitch FMA's change from G/S CAP to G/S TRK. Rudder authority, in event of a go-around, is established. Arm FMA's change from ILS to AUT/GA if automatic go-around logic is satisfied.

(Continued)

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FLIGHT CREW OPERATING MANUAL

ILS OR LOC ONLY APPROACH (Continued)

When decision height is reached,

DH Lights ON

Observe DH lights come on when airplane reaches decision height.

NOTE

In ILS below 1500 feet AGL, altitude preselect mode is inhibited.

If autopilot is engaged,

AP Disengage Button PUSH

Push AP disengage button twice.

Monitor autothrottle retard mode.

NOTE

When reverse thrust levers are actuated, autothrottle system will disengage (AUTO/THROT switch drops to OFF). ATS THROTTLE off warning lights will not come on.

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FLIGHT CREW OPERATING MANUAL

GO AROUND FROM FLIGHT DIRECTOR APPROACH

At decision height,

TO/GA Button PUSH

PF manually advance throttles, push TO/GA button and hold for at least 1 second.

NOTES

When pressure on throttles is released, autothrottle system will refine go-around thrust setting.

Thrust rating computer automatically changes to go-around (GA) if not previously selected.

Autothrottle mode changes from SPD (plus selected value) to EPR GA. Arm mode goes blank. Roll and pitch modes change from LOC TRK and G/S TRK to GO RND.

Go-Around Maneuver PERFORM

PF maneuver airplane to satisfy roll and pitch commands.

NOTES

Flight director command bars command fly up (maximum 20° airplane nose up).

Flight director command bars command go-around reference speed, wings level and maintains existing heading when roll attitude is less than 3°.

Fast/Slow indicator on each ADI will provide guidance to go-around speed (which equals approximately 1.3 Vs +5 knots for landing flaps).

If immediate climbing turn is required,

HDG Select Knob PULL

Momentarily pull out HDG select knob to engage heading select mode. Verify bank angle limit is set at 15°. Rotate HDG select knob until desired heading is displayed in HDG readout. FMA's will display EPR GA/ /HDG SEL/GO RND.

(Continued)

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FLIGHT CREW OPERATING MANUAL

GO AROUND FROM FLIGHT DIRECTOR APPROACH (Continued)

For all contingencies,

ALT Set Knob PULL

Momentarily pull out on ALT set knob to arm FGS for missed approach altitude capture. Arm mode will display ALT.

Pitch Control Wheel ROTATE

Rotate pitch control wheel as required to accelerate for flap/slat retraction. Pitch mode changes to VERT SPD.

CL Mode Button PUSH

Push CL mode button. EPR limit for climb thrust will be displayed in EPR LIM readout and EPR reference bug on EPR gage will be automatically positioned. Autothrottle mode changes from EPR GA to EPR CL.

SPD/MACH Readout SET

Rotate SPD/MACH select knob until desired speed appears in SPD/MACH readout.

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FLIGHT CREW OPERATING MANUAL

AUTOLAND APPROACH

DFGC 1-2 Switch 1 OR 2

Select flight guidance computer 1 or 2.

AP Switch. ON

AUTO THROT Switch ON

Move AUTO THROT switch to on (up) position and observe FMA displays SPD (plus selected value), HDG SEL, and ALT HLD.

VHF/NAV Readouts SET

Set same ILS frequency in both VHF/NAV readouts and identify.

NOTE

Both VHF NAV and CRS readouts must be set to same ILS frequency and course before autoland logic can complete.

VHF/CRS Readouts SET

Rotate VHF/CRS select knobs until required ILS front inbound course is displayed in each readout.

NO AUTOLAND Light OFF

Observe NO AUTOLAND light is off.

NOTES

If NO AUTOLAND light is on, move DFGC 1-2 switch to opposite position and again observe NO AUTOLAND light. If NO AUTOLAND light is off, continue autoland operation. If NO AUTOLAND light is on, autoland operation is not possible.

NO AUTOLAND light can come on any time computer is powered.

(Continued)

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FLIGHT CREW OPERATING MANUAL

AUTOLAND APPROACH (Continued)

HDG Readout SET

Rotate HDG selector knob until required localizer intercept heading appears in HDG readout. Verify HDG SEL mode is engaged.

AUTO LAND Button PUSH

Push AUTO LAND button and observe FMA's display LND.

NOTES

Pitch wheel may be used to arrive at approach entry altitude.

When localizer beam deviation reduces to capture threshold, airplane automatically turns as required to localizer beam centerline. LOC CAP will be annunciated in roll FMA's.

During localizer capture, bank limiter is overridden and airplane can bank to a maximum of 30 degrees.

As airplane settles on beam centerline, roll FMA's change from LOC CAP to LOC TRK. Autopilot will automatically establish required crab angle.

When glideslope pointer becomes active and upon command of PF, PNF move gear handle to DOWN and observe gear green lights are on and door light is off.

When one dot below glideslope, move FLAP/SLAT handle to 28 degree detent, observe FLAPS position indicators show 28 degrees, and SLAT LAND light is on.

If 40 degrees flaps are used for landing, move FLAP/SLAT handle to 40 degree detent at glideslope intercept.

SPD/MACH Readout SET

Rotate SPD/MACH select knob to set final approach speed in SPD readout. Autothrottle system FMA's will display SPD (plus selected value).

NOTES

If SPD readout is set prior to selecting landing flaps, autothrottle system FMA's will display ALFA SPD. After selecting landing flaps, FMA's will again display SPD.

If LOC TRK and G/S TRK are annunciated on FMA, but autoland logic has not been satisfied at 1500 feet AGL, FMA LND armed annunciator will flash.

(Continued)

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FLIGHT CREW OPERATING MANUAL

AUTOLAND APPROACH (Continued)

Verify that correct decision height has been set.

NOTES

Align mode engages at approximately 150 feet, roll FMA's switch from AUT LND to ALN (align), and crab angle maintained by autopilot is removed.

If ALN is not annunciated on an FMA by 100 feet of radio altitude, initiate a go-around or disconnect autopilot and continue the approach manually, conditions permitting.

Autothrottle system retard mode engages at approximately 50 feet AGL, as measured by radio altimeter, reducing engine thrust at rate programmed to reach or near idle at touchdown. Fast/Slow indicators are removed from view. Autothrottle FMA's change from SPD (plus selected value) to RETD.

Flare mode engages at approximately same time as retard mode, adjusting pitch attitude for touchdown. Pitch FMA's change from AUT LND to FLAR (flare).

Roll out mode engages at main gear wheel spin-up, roll and pitch FMA's switch to ROL OUT (roll out), arm FMA's go blank, and throttles move rapidly to aft idle stop.

After nose gear touchdown, the arm, roll, and pitch FMA's go blank and flight director command bars on both ADI's are removed from view.

Autopilot disengages five seconds after nose gear strut compression. Push autopilot disconnect button on control wheel to turn off flashing red AP lights and silence aural and vocal warning. Roll and pitch FMA's will now display HDG HLD and ALT HLD.

When reverse thrust is applied, autothrottle switch drops to OFF and autothrottle system FMA's go blank. PF must maintain runway alignment manually after nose gear strut compression.

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FLIGHT CREW OPERATING MANUAL

GO AROUND FROM AUTOLAND APPROACH

At decision height,

TO/GA Button PUSH

PF manually advance throttles, push TO/GA button and hold for at least 1 second.

NOTES

When pressure on throttles is released, autothrottle system will refine go-around thrust setting.

Thrust rating indicator automatically changes to go-around (GA) if not previously selected.

Autothrottle mode changes from SPD (plus selected value) to EPR GA. Arm mode goes blank. Roll and pitch modes change from AUT LND to GO RND.

PF monitor autopilot performance.

NOTES

If go-around is selected after flaps have been retracted from landing configuration, autopilot will not engage into go-around mode.

If runway contact is made during autopilot go-around, autopilot will remain engaged. Autopilot will disengage if go-around mode is selected after runway contact is made.

Autopilot will roll airplane to wings level and rotate it to a pitch attitude to maintain go-around reference speed (maximum pitch attitude is 20° airplane nose up). Airplane will maintain heading existing when roll attitude is less than 3°.

Fast/Slow indicator on each ADI will provide guidance to go-around speed (which equals approximately 1.3 Vs +5 knots for landing flaps).

(Continued)

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FLIGHT CREW OPERATING MANUAL

GO AROUND FROM AUTOLAND APPROACH (Continued)

If immediate climbing turn is required,

HDG Select Knob PULL

Momentarily pull out HDG select knob to engage heading select mode. Verify bank angle limit is set at 15°. Rotate HDG select knob until desired heading is displayed in HDG readout. FMA's will display EPR GA/ /HDG SEL/GO RND.

NOTE

Autopilot will disconnect if heading select is engaged during a single engine go-around.

For all contingencies,

ALT Set Knob PULL

Momentarily pull out on ALT set knob to arm FGS for missed approach altitude capture. Arm mode will display ALT.

Pitch Control Wheel ROTATE

Rotate pitch control wheel as required to accelerate for flap/slat retraction. Pitch mode changes to VERT SPD.

CL Mode Button PUSH

Push CL mode button. EPR limit for climb thrust will be displayed in EPR LIM readout and EPR reference bug on EPR gage will be automatically positioned. Autothrottle mode changes from EPR GA to EPR CL.

SPD/MACH Readout SET

Rotate SPD/MACH select knob until desired speed appears in SPD/MACH readout.

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FLIGHT CREW OPERATING MANUAL

AUTOMATIC FLIGHT - NORMAL OPERATION - PROCEDURES

AUTOLAND AVAILABILITY TEST

NOTE

Test must be performed while airplane is on ground.

VHF NAV Radios SET

Set both VHF NAV radios to an ILS frequency.

AUTOLAND Button. PUSH

Push AUTOLAND button and observe following:

NO AUTOLAND legend light flashing continuously.

Autothrottle, arm, roll and pitch mode annunciators display AUTO
LND/PRE/FLT/TEST.

Radio altimeters, ADI's and ILS indications display self-test functions.

After approximately 50 seconds, flight mode annunciator goes blank or reverts
to previous display and NO AUTOLAND legend light goes off indicating a valid
test.

NOTE

If test is invalid, NO AUTOLAND legend light remains on until
RESET button is pushed.

Move DFGC 1-2 switch to opposite position and repeat test.

VHF NAV Radios SET

■ Captain and First Officer set desired departure VHF NAV frequency and course.

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FLIGHT CREW OPERATING MANUAL

SELECT FLIGHT DIRECTOR/ AUTOPILOT TAKEOFF MODE

NOTES

This procedure describes steps necessary to make a flight director takeoff, including autopilot engagement immediately after lift-off. On ground, takeoff mode is flight director only. In flight, takeoff mode is both flight director and autopilot.

During flight director operation with autopilot off and autothrottles engaged, two possible incompatible modes may be displayed if non-normal sequence of autopilot and autothrottle modes is selected. These incompatible mode displays are speed on throttle (IAS or MACH SEL) and speed on pitch (IAS or MACH HOLD). Incompatibility will be displayed on non-selected side FMA. For example: With AP off and autothrottles engaged, if DFGC switch is in 1, pushing IAS/MACH mode button then pushing SPD SEL or MACH SEL mode button will cause Captain's FMA to display "SPD _ _ _" or "MACH _ _ _" (value set in SPD/MACH readout) and "VERT SPD". F/O's FMA will display "SPD _ _ _" or "MACH _ _ _" and "IAS" or "MACH".

FD Switches FD
SPD/MACH Select Knob PUSH

Push SPD/MACH select knob to first detent (fast slew) and set 250 knots or minimum maneuvering speed, whichever is higher. Push SPD/MACH select knob full in and set desired cruise mach number. Observe SPD/MACH readout continues to display selected mach number after knob is released from maximum detent. If a speed (IAS) reference is desired in SPD/MACH readout, push SPD/MACH select knob to maximum detent and release.

NOTE

Initial SPD/MACH readout on ground, after electrical power application is a speed reference value (100 knots).

HDG Readout SET

Rotate HDG selector knob until runway magnetic heading or first heading after takeoff appears in HDG readout.

Bank Angle Limit Selector 15 DEGREES

(Continued)

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FLIGHT CREW OPERATING MANUAL

SELECT FLIGHT DIRECTOR/AUTOPILOT TAKEOFF MODE (Continued)

ALT Readout SET

Rotate ALT set knob until first level-off altitude is displayed in ALT readout.

Arm altitude preselect mode by pulling ALT set knob.

NOTES

ALT will be displayed in arm FMAs.

When capture threshold is reached, selected altitude will be captured automatically if autopilot is engaged, or by flight director pitch guidance if autopilot is disengaged. Pitch profile readout will display existing vertical speed during ALT CAP phase.

Thrust Computer SET

Push T.O. or T.O./FLX on thrust computer indicator and observe maximum limit indexes on EPR gages indicate same value as displayed on thrust computer indicator readout.

NOTE

If T.O./FLX is not used for takeoff, set 00°C in ASSUMED TEMP readout.

After engine start,

TO/GA Button PUSH

Push either TO/GA button. Observe roll and pitch FMA's display TAK OFF. Flight director command bars will command wings level and a slight pitch up displacement. Fast/Slow indicators will show full slow. Flight director command bars and Fast/Slow indicators are not valid until after rotation.

When using HDG SEL mode for takeoff, verify runway magnetic heading is set in HDG readout. Pull HDG selector knob and observe roll FMA's display HDG SEL. Verify bank angle limit selector is set to 15 degrees and ALT readout displays desired altitude.

When ready for takeoff, if autothrottles are to be used, advance throttles to 1.4 EPR or 80% N₂ and verify EPR's are matched.

AUTO THROT Switch ON

Observe autothrottle system FMA's display EPR/T.O. and throttles advance to selected EPR limit.

NOTES

At 60 knots, autothrottle system clamp (CLMP) mode will engage, removing power from autothrottle system servo. Selecting a thrust rating mode other than T.O. or T.O. FLX will disengage CLMP mode.

If, while in autothrottle system EPR mode, flap limit airspeed is exceeded, autothrottle system will disengage.

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FLIGHT CREW OPERATING MANUAL

SELECT FLIGHT DIRECTOR/AUTOPILOT TAKEOFF MODE (Continued)

NOTES (Continued)

EPR synchronization will be provided when autothrottles are in any mode except CLMP.

CAUTION

Autothrottle system CLMP mode engages on takeoff when CADC senses 60 knots airspeed. If takeoff is made in head wind, CLMP mode will engage sooner and it may not be possible for autothrottle system to set takeoff EPR.

Rotate airplane to satisfy flight director pitch commands and Fast/Slow indicator. Cross check pitch attitude being commanded with primary airspeed indicator.

If desired after gear retraction, engage autopilot by moving AP switch to AP ON. Observe AP1 or AP2 light on, as appropriate.

NOTES

While autopilot is engaged, if maneuvering about pitch axis results in IAS at or below minimum maneuvering speed, pitch FMA's will alternately display SPD LOW and VERT SPD until corrective action is taken by pilot.

If autopilot is engaged during a turn, airplane will roll smoothly to wings level. Autopilot will maintain airplane on heading existing at moment bank angle reduces to 3 degrees. Autopilot will also maintain vertical speed existing at time of engagement.

ATS will automatically advance throttles to go-around EPR limit if an engine failure should occur above 400 feet while in the flight director and/or autopilot takeoff mode provided thrust was set or reduced below GA EPR prior to engine failure. Autothrottles will also automatically advance to GA EPR if climb gradient decreases to zero or less for five seconds.

Parallel rudder is engaged for takeoff and autopilot may be used for engine failed conditions. With a failed engine, autopilot will disengage when exiting roll channel takeoff mode and parallel rudder will fade out to series rudder.

Flight director takeoff speed command system provides the following:

- If an engine failure occurs prior to V_2 , system guidance will be to V_2 speed.
- If an engine failure occurs between V_2 and V_2+10 , system guidance will be to speed at which engine failed.
- For all other operations, system guidance will be to V_2+10 .

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FLIGHT CREW OPERATING MANUAL

NOISE ABATEMENT CLIMB SEGMENT

At 1500 feet above ground,

Climb Power ESTABLISH

PF command, "Climb power." PNF push CL mode button on thrust computer indicator and observe light (in button) is on, autothrottle CLMP mode disengages, and autothrottle system FMA's display EPR/CL.

NOTES

Selection of CL provides a climb EPR limit.

Autothrottle system CLMP mode can be disengaged by pushing MCT, CR, CL or GA mode button on TRI.

At 3000 feet above ground,

Pitch Profile Readout SET

Rotate pitch wheel to decrease existing vertical speed by one-half.

NOTE

This action will disengage flight director TAK OFF mode, and pitch FMA's will display VERT SPD. If roll FMA's were in TAK OFF prior to mode disengagement, they will now display HDG HLD.

When reaching required airspeed, retract flaps and slats and accelerate to desired climb speed.

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FLIGHT CREW OPERATING MANUAL

FLIGHT GUIDANCE CLIMB

When in clean configuration and at climb speed,

IAS/MACH Button PUSH

Pitch profile readout will display S, followed by speed value existing when button was pushed. Observe pitch FMA's display IAS.

NOTE

If autothrottle system is engaged in SPD SEL mode when IAS or MACH mode is engaged, CLMP will be displayed in autothrottle FMA's and will flash for approximately 5 seconds. CLMP mode will remain engaged until a pitch mode other than IAS or MACH is selected, until glideslope beam is captured, or any autothrottle system mode is selected.

If it becomes necessary to increase or decrease airspeed reference while in IAS or MACH mode, rotate pitch wheel in appropriate direction to increase or decrease reference airspeed or mach. Set airspeed by observing pitch profile readout as pitch wheel is adjusted.

NOTE

Pitch wheel has 2 functions. In IAS or MACH mode, it functions as a speed or mach trim wheel. If any other pitch mode (except TURB) is selected, it functions as a vertical speed selector.

If MACH mode is desired, when reaching desired mach,

IAS/MACH Button PUSH

Pitch profile readout will display M, followed by mach value existing when button was pushed. Observe pitch FMA's display MACH.

NOTE

If engaged in IAS or MACH modes, there are five methods of disengagement:

1. Capturing an altitude, using altitude preselect.
2. Pushing VERT SPD button.
3. Pushing ALT/HOLD button.
4. Pushing SPD SEL button.
5. Pushing MACH SEL button.

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FLIGHT CREW OPERATING MANUAL

AUTOMATIC ALTITUDE CAPTURE

AP Switch. AP ON

ALT Readout SET

Rotate ALT set knob until desired altitude is displayed in ALT readout.

Altitude Preselect Mode. ARM

Pull ALT set knob to engage altitude preselect mode. Observe ALT is displayed in arm FMA's.

NOTES

Altitude preselect mode provides automatic capture of a preselected altitude. Flight guidance system may be in any available pitch mode.

Approximately 750 feet from preselected altitude, a steady amber light on each primary altimeter will come on. Light will go off when 250 feet from selected altitude. When capture threshold is reached, ALT CAP mode will engage and pitch profile readout will read existing vertical speed. When ALT HLD mode engages, pitch profile readout will display zeros.

Deviation greater than 250 feet above or below selected altitude causes ALT ADVISORY lights to flash, a two-second tone to sound and a voice alert. Selecting a new reference altitude or flying back to within 250 feet of selected altitude will extinguish flashing lights and silence voice warning.

Altitude preselect mode will disarm if turbulence mode is selected or glideslope is captured.

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FLIGHT CREW OPERATING MANUAL

AUTOMATIC AUTOHROTTLE MODE CHANGE

During climb, before reaching preselected altitude,

SPD MACH Readout SET

Rotate SPD MACH select knob until required speed or mach is displayed in SPD MACH readout.

NOTES

When ALT CAP mode engages, autothrottle system will automatically switch from EPR/CL mode to airspeed or mach displayed in primary SPD MACH readout.

Pushing ALT HLD button or selecting ALT HLD mode by rotation of pitch select wheel will also cause automatic switching from EPR mode to SPD/MACH mode.

If primary SPD/MACH display is not as desired for cruise prior to ALT CAP mode engagement,

SPD/MACH Knob PUSH/RELEASE

Observe new primary display.

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FLIGHT CREW OPERATING MANUAL

FLIGHT DIRECTOR/AUTOPILOT ONS MODE (FOR MARCONI-OMEGA EQUIPPED AIRPLANES)

With flight director and/or autopilot engaged and airplane heading within 90 degrees of desired track,

NAV Button PUSH

Push NAV button on FGS panel and observe arm FMAs display NAV. As airplane captures Omega course, arm FMA's will go blank and roll FMA's will display NAV CAP. After airplane is established on course, roll FMA's will display NAV TRK.

NOTE

Once engaged, autopilot will remain in ONS mode regardless of subsequent HSI switching.

MD-80

FLIGHT CREW OPERATING MANUAL

DESCENT INITIATION VERTICAL SPEED MODE (Continued)

At 3000 feet above speed limiting altitude,

Pitch Profile Readout SET

Rotate pitch wheel toward ANU to reduce rate of descent until V-1500 appears in pitch profile readout. Observe airplane decelerate so as to pass speed limiting altitude indicating required airspeed. Adjust pitch wheel as required for remainder of descent.

As flap/slat configuration changes,

SPD Readout. SET

Rotate SPD/MACH knob to set desired airspeed in SPD readout.

Nearing initial approach altitude (no closer than 750 feet from selected level-off altitude), observe steady amber altitude advisory light come on. Observe light goes off when within 250 feet of selected altitude.

NOTES

Deviation from selected altitude is indicated by flashing altitude advisory light, a two-second tone and voice warning, "Altitude".

Returning to within 250 feet of reference altitude or selecting new reference altitude will turn off flashing lights and silence voice warning.

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FLIGHT CREW OPERATING MANUAL

DESCENT INITIATION MACH/IAS MODE

With FD switches in ON, AP switch in ON, AUTO THROT switch on (up), and in MACH SEL mode,

ALT Readout SET

PNF rotate ALT SET knob until level-off altitude is displayed in ALT readout.

Altitude Preselect Mode. ARM

PNF pull ALT set knob to engage altitude preselect mode.

Pitch Profile Readout SET

Rotate pitch wheel toward AND to initiate descent until V-2500 appears in pitch profile readout. VERT SPD will be displayed in pitch FMA's.

When desired MACH or IAS is attained,

IAS/MACH Button PUSH

Observe pitch FMA's indicate MACH or IAS as appropriate and ATS FMA's switch to CLMP and flash for 5 seconds. If MACH is selected, pitch profile readout will display M, followed by Mach number. If IAS is selected, readout will display S, followed by indicated airspeed selected.

SPD/MACH Knob PUSH/SET

Push full in on the SPD/MACH knob and set required airspeed to be used later in the descent and approach.

NOTES

If SPD SEL or MACH SEL autothrottle modes are re-established, IAS or MACH hold mode will be overridden automatically and pitch FMA's will switch to VERT SPD or ALT HLD as appropriate, and pitch displays will flash for 5 seconds.

If in MACH or IAS mode, rotating the pitch wheel will change MACH or IAS displayed in pitch profile readout.

If in CLMP, selecting a pitch mode other than MACH or IAS will cause CLMP mode to disengage and prior primary autothrottle mode to be re-established. Autothrottle system FMA's will flash for approximately 5 seconds to alert crew of change.

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FLIGHT CREW OPERATING MANUAL

FLIGHT DIRECTOR/AUTOPILOT VOR MODE

VHF NAV Readouts SET

Set and identify desired VOR frequency.

CRS Readouts SET

Set desired VOR course.

HDG Readout SET

Rotate HDG selector knob until desired intercept heading appears in HDG readout.

NOTE

If not already in HDG SEL mode, pull HDG selector knob and observe roll FMA's display HDG SEL.

VOR/LOC Button. PUSH

Observe arm FMA's display VOR.

NOTES

Roll control responds to selected heading and with autopilot engaged, VOR radial will be captured automatically. On HSI, at approximately 2 dots on the Course Deviation Indicator (CDI), VOR capture mode will engage and VOR CAP will be displayed in roll FMA's.

At approximately one-half dot CDI deviation, roll FMA's will display VOR TRK. Crosswind correction will be provided to maintain beam centerline. CDI will display any beam deviation.

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FLIGHT CREW OPERATING MANUAL

ILS OR LOC ONLY APPROACH

NOTE

Autopilot may be engaged for a coupled approach or off for a flight director approach.

VHF NAV Radios SET

Set and identify desired ILS station frequency.

Front Inbound ILS Course SET

Set same ILS front inbound course in both course readouts.

SPD MACH Readout SET

Rotate SPD MACH select knob to set desired IAS in SPD readout.

NOTE

If autothrottle system is desired, verify AUTO THROT switch is in on (up) position.

HDG Readout SET

Verify required localizer intercept heading is set in HDG readout.

ILS Button PUSH

Push ILS button and observe arm FMA's display ILS.

NOTES

If localizer only mode is desired, push VOR/LOC button. Glideslope logic will be inhibited.

Arm FMA's will display LOC. During localizer capture, arm FMA's will go blank and roll FMA's display LOC CAP. When airplane is on centerline, FMA's will switch from LOC CAP to LOC TRK.

Pitch Profile Readout SET

Rotate pitch wheel as required to position airplane at initial approach altitude.

Monitor localizer capture and tracking.

(Continued)

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FLIGHT CREW OPERATING MANUAL

ILS OR LOC ONLY APPROACH (Continued)

NOTE

Direction and amount of crab angle will be displayed on HSI as angular difference between airplane heading and the setting on course select pointer.

When glideslope pointer becomes active, extend landing gear. When one dot below glideslope, select 28° flaps.

SPD MACH Readout SET

Rotate SPD/MACH select knob to set final approach speed in SPD readout.

NOTES

If SPD MACH readout is set prior to selecting final approach flaps, autothrottle system FMA's will display ALFA SPD (minimum maneuvering airspeed).

ALFA SPD mode is automatically engaged and annunciated when SPD/MACH readout is set to a value less than alpha speed reference, and SPD SEL or MACH SEL autothrottle mode are engaged.

Monitor glideslope capture.

NOTE

As airplane reaches capture threshold, pitch mode annunciators change to G/S CAP. Capture point is variable and is function of rate of beam closure, plus beam deviation. Glideslope can be captured from above or below.

If 40 degrees flaps are used for landing, move FLAP/SLAT handle to 40 degree detent at glideslope intercept.

Monitor glideslope track.

NOTE

When airplane is on beam centerline, pitch FMA's change from G/S CAP to G/S TRK. Rudder authority, in event of a go-around, is established. Arm FMA's change from ILS to AUT/GA if automatic go-around logic is satisfied.

(Continued)

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FLIGHT CREW OPERATING MANUAL

ILS OR LOC ONLY APPROACH (Continued)

When decision height is reached,

DH Lights ON

Observe DH lights come on when airplane reaches decision height.

NOTE

In ILS below 1500 feet AGL, altitude preselect mode is inhibited.

If autopilot is engaged,

AP Disengage Button PUSH

Push AP disengage button twice.

Monitor autothrottle retard mode.

NOTE

When reverse thrust levers are actuated, autothrottle system will disengage (AUTO/THROT switch drops to OFF). ATS THROTTLE off warning lights will not come on.

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FLIGHT CREW OPERATING MANUAL

GO AROUND FROM FLIGHT DIRECTOR APPROACH

At decision height,

TO/GA Button PUSH

PF manually advance throttles, push TO/GA button and hold for at least 1 second.

NOTES

When pressure on throttles is released, autothrottle system will refine go-around thrust setting.

The thrust rating computer automatically changes to go-around (GA) if not previously selected.

Autothrottle mode changes from SPD (plus selected value) to EPR GA. Arm mode goes blank. Roll and pitch modes change from LOC TRK and G/S TRK to GO RND.

Go-Around Maneuver PERFORM

PF maneuver airplane to satisfy roll and pitch commands.

NOTES

Flight director command bars command fly up (maximum 20° airplane nose up).

Flight director command bars command go-around reference speed, wings level and maintains existing heading when roll attitude is less than 3°.

Fast/Slow indicator on each ADI will provide guidance to go-around speed (which equals approximately $1.3 V_S + 5$ knots for landing flaps).

If the -930 DFGC is installed and autothrottles are engaged, speed guidance will be the greater of $V_{REF} + 5$ knots or approach speed selected using speed select knob.

If the -930 DFGC is installed and autothrottles are disengaged, go-around speed guidance will be approximately $V_{REF} + 5$ knots. Final approach speeds greater than $V_{REF} + 5$, which may include speed additives for wind and gust conditions, will not be retained as a command speed for Fast/Slow error indication.

(Continued)

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FLIGHT CREW OPERATING MANUAL

GO AROUND FROM FLIGHT DIRECTOR APPROACH (Continued)

NOTES (Continued)

If the -970 DFGC is installed, the speed reference will be the speed at go-around initiation (TO/GA switch depressed) but not less than $1.3 V_S + 5$ KIAS or greater than $1.3 V_S + 25$ KIAS of the landing flap configuration with autothrottles engaged or disengaged.

If immediate climbing turn is required,

HDG Select Knob PULL

Momentarily pull out HDG select knob to engage heading select mode. Verify bank angle limit is set at 15°. Rotate HDG select knob until desired heading is displayed in HDG readout. FMA's will display EPR GA/ /HDG SEL/GO RND.

For all contingencies,

ALT Set Knob PULL

Momentarily pull out on ALT set knob to arm FGS for missed approach altitude capture. Arm mode will display ALT.

Pitch Control Wheel ROTATE

Rotate pitch control wheel as required to accelerate for flap/slat retraction. Pitch mode changes to VERT SPD.

CL Mode Button PUSH

Push CL mode button. EPR limit for climb thrust will be displayed in EPR LIM readout and EPR reference bug on EPR gage will be automatically positioned. Autothrottle mode changes from EPR GA to EPR CL.

SPD/MACH Readout SET

Rotate SPD/MACH select knob until desired speed appears in SPD/MACH readout.

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FLIGHT CREW OPERATING MANUAL

AUTOLAND APPROACH

DFGC 1-2 Switch 1 OR 2

Select flight guidance computer 1 or 2.

AP Switch. ON

AUTO THROT Switch ON

Move AUTO THROT switch to on (up) position and observe FMA displays SPD (plus selected value), HDG SEL, and ALT HLD.

VHF/NAV Readouts SET

Set same ILS frequency in both VHF/NAV readouts and identify.

NOTE

Both VHF NAV and CRS readouts must be set to same ILS frequency and course before autoland logic can complete.

VHF/CRS Readouts SET

Rotate VHF/CRS select knobs until required ILS front inbound course is displayed in each readout.

NO AUTOLAND Light OFF

Observe NO AUTOLAND light is off.

NOTES

If NO AUTOLAND light is on, move DFGC 1-2 switch to opposite position and again observe NO AUTOLAND light. If NO AUTOLAND light is off, continue autoland operation. If NO AUTOLAND light is on, autoland operation is not possible.

NO AUTOLAND light can come on any time computer is powered.

(Continued)

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FLIGHT CREW OPERATING MANUAL

AUTOLAND APPROACH (Continued)

HDG Readout SET

Rotate HDG selector knob until required localizer intercept heading appears in HDG readout. Verify HDG SEL mode is engaged.

AUTO LAND Button PUSH

Push AUTO LAND button and observe FMA's display LND.

NOTES

Pitch wheel may be used to arrive at approach entry altitude.

When localizer beam deviation reduces to capture threshold, airplane automatically turns as required to localizer beam centerline. LOC CAP will be annunciated in roll FMA's.

During localizer capture, bank limiter is overridden and airplane can bank to a maximum of 30 degrees.

As airplane settles on beam centerline, roll FMA's change from LOC CAP to LOC TRK. Autopilot will automatically establish required crab angle.

When glideslope pointer becomes active and upon command of PF, PNF move gear handle to DOWN and observe gear green lights are on and door light is off.

When one dot below glideslope, move FLAP/SLAT handle to 28 degree detent, observe FLAPS position indicators show 28 degrees, and SLAT LAND light is on.

If 40 degrees flaps are used for landing, move FLAP/SLAT handle to 40 degree detent, at glideslope intercept.

SPD/MACH Readout SET

Rotate SPD/MACH select knob to set final approach speed in SPD readout. Autothrottle system FMA's will display SPD (plus selected value).

NOTES

If SPD readout is set prior to selecting landing flaps, autothrottle system FMA's will display ALFA SPD. After selecting landing flaps, FMA's will again display SPD.

If LOC TRK and G/S TRK are annunciated on FMA, but autoland logic has not been satisfied at 1500 feet AGL, FMA LND armed annunciator will flash.

(Continued)

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FLIGHT CREW OPERATING MANUAL

AUTOLAND APPROACH (Continued)

Verify that correct decision height has been set.

NOTES

Align mode engages at approximately 150 feet, roll FMA's switch from AUT LND to ALN (align), and crab angle maintained by autopilot is removed.

If ALN is not annunciated on an FMA by 100 feet of radio altitude, initiate a go-around or disconnect autopilot and continue the approach manually, conditions permitting.

Autothrottle system retard mode engages at approximately 50 feet AGL, as measured by radio altimeter, reducing engine thrust at rate programmed to reach or near idle at touchdown. Fast/Slow indicators are removed from view. Autothrottle FMA's change from SPD (plus selected value) to RETD.

Flare mode engages at approximately same time as retard mode, adjusting pitch attitude for touchdown. Pitch FMA's change from AUT LND to FLAR (flare).

Roll out mode engages at main gear wheel spin-up, roll and pitch FMA's switch to ROL OUT (roll out), arm FMA's go blank, and throttles move rapidly to aft idle stop.

After nose gear touchdown, arm, roll, and pitch FMA's go blank and flight director command bars on both ADI's are removed from view.

Autopilot disengages five seconds after nose gear strut compression. Push autopilot disconnect button on control wheel to turn off flashing red AP lights and silence aural and vocal warning. Roll and pitch FMA's will now display HDG HLD and ALT HLD.

When reverse thrust is applied, autothrottle switch drops to OFF and autothrottle system FMA's go blank. PF must maintain runway alignment manually after nose gear strut compression.

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FLIGHT CREW OPERATING MANUAL

GO AROUND FROM AUTOLAND APPROACH

At decision height,

TO/GA Button PUSH

PF manually advance throttles, push TO/GA button and hold for at least 1 second.

NOTES

When pressure on throttles is released, autothrottle system will refine go-around thrust setting.

Thrust rating indicator automatically changes to go-around (GA) if not previously selected.

Autothrottle mode changes from SPD (plus selected value) to EPR GA. Arm mode goes blank. Roll and pitch modes change from AUT LND to GO RND.

PF monitor autopilot performance.

NOTES

If go-around is selected after flaps have been retracted from landing configuration, autopilot will not engage into go-around mode.

If runway contact is made during autopilot go-around, autopilot will remain engaged. Autopilot will disengage if go-around mode is selected after runway contact is made.

Autopilot will roll airplane to wings level and rotate it to a pitch attitude to maintain go-around reference speed (maximum pitch attitude is 20° airplane nose up). Airplane will maintain heading existing when roll attitude is less than 3°.

Fast/Slow indicator on each ADI will provide guidance to go-around speed (which equals approximately $1.3 V_S + 5$ knots for landing flaps).

If the -930 DFGC is installed and autothrottles are engaged, speed guidance will be the greater of $V_{REF} + 5$ knots or approach speed selected using speed select knob.

If the -930 DFGC is installed and autothrottles are disengaged, go-around speed guidance will be approximately $V_{REF} + 5$ knots. Final approach speeds greater than $V_{REF} + 5$, which may include speed additives for wind and gust conditions, will not be retained as a command speed for Fast/Slow error indication.

(Continued)

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FLIGHT CREW OPERATING MANUAL

GO AROUND FROM AUTOLAND APPROACH (Continued)

NOTES (Continued)

If the -970 DFGC is installed, the speed reference will be the speed at go-around initiation (TO/GA switch depressed) but not less than $1.3 V_S + 5$ KIAS or greater than $1.3 V_S + 25$ KIAS of the landing flap configuration with autothrottles engaged or disengaged.

If immediate climbing turn is required,

HDG Select Knob PULL

Momentarily pull out HDG select knob to engage heading select mode. Verify bank angle limit is set at 15°. Rotate HDG select knob until desired heading is displayed in HDG readout. FMA's will display EPR GA/ /HDG SEL/GO RND.

NOTE

Autopilot will disconnect if heading select is engaged during a single engine go-around.

For all contingencies,

ALT Set Knob PULL

Momentarily pull out on ALT set knob to arm FGS for missed approach altitude capture. Arm mode will display ALT.

Pitch Control Wheel ROTATE

Rotate pitch control wheel as required to accelerate for flap/slat retraction. Pitch mode changes to VERT SPD.

CL Mode Button PUSH

Push CL mode button. EPR limit for climb thrust will be displayed in EPR LIM readout and EPR reference bug on EPR gage will be automatically positioned. Autothrottle mode changes from EPR GA to EPR CL.

SPD/MACH Readout SET

Rotate SPD/MACH select knob until desired speed appears in SPD/MACH readout.

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FLIGHT CREW OPERATING MANUAL

PMS PLAN

Prior to loading PMS data:

STS/TEST Key PUSH/HOLD/RELEASE

Push and hold STS/TEST key and verify mode annunciators, line select keys, data display and PMS warning annunciator are illuminated. Release STS/TEST key and verify airframe/engine type is correct as displayed and software program identification number is displayed.

Line Select Key 1 PUSH

Push line select key 1 to check fault status.

NOTE

If a fault(s) is displayed, call maintenance.

STS/TEST Key PUSH

Push STS/TEST key to return to status page.

COST Index Factor ENTER INTO SCRATCHPAD

Enter COST index factor into scratchpad using data entry keys.

NOTES

COST index factor is loadable from 0 to 255. This will effect OPT speeds and altitudes. If no value is loaded for COST index factor, PMS will use a default value of zero.

COST index factor can also be loaded while in flight.

Line Select Key 1 PUSH

Push line select key 1 to enter cost index factor into data line 1.

Drag/Fuel Flow Factors ENTER INTO SCRATCHPAD

Enter drag factor (KD), /, fuel flow factor (KF) into scratchpad using the data entry keys.

NOTES

KD and KF can be loaded as any value from -9.9 to +9.9. If no value is loaded for KD or KF, PMS will use a default value of zero.

Values for KD and KF will have an affect on OPT speeds selected by PMS.

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FLIGHT CREW OPERATING MANUAL

PMS PLAN (Continued)

Line Select Key 2 PUSH

Push line select key 2 to enter KD and KF data into data line 2.

Descent Default Speed -

Descent default speed can be changed on this page only while on the ground.

NOTE

Changed speed schedule will then become new default speed for future flights. To be effective for the current trip, it must be changed prior to entering data on PLAN page.

To load PLAN page:

PLAN Key. PUSH

Push PLAN key and observe PLAN page is displayed.

NOTE

All data on this page is required for complete PERF operation. If all data is not entered, only limited PERF functions are available.

GWT ENTER INTO SCRATCHPAD

Enter GWT into scratchpad. Push line select key 1 to transfer GWT into data line 1.

FUEL ENTER INTO SCRATCHPAD

Enter FUEL into scratchpad. Push line select key 2 to transfer FUEL into data line 2.

TRIP ENTER INTO SCRATCHPAD

Enter TRIP distance into scratchpad. Push line select key 3 to transfer TRIP distance into data line 3.

NOTES

Unreasonable GWT and FUEL will cause CHECK GWT or CHECK FUEL (respectively) messages to appear in scratchpad.

Editing any parameter, except fuel, will cause recomputation to take place.

No other pages are available (except STS/TEST page) until planning data is entered.

(Continued)

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FLIGHT CREW OPERATING MANUAL

PMS PLAN (Continued)

Observe flashing ↑ in scratchpad. BOD GWT and BOD FUEL weights are being computed and are displayed as — — —. Move slew switch up or down until PLAN-CRZ page is displayed.

NOTE

Data on PLAN CRZ page is not necessary for system engagement. If no data is entered, planned trajectory will be based on no altitude constraints, zero wind and standard day temperature.

CRZ ALTITUDE/S ENTER INTO SCRATCHPAD

Enter CRZ ALTITUDE(S) (flight levels) into scratchpad. Push line select key 1 to transfer CRZ ALTITUDE(S) into data line 1.

NOTE

If an altitude is armed above planned altitude but below maximum altitude (in flight), altitude will change on PLAN-CRZ page to agree with new armed altitude. If altitude above maximum is armed, arm will be cancelled by PMS approximately 2 seconds later. (Maximum altitude is gross weight dependent with an upper limit of 37,000 feet.)

WIND COMPONENT ENTER INTO SCRATCHPAD

Enter WIND COMPONENT into scratchpad (+ for tailwind, — for headwind).

NOTES

A positive wind component entry does not require a + sign. However, for a negative wind component, first push alternate function key, then — key, then wind component.

Loaded wind continues to be displayed and can be edited in flight. However, POA computations begin to use current wind when first PLAN altitude is reached.

Push line select key 2 to transfer WIND COMPONENT to data line 2.

TEMP or DEV ENTER INTO SCRATCHPAD

Enter TEMP at initial cruise altitude or the corresponding DEV (deviation from standard at initial flight level) preceded by a / into scratchpad. Push line select key 3 to enter TEMP or DEV into data line 3. In flight, this line changes to single engine maximum altitude with distance and time to that altitude.

(Continued)

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FLIGHT CREW OPERATING MANUAL

PMS PLAN (Continued)

NOTES

Loaded TEMP/DEV continues to be displayed and can be changed at any time before reaching 15,000 feet. Above 15,000 feet, editing of TEMP/DEV is inhibited and POA computations are based on current temperature/deviation.

In flight, PLAN page TRIP distance changes to BOD/ALT.

GWT, FUEL and BOD distance display current data in flight. These parameters can be edited at any time.

Distance to BOD is entered TRIP distance minus 30 NM and BOD ALT is 10,000 feet. These are initial values and can be edited.

BOD definition is primarily used by PMS to compute an initial flight profile. Further geographic definition of the BOD is done on expanded BOD page.

If BOD is to be expanded further while on the PLAN page,

Line Select Or VERT WPTS Key PUSH

Push line select key or VERT WPTS key and observe WPTS page is displayed. Slew up until BOD line display comes into view.

Line Select Key PUSH

Push line select key adjacent to BOD line display and observe PMS displays WPT BOD* page.

NOTE

Data line 1 of WPT BOD* page contains lateral position data of BOD, which can be defined as a VOR/DME, ILS/DME, VOR or ILS frequency/distance or a VOR frequency/radial/distance.

Lateral Position Data ENTER INTO SCRATCHPAD

Enter lateral position data into scratchpad using data entry keys.

NOTE

A / must be inserted between a frequency and radial and between a radial and distance entry.

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FLIGHT CREW OPERATING MANUAL

PMS PLAN (Continued)

Line Select Key 1 PUSH

Push line select key 1 and observe lateral position data is displayed in data line one.

NOTES

Data line 2 defines desired speed/wind speed/wind direction at BOD. Any or all of these can be inserted, but if omitted, wind will default to zero and speed will be that used during descent if BOD is above 10,000 feet or 250 knots if BOD is 10,000 feet or lower.

Wind data can be loaded only after lateral position has been completely loaded and will default to zero if altitude definition is changed.

Speed/Wind Speed/Wind Direction ENTER INTO SCRATCHPAD

Enter speed, /, wind speed, /, wind direction into scratchpad using data entry keys.

NOTE

Any speed above 130 knots can be loaded into system and PMS will compute a deceleration phase into profile.

Line Select Key 2 PUSH

Push line select key 2 and observe speed/wind speed/wind direction is displayed in data line 2.

NOTE

Data line 3 displays BOD distance and altitude. Distance and/or altitude on this line can be loaded at any time (in flight or on ground), except when within 200 nautical miles of a BOD that is defined relative to a VOR/DME and that VOR/DME is tuned and being used for distance update. If an attempt to edit BOD distance is made under this condition, it will not be accepted and advisory message DISTANCE UPDATING will be displayed.

Distance/Altitude ENTER INTO SCRATCHPAD

Enter distance and/or / altitude into scratchpad using data entry keys.

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FLIGHT CREW OPERATING MANUAL

PMS PLAN (Continued)

Line Select Key 3 PUSH

Push line select key 3 and observe distance and/or / altitude are displayed in data line 3.

PLN DES W/V page:

PLN DES W/V page allows loading of wind data at three flight levels. Winds are used to develop a vertical wind profile for descent.

NOTES

PLN DES W/V page may be selected after a GWT and TRIP or BOD distance have been entered on PLAN page and BOD GWT and BOD FUEL have been computed.

Winds may be entered in any order of altitude but a wind direction and speed must be specified.

Altitude of a wind may be entered in feet or flight level but will always be displayed to nearest flight level.

Winds are entered in relation to airplane heading. Wind component is then used by the PMS to develop a descent vertical wind model.

PMS maximum wind shear is 20 knots per 1000 feet. If an edit not within this limit is made, the message CHECK WIND PROFILE will be displayed in scratchpad.

To enter data on PLN DES W/V page:

Altitude/Wind Direction/Wind Speed ENTER INTO SCRATCHPAD

Appropriate Line Select Key PUSH

Enter altitude / wind direction / and wind speed into scratchpad. Push line select key 1, 2 or 3 and observe wind data is now displayed in corresponding data line.

NOTES

To enter a second or third wind, repeat previous steps using remaining blank data lines and their appropriate line select key.

Clearing of a wind from a data line may be accomplished by pushing CLEAR key then pushing appropriate line select key.

Winds may be edited at anytime. However, once below an altitude, a wind is no longer used by the PMS.

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FLIGHT CREW OPERATING MANUAL

PMS PLAN (Continued)

When a REPLAN is desired,

When edits are made on PLAN page, PMS makes adjustments as required to current computed profile.

A second procedure, REPLAN, completely clears current profile from PMS and allows for definition of a new profile.

NOTE

Replan is automatically accomplished at end of PMS profile, but can be manually initiated any time a new profile (climb, cruise, descent) is desired.

PLAN Key PUSH

Push PLAN key and observe PLAN page is displayed.

CLEAR Key/Line Select Key 3 PUSH/PUSH

Line Select Key 3 PUSH

Push CLEAR key then line select key 3 and observe message CONFIRM PLAN is displayed in data line 3 and line select key 3 is illuminated.

Line Select Key 3 PUSH

Push line select key 3 again.

At this point, (1) GWT and FUEL weight are retained and continue to be updated and (2) All other flight plan data previously entered into PMS is cleared, including all of PLAN CRZ page and geographic definition of BOD, if previously entered.

BOD distance, ALT and other planning data can now be entered and new profile will be computed by PMS.

MD-80

FLIGHT CREW OPERATING MANUAL

PMS PLAN (POA INACTIVE)

NOTES

When current trip related data is not available to PMS, only limited operation of system is possible. This occurs when any of the following conditions exist:

- Airplane leaves the ground with TRIP distance not entered on PLAN page,
- Airplane flies past the bottom of descent (BOD) without subsequent entry of new BOD distance and altitude,
- Airplane is in climb past PMS computed top of descent (TOD),
- BOD distance and ALT are cleared from PLAN page.

PMS operations under any of these conditions will be limited to a pitch and thrust coupled speed hold mode which will be identified as CLB [NON OPT], CRZ [NON OPT] or DES [NON OPT]. No profile computations will be made by PMS, but maximum/minimum speeds and engine limits will be computed and honored and airplane will not be allowed to climb or descend through selected altitude.

PLAN Key. PUSH

Push PLAN key and observe PLAN page is displayed.

GWT. ENTER

Enter gross weight into scratchpad.

Line Select Key 1. PUSH

Push line select key 1 to transfer GWT into data line 1.

If only gross weight is entered into PMS CDU, no profile related data will be displayed. PMS will only operate in coupled speed hold mode, within constraints of minimum/maximum speeds, engine limits and selected altitude.

NOTE

Only [NON OPT] (POA inactive) CLB, CRZ and DES modes are available under these circumstances.

(Continued)

MD-80

FLIGHT CREW OPERATING MANUAL

PMS CLIMB

Initial selection and entry into a PMS climb mode can only be completed after the following conditions have been satisfied:

- Climb vertical speed greater than 240 fpm (CLB annunciator illuminated), and selected altitude above current altitude.
- TRI not in takeoff or go-around.
- Either FD or AP engaged.
- PMS valid.
- Autothrottle engaged.

PERF Button PUSH

Push PERF button and observe autothrottle and pitch FMA's display PERF CLB.

When transitioning from PERF CRZ to CLB and a higher altitude has been armed (observe auto-selection of CLB OPT page and illumination of line select key 1 with SPD and SEL alternately flashing in data line 1),

NOTES

PERF modes are disconnected whenever any other DFGS pitch axis mode is selected, or whenever another autothrottle mode is selected, or whenever flap position exceeds approximately 26° extend, or whenever PMS is invalid or whenever T.O. or TO FLX is selected on TRI.

Power transients (electrical bus transfers) on the electrical bus powering the PMS computer will cause a momentary PMS INVALID. This will cause DFGS to revert to CLMP mode of autothrottles and IAS or MACH mode of Autopilot/Flight Director. Appropriate DFGS annunciation is provided by FMA. PERF mode may be reengaged after such reversions.

Line Select Key 1 PUSH

Push line select key 1 to engage CLB OPT mode.

(Continued)

MD-80

FLIGHT CREW OPERATING MANUAL

PMS CLIMB (Continued)

NOTES

When transitioning from CRZ [NON OPT] to CLB OPT, a short duration speed bug transient may occur.

If an altitude is armed above planned altitude, altitude on PLAN CRZ page will change to agree with armed altitude.

If 250 knot speed restriction is displayed in data line 1, speed bug will be at 250. However, PMS will control to, and FAST/SLOW indicator will center at 2.5 knots below 250 knot restriction.

The 250 knot vertical event for climb is displayed in data line 3.

Bracketed quantity indicates speed restriction is in effect.

To clear [250] knot speed restriction,

CLEAR Key. PUSH

Line Select Key 1 or 3. PUSH

NOTES

If line select key 1 was pushed, observe line select key 1 illuminated with SPD and SEL alternately flashing and unrestricted speed displayed in data line 1.

If line select key 3 was pushed, observe data line 3 display flashing between CLEAR and current display.

Line Select Key 1 or 3. PUSH

Push line select key 1 or 3 (same key as used in preceding step). Observe removal of restriction with the new speed displayed in data line 1.

NOTES

Removal of speed restriction can also be obtained by calling up vertical waypoint TO page and editing CLEAR in line where restriction is displayed.

At altitudes of 27,000 feet or above, SPD is displayed as a Mach number.

(Continued)

MD-80

FLIGHT CREW OPERATING MANUAL

PMS CLIMB (Continued)

If a climb other than CLB OPT is desired,

Climb Mode Desired DETERMINE

CLB [NON OPT] (POA active)

Editing of speed on either CLB OPT or CLB MAX page will create CLB [NON OPT] page.

Desired Speed ENTER INTO SCRATCHPAD

Enter desired speed into scratchpad using data entry keys.

NOTES

Display changes from speed (SPD) to Mach (M.) at leading digit of speed entry as follows:

- 1 through 4 - IAS
- 5 through 9 - Mach

If leading decimal is used, any Mach entry that does not exceed the limit speeds will be accepted by the system.

Line Select Key 1 PUSH

Push line select key 1 and observe it is illuminated with SPD and SEL alternately flashing in data line 1 and page title changed to CLB [NON OPT]. Push line select key 1 again to engage mode.

NOTES

Further edits may be made to change speed as required.

CLB OPT page can be recalled by slewing on this page and pushing line select key 1 or editing CLEAR on line 1.

[END]

CLB MAX

Slew Switch/Keys PUSH

Slew in either direction until CLB MAX page is displayed. Observe line select key 1 is illuminated and SPD and SEL alternately flashing in data line 1.

Line Select Key 1 PUSH

Push line select key 1 to engage mode.

(Continued)

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FLIGHT CREW OPERATING MANUAL

PMS CLIMB (Continued)

NOTE

IAS/Mach is computed by system for maximum angle of climb. CLB MAX speed is the higher of 1.5 V_S for a clean airplane or 1.3g buffet (low).

CLB OPT page can be recalled by slewing on this page and pushing line select key 1 or editing CLEAR on line 1.

Climb Altitude/Distance Inquiry:

NOTE

This procedure will allow entry of an altitude or distance in data line 3 of any climb page except CLB [NON OPT] (POA inactive), thus creating a new vertical event called ALT*, with its corresponding altitude/distance/time data.

Altitude/distance inquiry step is valid only between present position on profile and next top of climb (TOC) point. Editing of an altitude below current altitude will result in a CHECK ENTRY message. Editing of an altitude or distance beyond next TOC point will be accepted in line 3 but remainder of parameters will be dashed.

NOTE

A climb page must be displayed (but does not need to be engaged) in order to make an altitude/distance inquiry. If not on a climb page, push CLB key and observe engaged mode is displayed.

If altitude/distance inquiry is desired,

Type Of Inquiry Desired DETERMINE

Altitude

Altitude Desired ENTER INTO SCRATCHPAD

Enter desired altitude into scratchpad using data entry keys.

Line Select Key 3 PUSH

Push line select key 3 and observe data is now displayed on data line 3.

NOTE

Distance and time in data line 3 will decrease until desired altitude is reached, then data line 3 will change to display next vertical event.

[END]

Distance

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FLIGHT CREW OPERATING MANUAL

PMS CLIMB (Continued)

Distance Desired ENTER INTO SCRATCHPAD

Enter a / and desired distance into scratchpad using data entry keys.

Line Select Key 3 PUSH

Push line select key 3 and observe data is now displayed in data line 3.

NOTES

Altitude and time now correspond to desired distance.
Distance and time also decrease until zero distance and time are reached. Altitude will vary slightly but will always be that projected to be reached in displayed distance and time.

Distance inquiries are limited to 999 NM.

PMS CLIMB (POA INACTIVE)

Under conditions when the POA is not active, a CLB [NON OPT] mode, without profile related data, is only available mode during climb.

To initiate speed change,

Desired SPD ENTER INTO SCRATCHPAD

Enter desired SPD into scratchpad using data entry keys.

Line Select Key 1 PUSH

Push line select key 1 and observe desired SPD is now displayed in data line 1, with SPD and SEL alternately flashing and line select key 1 is illuminated. Push line select key 1 again to command new speed.

NOTES

Speed editing is the only operation that can be performed on this page.

Thrust target is dashed (EPR ---) when mode is not engaged.

MD-80

FLIGHT CREW OPERATING MANUAL

PMS CRUISE

Initial selection and entry into a PMS cruise mode can only be completed after the following conditions have been satisfied:

- Vertical speed less than 240 fpm (CRZ annunciator illuminated) and selected altitude within 512 feet of current altitude.
- TRI not in takeoff or go-around.
- Either FD or AP engaged.
- PMS valid.
- Autothrottle engaged.

PERF Button PUSH

Push PERF button and observe autothrottles and pitch FMA's display PERF CRZ.

NOTES

When transitioning to PERF CRZ from a climb or descent mode, PMS will capture selected altitude automatically.

At capture of planned altitude (from PLAN CRZ page), PMS will transition to CRZ OPT or CRZ [NON OPT] when a non optimum cruise speed has been armed.

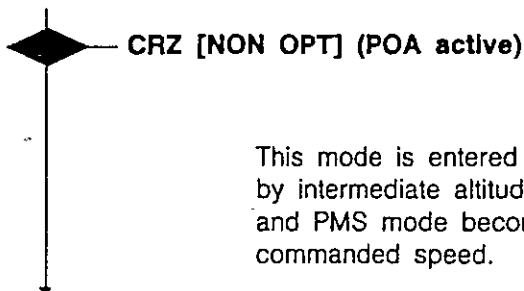
At capture of any other altitude (intermediate level-off), PMS will transition to CRZ [NON OPT] at currently commanded speed.

CRZ OPT:

CRZ OPT mode will be auto-selected whenever transition is made from climb to cruise within 1024 feet of PLAN altitude.

If cruise mode other than CRZ OPT is desired,

Cruise Mode Desired DETERMINE



NOTES

This mode is entered when climb or descent is interrupted by intermediate altitude clearance. Airplane captures altitude and PMS mode becomes CRZ [NON OPT] at currently commanded speed.

(Continued)

MD-80

FLIGHT CREW OPERATING MANUAL

PMS CRUISE (Continued)

Cruise Mode Desired (Continued)

NOTES (Continued)

CRZ [NON OPT] can also be created by editing IAS or Mach on CRZ page.

If a speed change is desired,

Desired Speed ENTER INTO SCRATCHPAD

Enter desired speed into scratchpad using data entry keys.

Line Select Key 1 PUSH

Push line select key 1 and observe SPD and SEL alternately flashing in data line 1 and desired speed now displayed. Push line select key 1 again to command new speed.

NOTES

Speed or Mach may be edited at any time. CRZ [NON OPT] can thus be armed for entry at transition to CRZ.

After speed edit, remaining page data is for edited speed.

Display changes from speed to mach at leading digit of speed entry as follows:

4 or less – IAS
5 or more – Mach

If leading decimal is used, any legal Mach entry will be accepted by system.

To return to CRZ OPT page,

Slew Switch/Keys PUSH

Slew in either direction until CRZ OPT page is displayed. Observe line select key 1 is illuminated and SPD and SEL are alternately flashing in data line 1.

Line Select Key 1 PUSH

Push line select key 1 to command CRZ OPT mode.

(Continued)

MD-80

FLIGHT CREW OPERATING MANUAL

PMS CRUISE (Continued)

Cruise Mode Desired (Continued)

NOTE

CRZ OPT can also be obtained from CRZ [NON OPT] page by pushing CLEAR key and then pushing line select key 1 twice.

[END]

HOLD/ENDUR

NOTES

HOLD/ENDUR mode and display is a cruise mode where speed is controlled to a minimum fuel flow as computed for current conditions.

HOLD/ENDUR speed is based on one of two airplane configurations:

- Clean.
- Slats extended, flaps zero.

This speed is limited to V_{MAX}/V_{MIN} which will consider current flap extension.

If HOLD/ENDUR mode is desired,

NOTE

If not on a cruise page, push CRZ key to obtain a cruise page before starting procedure.

Slew Switch/Keys PUSH

Slew in either direction until HOLD/ENDUR page is displayed. Observe line select key 1 is illuminated and SPD and SEL are alternately flashing in data line 1.

Line Select Key 1 PUSH

Push line select key 1 to command mode.

(Continued)

MD-80

FLIGHT CREW OPERATING MANUAL

PMS CRUISE (Continued)

To return to CRZ OPT page,

Slew Switch/Keys PUSH

Slew in either direction until CRZ OPT page is displayed. Observe line select key 1 is illuminated and SPD and SEL are alternately flashing in data line 1.

Line Select Key 1 PUSH

Push line select key 1 to command CRZ OPT mode.

During cruise, 5 minutes before computed top of descent, PLAN page with message DIST TO BOD? is automatically displayed.

CAUTION

Prior to initiating descent under PMS control, it is essential that distance to BOD be confirmed. Errors in distance to BOD can be caused by diversions from originally planned route of flight or drop-outs of VOR/DME or ILS/DME data to PMS during flight.

The DIST TO BOD? scratchpad message must be cleared in accordance with one of the following methods:

- If the BOD is defined relative to a VOR/ILS and bottom of descent distance displayed is less than 200 NM, verify BOD definition is correct, BOD VOR/ILS is tuned and no VOR/DME flags are present.
- Push CLEAR key to clear DIST TO BOD? message.

NOTE

BOD distance displayed in this case will be the distance direct from present position to BOD point.

- In all other cases, BOD distance must be crosschecked against other navigation systems or charts. If displayed BOD distance is not correct, edit to correct values.

When BOD distance is correct, push CLEAR key to clear DIST TO BOD? message.

(Continued)

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FLIGHT CREW OPERATING MANUAL

PMS CRUISE (Continued)

NOTES

After clearing DIST TO BOD? message, PMS will display preselected descent page. If a descent mode has not been selected, PMS will automatically display DES [NON OPT].

ARM ALT? will be displayed on scratchpad if a lower than cruise altitude is not selected and armed.

PLN CRZ W/V Page.

The PLN CRZ W/V page advises pilot of the characteristics of the cruise wind model being used by the PMS, and will allow edits of model based on pilots knowledge of winds above and below airplane's current altitude.

NOTES

Based on pilot inputs, PMS will compute a modified optimum altitude.

This page is available only in cruise at a PLAN altitude.

If PLAN CRZ W/V page is desired,

PLAN Key. PUSH

Push PLAN key and observe PLAN page is displayed. Slew up or down until PLN CRZ W/V page is displayed. Observe data line 2 displays current measured wind direction, speed and component of that wind along airplane heading.

NOTES

No edits are allowed on data line 2.

Data lines 1 and 3 respectively default to altitudes 4000 ft above and below the current cruise altitude with zero wind shear in that altitude band.

When loading data into lines 1 and 3, both wind angle and speed must be entered at the same time.

If default altitudes are to be used, it is not necessary to load altitude into PMS.

(Continued)

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FLIGHT CREW OPERATING MANUAL

PMS CRUISE (Continued)

To enter winds on PLN CRZ W/V page,

Altitude (If Applicable)/Direction/Speed. ENTER INTO SCRATCHPAD

Enter altitude (if other than a default altitude), /, direction, / and speed of wind into scratchpad. Push line select key 1 or 3 to enter data on corresponding data line. To enter second wind, repeat above step entering data on remaining blank data line by using appropriate line select key.

NOTES

After an edit has been made, the edited line and optimum altitude display are bracketed to indicate that each is resultant of an edit.

Bracketed optimum altitude will also appear on all other pages where optimum altitude is normally displayed.

Wind direction and speed edits will be dashed if the data line 2 component changes by more than 20 knots due to a wind change or a turn to a new heading.

(Continued)

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FLIGHT CREW OPERATING MANUAL

PMS CRUISE (Continued)

To clear a previous edit,

CLEAR Key/Line Select Key PUSH/PUSH

Push CLEAR key and then push appropriate line select key. Observe that data line has reverted to default altitude and direction and speed of wind are now dashed.

Cruise Altitude/Distance Inquiry:

Altitude/distance inquiry procedure is valid only between present position on profile and next top of climb (TOC) point. Editing of an altitude below current altitude will result in a CHECK ENTRY message. Editing of an altitude or distance beyond next TOC point will be accepted in line 3, but remainder of parameters will be dashed.

NOTE

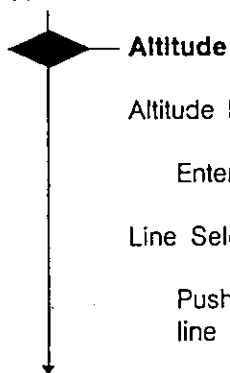
This procedure will allow entry of an altitude or distance in data line 3 of any cruise page except CRZ [NON OPT] (POA inactive), thus creating a new vertical event called ALT*, with its corresponding altitude/distance/time data.

If altitude/distance inquiry is desired,

NOTE

A cruise page must be displayed in order to make a altitude/distance inquiry. If not on a cruise page, push CRZ key and observe engaged mode is displayed.

Type Of Inquiry Desired DETERMINE



Altitude Desired ENTER INTO SCRATCHPAD

Enter desired altitude into scratchpad using data entry keys.

Line Select Key 3 PUSH

Push line select key 3 and observe data is now displayed on data line 3.

(Continued)

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FLIGHT CREW OPERATING MANUAL

PMS CRUISE (Continued)

Type Of Inquiry Desired (Continued)

NOTE

Distance and time in data line 3 will now decrease until desired altitude is reached. Then data line 3 will change to display next vertical event.

[END]

Distance

Distance Desired. ENTER INTO SCRATCHPAD

Enter desired distance into scratchpad using data entry keys.

Line Select Key 3. PUSH

Push line select key 3 and observe data is now displayed in data line 3.

NOTES

Altitude and time now correspond to desired distance. Distance and time also decrease until zero distance and time are reached. Altitude will vary slightly but will always be that projected to be reached in displayed distance and time.

Distance inquiries are limited to 999 NM.

MD-80

FLIGHT CREW OPERATING MANUAL

PMS CRUISE (POA INACTIVE)

Under conditions when the POA is inactive, a CRZ [NON OPT] mode, without profile related data, is the only available mode during cruise.

NOTE

Speed editing is only operation that can be performed on this page.

To initiate a speed change,

Desired Speed ENTER INTO SCRATCHPAD

Enter desired speed into scratchpad using data entry keys.

Line Select Key 1 PUSH

Push line select key 1 and observe desired SPD now displayed in data line 1 with SPD and SEL alternately flashing and line select key 1 is now illuminated. Push line select key 1 again to command new speed.

NOTE

Thrust target is dashed (EPR --) when mode is not engaged.

MD-80

FLIGHT CREW OPERATING MANUAL

PMS DESCENT

Initial selection and entry into a PMS descent mode can only be completed after the following conditions have been satisfied:

- Descent vertical speed greater than 240 feet per minute (DES annunciator illuminated) and selected altitude below current altitude.
- TRI not in takeoff or go-around.
- Either FD or AP engaged.
- PMS valid.
- Autothrottle engaged.

PERF Button PUSH

Push the PERF button and observe autothrottle and pitch FMA's display PERF DES.

When transitioning to PERF DES mode and time to TOD vertical event is less than 5 minutes; armed altitude below current altitude and BOD definition has been completed,

Line Select Key 1 PUSH

Push line select key 1 and observe VERTICAL ALERT light illuminates 15 seconds prior to TOD.

NOTES

Descent begins at optimum point (distance and time to TOD = zero).

There are three descent modes available in PERF; DES [NON OPT], DES OPT and DES [V/S].

PMS maintains control of pitch and thrust in all modes.

Descent speed, BOD distance and BOD definition may be edited in all PERF DES mode except when the POA is not active.

(Continued)

MD-80

FLIGHT CREW OPERATING MANUAL

PMS DESCENT (Continued)

NOTES (Continued)

If BOD distance is less than 200 NM with BOD defined relative to a VOR/ILS and BOD VOR/ILS is tuned and being used for distance updates, attempts to edit BOD distance will not be accepted.

PMS will continue to compute descent profile for defined conditions. Pitch and thrust commands (within limits of allowable speed and thrust) will be commanded by the PMS.

When unplanned tailwinds are present, trajectory of airplane will tend to go long, and an ADD DRAG advisory message will be displayed based on altitude/miss distance. Similarly, a REMOVE DRAG message will be displayed if miss distance is negative and speedbrakes are extended.

If descent is interrupted by an intermediate clearance altitude, PMS will transition to CRZ [NON OPT] at selected altitude.

Descent Mode Desired DETERMINE

DES [NON OPT] (POA active)

This page is auto-selected during cruise after clearing DIST TO BOD? message. Without a lower altitude armed, ARM ALT? message will appear in scratchpad, and line select key 1 will be illuminated with alternate flashing of SPD and SEL in data line 1.

NOTES

Descent speed will be default value unless changed by pilot.

This page will be displayed any time a lower altitude is armed. However, line select key 1 will not be illuminated and SPD and SEL will not flash in data line 1 until 5 minutes from TOD.

Line Select Key 1 PUSH

Push line select key 1 for automatic entry at TOD.

NOTE

Page will again be displayed at 6 NM to TOD with a SELECT DES? message if mode has not been engaged as described.

(Continued)

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FLIGHT CREW OPERATING MANUAL

PMS DESCENT (Continued)

Descent Mode Desired (Continued)

To initiate a speed change,

Desired Speed ENTER INTO SCRATCHPAD

Enter desired speed into scratchpad using the data entry keys.

Line Select Key 1 PUSH

Push line select key 1 and observe, speed is displayed in data line 1 with SPD and SEL alternately flashing and line select key 1 illuminated. Push line select key 1 again to command speed.

NOTE

If the 250 knot speed restriction below 10,000 feet is in effect, VERTICAL ALERT it will illuminate when projected time to 10,000 feet is 15 seconds. The command shown on the CDU and speed bug will begin to decrease as altitude approaches 10,000 feet such that 250 knots will be achieved at 10,000 feet.

[END]

DES OPT

NOTE

The DES OPT page can be called up at any time to arm the DES OPT mode.

For auto-selection of DES OPT at TOD,

DES Key PUSH

Slew Switch/Keys PUSH

Slew in either direction until DES OPT page is displayed. Observe SPD and SEL alternately flashing in data line 1.

Line Select Key 1 PUSH

Push line select key 1 to command mode.

(Continued)

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FLIGHT CREW OPERATING MANUAL

PMS DESCENT (Continued)

Descent Mode Desired (Continued)

To transition to DES OPT from another descent mode,

Slew Switch/Keys PUSH

Slew in either direction until DES OPT page is displayed. Observe SPD and SEL flashing in data line 1. Push line select key 1 to command mode.

NOTE

If the 250 knot speed restriction is in effect, VERTICAL ALERT light will illuminate when projected time to 10,000 feet is 15 seconds. Speed will transition to 250 knots or remain at optimum, whichever is lower.

[END]

DES [V/S]

To transition to DES [V/S], PMS must be in CRZ or DES, and armed altitude below current altitude. Observe DES [V/S] NOW? is displayed in data line 2 of DES (OPT or [NON OPT]) page.

Line Select Key 2 PUSH

Push line select key 2 and observe DES [V/S] page is displayed with SEL and V/S alternately flashing in data line 2. Push line select key 2 again to command mode.

NOTES

At entry to mode, PMS will hold current IAS and a vertical speed of 1000 feet per minute. EPR display in line 1 is thrust command required to hold IAS and V/S as displayed.

If DES[V/S] mode is entered above FL270 from a Mach cruise mode, initial speed display will be both mach and IAS and will transition from both to IAS at FL270.

Either IAS or V/S can be edited.

Any IAS - vertical speed combination can be edited, provided drag is not required, to maintain that combination. IAS edit must be within V_{MIN}/V_{MAX} limits. V/S edit must be within -200 to -6000 feet per minute or a CHECK ENTRY message will be displayed. If V/S edit is greater than maximum V/S obtainable with idle thrust and no drag at descent speed, a MAX RATE XXX message will be displayed.

(Continued)

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FLIGHT CREW OPERATING MANUAL

PMS DESCENT (Continued)

NOTE

When both quantities are enclosed in brackets, editing CLEAR into data line 1 will allow IAS to vary and hold displayed V/S at idle thrust. Or, editing CLEAR into line 2 will allow V/S to vary and hold displayed IAS at idle thrust.

Intercept of DES OPT or DES [NON OPT] profile from DES [V/S]:

In DES [V/S], when within 6 NM of the armed descent profile, page for the armed mode is autoselected with a SELECT DES message displayed in scratchpad.

Line Select Key 1 PUSH

Push line select key 1 to disengage DES [V/S] and begin descent to BOD.

PERF Mode at BOD:

When airplane is either at BOD altitude and beyond BOD or below BOD altitude, PMS reverts to a [NON OPT] mode with POA inactive. PLAN page will be automatically selected with ENTER PLAN in scratchpad to allow data to be entered for a new profile.

Descent Altitude/Distance Inquiry:

Altitude/distance inquiry procedure is valid only between present position on profile and end of defined profile. Edit of an altitude above current altitude will result in a CHECK ENTRY message; edit of an altitude or distance beyond end of profile will be accepted in line 3, but remainder of parameters will be dashed.

NOTE

This procedure will allow entry of an altitude or distance in data line 3 of any descent page except DES [NON OPT] (POA inactive), thus creating a new vertical event called ALT*, with its corresponding altitude/distance/time data.

If altitude/distance inquiry is desired,

NOTE

A descent page must be displayed in order to make a altitude/distance inquiry. If not on a descent page push DES key and observe engaged mode is displayed.

(Continued)

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FLIGHT CREW OPERATING MANUAL

PMS DESCENT (Continued)

Type of Inquiry Desired DETERMINE

Altitude

Altitude Desired ENTER INTO SCRATCHPAD

Enter desired altitude into scratchpad using data entry keys.

Line Select Key 3 PUSH

Push line select key 3 and observe data is now displayed on data line 3.

NOTE

Distance and time in data line 3 will now decrease until desired altitude is reached. Data line 3 will change to display next vertical event.

[END]

Distance

Distance Desired ENTER INTO SCRATCHPAD

Enter desired altitude into scratchpad using data entry keys.

Line Select Key 3 PUSH

Push line select key 3 and observe data is now displayed in data line 3.

NOTES

Altitude and time now correspond to desired distance. Distance and time also decrease until zero distance and time are reached. Altitude will vary slightly but will always be that projected to be reached in displayed distance and time.

Distance inquiries are limited to 999 NM.

MD-80

FLIGHT CREW OPERATING MANUAL

PMS DESCENT (POA INACTIVE)

Under conditions when POA is not active, a DES [NON OPT] mode, without profile related data, is only mode available during descent.

NOTE

Speed editing is only operation that can be performed on this page.

To initiate a speed change,

Desired Speed ENTER INTO SCRATCHPAD

Enter desired speed into scratchpad, using data entry keys.

Line Select Key 1 PUSH

Push line select key 1 and observe desired SPD is displayed in data line 1 with SPD and SEL alternately flashing and line select key 1 is illuminated. Push line select key 1 again to command new speed.

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FLIGHT CREW OPERATING MANUAL

PMS CROSS-POINT (X-PT*)

PMS cross-point (X-PT*) procedure allows entry of an altitude/distance X-PT* event in data line 3 of any CRZ or DES page when POA is active.

NOTES

A maximum of two cross-points may be defined at any one time. After a cross-point has been used by PMS, it may be replaced by another.

X-PT* procedure cannot be used before last planned TOC on PMS profile has been reached. If X-PT* data is entered prior to last planned TOC, PMS will display X-PT BEFORE TOC in scratchpad.

If X-PT BEFORE TOC is displayed, pushing CLEAR key will remove message from scratchpad.

If a X-PT* is desired,

Page Displayed DETERMINE

Waypoints page:

NOTE

If a X-PT* is created on a WPTS page, PMS will automatically place X-PT* in proper sequence according to its altitude.

Altitude/Distance ENTER INTO SCRATCHPAD

Enter altitude, / and distance into scratchpad using data entry keys.

Line Select Key PUSH

Push any line select key and observe X-PT* and its corresponding altitude/distance and time have been placed in their proper sequence and are now displayed on data line 2.

CRZ or DES page:

Altitude/Distance ENTER INTO SCRATCHPAD

Enter altitude, / and distance into scratchpad using data entry keys.

(Continued)

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FLIGHT CREW OPERATING MANUAL

PMS CROSS-POINT (X-PT*) (Continued)

Line Select Key 3 PUSH

Push line select key 3 and observe PMS automatically transitions to basic waypoints page with X-PT* event displayed on data line 2.

NOTE

After a X-PT* has been created, altitude and/or distance may be edited (one at a time) on WPTS page.

If an altitude or distance edit is desired,

Altitude or / Distance ENTER INTO SCRATCHPAD

Enter altitude or / distance into scratchpad using data entry keys.

NOTE

If a distance edit is to be made, it must be preceded by a /.

Line Select Key PUSH

Push appropriate line select key and observe altitude or / distance now displays edited value.

If further definition of a X-PT* is desired,

NOTE

A X-PT* definition can be expanded further to include lateral position and a speed restriction.

To expand X-PT* definition, PMS must display WPT X-PT* page. WPT X-PT* page may be displayed by one of the following methods:

- From a CRZ or DES page, push VERT WPTS key and slew until X-PT* event is displayed, then push line select key adjacent to X-PT*.
- From a VERT WPTS page, slew until X-PT* event is displayed, then push line select key adjacent to X-PT*.
- From expanded PPOS page, slew up until WPT X-PT* page is displayed.
- From expanded BOD page, slew down until WPT X-PT* page is displayed.

(Continued)

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FLIGHT CREW OPERATING MANUAL

PMS CROSS-POINT (X-PT*) (Continued)

NOTE

Data line 1 defines lateral position of X-PT*. It can be loaded as a frequency, frequency/radial/distance or, if an ILS frequency is used, as a frequency / / distance.

Lateral Position Data ENTER INTO SCRATCHPAD

Enter lateral position data into scratchpad using data entry keys.

Line Select Key 1 PUSH

Push line select key 1 and observe lateral position data is displayed in data line 1.

Desired Speed ENTER INTO SCRATCHPAD

Enter desired speed (at X-PT*) into scratchpad using the data entry keys.

Line Select Key 2 PUSH

Push line select key 2 and observe desired speed is displayed in data line 2.

NOTE

If no speed is entered, PMS will automatically display a X-PT* speed after X-PT* has been completely defined on data line 3. This speed will be an optimum POA speed, non-optimum default descent speed or 250 KTS if X-PT* is at or below 10,000 feet and speed restriction is in effect.

Altitude/Distance ENTER INTO SCRATCHPAD

Enter altitude/distance into scratchpad using data entry keys.

Line Select Key 3 PUSH

Push line select key 3 and observe altitude and distance are displayed in data line 3.

NOTE

Distance will now decrease until X-PT* is reached.

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FLIGHT CREW OPERATING MANUAL

PMS SINGLE ENGINE OPERATION

NOTE

Engine failure is detected based on either a loss of an EPR sensor or excessive difference between EPR readings (indicating loss of power on one engine).

At engine failure, PMS will annunciate SELECT MCT thrust mode unless mode was previously engaged.

NOTE

If engine failure indication is in error, pushing CLEAR key will remove SELECT MCT message from scratchpad.

MCT Button. PUSH

Push MCT button on TRI and observe MCT LIM is displayed in data line 2.

PMS will continue to command single engine speeds and a complete 2 engine profile until engine failure has been confirmed by one of the following:

- If above single engine maximum altitude, confirmation is automatic. As airplane decelerates and approaches driftdown speed, PMS automatically enters driftdown mode.
- If below single engine maximum altitude, PMS will display PLAN CRZ page with CONFIRMED ENGINE FAILURE and 1 ENG FL XXX XXXMN X:XX, alternately flashing in data line 3. Pushing line select key 3 will engage engine out mode and will clear flashing display from data line 3.

NOTES

At or below single engine maximum altitude, all CLB, CRZ and DES modes are available.

Above single engine maximum altitude, PMS can only be engaged into DES OPT or DRIFTDOWN submodes of engine out.

After entering DRIFTDOWN, PMS will continue to command driftdown speed and TRI selected thrust until two engine operation is restored or one of the following occurs:

- Arrival at single engine maximum altitude.

(Continued)

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FLIGHT CREW OPERATING MANUAL

PMS SINGLE ENGINE OPERATION (Continued)

NOTES (Continued)

- Arrival at armed altitude below single engine maximum altitude.
- Start of descent profile to BOD.

A cross-point (X-PT*) cannot be created in this mode and all previously inserted cross-points are cancelled.

Driftdown Altitude/Distance inquiry:

NOTE

The driftdown altitude/distance inquiry will allow entry of an altitude or distance in data line 3 of the DRIFTDOWN page, thus creating a new vertical event called ALT*, with its corresponding altitude/distance/time data.

Altitude/distance inquiry procedure is valid only between present position and the end of the driftdown profile.

NOTE

If inquiry is to a point beyond driftdown profile it will not be accepted by the PMS.

If an Altitude/Distance inquiry is desired,

Type Of Inquiry Desired DETERMINE



Altitude

Altitude Desired ENTER INTO SCRATCHPAD

Enter desired altitude into scratchpad using data entry keys.

Line Select Key 3 PUSH

Push line select key 3 and observe data is now displayed on data line 3.

NOTE

Distance and time in data line 3 will decrease until desired altitude is reached, then data line 3 will change to display next vertical event.

[END]

Distance

(Continued)

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FLIGHT CREW OPERATING MANUAL

PMS SINGLE ENGINE OPERATION (Continued)

Distance Desired. ENTER INTO SCRATCHPAD

Enter a / and the desired distance into scratchpad using data entry keys.

Line Select Key 3. PUSH

Push line select key 3 and observe data in now displayed in data line 3.

NOTES

Altitude and time now correspond to desired distance.
Distance and time also decrease until zero distance and time are reached. Altitude will vary slightly but will always be that projected to be reached in displayed distance and time.

Distance inquiries are limited to 999 NM.

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FLIGHT CREW OPERATING MANUAL

OPERATIONAL ADVISORIES

NOTE

CDU operational advisory messages appear in scratchpad of CDU. "CDU MESSAGE" annunciator (located on main instrument panel) will illuminate when a CDU scratchpad message appears. Procedures for clearing these messages are listed in the following tables.

MESSAGE	CONDITION(S)	CLEARED BY	REMARKS, NOTES
ENTER PLAN	1. Engine start before plan data entered.	1. PLAN entry. 2. CLEAR key.	
CHECK GWT	1. Entered GWT outside limits (88 - 170 KLB).	1. Entry of GWT within limits. 2. CLEAR key. 3. Selection of different display page.	Will not accept GWT outside limits.
CHECK FUEL	1. Engine start before fuel weight entered. 2. Entered fuel outside limits (10-60 KLB).	1. Fuel weight entry. 2. CLEAR key. 3. Selection of different display page if due to entry.	Fuel displays blanked.
MAX LAND WT?	1. Predicted GWT at BOD greater than 135 KLB.	1. Correction of previously entered planning data if in error. 2. Entry of additional planning data; alt, wind, & temp. 3. CLEAR key.	Correction or entry of additional data for the Performance Optimization Algorithm may cause predicted BOD gross wt to fall below max.
CHK BOD FUEL	1. Predicted fuel at BOD less than 5 KLB. 2. Preflight or distance to BOD less than 500 nautical miles.	1. Correction of previously entered data if in error. 2. Entry of additional planning data; alt, & wind, 3. CLEAR key.	Correction or entry of additional data for the POA may cause predicted BOD fuel to increase above minimum.

(Continued)

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FLIGHT CREW OPERATING MANUAL

OPERATIONAL ADVISORIES (Continued)

MESSAGE	CONDITION(S)	CLEARED BY	REMARKS, NOTES
VMAX XXX KT OR VMIN XXX KT	1. Airplane too fast/slow for configuration. 2. Edited longitudinal speed outside V _{MAX} /V _{MIN} limits.	1. Airplane speed within MAX/MIN limits. 2. CLEAR key, entry of acceptable speed, or different page selection.	This message is not clearable with the CLEAR key. Status message annunciator is cleared. Control laws hold speed within V _{MAX} /V _{MIN} limits when PMS is engaged. PMS does not accept commands outside V _{MAX} /V _{MIN} .
ARM ALT?	1. In CLB or DES with clearance altitude not armed. 2. Time to TOD 5 min or less and lower altitude not armed.	1. Arm appropriate altitude. 2. CLEAR key.	Alert does not appear until clearance altitude input for 10 sec. unchanged. Cannot initiate CLB or DES from CRZ without armed ALT.
SELECT DES	1. In CRZ, +/- 6 NM to TOD, DES not enabled. 2. V/S descent within 3 NM of profile.	1. CLEAR, DES enabled/selected or 3 NM past TOD.	Replaced by PAST TOD message if airplane remains in CRZ 3 NM past TOD.
PAST TOD	1. In CRZ, and 3 NM past TOD.	1. CLEAR, begin DES, or arm another DES mode.	Defaults to DES page with message.
MAX RATE XXXX	1. In DES V/S, and edited V/S - IAS combination cannot be held without drag.	1. Edit new V/S or IAS	Not clearable with CLEAR key.
CHECK ENTRY	1. Improper sequence of entries in scratchpad.	1. Reload scratchpad data. 2. CLEAR key. 3. Selection of a different display page.	
DIST TO BOD?	1. 5 minutes prior to TOD	1. Edit BOD distance. 2. CLEAR key.	Plan page autoselected when message appears.
STEP CLB?	1. 5 min or less to step climb point in cruise and higher altitude not armed.	1. Higher altitude armed. 2. CLEAR key.	

(Continued)

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FLIGHT CREW OPERATING MANUAL

OPERATIONAL ADVISORIES (Continued)

MESSAGE	CONDITION(S)	CLEARED BY	REMARKS, NOTES
CHECK ALTITUDE	- Entered altitude negative or greater than operational ceiling. - Illegal entry, i.e., single digit.	- Enter altitude in range. - CLEAR key. - Selection of different display page.	BOD altitude limited to 37,000 feet or TOD altitude.
CHECK TEMPERATURE	Entered temperature more than 25°C from standard.	- Enter in range temperature. - CLEAR key. - Selection of different display page.	
CHECK WIND	Wind magnitude greater than 250 kt or wind direction outside range 0 to 360°.	- Enter in range parameter. - CLEAR key. - Selection of different page.	
CONFIRM PLAN	In cruise below current planned altitude for 10 minutes.	- Edit current planned altitude to current cruise altitude. - CLEAR key.	If message is cleared with CLEAR key, the 10 minute timer is restarted. Permanent clear is obtained if current planned altitude is edited to current cruise altitude. The PLN-CRZ page shall be auto selected unless data is being loaded on another page.
CHECK DISTANCE	Entered trip distance less than 50 NM (on ground only) or greater than upper limit.	- Entry of an in tolerance distance. - CLEAR key. - Selection of a different page.	
D/R	- Invalid data from both VORs, both DMEs, or one VOR and one DME. - DES not VOR/DME referenced.	- Valid data from both VOR and DME on either 1 or 2 side. - Define BOD as FREQ/RDL/DIS	Message is not clearable by CLEAR key. Indicates PMS is dead reckoning due to inadequate nav data. (Only shows in DES mode).

(Continued)

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FLIGHT CREW OPERATING MANUAL

OPERATIONAL ADVISORIES (Continued)

MESSAGE	CONDITION(S)	CLEARED BY	REMARKS; NOTES
ADD DRAG	See NOTES.	Extending speed brakes, or REMOVE DRAG message conditions.	Not displayed in DRIFTDOWN.
REMOVE DRAG	See NOTES.	Retracting speed brakes, or ADD DRAG message conditions.	
BOD ABOVE X-PT	1. Altitude is greater than a X-PT altitude.	1. CLEAR key	
BOD BEFORE X-PT	1. Distance entered is less than the distance to a X-PT + 1 NM.	1. CLEAR key	
CHECK WIND PROFILE	1. An edit wind shear greater than 20 KTS per 1,000 ft.	1. Enter in range parameter. 2. CLEAR key. 3. Selection of different page.	
DISTANCE UPDATING	1. Distance updating is occurring. 2. If a X-PT BOD is tied to a WPT, a distance edit will be rejected.	1. Change X-PT or BOD definition. 2. CLEAR key.	
LAND FLAPS	1. PERF mode exit due to landing flap configuration.	1. Exit Land Flap configuration and re-enter PERF mode. 2. CLEAR key.	
NO ENTRY	1. Entry of planned cruise altitudes on the PLAN-CRZ page will be inhibited in DRIFTDOWN mode.	1. CLEAR key	
SELECT CL LIMIT	1. Inadequate thrust to maintain speeds above V_{MIN} at high altitudes with CRZ thrust selected.	1. CLEAR key 2. Manually select CLB thrust limit	
SELECT MCT LIMIT	1. At detection of ENGINE OUT.	1. CLEAR key 2. Select MCT on TRI	

(Continued)

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FLIGHT CREW OPERATING MANUAL

OPERATIONAL ADVISORIES (Continued)

MESSAGE	CONDITION(S)	CLEARED BY	REMARKS, NOTES
X-PT BEFORE TOC	1. WPT distance is less than last TOC distance	1. Check distance. 2. CLEAR key.	
X-PT BELOW BOD	1. Altitude is less than BOD altitude and distance is less than distance to BOD but greater than X-PT distance, if X-PT is previously defined.	1. Check altitude. 2. CLEAR key.	
X-PTS FULL	1. Two X-PTS were previously defined.	1. CLEAR key.	
X-PT PAST BOD	1. Distance entered is greater than distance to BOD and altitude is greater than or equal to BOD's altitude.	1. Check altitude and distance. 2. CLEAR key.	

NOTES

An ADD DRAG advisory message will be displayed based on altitude/miss distance from profile.

A REMOVE DRAG message will be displayed if miss distance is negative and speed brakes are extended and in DRIFTDOWN any time drag is out.

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FLIGHT CREW OPERATING MANUAL

Chapter 4

AUXILIARY POWER UNIT

TABLE OF CONTENTS

AIR LIBERTE INDUSTRIES

(SERIES 80)

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
LIMITATIONS	4-10-0	1	1/2	All
NORMAL OPERATION				
Ground And Air Start Using Starter	4-20-0	1	1	All
Shutdown	4-20-0	1	5/6	All
ABNORMAL OPERATION				
APU Airstart Using Windmill RPM	4-30-0	1	1	All
APU OIL PRESS LOW And/Or APU OIL TEMP HIGH Light(s) On	4-30-0	1	3	All
No Load Idle EGT-High-APU	4-30-0	1	4	All
No Rotation Or No Start Or Hung Start-APU	4-30-0	1	5	All

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FLIGHT CREW OPERATING MANUAL

AUXILIARY POWER UNIT (APU) – LIMITATIONS

For APU GTCP85-98DHF & 98DCK

OPERATION	TIME LIMIT	MAXIMUM EGT	MAXIMUM ROTOR SPEED
Starting	30 seconds	760°C	110%
Idle (No Load)	Continuous	–	110%
Maximum Rated Load	Continuous	630°C	110%
Maximum Allowable Load	Transient	663°C	110%

APU starter motor duty cycle is two consecutive start attempts (maximum of 90 seconds each) followed by 5 minutes off, then a third attempt (maximum of 90 seconds) followed by 60 minutes off.

APU bleed AIR switch must be at OFF position for all inflight operations.

APU operation is restricted to altitudes of 35,000 feet (MSL) and below.

For APU GTCP36-280 (D)

OPERATION	TIME LIMIT	MAXIMUM EGT	MAXIMUM ROTOR SPEED
Starting	–	100%	108%
Idle (No Load)	Continuous	100%	108%
Maximum Rated Load	Continuous	100%	108%
Maximum Allowable Load	Transient	106%	108%

APU starter motor duty cycle is a maximum of three consecutive unsuccessful starts. If third start is unsuccessful, maintenance action is required.

APU bleed AIR switch must be at OFF position for all inflight operations.

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FLIGHT CREW OPERATING MANUAL

AUXILIARY POWER UNIT (APU) - NORMAL OPERATION

GROUND AND AIR START USING STARTER

Before start (For air start, refer to APU START ENVELOPE chart),

BATT Switch ON/LOCK

■ Pull and move BATT switch to ON then rotate to horizontal.

■ Indicator Selector BATT VOLT

■ Rotate indicator selector to BATT VOLT and check battery voltage is 25 volts or higher.

CAUTION

If battery voltage is less than 25 volts, move BATT switch to OFF. Battery must be replaced.

FIRE WARNING (If Not Previously Tested) CHECK

APU FIRE Control Switch NORM

APU DOORS Switch AUTO

APU AIR Switch OFF

APU MASTER Switch OFF

■ START PUMP Switch (If AC Electrical Power Not Available) ON

NOTE

If ac electrical power is not available, move START PUMP switch to ON. If ac electrical power is available, move a R MAIN or CTR tank pump switch to ON.

Start,

APU MASTER Switch START/RELEASE

NOTE

Momentary deflections of EGT and RPM indications are normal during start of the GTCP36-280[D] APU.

APU OIL PRESS LOW Light (AT OR PRIOR TO 95% RPM) OFF

NOTE

■ Multiple start attempts are acceptable.

After start,

■ START PUMP Switch (After AC Fuel Pump On) OFF

(Continued)

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FLIGHT CREW OPERATING MANUAL

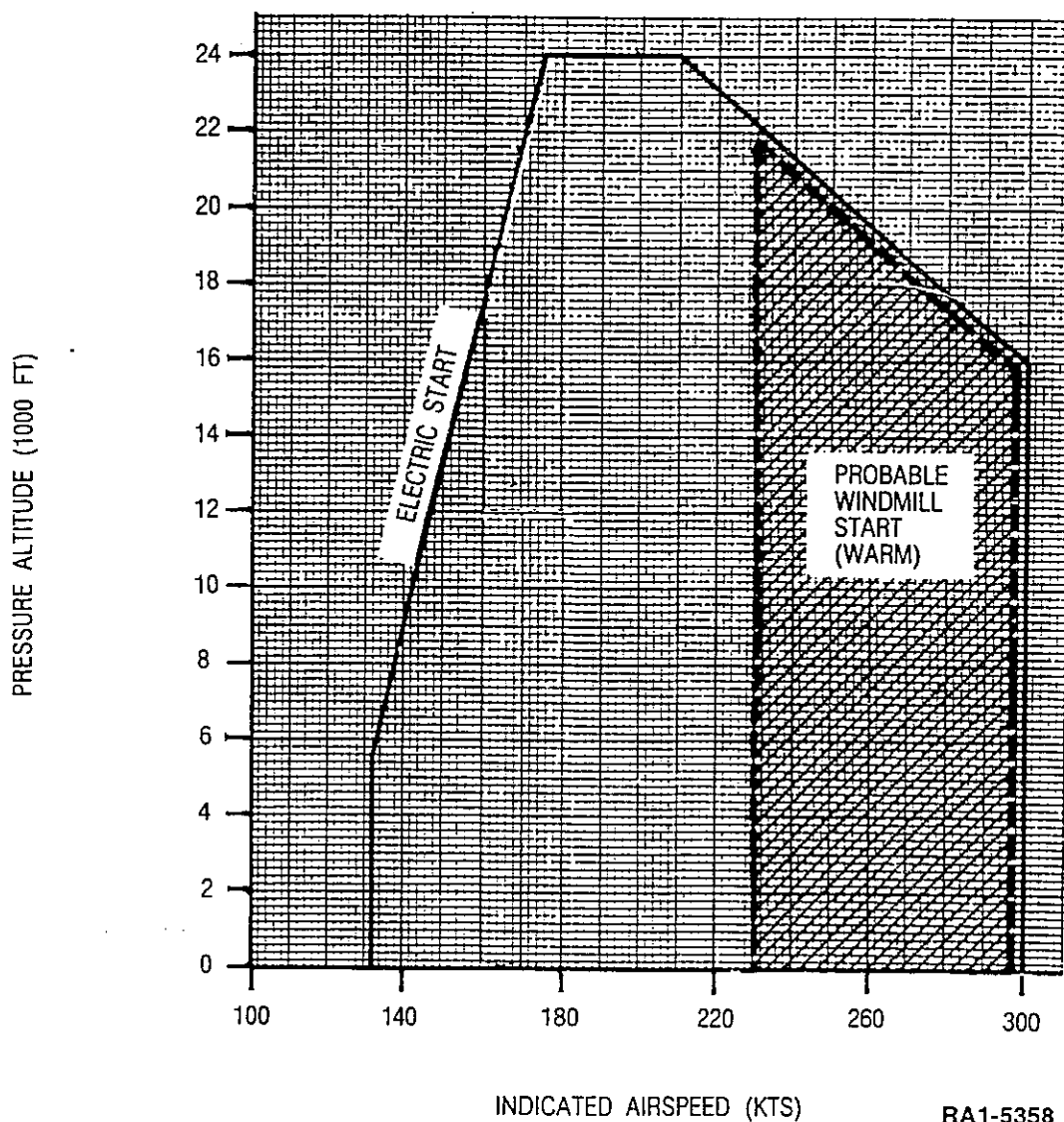
GROUND AND AIRSTART USING APU STARTER (Continued)

APU START ENVELOPE

FOR GTCP85-98DHF & 98DCK APU'S
WITH INLET ACTUATOR P/N 1051T100-11 AND PREVIOUS.

- ELECTRIC START ENVELOPE
- - - PROBABLE WINDMILLING START ENVELOPE

NOTE: WINDMILL START IS
IMPROBABLE WITH COLD
SOAK EXCEEDING 1/2 HOUR



INDICATED AIRSPEED (KTS)

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(Continued)

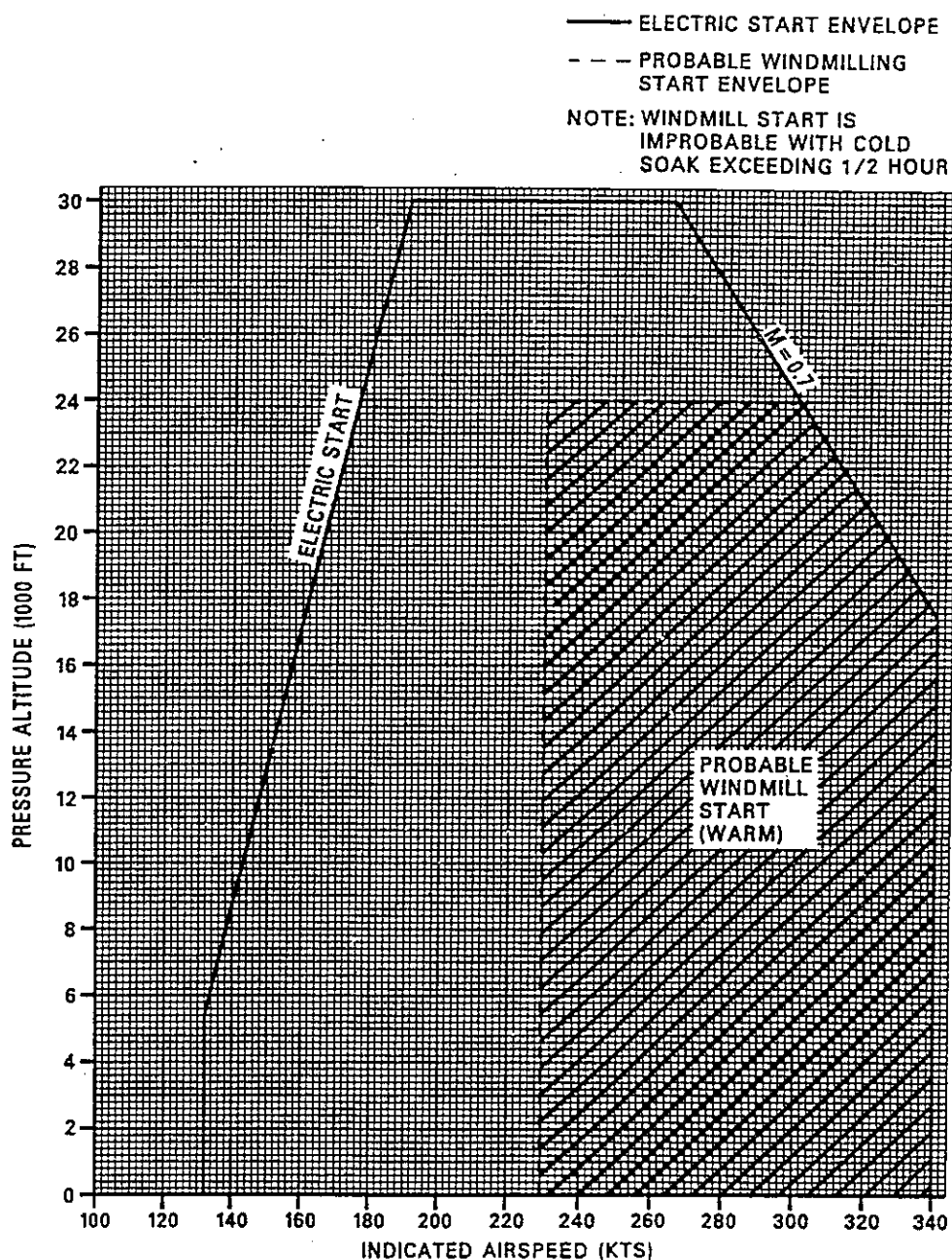
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FLIGHT CREW OPERATING MANUAL

GROUND AND AIRSTART USING APU STARTER (Continued)

APU START ENVELOPE

FOR GTCP85-98DHF & 98DCK
APU'S WITH INLET ACTUATOR P/N 1051T100-13 & SUBSEQUENT



CAG(IGDS)

(Continued)

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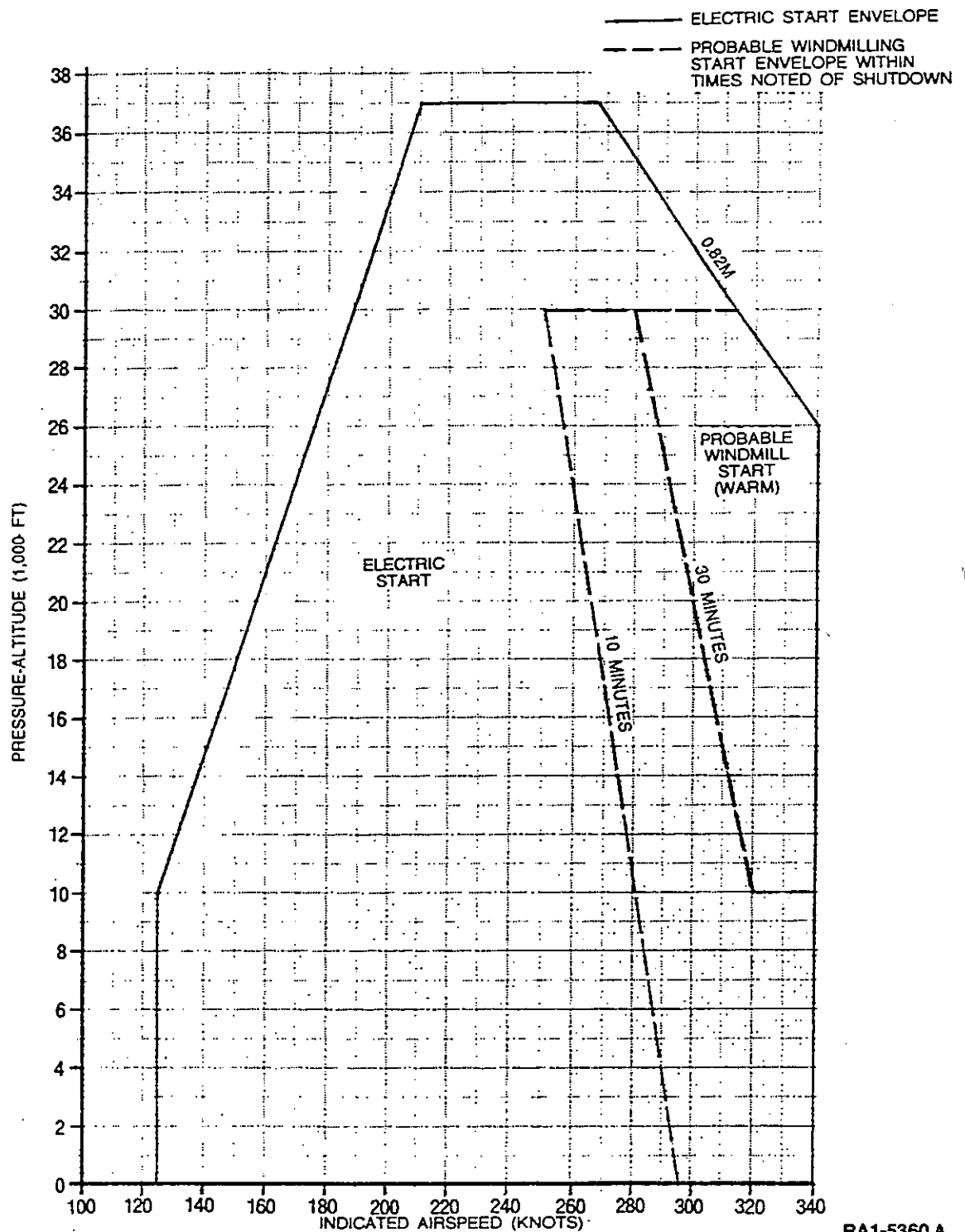
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FLIGHT CREW OPERATING MANUAL

GROUND AND AIRSTART USING APU STARTER (Continued)

APU START ENVELOPE FOR GTCP36-280(D) APU'S



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FLIGHT CREW OPERATING MANUAL

SHUTDOWN

APU AIR Switch OFF
APU MASTER Switch OFF

CAUTION

Except in an emergency, do not shut down APU by moving APU FIRE CONTROL switch to OFF & AGENT ARM, BATT switch to OFF, or pulling APU CONTROL circuit breaker, without first allowing a 60-second cool-down with bleed air off.

NOTES

If APU does not shut down 60 seconds after MASTER switch is moved to OFF, move APU FIRE CONTROL switch to OFF & AGENT ARM. After APU shuts down, return switch to NORM.

After shutdown in flight, APU may continue to windmill. Normal indications are 0 percent to 11 percent.

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FLIGHT CREW OPERATING MANUAL

AUXILIARY POWER UNIT (APU) – ABNORMAL OPERATION

APU AIRSTART USING WINDMILL RPM

NOTE

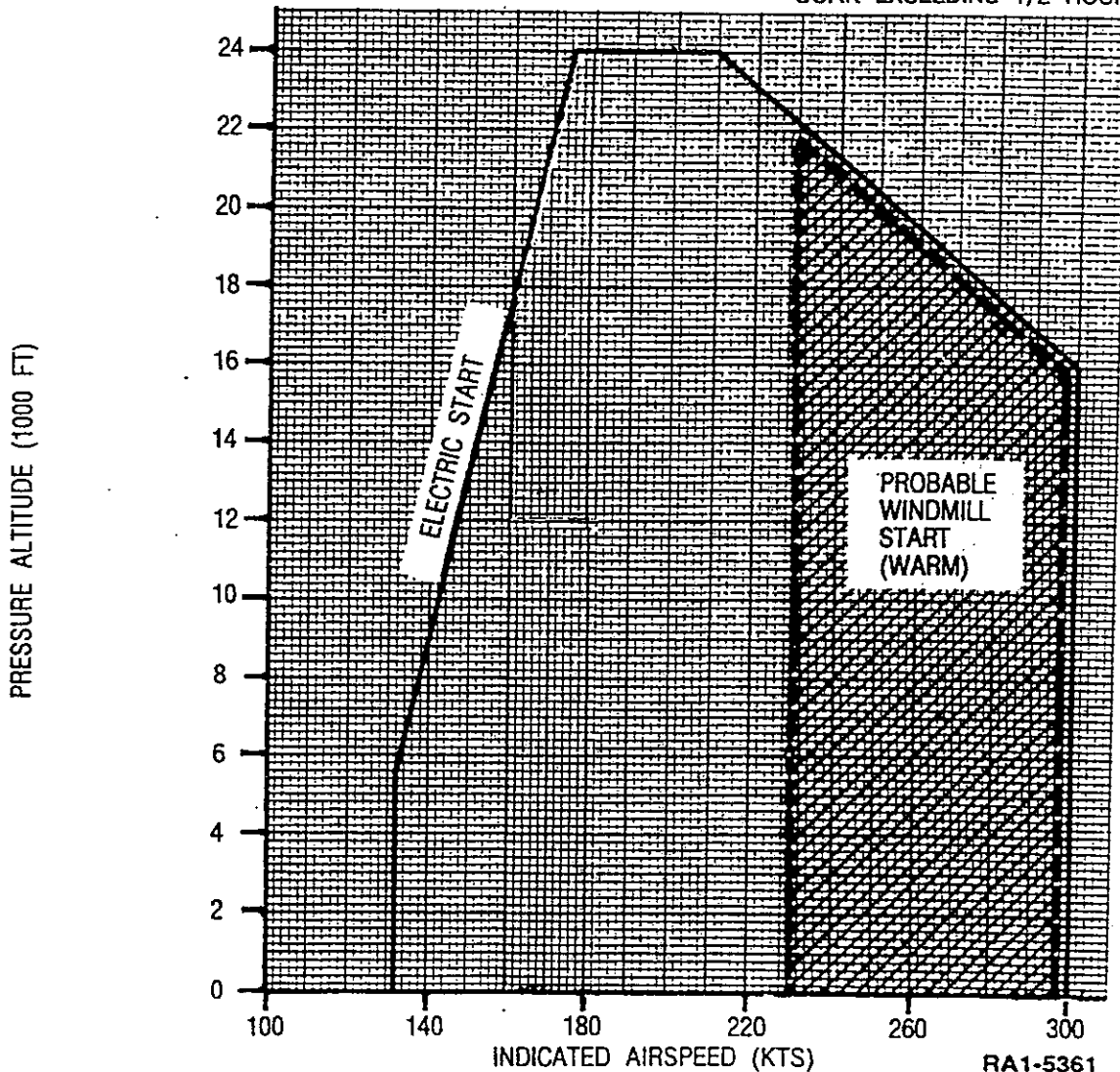
Both engine driven generators inoperative in flight.

APU START ENVELOPE

FOR GTCP85-98DHF & 98DCK APU'S
WITH INLET ACTUATOR P/N 1051T100-11 AND PREVIOUS.

- ELECTRIC START ENVELOPE
- - - PROBABLE WINDMILLING START ENVELOPE

NOTE: WINDMILL START IS
IMPROBABLE WITH COLD
SOAK EXCEEDING 1/2 HOUR



RA1-5361

(Continued)

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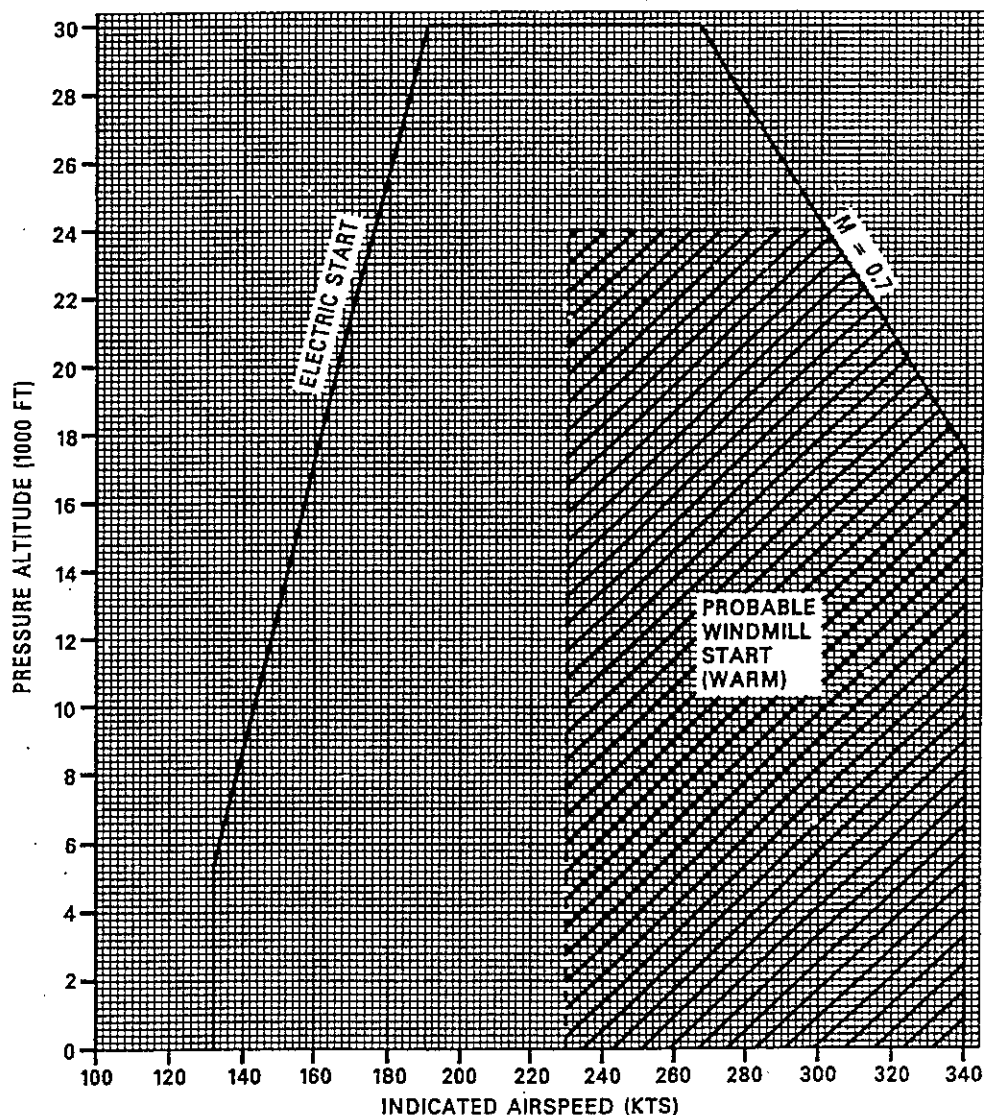
FLIGHT CREW OPERATING MANUAL

APU AIRSTART USING WINDMILL RPM (Continued)

APU START ENVELOPE
 FOR GTCP85-98DHF & 98DCK
 APU'S WITH INLET ACTUATOR P/N 1051T100-13 & SUBSEQUENT

————— ELECTRIC START ENVELOPE
 - - - - - PROBABLE WINDMILLING
 START ENVELOPE

NOTE: WINDMILL START IS IMPROBABLE
 WITH COLD SOAK EXCEEDING 1/2
 HOUR



CAG(IGDS)

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Section 3
 4-30-0
 CODE 1-ZL
 Page 2

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FLIGHT CREW OPERATING MANUAL

APU AIRSTART USING WINDMILL RPM (Continued)

BATT Switch ON/LOCK

APU FIRE CONT Switch NORM

APU AIR Switch OFF

APU MASTER Switch OFF

APU DOORS Switch AUTO

APU START PUMP Switch ON

APU MASTER Switch START/RELEASE

■ APU OIL PRESS LOW Light (At or Prior To 95% RPM). OFF

NOTES

Multiple start attempts are acceptable, if required.

BATT switch must be left in ON to sustain APU operation.

After start and after ac powered fuel pump is supplying fuel pressure for APU,

START PUMP Switch OFF

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FLIGHT CREW OPERATING MANUAL

APU OIL PRESS LOW AND/OR APU OIL
TEMP HIGH LIGHT(S) ON

APU FIRE CONT Switch OFF AND AGENT ARM
APU AIR Switch OFF
APU DOORS Switch. AUTO
APU MASTER Switch OFF
APU FIRE CONTROL Switch NORM

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FLIGHT CREW OPERATING MANUAL

NO LOAD IDLE EGT HIGH - APU

NOTES

This procedure is to be used when no-load idle EGT is stabilized considerably above normal idle values (200-400C) when APU AIR switch is on and all pneumatic powered systems are off.

Normally, idle EGT will rise momentarily when APU bleed air valve is opened until pneumatic ducting is pressurized, then return to original no-load value.

If EGT remains high, the most probable cause is a pneumatic duct leak.

APU AIR Switch OFF

APU MASTER Switch OFF

Call maintenance.

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FLIGHT CREW OPERATING MANUAL

**NO ROTATION OR NO START
OR HUNG START - APU**

APU PERCENT RPM Gage

 **Zero indication**

BATT VOLT indication after applying started load

 **Less than 22 volts**

Discontinue start attempt. Call maintenance.

[END]

More than 22 volts

APU MASTER Switch OFF

APU CONTROL (Overhead Panel) and
APU DOOR CONTROL (Lower EPC) Circuit Breakers (If Tripped) RESET

CAUTION

A tripped circuit breaker may be reset only once. If a circuit breaker trips after it has been reset, the cause should be determined and corrected before attempting a subsequent reset.

GEAR HDL REL Button

 **Retracted**

Call maintenance.

NOTE

A retracted GEAR HDL REL button indicates an extended nose strut and failure of ground shift mechanism to go into ground mode.

[END]

Extended

APU MASTER Switch RUN

APU Doors

 **Open**

Attempt another start.

[END]

Closed

APU DOORS Switch. NON RAM 24 SECONDS MINIMUM THEN OFF

(Continued)

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FLIGHT CREW OPERATING MANUAL

NO ROTATION OR NO START OR HUNG START - APU (Continued)

APU PERCENT RPM Gage (Continued)

Attempt another start.

NOTE

After APU shutdown, move APU DOORS switch to AUTO to close APU doors.

[END]

Stabilized below idle RPM (Green Arc)

NOTE

No increase in EGT indicates no start. A continuing increase in EGT indicates a hung start.

APU MASTER Switch OFF

START/TANK PUMP Switch AS REQUIRED

CAUTION

Observe starter duty cooling time prior to performing second start attempt.

[END]

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FLIGHT CREW OPERATING MANUAL

Chapter 5

COMMUNICATIONS

TABLE OF CONTENTS

AIR LIBERTE INDUSTRIES

(SERIES 80)

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
LIMITATIONS	5-10-0	1	1/2	All
NORMAL OPERATION	5-20-0	1	1/2	All
ABNORMAL OPERATION	5-30-0		(NOT USED)	

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FLIGHT CREW OPERATING MANUAL

COMMUNICATIONS - LIMITATIONS

- There are no limitations.

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FLIGHT CREW OPERATING MANUAL

COMMUNICATIONS - NORMAL OPERATION

- Established by individual operator.

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FLIGHT CREW OPERATING MANUAL

Chapter 6

ELECTRICAL

TABLE OF CONTENTS

AIR LIBERTE INDUSTRIES

(SERIES 80)

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
LIMITATIONS	6-10-0	1	1	All
NORMAL OPERATION				
AC Crosstie Check	6-20-0	1	1	All
APU Power To Ground Service Bus, Or To All Buses	6-20-0	1	2	All
External Power To Ground Service Bus, Or To All Buses	6-20-0	1	3/4	All
ABNORMAL OPERATION				
AC CROSSTIE LOCKOUT Light On	6-30-0	2	1	All
AC EMER BUS OFF Light On	6-30-0	2	3	All
APU GEN OFF Light On	6-30-0	2	6	All
CSD OIL PRESS LOW Light On	6-30-0	2	6A	All
CSD Oil Outlet Temperature High	6-30-0	2	6B	All
DC BUS OFF Light On	6-30-0	2	7	All
DC EMER BUS OFF Light On	6-30-0	2	8	All
DC TRANSFER BUS OFF Light On	6-30-0	2	8A	All
Generator Bus Circuit Breakers (35 Or 50 Amp) Tripped	6-30-0	2	8B	All
Intermittent AC Power Interruptions	6-30-0	2	8C	All
L Or R GEN OFF Light On	6-30-0	2	10	All

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FLIGHT CREW OPERATING MANUAL

ELECTRICAL - LIMITATIONS

GENERAL

The values shown in the normal column are normal operating ranges. Indications outside the normal range indicate possible system abnormalities.

Limits shown in the allowable column should not be exceeded, and sustained operation at these limits is not recommended.

CAUTION

ANY CONDITION WHICH CAUSES ANY INDICATION IN THE ALLOWABLE COLUMN, OTHER THAN WITHIN THE NORMAL RANGE, SHOULD BE CORRECTED AT THE EARLIEST OPPORTUNITY.

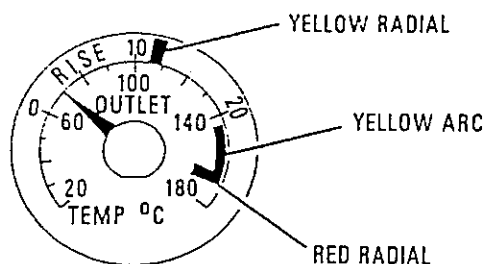
CONDITION OR ITEM		NORMAL		ALLOWABLE	
		MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
LEFT DC LOADMETERS		THE MAXIMUM DIFFERENCE BETWEEN THE TWO INDICATIONS SHOULD NOT EXCEED 0.3 AND BOTH LOADMETERS SHOULD INDICATE SOME LOAD.		0	1.0
RIGHT DC LOADMETERS		SAME AS ABOVE			
RIGHT OR LEFT DC BUS		24V	28V	22V	30V
GENERATORS	VOLTAGE	VOLTAGE: 112V	118V	107V	123V
	ENGINE FREQUENCY	FREQUENCY: 396 CPS	404 CPS	380 CPS	420 CPS
	APU FREQUENCY	390 CPS	420 CPS	380 CPS	420 CPS
EXTERNAL POWER NOTE: IF EXTERNAL POWER IS NOT WITHIN NORMAL LIMITS, IT SHOULD BE CORRECTED AS SOON AS POSSIBLE.		VOLTAGE: 112V	118V	107V	123V
		FREQUENCY: 396 CPS	404 CPS	380 CPS	420 CPS
AC LOADMETERS OF OPERATING GENERATORS NOTE: GENERATOR OVERLOAD RATINGS FOR SHORT TIME OPERATION ARE: A. 1.5 FOR 5 MINUTES B. OVER 1.5 FOR 5 SECONDS (THE OVERLOAD RATING OF THE GENERATOR IS 2.0 FOR 5 SECONDS)		ENGINE GENERATORS			
		OVER 0		UNDER 1.0	0
		APU GENERATOR			
		GND	OVER 0	UNDER 1.25	OVER 0
		FLT	OVER 0	UNDER 1.0 BELOW 25,000 FEET UNDER 0.7 ABOVE 25,000 FEET	UNDER 1.0 BELOW 25,000 FEET UNDER 0.7 ABOVE 25,000 FEET

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FLIGHT CREW OPERATING MANUAL

ELECTRICAL - LIMITATIONS



CSD TEMPERATURE INDICATOR

CONDITION OR ITEM	NORMAL		ALLOWABLE	
	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
GENERATOR DRIVE TRANSMISSION OIL TEMPERATURE RISE.	Yellow radial on rise temp scale (11.2°C) indicates an operating point which, when exceeded, may indicate a system malfunction and should be recorded in the flight log.			
GENERATOR DRIVE TRANSMISSION OUTLET OIL TEMPERATURE	ABOVE 0	146°C	-----	163°C
BATTERY VOLTAGE A. NO OTHER POWER ON AIRPLANE. NO LOAD ON BATTERY. B. BATTERY CHARGING. NOTE: BATTERY VOLTAGE MAY BE STEADY OR MAY BE FLUCTUATING, DEPENDING ON MODE OR OPERATION OF THE BATTERY CHARGER. C. EMERGENCY POWER SWITCH IN ON POSITION.	NOT LESS THAN 25 VOLTS 29 TO 34 VOLTS 25 VOLTS AT 165°F 37.5 VOLTS AT 0°F NOTE: BATTERY CHARGING VOL- TAGES AT NOMINAL AM- BIENT TEMPS (70°F) NOT LESS THAN 25 VOLTS			
BATTERY AMPERES A. BATTERY CHARGING B. EMERGENCY POWER SWITCH IN ON POSITION 1. NO POWER ON AIRPLANE 2. WITH GROUND POWER OR EN- GINE/APU GENERATOR SUPPLYING DC TRANSFER BUS	0	65 AMPERES TO THE LEFT		
		1. 10 TO 50 AMPERES TO THE RIGHT 2. 10 TO 50 AMPERES TO THE RIGHT		
BATTERY CHARGER	NOTE: DO NOT ATTEMPT TO RESET A TRIPPED BATTERY CHARGER CIRCUIT BREAKER.			

CAG(IGDS)

RA1-129H

Section 3
6-10-0
CODE 1-ZL
Page 2

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MD-80

FLIGHT CREW OPERATING MANUAL

ELECTRICAL - NORMAL OPERATION

AC CROSSTIE CHECK

NOTE

This check should be accomplished prior to first flight of the day. All electrical buses must be powered by the engine-driven generators. If external or APU electrical power is connected, the EXT PWR and APU L and R bus power switches must be off. AC BUS X-TIE switch must be in AUTO.

L GEN Switch OFF

Move L GEN Switch to OFF. Observe left AC LOAD meter indicates zero and right AC LOAD meter indicates approximately double. Observe L GEN OFF light is on, and all BUS OFF lights remain off.

L GEN Switch ON

Move L GEN Switch to ON, observe left AC LOAD meter indication increases, and right AC LOAD meter indication decreases, both showing some load. All electrical system warning and caution annunciators should be off.

R GEN Switch OFF

Move R GEN Switch to OFF. Observe right AC LOAD meter indicates zero and left AC LOAD meter indicates approximately double. Observe R GEN OFF light is on, and all BUS OFF lights remain off.

R GEN Switch ON

Move R GEN Switch to ON, observe right AC LOAD meter indication increases and left AC LOAD meter indication decreases, both showing some load. All electrical system warning and caution annunciators should be off.

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FLIGHT CREW OPERATING MANUAL

APU POWER TO GROUND SERVICE BUS, OR TO ALL BUSES

Indicator Selector Switch APU VOLT/FREQ

Rotate indicator selector switch to APU VOLT/FREQ and observe voltage indicates approximately 115 volts and frequency approximately 400 cps.

Electrical Bus(es) Power Required



GROUND SERVICE BUS only

GROUND SERVICE APU PWR Switch ON

GROUND SERVICE EXT PWR Switch. OFF

NOTES

Observe ground service APU power in use light should come on.

Ground service bus and DC transfer bus are now powered.

[END]

L and R AC buses

APU L BUS. and APU R BUS Switches (One At a Time) ON

NOTES

Observe APU power in use lights come on.

Observe all BUS OFF lights go off.

APU AC LOAD meter and left and right DC LOAD meters should indicate some load within normal limits. Galley ovens should not be on.

All electrical buses are now powered.

Monitor APU ac load. Continuous operation of all electrical equipment may exceed limitations.

[END]

MD-80

FLIGHT CREW OPERATING MANUAL

EXTERNAL POWER TO GROUND SERVICE BUS, OR TO ALL BUSES

Indicator Selector Switch EXT PWR VOLT/FREQ

Rotate indicator selector switch to EXT PWR VOLT/FREQ and observe voltage indicates approximately 115 volts and frequency indicates approximately 400 cps.

Electrical Bus(es) Power Required

GROUND SERVICE BUS Only

GROUND SERVICE EXT PWR Switch. ON

GROUND SERVICE APU PWR Switch OFF

NOTES

Observe ground service external power in use light comes on.

Ground service bus and DC transfer bus are now powered.

[END]

L and R AC buses

EXT PWR L BUS and EXT PWR R BUS Switches (One At a Time). ON

NOTES

Observe external power in use lights come on.

Observe all BUS OFF lights go off.

DC LOAD meters should indicate within normal limits.

All electrical buses are now powered.

Indicator Selector Switch BATT AMP

Rotate indicator selector switch to BATT AMP and observe BATT AMP indication is zero to 65 amps to left. Indication may be steady or pulsing, depending on battery charger mode of operation.

NOTE

Battery switch must be on for battery charger operation.

[END]

MD-80

FLIGHT CREW OPERATING MANUAL

ELECTRICAL - ABNORMAL OPERATION

AC CROSSTIE LOCKOUT LIGHT ON
(L, R) AC BUS OFF, (L, R OR APU) GEN
OFF AND DC BUS OFF LIGHTS ALSO ON

NOTES

AC crosstie lockout may have been caused by a temporary fault in electrical system.

AC CROSSTIE LOCKOUT light on indicates AC crosstie relay automatically locked open.

Fuel Boost Pump Switches (All) ON

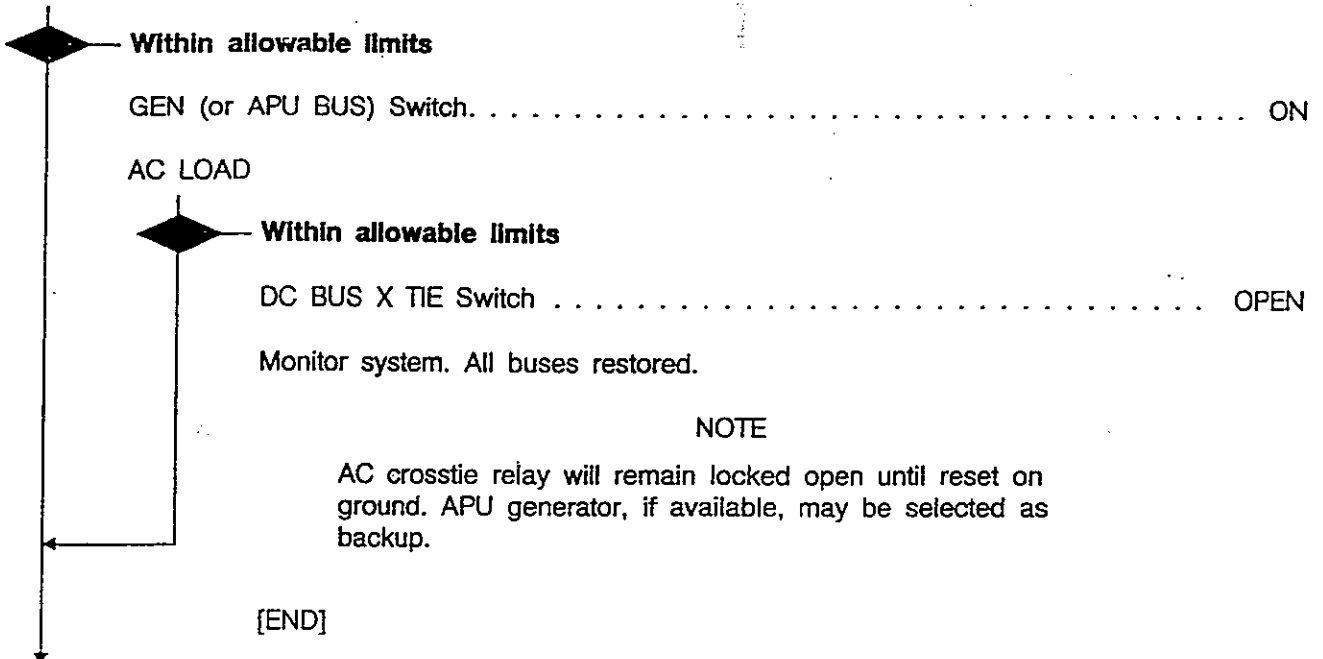
DC BUS X TIE Switch CLOSE

DC BUS OFF light should go off and DC buses should be restored. Monitor DC LOAD meters.

Indicator Selector Switch AFFECTED GENERATOR

Affected Engine (or APU) GEN Switch RESET/OFF (OR NORM)

AC VOLTS/FREQUENCY



(Continued)

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FLIGHT CREW OPERATING MANUAL

AC CROSSTIE LOCKOUT LIGHT ON (Continued)

AC VOLTS/FREQUENCY (Continued)

Not within allowable limits

GEN Switch OFF

Generator cannot be used. Do not attempt additional resets.

APU Generator Availability

NOTES

Prior to starting APU, verify APU L/R BUS switches are in OFF.

If right generator bus is not powered battery charger will be inoperative. More than one APU start attempt will reduce battery power and result in less than 30 minutes of emergency power if all AC power is lost.

Available (AC VOLTS/FREQUENCY within limits)

APU BUS Switch (Affected Side) ON

AC LOAD

Within allowable limits

DC BUS X TIE Switch OPEN

Monitor system. All buses restored.

NOTE

AC crosstie relay will remain locked open until reset on ground.

[END]

Not within allowable limits

Generator bus cannot be restored. Reset APU generator if required. Select APU BUS switch to provide backup for operating system.

Not available

Continue flight with affected system inoperative. Refer to Section 4 – ELECTRICAL, circuit breaker panel illustrations to determine affected circuits.

(Continued)

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FLIGHT CREW OPERATING MANUAL

AC CROSSTIE LOCKOUT LIGHT ON (Continued)

For airplanes with -970 and -971 DFGCs,

F/D, AP, and AUTO THROT Switches OFF

Center Tank Fuel Quantity



Zero fuel remaining

CTR Tank Pump Switches OFF

[END]

Fuel remaining

CTR Tank Pump Switches ON

Main Tank Pump Switches (One At a Time) OFF

When CTR FUEL QTY indicator indicates 500 pounds/225 kilograms,

Main Tank Pump Switches ON

NOTE

Remaining center tank fuel may be used by leaving tank pump switches in one main tank OFF. When CTR FUEL QTY indicates zero or INLET FUEL PRESS LOW is annunciated, move main tank pump switches for that tank back to ON.

[END]

TEMPORARY
REVISION

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FLIGHT CREW OPERATING MANUAL

AC EMER BUS OFF LIGHT ON

Phase Of Flight

Critical and Captain's flight instruments are inoperative

EMER PWR Switch ON

CAUTION

With EMER PWR switch in ON, battery cannot be relied upon for more than 30 minutes. Use emergency power only as required.

Captain's Flight Instruments

Not restored

EMER PWR Switch OFF

Restored

Use emergency power as long as phase of flight is critical. When no longer critical, move EMER PWR switch to OFF.

Not critical and Captain's flight instruments are normal

EMERGENCY AC BUS SENSING Circuit Breaker
(Overhead Circuit Breaker Panel) RESET (IF TRIPPED)

CAUTION

One reset of tripped circuit breaker may be attempted after a cooling period of approximately 2 minutes. If the circuit breaker trips again, do not attempt another reset.

[END]

Not critical and Captain's flight instrument flags are in view

Continue flight with unaffected instruments.

(Continued)

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FLIGHT CREW OPERATING MANUAL

**TEMPORARY
REVISION**

TEMPORARY REVISION 2-1608

FILING INSTRUCTIONS:

Insert this Temporary Revision so that Page 2 of 2 faces Volume II, Section 3, 6-30-0, CODE 2, Page 3, AC EMER BUS OFF LIGHT ON procedure.

Retain this Temporary Revision until notified to remove it.

DESCRIPTION AND REASON:

This Temporary Revision revises the CAUTION regarding resetting of circuit breakers to improve publications commonality.

EFFECTIVITY:

AM, AY, BW, FL, HA, JD, JP,
KE, LM, LV, OZ, RP, SI, TW,
XA, XL, XO, XR, XZ, Z1, Z4,
Z6, Z9, ZC, ZD, ZL, ZYU

Section 3
6-30-0
CODE 2

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FLIGHT CREW OPERATING MANUAL

AC EMER BUS OFF LIGHT ON (Continued)

At Captain's discretion,

EMER PWR Switch ON

CAUTION

With EMER PWR switch in ON, battery cannot be relied upon for more than 30 minutes. Use emergency power only as required.

NOTE

Flight instruments may take up to 3 minutes to erect before flags disappear. Fly airplane with wings straight and level.

EMER AC BUS OFF Light CHECK



Light off

Use emergency power only as required.

NOTE

Battery charger will not operate while EMER PWR switch is in ON.

[END]

Light on

EMER PWR Switch OFF

Continue flight with affected instruments inoperative.

NOTE

Refer to emergency AC bus portion of overhead circuit breaker panel to determine affected circuits.

FLIGHT CREW OPERATING MANUAL

APU GEN OFF LIGHT ON

APU BUS Switches OFF
 Indicator Selector Switch APU
 APU GEN Switch RESET

NOTE

A generator must be reset only once for a given fault. If fault trips generator after reset, fault should be located and corrected before attempting to place generator on its bus again.

AC Volts/Frequency CHECK



Not within allowable limits

Generator capability lost.

[END]

With allowable limits

NOTE

If APU generator is only power source, move GALLEY switch to OFF before energizing generator buses.

APU BUS Switches (One At a Time) ON

AC Volts/Frequency and APU GEN OFF Light OBSERVE



Volts/frequency zero or APU GEN OFF light on

Generator capability lost.

APU BUS Switches OFF

[END]

Volts/frequency normal and APU GEN OFF light off

Continue normal operation.

FLIGHT CREW OPERATING MANUAL

CSD OIL PRESS LOW LIGHT ON

Associated GEN OFF Light. CHECK

GEN OFF light on

Associated GEN Switch. OFF

CAUTION

Next switch action is irrevocable. Make certain switch selected is for malfunctioning CSD.

Associated CSD Disconnect Switch (Hold For 3 Seconds) DISC

NOTE

CSD disconnect can be confirmed by observing AC VOLTS and FREQUENCY below scale.

Utilize APU generator if available.

[END]

GEN OFF light off

APU Generator Availability DETERMINE

APU generator not available

Continue operation of engine generator at Captain's discretion.

[END]

APU generator available

APU BUS Switch (Engine With CSD OIL LOW Light On) ON

Associated GEN Switch. OFF

CAUTION

Next switch action is irrevocable. Make certain switch selected is for malfunctioning CSD.

Associated CSD Disconnect Switch (Hold For 3 Seconds) DISC

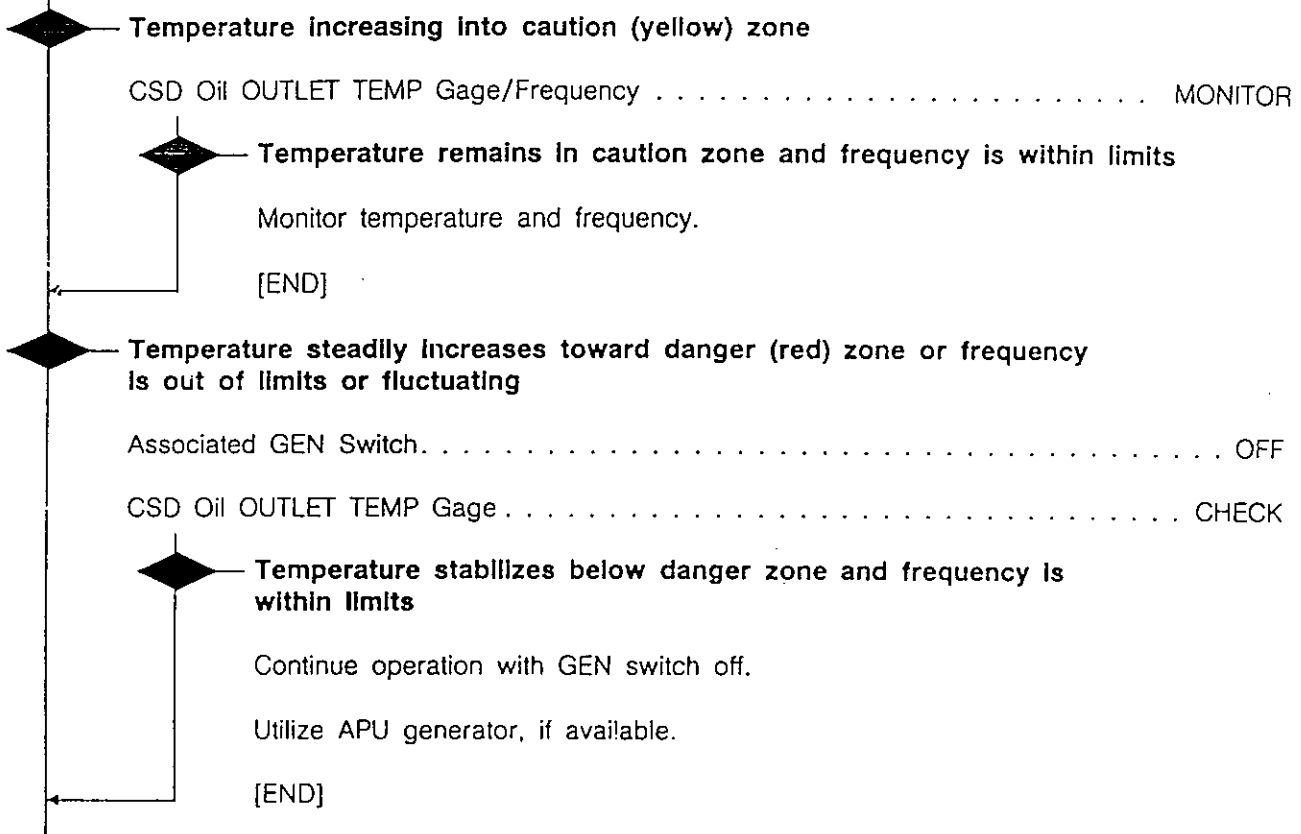
NOTE

CSD disconnect can be confirmed by observing AC VOLTS and FREQUENCY below scale.

FLIGHT CREW OPERATING MANUAL

CSD OIL OUTLET TEMPERATURE HIGH

CSD Oil OUTLET TEMP Gage CHECK



Temperature increases and stabilizes In danger (red) zone or frequency Is out of limits

Associated GEN Switch. OFF

CAUTION

Next switch action is irrevocable. Make certain switch selected is for malfunctioning CSD.

Associated CSD Disconnect Switch (Hold For 3 Seconds) DISC

NOTE

CSD disconnect can be confirmed by observing AC VOLTS and FREQUENCY below scale and/or illumination of CSD OIL PRESS LOW light.

Utilize APU generator, if available.

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FLIGHT CREW OPERATING MANUAL

DC BUS OFF LIGHT ON

DC LOAD Meters

Abnormal

Affected TRANSFORMER/XFMR RECTIFIER (T/R) Circuit Breakers
(Upper EPC/Ground Service Bus)

Tripped

TRANSFORMER/XFMR
RECTIFIER -1 or -2 C/B's. RESET

If TR -1 C/B's will not reset, try resetting -2 C/B's. If TR C/B's will not
reset, continue with affected equipment inoperative.

CAUTION

Do not attempt to move DC BUS X TIE switch to CLOSE if
T/R circuit breakers cannot be reset.

[END]

Not tripped

DC BUS X TIE Switch CLOSE

[END]

Normal

DC BUS OFF SENSING C/B (Lower EPC) (If Tripped) RESET

NOTE

If DC BUS OFF light is on and DC LOAD meters are normal,
sensing circuit is faulty.

[END]

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FLIGHT CREW OPERATING MANUAL

DC EMER BUS OFF LIGHT ON

NOTES

Continue with affected equipment inoperative until time is available to complete this procedure.

DC EMER BUS OFF light may be illuminated by a malfunctioning sensing circuit or by a tripped circuit breaker. Resetting EMERGENCY DC BUS SENSING circuit breaker (overhead panel) may restore normal indication.

EMERGENCY DC BUS FEED Circuit Breaker CHECK



Tripped

Reset circuit breaker, one time only.

CAUTION

If circuit breaker will not reset or trips again, do not move EMER PWR switch to ON, a bus fault may exist.

[END]

Not tripped

Continue operation with affected circuits inoperative.

At Captain's discretion,

EMER PWR Switch ON

NOTE

Operation with EMER PWR switch in ON will power emergency AC bus and emergency DC bus. With BATT switch in ON, DC transfer bus is powered regardless of EMER PWR switch position. Battery, if fully charged, will supply power for certain emergency equipment for approximately 30 minutes. Only equipment essential for safe flight should be used.

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FLIGHT CREW OPERATING MANUAL

**TEMPORARY
REVISION**

TEMPORARY REVISION 2-1609

FILING INSTRUCTIONS:

Insert this Temporary Revision so that pages 2 of 5, 3 of 5, 4 of 5 and 5 of 5 of this Temporary Revision face Volume II, Section 3, 6-30-0, CODE 2, Pages 8A, 8B, 8C and 8D respectively.

Retain this Temporary Revision until notified to remove it.

DESCRIPTION AND REASON:

This Temporary Revision revises the CAUTION regarding resetting of circuit breakers to improve publications commonality.

EFFECTIVITY:

AM, AY, BW, FL, HA, JD, JP,
KE, LM, LV, OZ, RP, SI, TW,
XA, XL, XO, XR, XZ, Z1, Z4,
Z6, Z9, ZC, ZD, ZL, ZYU

Section 3
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CODE 2

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TEMPORARY
REVISION

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FLIGHT CREW OPERATING MANUAL

DC TRANSFER BUS OFF LIGHT ON

NOTE

If standby horizon indicator power off flag is not in view, DC transfer bus may still be powered. DC TRANSFER BUS OFF light may be illuminated by malfunctioning sensing circuit or tripped circuit breaker. Resetting DC TRANSFER BUS SENSING circuit breaker (lower EPC panel) may restore normal indication.

DC TRANSFER BUS FEED Circuit Breaker (Lower EPC Panel)



Tripped

Reset circuit breaker, one time only.

CAUTION

One reset of tripped circuit breaker may be attempted after a cooling period of approximately 2 minutes. If the circuit breaker trips again, do not attempt another reset.

If circuit breaker will not reset or trips again,

Continue operation with affected equipment inoperative. Refer to systems description for circuits powered by DC transfer bus. Land at nearest suitable airport.

[END]

Not tripped

DC TRANSFER BUS FEED Circuit Breaker (Lower EPC Panel) PULL

CHARGER & TRANSFER RELAY

CONTROL Circuit Breaker (Lower EPC Panel) PULL

Battery should restore power to DC transfer bus. Battery charger will be inoperative. Land at nearest suitable airport.

NOTE

Battery is time limited at 45 amperes for 30 minutes

[END]

Section 3

6-30-0

CODE 2

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FLIGHT CREW OPERATING MANUAL

DC TRANSFER BUS OFF LIGHT ON

NOTE

If standby horizon indicator power off flag is not in view, DC transfer bus may still be powered. DC TRANSFER BUS OFF light may be illuminated by malfunctioning sensing circuit or tripped circuit breaker. Resetting DC TRANSFER BUS SENSING circuit breaker (lower EPC panel) may restore normal indication.

DC TRANSFER BUS FEED Circuit Breaker (Lower EPC Panel) CHECK

Tripped

Reset circuit breaker, one time only.

CAUTION

A tripped circuit breaker may be reset only once. If a circuit breaker trips after it has been reset, the cause should be determined and corrected before attempting a subsequent reset.

If circuit breaker will not reset or trips again,

Continue operation with affected equipment inoperative. Refer to systems description for circuits powered by DC transfer bus. Land at nearest suitable airport.

[END]

Not tripped

DC TRANSFER BUS FEED Circuit Breaker (Lower EPC Panel) PULL

CHARGER & TRANSFER RELAY

CONTROL Circuit Breaker (Lower EPC Panel) PULL

Battery should restore power to DC transfer bus. Battery charger will be inoperative. Land at nearest suitable airport.

NOTE

Battery is time limited at 45 amperes for 30 minutes.

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FLIGHT CREW OPERATING MANUAL

GENERATOR BUS CIRCUIT BREAKERS (35 OR 50 AMP) TRIPPED

NOTE

When APU is operating in flight, only the APU BUS switch on affected side should be on.

AC BUS X TIE Switch OPEN

Affected Generator Bus Circuit Breakers (All) OPEN (PULL)

NOTES

If circuit breaker(s) of one or two phase(s) of a particular load are tripped, the associated circuit breaker(s) should also be opened (pulled).

When a circuit breaker trips, a 3-minute cooling period should be observed before reset.

Affected Generator Bus Circuit Breakers (All) RESET

CAUTION

A tripped circuit breaker may be reset only once. If a circuit breaker trips after it has been reset, the cause should be determined and corrected before attempting a subsequent reset.

If reset is successful,

AC BUS X TIE Switch AUTO

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FLIGHT CREW OPERATING MANUAL

TEMPORARY
REVISION

GENERATOR BUS CIRCUIT BREAKERS (35 OR 50 AMP) TRIPPED

NOTE

When APU is operating in flight, only the APU BUS switch on affected side should be on.

AC BUS X TIE Switch OPEN

Affected Generator Bus Circuit Breakers (All) OPEN (PULL)

NOTE

If circuit breaker(s) of one or two phase(s) of a particular load are tripped, the associated circuit breaker(s) should also be opened (pulled).

Affected Generator Bus Circuit Breakers (All) RESET

CAUTION

One reset of tripped circuit breaker may be attempted after a cooling period of approximately 2 minutes. If the circuit breaker trips again, do not attempt another reset.

If reset is successful,

AC BUS X TIE Switch AUTO

[END]

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6-30-0
CODE 2

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FLIGHT CREW OPERATING MANUAL

INTERMITTENT AC POWER INTERRUPTIONS

NOTE

This condition may be characterized by a loud buzzing/chattering sound from the EPC and any combination of random circuit breaker trips, inappropriate CAWS messages, loss of some flight instruments, flashing cockpit annunciators and loss of left or right AC bus(es).

AC BUS X TIE Switch OPEN

L/R GEN OFF Light



L/R GEN OFF light on

Associated GEN Switch. RESET/OFF

NOTE

A generator must be reset only once for a given fault. If a fault trips the generator after reset, the fault should be located and corrected before attempting to place the generator on its bus again.

Indicator Selector Switch ASSOCIATED GEN

AC Volts/Frequency



Within allowable limits

Associated GEN Switch. ON

AC Volts/Frequency/AC Load



Within allowable limits

Circuit Breaker(s) CHECK/RESET

NOTE

If circuit breaker(s) of one or two phases of a particular load are tripped, the associated circuit(s) should also be opened (pulled) and all phases reset together.

(Continued)

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FLIGHT CREW OPERATING MANUAL

TEMPORARY
REVISION

INTERMITTENT AC POWER INTERRUPTIONS (Continued)

L/R GEN OFF Light (Continued)

AC Volts/Frequency (Continued)

AC Volts/Frequency/AC Load (Continued)

CAUTION

One reset of tripped circuit breaker may be attempted after a cooling period of approximately 2 minutes. If the circuit breaker trips again, do not attempt another reset.

Monitor system.

[END]

**Not within allowable limits or generator will
not stay connected to distribution system**

Associated GEN Switch OFF

DC BUS X TIE Switch CLOSE

L/R GEN OFF light off

Circuit Breaker(s) CHECK/RESET

NOTE

If circuit breaker(s) of one or two phases of a particular load are tripped, the associated circuit breaker(s) should also be opened (pulled) and all phases reset together.

CAUTION

One reset of tripped circuit breaker may be attempted after a cooling period of approximately 2 minutes. If the circuit breaker trips again, do not attempt another reset.

(Continued)

Section 3

6-30-0

CODE 2

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McDonnell Douglas Corporation Proprietary Information - Use or disclosure of THESE DATA SUBJECT TO RESTRICTIVE LEGEND ON TITLE PAGE OR FIRST PAGE

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FLIGHT CREW OPERATING MANUAL

INTERMITTENT AC POWER INTERRUPTIONS

NOTE

This condition may be characterized by a loud buzzing/chattering sound from the EPC and any combination of random circuit breaker trips, inappropriate CAWS messages, loss of some flight instruments, flashing cockpit annunciators and loss of left or right AC bus(es).

AC BUS X TIE Switch OPEN

L/R GEN OFF Light CHECK



L/R GEN OFF light on

Associated GEN Switch RESET/OFF

NOTE

A generator must be reset only once for a given fault. If a fault trips the generator after reset, the fault should be located and corrected before attempting to place the generator on its bus again.

Indicator Selector Switch ASSOCIATED GEN

AC Volts/Frequency CHECK



Within allowable limits

Associated GEN Switch ON

AC Volts/Frequency/AC Load CHECK



Within allowable limits

Circuit Breaker(s) CHECK/RESET

NOTES

If circuit breaker(s) of one or two phases of a particular load are tripped, the associated circuit(s) should also be opened (pulled) and all phases reset together.

When a circuit breaker trips, a 3-minute cooling period should be observed before reset.

(Continued)

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FLIGHT CREW OPERATING MANUAL

INTERMITTENT AC POWER INTERRUPTIONS (Continued)

L/R GEN OFF Light (Continued)

AC Volts/Frequency (Continued)

AC Volts/Frequency/AC Load (Continued)

CAUTION

A tripped circuit breaker may be reset only once. If a circuit breaker trips after it has been reset, the cause should be determined and corrected before attempting a subsequent reset.

Monitor system.

[END]

Not within allowable limits or generator will not stay connected to distribution system

Associated GEN Switch. OFF

DC BUS X TIE Switch CLOSE

L/R GEN OFF light off

Circuit Breaker(s) CHECK/RESET

NOTES

If circuit breaker(s) of one or two phases of a particular load are tripped, the associated circuit breaker(s) should also be opened (pulled) and all phases reset together.

When a circuit breaker trips, a 3-minute cooling period should be observed before reset.

CAUTION

A tripped circuit breaker may be reset only once. If a circuit breaker trips after it has been reset, the cause should be determined and corrected before attempting a subsequent reset.

(Continued)

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FLIGHT CREW OPERATING MANUAL

INTERMITTENT AC POWER INTERRUPTIONS (Continued)

APU Generator Availability DETERMINE

NOTE

Prior to starting APU, verify APU L/R BUS switches are in OFF.

Available (AC volts/frequency within limits) and only one generator is operative

APU L or R BUS Switch
(Switch With Inoperative Generator) ON

NOTE

During approach, verify GALLEY switch is in OFF then move other APU BUS switch to ON (or both APU BUS switches to ON if operating with two engine generators.)

Not available and only one generator is operative

Land at nearest suitable airport.

CAUTION

Do not return AC BUS X TIE switch to AUTO.

FLIGHT CREW OPERATING MANUAL

L OR R GEN OFF LIGHT ON

NOTE

This procedure addresses loss of an engine generator due to action of fault protection.

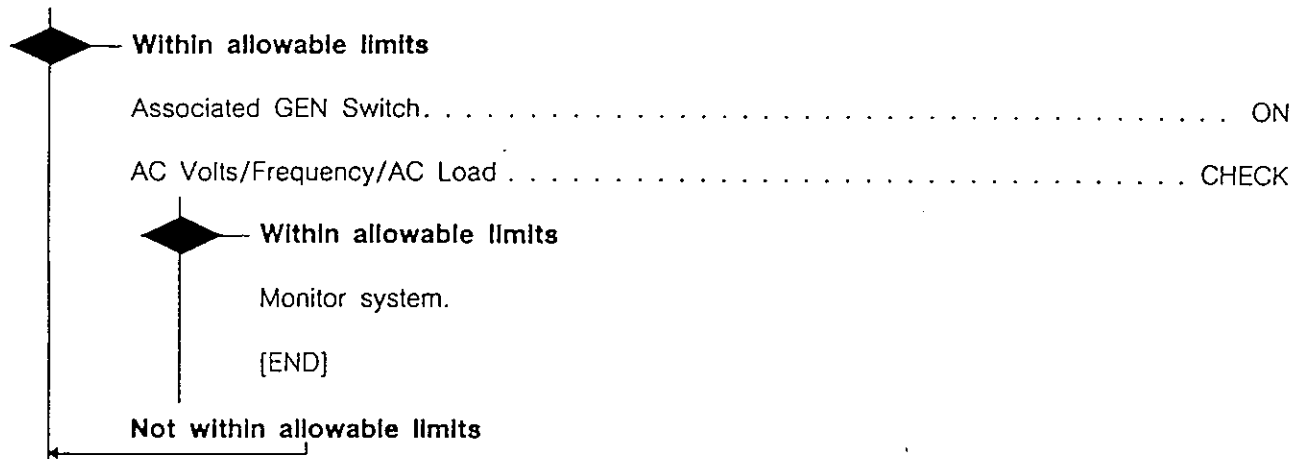
Associated GEN Switch. RESET/OFF

NOTE

A generator must be reset only once for a given fault. If fault trips generator after reset, fault should be located and corrected before attempting to place generator on its bus again.

Indicator Selector Switch. ASSOCIATED GEN

AC Volts/Frequency. CHECK



Not within allowable limits or generator will not stay connected to distribution system

Associated GEN Switch. OFF

NOTE

All buses will be powered through AC crosstie relay.

AC LOAD Meter (Operating Generator). MONITOR

Prior to landing,

One AIR CONDITIONING SUPPLY Switch OFF

GALLEY Switch OFF

(Continued)

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FLIGHT CREW OPERATING MANUAL

Chapter 7

ENGINES

TABLE OF CONTENTS

AIR LIBERTE INDUSTRIES

(SERIES 80)

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
LIMITATIONS	7-10-0	12	1	All
RESTRICTED AREAS	7-15-0	3	1	All
NORMAL OPERATION				
Starting	7-20-0	14/21	1	Use CODE 14 for all FSN's except 49662
Engine Pneumatic Cross Start	7-20-0	14/21	3	Use CODE 21 for FSN 49662
Unsatisfactory Start	7-20-0	14/21	4	
Clearing	7-20-0	14/21	4	
Inflight Start	7-20-0	14/21	5	
Inflight Relight Chart	7-20-0	14/21	6	
Battery Start	7-20-0	14/21	7	
Starting In Excessive Tailwind	7-20-0	14/21	9	
Powerback	7-20-0	14/21	10	
ABNORMAL OPERATION - STARTING				
EGT Does Not Indicate In Normal Range	7-30-0	3/4	1	Use CODE 3 for all FSN's except 49662
Hung Start	7-30-0	3/4	2	
OIL PRESS LOW Light On After Start	7-30-0	3/4	3	Use CODE 4 for FSN 49662

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FLIGHT CREW OPERATING MANUAL

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
ABNORMAL OPERATION - STARTING (Continued)				
No Oil Pressure Rise During Start	7-30-0	3/4	3	Use CODE 3 for all FSN's except 49962
No Rotation, N ₁ Tachometer	7-30-0	3/4	4	Use CODE 4 for FSN 49662
No Rotation, N ₂ Tachometer	7-30-0	3/4	4	
Starter Valve Fails To Function	7-30-0	3/4	5	
Tailpipe Fire Or Torching	7-30-0	3/4	6	

ABNORMAL OPERATION

Engine Surging Or Popping In Forward Thrust	7-30-5	26	1	All
EGT Inoperative Or Reads High	7-30-5	26	3/4	All
EPR Erratic Or Fixed	7-30-5	26	5	All
Fuel Flow Gage Inoperative Or Reads High	7-30-5	26	6	All
FUEL FILTER PRESS DROP Light On	7-30-5	26	7	All
High Oil Pressure	7-30-5	26	8	All
High Oil Temperature	7-30-5	26	9	All

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FLIGHT CREW OPERATING MANUAL

LIMITATIONS (Continued)

ENGINE SYSTEMS

For airplanes with three-position (N₁, OFF, N₂) ENG SYNC selector, the selector must be in OFF any time below 1500 feet AGL. For airplanes with four-position (EPR, OFF, N₁, N₂) ENG SYNC selector, the selector may be in EPR if Service Bulletin 76-44 or its production equivalent has been incorporated.

Use of engine ignition:

Engine ignition is not included in FAA limitations. However, observance of following duty cycle will increase service life and prevent possible damage to equipment:

Selector Position	Duty Cycle
SYS A/SYS B/BOTH/ OVRD (20 joule AC)	10 minutes on, 10 minutes off. Repeat as necessary.

Starter duty cycle:

Standard	Alternate
90 seconds on*	90 seconds on*
5 minutes off	10 minutes off
30 seconds on	60 seconds on
5 minutes off	10 minutes off
30 seconds on	60 seconds on
Sequence may continue	Sequence may continue

*May consist of 3 normal start cycles of 30 seconds each with engine allowed to stop turning between starts.

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FLIGHT CREW OPERATING MANUAL

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
ABNORMAL OPERATION (Continued)				
N ₁ And/Or N ₂ Overspeed	7-30-5	26	9	All
(L/R) OIL PRESS LOW Light On/ (L/R) Oil Pressure Low Indication	7-30-5	26	10	All
Oil Quantity Decreasing Or Increasing	7-30-5	26	11	All
OIL STRAINER CLOGGING Light On	7-30-5	26	12	All
REVERSER ACCUMULATOR LOW Light On	7-30-5	26	13	All
Reverser Deployed Or REVERSE THRUST/UNLOCK Light(s) On In Flight	7-30-5	26	14	All
Reverser Interlock Will Not Release, Or Reverser Lever Returns To Reduced Thrust	7-30-5	26	15	All
START VALVE OPEN Light On/Annunciation	7-30-5	26	16	All

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FLIGHT CREW OPERATING MANUAL

ENGINES – LIMITATIONS (JT8D-219)

Engine Thrust

OPERATING CONDITIONS	OPERATING LIMITS						
	Time Limit	Maximum EGT (°C)	Minimum Oil Pressure (PSIG) (4)	Oil Temp °C (5)	Static S.L. Thrust Std. Day*	Maximum Rotor Speeds	
						N ₁	N ₂
Maximum Takeoff	5 Minutes 2 Minutes **	625 630	40	135	21,700 (7)	101.6%	102.5%
Normal Takeoff	5 Minutes 2 Minutes **	590 595	40	135	21,000 (7)	98.8%	100.9%
Maximum Continuous Thrust (MCT)	Continuous	580	40	135	18,900		
Starting (Ground) (Flight)	Momentary Momentary	475(6) 625(6)	40 40	135 135			
Idle		480 ***	40	135			

* Maximum EPR values for takeoff, normal takeoff and maximum continuous thrust limits are presented on appropriate thrust charts.

** The sum of time at both takeoff thrust settings must not exceed 5 minutes.

*** 480 applies when air bleed or power extraction is being used.

(Continued)

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FLIGHT CREW OPERATING MANUAL

LIMITATIONS (Continued)

1. During takeoff, engine anti-icing must be turned on if icing conditions exist or are anticipated.
2. Autothrottle system must be disconnected if engine surge is detected during takeoff.
3. Prior to takeoff or prior to approach if indicated fuel temperature is 0°C or less, it is recommended that fuel heat be turned on for one cycle. Fuel heat must remain OFF during takeoff, approach/landing, and go-around. In flight, if the FUEL FILTER PRES DROP light or FUEL FIL PRES DROP message (with EOAP) comes on, use the fuel heat as required.
4. Normal oil pressure is 40-55 PSIG. Oil pressures between 35 and 40 PSIG are undesirable and should be tolerated only for completion of the flight, preferably at reduced power settings. Engine operation with oil pressure below 35 PSIG should be avoided.
5. An oil temperature of 165°C is allowed for a maximum period of 15 minutes.
6. If maximum allowable starting temperature is exceeded, engine should be shut down and inspected.
7. The 21,700 lb. takeoff static thrust at sea level is flat rated to 28.9°C (84°F) ambient temperature. The 21,000 lb. normal takeoff static thrust at sea level is flat rated to 28.9°C (84°F) ambient temperature.

Reverse Thrust

Inflight movement of reverse thrust levers or use of reverse thrust is prohibited.

Ground reverse thrust is limited to maximum continuous thrust settings except in an emergency.

The following limitations are applicable when airplane is operated using reverse thrust for powerback (reverse taxi):

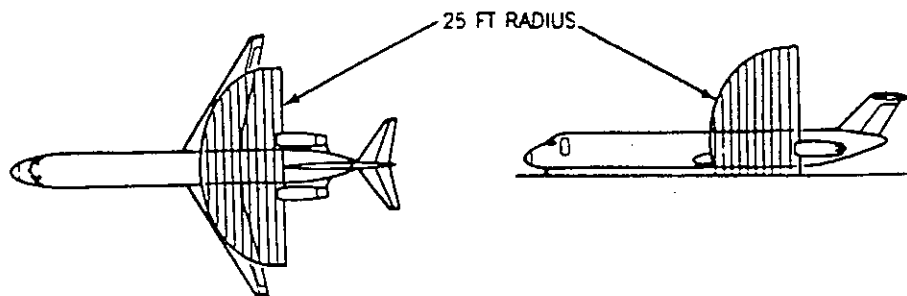
- Do not apply more than 1.3 EPR during powerback operations. If Intermediate Reverse Thrust Detent is installed, do not exceed the detent, even if the 1.3 EPR is not achieved.
- Thrust values in excess of 1.2 EPR should be limited to momentary power applications as necessary to initiate powerback operations.
- Ramp slope limit range is +1% to -2%.
- Thrust reversers on both engines must be operative.
- Application of brakes while backing is prohibited.
- Powerback is not authorized when ice, snow or slush is on ramp or during periods of heavy rain.

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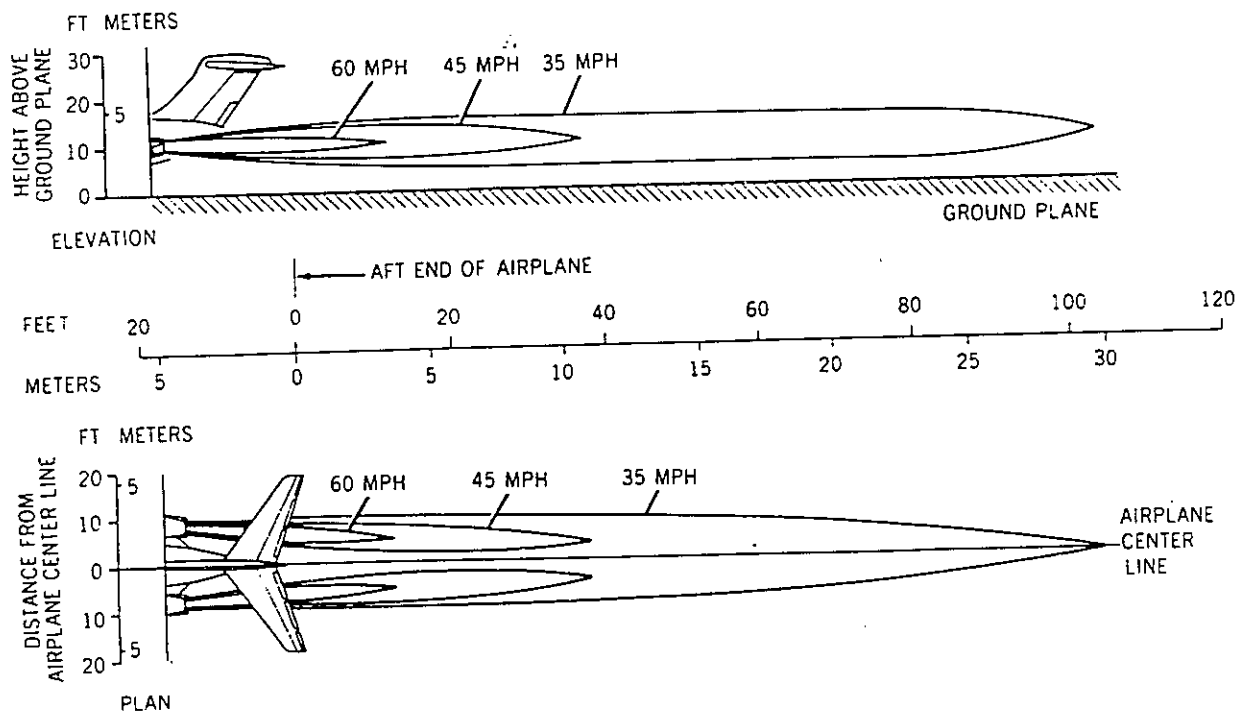
FLIGHT CREW OPERATING MANUAL

ENGINE - RESTRICTED AREAS

JT8D Series 200 Engines



ALL POWERS



JET ENGINE EXHAUST VELOCITY CONTOURS, IDLE POWER

- NOTES:
1. THESE CONTOURS ARE TO BE USED AS GUIDELINES ONLY SINCE OPERATIONAL ENVIRONMENT VARIES GREATLY—OPERATIONAL SAFETY ASPECTS ARE THE RESPONSIBILITY OF THE USER/PLANNER
 2. ALL VELOCITY VALUES ARE STATUTE MILES PER HOUR
 3. CROSSWINDS WILL HAVE CONSIDERABLE EFFECT ON CONTOURS
 4. SEA LEVEL STATIC—STANDARD DAY—ZERO RAMP GRADIENT
 5. BOTH ENGINES AT SAME THRUST

CONVERSION FACTOR
1 MPH = 1.6 KM PER HOUR

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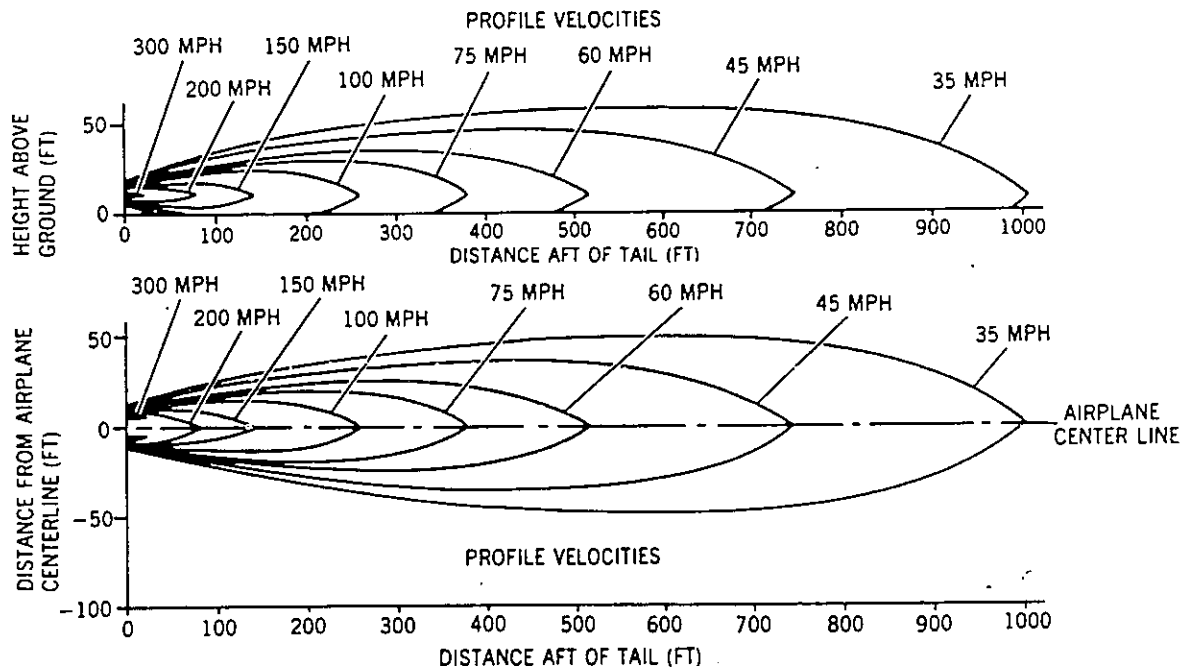
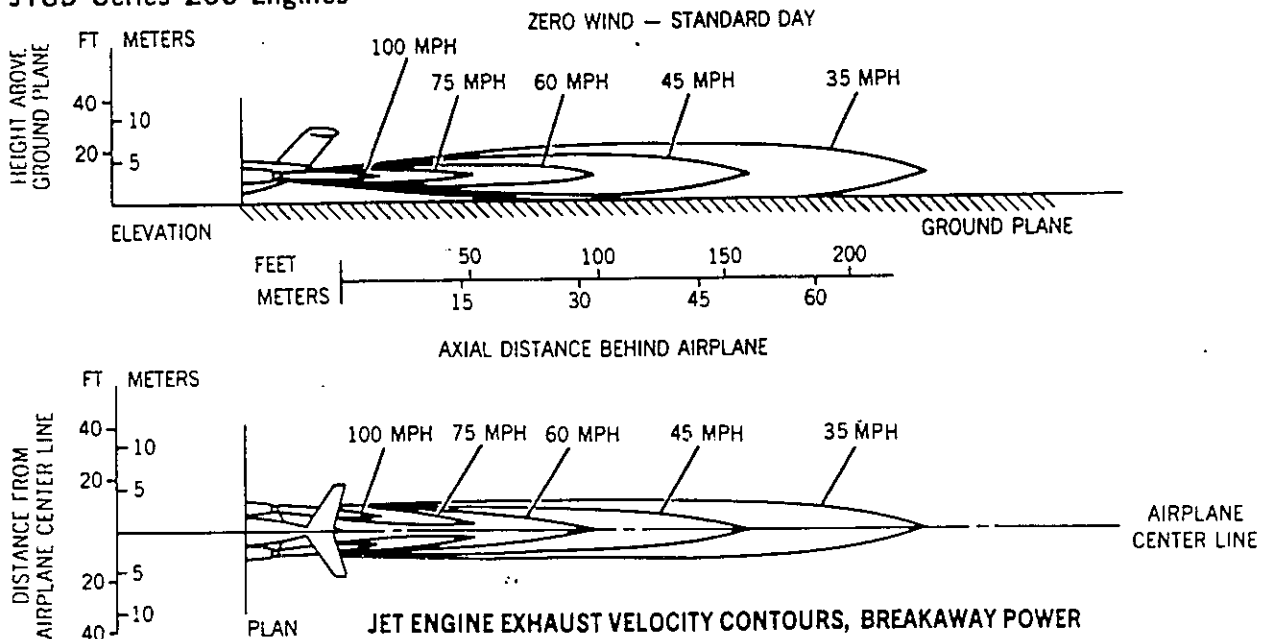
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FLIGHT CREW OPERATING MANUAL

ENGINE - RESTRICTED AREAS (Continued)

JT8D Series 200 Engines



JET ENGINE EXHAUST VELOCITY CONTOURS, TAKEOFF POWER

- NOTES: 1. THESE CONTOURS ARE TO BE USED AS GUIDELINES ONLY SINCE OPERATIONAL ENVIRONMENT VARIES GREATLY—OPERATIONAL SAFETY ASPECTS ARE THE RESPONSIBILITY OF THE USER/PLANNER
2. ALL VELOCITY VALUES ARE STATUTE MILES PER HOUR
3. CROSSWINDS WILL HAVE CONSIDERABLE EFFECT ON CONTOURS
4. SEA LEVEL STATIC—STANDARD DAY—ZERO RAMP GRADIENT
5. BOTH ENGINES AT SAME THRUST

CONVERSION FACTOR
1 MPH = 1.6 KM PER HOUR

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FLIGHT CREW OPERATING MANUAL

ENGINES - NORMAL OPERATION

STARTING

Start Checklist COMPLETED

INLET FUEL PRESS LOW Lights OFF

ENG IGN Selector SYS A OR SYS B OR BOTH

NOTE

Use of BOTH can mask the failure of one of the ignition systems.

START Switch HOLD TO ON

Observe START VALVE OPEN light is on. If START switch is inadvertently released, do not re-engage until engine rotation has stopped.

N₂ RPM. ROTATION CHECKED

OIL PRESS RISING

N₁ RPM. ROTATION CHECKED

If no rotation, discontinue start (possible rotor seizure). Confirm N₁ rotation with ground crew if subsequent start will be attempted.

FUEL Lever. ON AT MAXIMUM MOTORING
(20% N₂ RPM MINIMUM)

NOTES

Moving FUEL lever to ON (i.e., pressurizing engine) when N₂ tachometer indicates maximum motoring RPM (maximum motoring is defined as no N₂ RPM change for 5 seconds) and N₁ RPM indicates positive rotation, will improve the probability of a good start. Minimum N₂ RPM for moving FUEL lever to ON is 20%.

If N₂ tachometer is inoperative, move FUEL lever to ON at 5% N₁. Release START switch at 12-20% N₁.

If EGT does not rise within 20 seconds after moving FUEL lever to ON, discontinue start.

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FLIGHT CREW OPERATING MANUAL

STARTING (Continued)

Initial FUEL FLOW APPROXIMATELY 800 PPH

CAUTION

A starting FUEL FLOW indication of 1100 PPH (or more) is an indication of an impending hot start. FUEL control lever should be moved to OFF immediately, before a hot start is experienced.

NOTE

Keep hand on FUEL control lever until all engine indications are stabilized.

EGT RISING

Continue to monitor EGT until N₂ is stabilized at or above 50%.

START Switch RELEASE AT 40% N₂

START VALVE OPEN Light OFF

OIL PRESS LOW Light OFF

Idle Stabilized OBSERVE FOLLOWING: N₂ RPM 50-61%;
EGT 300-480°C; FUEL FLOW 600-1100
PPH; OIL PRESS 40-55 PSI

NOTES

If oil temperature is below 25°C, OIL STRAINER CLOGGING light may remain on after engine start for as long as five minutes. If light remains on after five minutes, shut down engine and call maintenance.

After starting JT8D-217C/219 engines without P&W S/B 5863 or production equivalent (revised surge bleed), if N₂ stabilizes below 50% or EGT continues to rise, either add power momentarily to 65% N₂ (while monitoring EGT) and return to idle (this will close the 13th stage bleed valve) or adjust power as required to maintain N₂ at slightly above 50%. For engines with P&W S/B 5863 or production equivalent, an approximately 30°C higher EGT at constant N₂ can be expected when compared to an engine with the original surge bleed system. This EGT split will disappear once all bleeds close.

Engine must be stabilized at idle before moving AIR CONDITIONING SUPPLY switch to AUTO.

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FLIGHT CREW OPERATING MANUAL

ENGINES - NORMAL OPERATION

STARTING

Start Checklist COMPLETED

INLET FUEL PRESS LOW Lights OFF

ENG IGN Switch GRD START & CONTIN

START Switch HOLD TO ON

Observe START VALVE OPEN light is on. If START switch is inadvertently released, do not re-engage until engine rotation has stopped.

N₂ RPM. ROTATION CHECKED

OIL PRESS RISING

N₁ RPM. ROTATION CHECKED

If no rotation, discontinue start (possible rotor seizure). Confirm N₁ rotation with ground crew if subsequent start will be attempted.

FUEL Lever. ON AT MAXIMUM MOTORING
(20% N₂ RPM MINIMUM)

NOTES

Moving FUEL lever to ON (i.e. pressurizing engine) when N₂ tachometer indicates maximum motoring RPM (maximum motoring is defined as no N₂ RPM change for 5 seconds) and N₁ RPM indicates positive rotation, will improve the probability of a good start. Minimum N₂ RPM for moving FUEL lever to ON is 20%.

If N₂ tachometer is inoperative, move FUEL lever to ON at 5% N₁. Release START switch at 12-20% N₁.

If EGT does not rise within 20 seconds after moving FUEL lever to ON, discontinue start.

(Continued)

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FLIGHT CREW OPERATING MANUAL

STARTING (Continued)

Initial FUEL FLOW APPROXIMATELY 800 PPH

CAUTION

A starting FUEL FLOW indication of 1100 PPH (or more) is an indication of an impending hot start. FUEL control lever should be moved to OFF immediately, before a hot start is experienced.

NOTE

Keep hand on FUEL control lever until all engine indications are stabilized.

EGT RISING

Continue to monitor EGT until N_2 is stabilized at or above 50%.

START Switch RELEASE AT 40% N_2

START VALVE OPEN Light OFF

OIL PRESS LOW Light OFF

Idle Stabilized OBSERVE FOLLOWING: N_2 RPM 50-61%;
EGT 300-480°C; FUEL FLOW 600-1000
PPH; OIL PRESS 40-55 PSI

NOTES

If oil temperature is below 25°C, OIL STRAINER CLOGGING light may remain on after engine start for as long as five minutes. If light remains on after five minutes, shut down engine and call maintenance.

After starting JT8D-217C/219 engines without P&W S/B 5863 or production equivalent (revised surge bleed), if N_2 stabilizes below 50% or EGT continues to rise, either add power momentarily to 65% N_2 (while monitoring EGT) and return to idle (this will close the 13th stage bleed valve) or adjust power as required to maintain N_2 at slightly above 50%. For engines with P&W S/B 5863 or production equivalent, an approximately 30°C higher EGT at constant N_2 can be expected when compared to an engine with the original surge bleed system. This EGT split will disappear once all bleeds close.

Engine must be stabilized at idle before moving AIR CONDITIONING SUPPLY switch to AUTO.

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FLIGHT CREW OPERATING MANUAL

ENGINE PNEUMATIC CROSS START

Ramp Check HAZARD AREA CLEAR

NOTE

It is advisable to taxi away from terminal on one engine, clear the area, then make cross bleed start.

PNEU X-FEED VALVE Levers BOTH OPEN

AIR COND SHUTOFF Switch. OVRD

Throttle ADVANCED TO OBTAIN
REQUIRED PNEU PRESS

Set throttle to obtain 36 psi (approximately 1.25 EPR or 80% N₂).

NOTE

If takeoff warning is activated, retard throttle until warning stops. Minimum recommended pneumatic pressure at sea level is 36 psi. For each 1000 feet increase in pressure altitude, subtract 1 psi from recommended minimum.

Using normal starting procedures, start non-operating engine.
(At starter release, reduce throttle to idle on operating engine).

AIR COND SHUTOFF Switch. AUTO

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FLIGHT CREW OPERATING MANUAL

UNSATISFACTORY START

FUEL Lever. OFF

If starter is still engaged,

Continue rotation for 10 to 15 seconds to clear engine of fuel.

START Switch OFF

ENG IGN Selector. OFF

NOTE

Proceed to engine clearing procedure before attempting another start.

CLEARING

FUEL Lever. OFF

Throttle IDLE

N₂ Tachometer. INDICATES ROTATION HAS CEASED

ENG IGN Selector. OFF

START Switch ON, HOLD 20 SECONDS

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FLIGHT CREW OPERATING MANUAL

INFLIGHT START

Throttle IDLE

FUEL Lever OFF

Affected Engine GEN Switch OFF

Affected ENG HYD PUMPS Switch OFF

PNEU X-FEED VALVE Lever CLOSE

ENG Anti-Ice ON

Main Tank Fuel Pump Switches ON

Airspeed PER INFLIGHT RELIGHT CHART BELOW

Oil Pressure INDICATING

ENG IGN Selector OVRD

FUEL Lever ON

Engine Instruments STABILIZED

ENG IGN Selector AS REQUIRED

ENG Anti-Ice AS REQUIRED

Hydraulic, Electrical, Fuel, Pneumatic and Air Conditioning Systems NORMAL

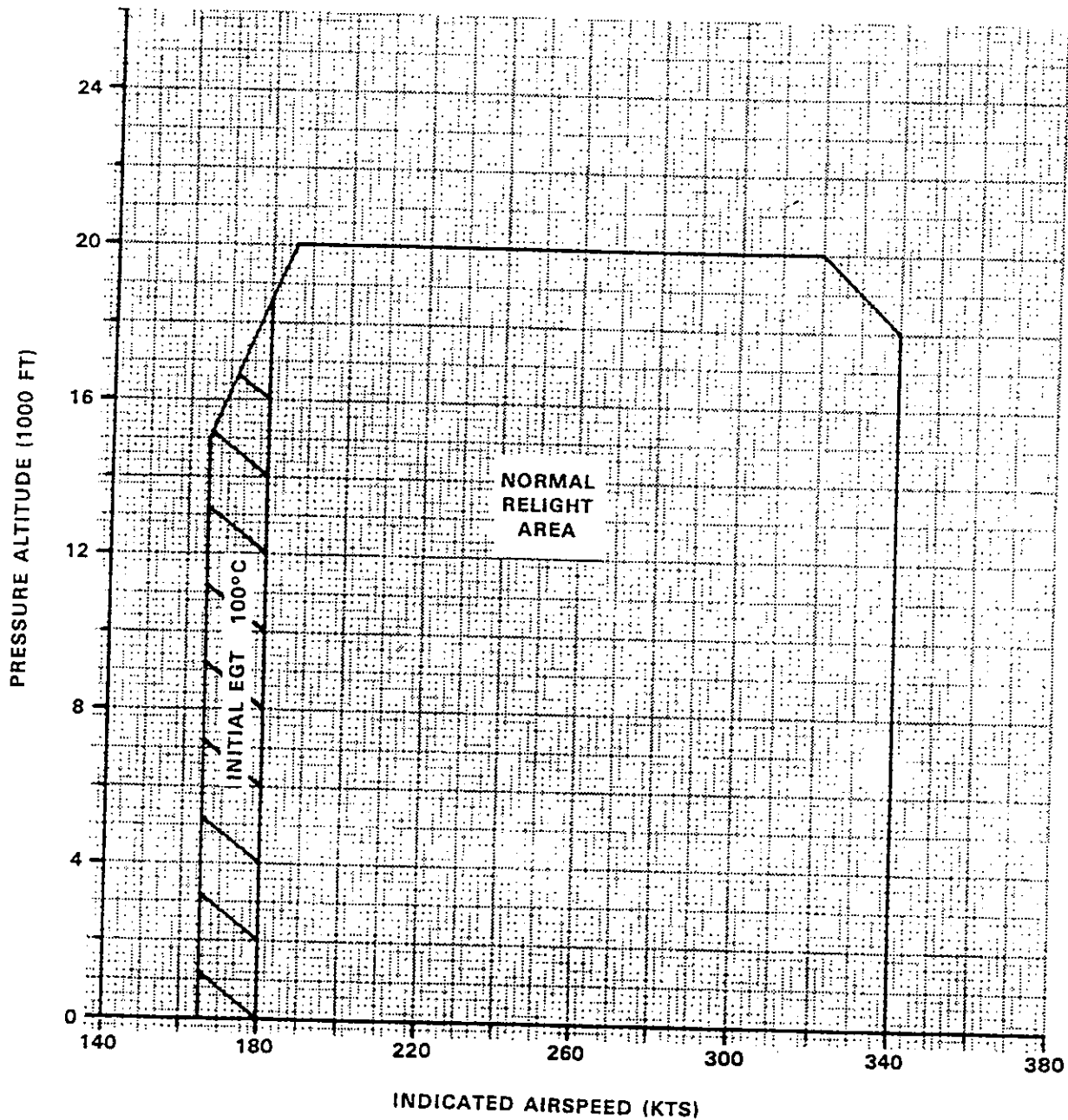
NOTE

If EGT and RPM rise do not occur within 20 seconds after FUEL control lever has been moved to ON, move FUEL control lever to OFF and discontinue airstart. If start is not successful with initial EGT above 100°C, allow EGT to cool below 100°C before attempting a second start. If start is still unsuccessful, refer to Emergency Procedures - ENGINE FAILURE/INFLIGHT ENGINE SHUTDOWN.

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FLIGHT CREW OPERATING MANUAL

MD80/MD87/MD88
INFLIGHT RELIGHT ENVELOPE BASED
ON SINGLE IGNITER OPERATION
JT8D-217C/-219 ENGINES



DATA SOURCE: J8480, SEC 3, APPENDIX 6B, PAGE 6 DATED 5-10-92 (-219) AND
APPENDIX 6E, PAGE 6A, DATED 5-10-92 (-217C).

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FLIGHT CREW OPERATING MANUAL

BATTERY START

Wheels CHOCKED

Applicable Before Start And Start Checklist Items (Listed Below) COMPLETE

Maintenance Log. CHECKED/ON BOARD

Circuit Breakers CHECKED

ENG SYNC Selector OFF

CSD Disconnect Switches NORM

Generators ON

AC/DC X TIE Switches OPEN/OPEN

BATT Switch ON/LOCK

Annunciator Panel CHECKED

Verify DC TRANSFER BUS OFF light is off and all other lights are normal for existing conditions.

Anti-Collision Light ON

Fire Warning CHECKED

AGENT LOW lights are not powered.

Throttles IDLE

FUEL Levers OFF

FUEL X FEED Lever. OFF

CABIN ALT Control Lever AUTO/VALVE OPEN

PARK BRAKE Control SET

BRAKE PRESS indicator and PARKING BRAKES ON annunciator lights are not powered.

PNEU X-FEED VALVE Levers OPEN

ENG HYD PUMPS/TRANS & AUX Pumps HI/OFF

Communications SET

(Continued)

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FLIGHT CREW OPERATING MANUAL

BATTERY START (Continued)

EMER PWR Switch ON

Rotate EMER PWR switch to ON and observe DC and AC EMER BUS OFF lights go off. Check DC VOLTS indicate approximately 28 volts (minimum of 25 volts is acceptable).

PNEU PRESS Gage CHECK

Check that PNEU PRESS gage indication is adequate for start.

START Pump Switch ON

ENG IGN Selector SYS A OR SYS B

Right Engine START

NOTES

OIL PRESS LOW light, EGT, and N₁ and N₂ tachometers will be operative during the start.

After releasing START switch it can be determined start valve has closed by observing pneumatic pressure return to its original value.

During start cycle, until generator comes on line, the following engine instruments and indicators will be inoperative:

- OIL PRESS indicator
- OIL QUANTITY indicator
- OIL TEMP indicator
- EPR indicator
- FUEL FLOW indicator
- START VALVE OPEN light
- OIL STRAINER CLOGGING light
- INLET FUEL PRESS LOW light

EMER PWR Switch OFF

AC BUS X TIE Switch AUTO

Uncompleted Before Start and Start Checklist
Items (Refer to Normal Checklists) COMPLETE

START Pump Switch OFF

Left Engine NORMAL START

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FLIGHT CREW OPERATING MANUAL

STARTING IN EXCESSIVE TAILWIND

NOTE

Starting in a tailwind is typically successful using normal procedures. When airplane is exposed to exceptionally strong tailwinds (in excess of approximately 20 knots) and gate layout prevents an alternate position for starting, the following procedure may be used to minimize reverse engine rotation.

Start Checklist COMPLETED

AUX And TRANS HYD Pump Switches. ON

NOTE

Coordinate reverser deployment in parking area with ground crew.

Thrust Reverser Levers REVERSE DETENT

Leave reversers deployed to stop reverse engine rotation (approximately 2 minutes).

Right Thrust Reverser Lever FULL DOWN (FORWARD IDLE POSITION)

When reverser is stowed and latched,

AUX HYD Pump Switch OFF

Start right engine using normal starting procedure.

Left Thrust Reverser Lever FULL DOWN (FORWARD IDLE POSITION)

TRANS HYD Pump Switch OFF

Start left engine using normal starting procedure.

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FLIGHT CREW OPERATING MANUAL

POWERBACK

NOTES

Reverse taxi is authorized only in approved ramp areas.

Thrust reversers on both engines must be operative.

Reverse taxi is not authorized when ice, snow or slush is on ramp or during periods of heavy rain.

FLAP/SLAT Handle UP/RET

Verify FLAP/SLAT handle is in UP/RET to allow unobstructed view under airplane.

Tower Clearance RECEIVED

Hand Signal Communication ESTABLISH

Captain determine ground crewman (coordinator) is properly positioned in front of airplane and give thumbs up signal. Coordinator responds with an all clear salute.

NOTE

If ambient light conditions preclude coordinator from seeing Captain's hand signal, Captain may flash nose light one time in lieu of thumb signal.

Radio contact with coordinator is not required.

Reverse Thrust Levers IDLE REVERSE DETENT

CAUTION

Ensure all personnel and equipment are well clear of engine exhaust area prior to initiating movement of thrust levers.

Move reverse thrust levers to reverse thrust idle detent and observe ENG REVERSE THRUST lights are on.

NOTE

In some cases, when tires have flat spots or if chocks are installed, it may be desirable to taxi forward a few inches before starting powerback operation. Coordinate as required. Stop forward motion with brakes.

(Continued)

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FLIGHT CREW OPERATING MANUAL

POWERBACK (Continued)

As soon as ENG REVERSE THRUST lights are on,

Parking Brakes. RELEASE

Release parking brakes and place both feet on floor.

NOTES

Both pilots should have their feet on floor during powerback operation.

The Captain must maintain eye contact with coordinator during entire powerback operation. First Officer monitor instruments and lights.

When coordinator gives backup hand signal to begin taxi,

Engine Power INCREASE AS REQUIRED

Do not apply more than 1.3 EPR during powerback operations. If Intermediate Reverse Thrust Detent is installed, **do not** exceed detent, even if 1.3 EPR is not achieved. Thrust values in excess of 1.2 EPR should be limited to a momentary power application as necessary to initiate powerback operations.

NOTES

If airplane does not move after reaching 1.3 EPR or intermediate reverse thrust detent (if installed), discontinue powerback.

If airplane rolls too fast with both reverse thrust levers in reverse, move one reverse thrust lever to forward idle.

Coordinator's Signals OBSERVE

Observe coordinator's signals and maneuver airplane accordingly.

NOTES

Coordinator rotates both hands in a rolling motion to direct airplane to taxi straight back. Speed of rotation advises Captain to increase or decrease reverse taxi speed.

To instruct Captain to turn, coordinator points downward with his right or left hand. Downpointing hand identifies direction tail of airplane is to follow while other hand continues rotating motion. Captain turns steering wheel in direction coordinator is pointing. To increase turn rate, coordinator speeds up motion of rotating hand. Avoid sharp turns because higher thrust levels are required.

(Continued)

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FLIGHT CREW OPERATING MANUAL

POWERBACK (Continued)

WARNING

Do not use brakes while airplane is moving rearward.

CAUTION

If coordinator abruptly changes his hand signals from a rolling motion to a come ahead signal, he is indicating an emergency stop is required. Immediately move reverse thrust levers down and forward to apply forward thrust as required to stop rearward motion, then reduce power to idle.

In event of thrust reverser failure while in reverse, use necessary forward thrust on other engine to stop rearward motion.

When powerback is completed and coordinator gives come ahead signal,

Reverse Thrust Levers FULL DOWN AND FORWARD AS REQUIRED

Move reverse thrust levers down and apply forward thrust as required to change direction of movement.

NOTE

Captain acknowledge turnover signal from coordinator with thumbs up signal or nose light. Maneuver airplane as required to leave ramp area.

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FLIGHT CREW OPERATING MANUAL

ENGINES - NORMAL OPERATION

STARTING

Start Checklist COMPLETED

INLET FUEL PRESS LOW Lights OFF

ENG IGN Selector SYS A OR SYS B OR BOTH

NOTE

Use of BOTH can mask the failure of one of the ignition systems.

START Switch HOLD TO ON

Observe START VALVE OPEN light is on. If START switch is inadvertently released, do not re-engage until engine rotation has stopped.

N₂ RPM. ROTATION CHECKED

OIL PRESS RISING

N₁ RPM. ROTATION CHECKED

If no rotation, discontinue start (possible rotor seizure). Confirm N₁ rotation with ground crew if subsequent start will be attempted.

FUEL Lever. ON AT MAXIMUM MOTORING
(20% N₂ RPM MINIMUM)

NOTES

Moving FUEL lever to ON (i.e., pressurizing engine) when N₂ tachometer indicates maximum motoring RPM (maximum motoring is defined as no N₂ RPM change for 5 seconds) and N₁ RPM indicates positive rotation, will improve the probability of a good start. Minimum N₂ RPM for moving FUEL lever to ON is 20%.

If N₂ tachometer is inoperative, move FUEL lever to ON at 5% N₁. Release START switch at 12-20% N₁.

If EGT does not rise within 20 seconds after moving FUEL lever to ON, discontinue start.

(Continued)

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FLIGHT CREW OPERATING MANUAL

STARTING (Continued)

Initial FUEL FLOW APPROXIMATELY 800 PPH

CAUTION

A starting FUEL FLOW indication of 1100 PPH (or more) is an indication of an impending hot start. FUEL control lever should be moved to OFF immediately, before a hot start is experienced.

NOTE

Keep hand on FUEL control lever until all engine indications are stabilized.

EGT RISING

Continue to monitor EGT until N_2 is stabilized at or above 50%.

START Switch RELEASE AT 40% N_2

START VALVE OPEN Light OFF

OIL PRESS LOW Light OFF

Idle Stabilized OBSERVE FOLLOWING: N_2 RPM 50-61%;
EGT 300-480°C; FUEL FLOW 600-1000
PPH; OIL PRESS 40-55 PSI

NOTES

If oil temperature is below 25°C, OIL STRAINER CLOGGING light may remain on after engine start for as long as five minutes. If light remains on after five minutes, shut down engine and call maintenance.

After starting JT8D-217C/219 engines without P&W S/B 5863 or production equivalent (revised surge bleed), if N_2 stabilizes below 50% or EGT continues to rise, either add power momentarily to 65% N_2 (while monitoring EGT) and return to idle (this will close the 13th stage bleed valve) or adjust power as required to maintain N_2 at slightly above 50%. For engines with P&W S/B 5863 or production equivalent, an approximately 30°C higher EGT at constant N_2 can be expected when compared to an engine with the original surge bleed system. This EGT split will disappear once all bleeds close.

Engine must be stabilized at idle before moving AIR CONDITIONING SUPPLY switch to AUTO.

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FLIGHT CREW OPERATING MANUAL

ENGINE PNEUMATIC CROSS START

Ramp Check HAZARD AREA CLEAR

NOTE

It is advisable to taxi away from terminal on one engine, clear the area, then make cross bleed start.

PNEU X-FEED VALVE Levers BOTH OPEN

AIR COND SHUTOFF Switch. OVRD

Throttle ADVANCED TO OBTAIN
REQUIRED PNEU PRESS

Set throttle to obtain 36 psi (approximately 1.25 EPR or 80% N₂).

NOTE

If takeoff warning is activated, retard throttle until warning stops. Minimum recommended pneumatic pressure at sea level is 36 psi. For each 1000 feet increase in pressure altitude, subtract 1 psi from recommended minimum.

Using normal starting procedures, start non-operating engine.
(At starter release, reduce throttle to idle on operating engine).

AIR COND SHUTOFF Switch. AUTO

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FLIGHT CREW OPERATING MANUAL

UNSATISFACTORY START

FUEL Lever OFF

If starter is still engaged,

Continue rotation for 10 to 15 seconds to clear engine of fuel.

START Switch OFF

ENG IGN Selector OFF

NOTE

Proceed to engine clearing procedure before attempting another start.

CLEARING

FUEL Lever OFF

Throttle IDLE

N₂ Tachometer INDICATES ROTATION HAS CEASED

ENG IGN Selector SYS A OR SYS B OR BOTH

START Switch ON; HOLD 20 SECONDS

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FLIGHT CREW OPERATING MANUAL

INFLIGHT START

Throttle IDLE

FUEL Lever OFF

Affected Engine GEN Switch OFF

Affected ENG HYD PUMPS Switch OFF

PNEU X-FEED VALVE Lever CLOSE

ENG Anti-Ice ON

Main Tank Fuel Pump Switches ON

Airspeed PER INFLIGHT RELIGHT CHART BELOW

Oil Pressure INDICATING

ENG IGN Selector OVRD

FUEL Lever ON

Engine Instruments STABILIZED

ENG IGN Selector AS REQUIRED

ENG Anti-Ice AS REQUIRED

Hydraulic, Electrical, Fuel, Pneumatic and Air Conditioning Systems NORMAL

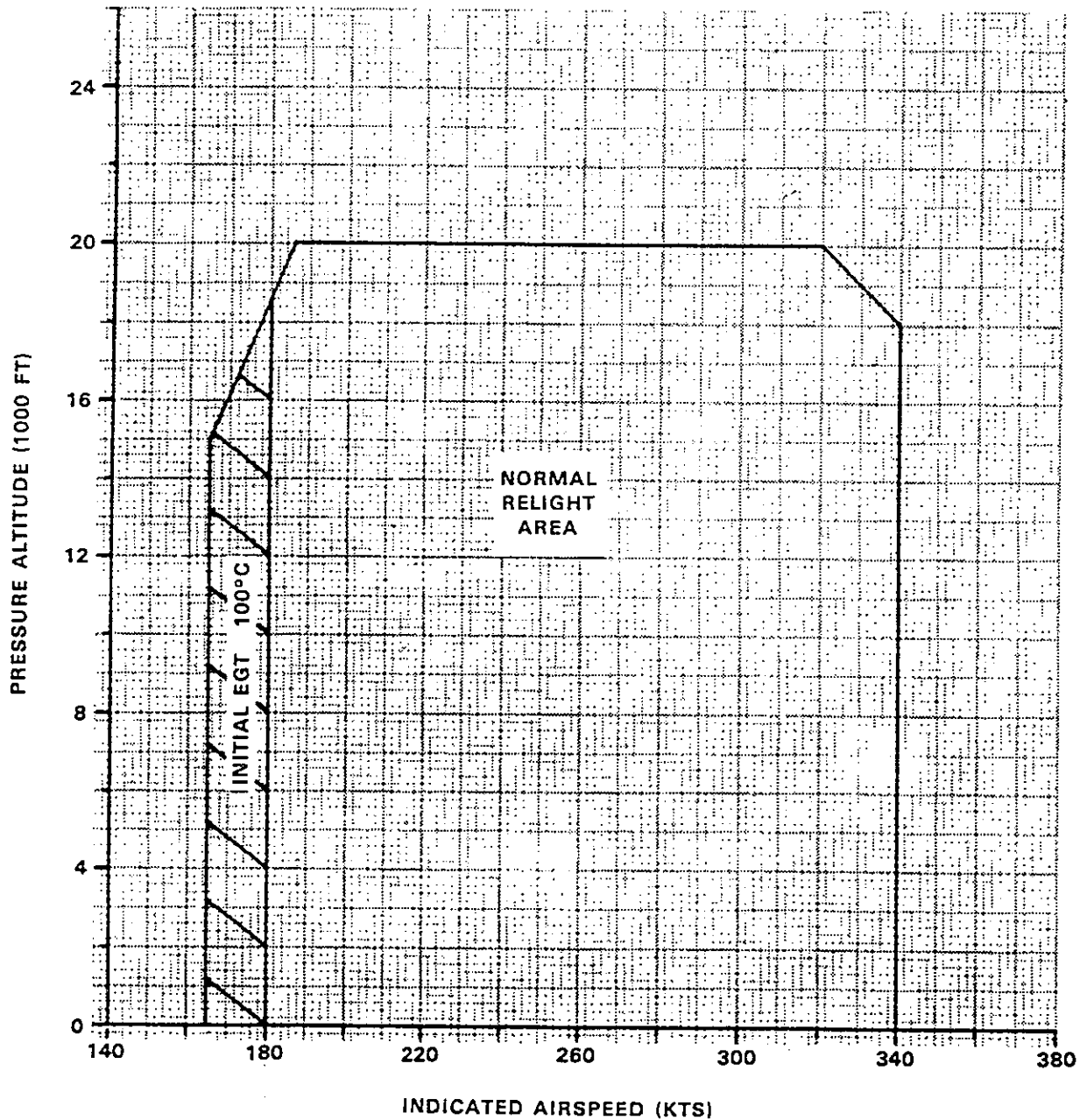
NOTE

If EGT and RPM rise do not occur within 20 seconds after FUEL control lever has been moved to ON, move FUEL control lever to OFF and discontinue airstart. If start is not successful with initial EGT above 100°C, allow EGT to cool below 100°C before attempting a second start. If start is still unsuccessful, refer to Emergency Procedures - ENGINE FAILURE/INFLIGHT ENGINE SHUTDOWN.

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FLIGHT CREW OPERATING MANUAL

MD80/MD87/MD88
INFLIGHT RELIGHT ENVELOPE BASED
ON SINGLE IGNITER OPERATION
JT8D-217C/-219 ENGINES



DATA SOURCE: J8480, SEC 3, APPENDIX 6B, PAGE 6 DATED 5-10-92 (-219) AND
APPENDIX 6E, PAGE 6A, DATED 5-10-92 (-217C).

RA1-2820C

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FLIGHT CREW OPERATING MANUAL

BATTERY START

Wheels CHOCKED

Applicable Before Start And Start Checklist Items (Listed Below) COMPLETE

Maintenance Log. CHECKED/ON BOARD

Circuit Breakers CHECKED

ENG SYNC Selector OFF

CSD Disconnect Switches NORM

Generators ON

AC/DC X TIE Switches OPEN/OPEN

BATT Switch ON/LOCK

Annunciator Panel CHECKED

Verify DC TRANSFER BUS OFF light is off and all other lights are normal for existing conditions.

Anti-Collision Light ON

Fire Warning CHECKED

AGENT LOW lights are not powered.

Throttles IDLE

FUEL Levers OFF

FUEL X FEED Lever. OFF

CABIN ALT Control Lever AUTO/VALVE OPEN

PARK BRAKE Control SET

BRAKE PRESS indicator and PARKING BRAKES ON annunciator lights are not powered.

PNEU X-FEED VALVE Levers OPEN

ENG HYD PUMPS/TRANS & AUX Pumps HI/OFF

Communications SET

(Continued)

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FLIGHT CREW OPERATING MANUAL

BATTERY START (Continued)

EMER PWR Switch ON

Rotate EMER PWR switch to ON and observe DC and AC EMER BUS OFF lights go off. Check DC VOLTS indicate approximately 28 volts (minimum of 25 volts is acceptable).

PNEU PRESS Gage CHECK

Check that PNEU PRESS gage indication is adequate for start.

START Pump Switch ON

ENG IGN Selector SYS A OR SYS B

Right Engine START

NOTES

OIL PRESS LOW light, EGT, and N_1 and N_2 tachometers will be operative during the start.

After releasing START switch it can be determined start valve has closed by observing pneumatic pressure return to its original value.

During start cycle, until generator comes on line, the following engine instruments and indicators will be inoperative:

OIL PRESS indicator
OIL QUANTITY indicator
OIL TEMP indicator
EPR indicator
FUEL FLOW indicator
START VALVE OPEN light
OIL STRAINER CLOGGING light
INLET FUEL PRESS LOW light

EMER PWR Switch OFF

AC BUS X TIE Switch AUTO

Uncompleted Before Start and Start Checklist
Items (Refer to Normal Checklists) COMPLETE

START Pump Switch OFF

Left Engine NORMAL START

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FLIGHT CREW OPERATING MANUAL

STARTING IN EXCESSIVE TAILWIND

NOTE

Starting in a tailwind is typically successful using normal procedures. When airplane is exposed to exceptionally strong tailwinds (in excess of approximately 20 knots) and gate layout prevents an alternate position for starting, the following procedure may be used to minimize reverse engine rotation.

Start Checklist COMPLETED
AUX And TRANS HYD Pump Switches. ON

NOTE

Coordinate reverser deployment in parking area with ground crew.

Thrust Reverser Levers REVERSE DETENT

Leave reversers deployed to stop reverse engine rotation (approximately 2 minutes).

Right Thrust Reverser Lever FULL DOWN (FORWARD IDLE POSITION)

When reverser is stowed and latched,

AUX HYD Pump Switch OFF

Start right engine using normal starting procedure.

Left Thrust Reverser Lever FULL DOWN (FORWARD IDLE POSITION)

TRANS HYD Pump Switch OFF

Start left engine using normal starting procedure.

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FLIGHT CREW OPERATING MANUAL

POWERBACK

NOTES

Reverse taxi is authorized only in approved ramp areas.

Thrust reversers on both engines must be operative.

Reverse taxi is not authorized when ice, snow or slush is on ramp or during periods of heavy rain.

FLAP/SLAT Handle UP/RET

Verify FLAP/SLAT handle is in UP/RET to allow unobstructed view under airplane.

Tower Clearance RECEIVED

Hand Signal Communication ESTABLISH

Captain determine ground crewman (coordinator) is properly positioned in front of airplane and give thumbs up signal. Coordinator responds with an all clear salute.

NOTE

If ambient light conditions preclude coordinator from seeing Captain's hand signal, Captain may flash nose light one time in lieu of thumb signal.

Radio contact with coordinator is not required.

■ Reverse Thrust Levers IDLE REVERSE DETENT

CAUTION

Ensure all personnel and equipment are well clear of engine exhaust area prior to initiating movement of thrust levers.

■ Move reverse thrust levers to reverse thrust idle detent and observe ENG REVERSE THRUST lights are on.

NOTE

In some cases, when tires have flat spots or if chocks are installed, it may be desirable to taxi forward a few inches before starting powerback operation. Coordinate as required. Stop forward motion with brakes.

(Continued)

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FLIGHT CREW OPERATING MANUAL

POWERBACK (Continued)

As soon as ENG REVERSE THRUST lights are on,

Parking Brakes RELEASE

Release parking brakes and place both feet on floor.

NOTES

Both pilots should have their feet on floor during powerback operation.

The Captain must maintain eye contact with coordinator during entire powerback operation. First Officer monitor instruments and lights.

When coordinator gives backup hand signal to begin taxi,

Engine Power INCREASE AS REQUIRED

Do not apply more than 1.3 EPR during powerback operations. If Intermediate Reverse Thrust Detent is installed, **do not** exceed detent, even if 1.3 EPR is not achieved. Thrust values in excess of 1.2 EPR should be limited to a momentary power application as necessary to initiate powerback operations.

NOTES

If airplane does not move after reaching 1.3 EPR or intermediate reverse thrust detent (if installed), discontinue powerback.

If airplane rolls too fast with both reverse thrust levers in reverse, move one reverse thrust lever to forward idle.

Coordinator's Signals OBSERVE

Observe coordinator's signals and maneuver airplane accordingly.

NOTES

Coordinator rotates both hands in a rolling motion to direct airplane to taxi straight back. Speed of rotation advises Captain to increase or decrease reverse taxi speed.

To instruct Captain to turn, coordinator points downward with right or left hand. Downpointing hand identifies direction tail of airplane is to follow while other hand continues rotating motion. Captain turns steering wheel in direction coordinator is pointing. To increase turn rate, coordinator speeds up motion of his rotating hand. Avoid sharp turns because higher thrust levels are required.

(Continued)

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FLIGHT CREW OPERATING MANUAL

POWERBACK (Continued)

WARNING

Do not use brakes while airplane is moving rearward.

CAUTION

If coordinator abruptly changes hand signals from a rolling motion to a come ahead signal, he is indicating an emergency stop is required. Immediately move reverse thrust levers down and forward to apply forward thrust as required to stop rearward motion, then reduce power to idle.

In event of thrust reverser failure while in reverse, use necessary forward thrust on other engine to stop rearward motion.

When powerback is completed and coordinator gives come ahead signal,

Reverse Thrust Levers FULL DOWN AND FORWARD AS REQUIRED

Move reverse thrust levers down and apply forward thrust as required to change direction of movement.

NOTE

Captain acknowledge turnover signal from coordinator with thumbs up signal or nose light. Maneuver airplane as required to leave ramp area.

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FLIGHT CREW OPERATING MANUAL

ENGINES - ABNORMAL OPERATION - STARTING

**EGT DOES NOT INDICATE
IN NORMAL RANGE**

EGT Gage OBSERVE

No rise within 20 seconds of fuel lever on

Discontinue start, proceed with Unsatisfactory Start and/or
Clearing procedure.

ENGINE IGNITION (Upper EPC) and ENGINE
EXHAUST TEMP (Overhead Panel) Circuit Breakers RESET (IF TRIPPED)

CAUTION

A tripped circuit breaker may be reset only once. If a circuit
breaker trips after it has been reset, the cause should be
determined and corrected before attempting a subsequent
reset.

Attempt another start.

NOTE

If opposite ignition system is available, rotate ENG IGN
selector to opposite (SYS A or SYS B) position.

If no rise within 20 seconds of fuel lever on,

Discontinue start, proceed with Unsatisfactory Start and/or
Clearing procedure. Maintenance is required.

[END]

Below normal

Anticipate hung start. Crosscheck other engine parameters
at idle for normal indications.

Continued operation permissible.

NOTE

At Captain's discretion, a power check of engine may be
made prior to takeoff.

[END]

Above normal

Anticipate a hot start. If EGT exceeds/approaches limits, shut down engine.

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FLIGHT CREW OPERATING MANUAL

HUNG START

NOTE

Engine does not continue acceleration to idle and other indications are in normal range.

Associated ENG HYD PUMPS Switch OFF

Move the associated ENG HYD PUMPS switch to OFF to remove the hydraulic load from the engine.

Associated Throttle ADVANCE ABOVE IDLE

Engine Indications OBSERVE



Does not accelerate to Idle RPM within 2 minutes after fuel on or Indications abnormal

Shut down engine. Refer to Engine - Normal Operation, Clearing procedure.

[END]

Idle RPM within 2 minutes of fuel on, Indications normal

Associated ENG HYD PUMPS Switch HI

Engine Indications OBSERVE



Abnormal

Shut down engine. Refer to Engine - Normal Operation, Clearing procedure.

[END]

Normal

[END]

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FLIGHT CREW OPERATING MANUAL

OIL PRESS LOW LIGHT ON AFTER START

OIL PRESS Gage OBSERVE

Above 40 psi

OIL PRESS LOW Light/OIL PRESS Gage OBSERVE

With normal pressure, regardless of light condition (on or off), continue operation, observe OIL QUANTITY and OIL TEMP gage indications.

[END]

Below 40 psi

Shut down engine, maintenance action required.

NO OIL PRESSURE RISE DURING START

Discontinue start.

Associated ENGINE OIL PRESSURE Circuit Breaker (Upper EPC) CHECK

Tripped

Reset circuit breaker and start engine.

CAUTION

A tripped circuit breaker may be reset only once. If a circuit breaker trips after it has been reset, the cause should be determined and corrected before attempting a subsequent reset.

If applicable, allow drainage period or perform clearing procedure.

[END]

Not tripped

Maintenance action is required.

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FLIGHT CREW OPERATING MANUAL

NO ROTATION, N₁ TACHOMETER

NOTE

Tachometer circuits do not require airplane electrical power.

Discontinue Start, indicates possible N₁ rotor seizure.

Confirm N₁ rotor rotation with ground crew.



Confirmed

Proceed with engine start utilizing N₂ and remaining engine indications.

[END]

No rotation

Maintenance action required.

NO ROTATION, N₂ TACHOMETER (START VALVE OPEN LIGHT ON)

NOTE

Tachometer circuits do not require airplane electrical power.

N₁ Tachometer and/or OIL PRESS Gage OBSERVE



Rotation not confirmed

Discontinue start.

[END]

Rotation confirmed

Continue start, use 5% N₁ RPM for fuel on. START switch OFF at 12 to 20% N₁ RPM.

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FLIGHT CREW OPERATING MANUAL

STARTER VALVE FAILS TO FUNCTION

Associated ENGINE START VALVE Circuit Breaker (Lower EPC) RESET (IF TRIPPED)

CAUTION

A tripped circuit breaker may be reset only once. If a circuit breaker trips after it has been reset, the cause should be determined and corrected before attempting a subsequent reset.

If unable to electrically open start valve,

Start Checklist COMPLETE

Ground Crew INTERPHONE

Request ground crew to go on interphone at engine.

When ready to start, command energize starter and observe START VALVE OPEN light come on.

■ When N₂ RPM reaches maximum motoring (20% minimum),

FUEL Lever ON

After EGT rise and N₂ RPM 30 to 40%,

PNEU X-FEED VALVE(L,R) (starting engine) CLOSE

Command ground crew to close start valve. Observe START VALVE OPEN light goes off.

Obtain ground clearance prior to starting other engine.

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FLIGHT CREW OPERATING MANUAL

TAILPIPE FIRE OR TORCHING

FUEL Lever OFF

Starter



Disengaged

Allow N₂ to decrease to 20% or less then,

ENG IGN Selector SYS A OR SYS B

ENG START Switch ON

NOTE

If tailpipe fire occurs during engine shutdown, motoring will not be possible if other engine has been shut down and APU air is not available. If tailpipe fire persists, it will be necessary to extinguish fire using ground equipment.

Engaged

After fire is extinguished,

ENG START Switch OFF

ENG IGN Selector OFF

Call maintenance.

[END]

MD-80

FLIGHT CREW OPERATING MANUAL

TAILPIPE FIRE OR TORCHING (Continued)

Phase Of Flight (Continued)

Allow N₂ rpm to decrease to 20% then,

ENG START Switch ON

After fire extinguishes,

ENG START Switch OFF

Call maintenance.

[END]

During shutdown

When N₂ rpm is less than 20%,

ENG START Switch ON

NOTE

Motoring will not be possible if other engine has been shut down and APU is not running. Under these conditions, it will be necessary to extinguish fire using ground equipment.

After fire is extinguished.

ENG START Switch OFF

Call maintenance.

[END]

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FLIGHT CREW OPERATING MANUAL

ENGINES - ABNORMAL OPERATION - STARTING

**EGT DOES NOT INDICATE
IN NORMAL RANGE**

EGT Gage OBSERVE

No rise within 20 seconds of fuel lever on

Discontinue start, proceed with Unsatisfactory Start and/or
Clearing procedure.

ENGINE IGNITION (Upper EPC) and ENGINE
EXHAUST TEMP (Overhead Panel) Circuit Breakers RESET (IF TRIPPED)

CAUTION

A tripped circuit breaker may be reset only once. If a circuit
breaker trips after it has been reset, the cause should be
determined and corrected before attempting a subsequent
reset.

Attempt another start.

NOTE

If opposite ignition system is available, rotate ENG IGN
selector to opposite (SYS A or SYS B) position.

If no rise within 20 seconds of fuel lever on,

Discontinue start, proceed with Unsatisfactory Start and/or
Clearing procedure. Maintenance is required.

[END]

Below normal

Anticipate hung start. Crosscheck other engine parameters
at idle for normal indications.

Continued operation permissible.

NOTE

At Captain's discretion, a power check of engine may be
made prior to takeoff.

[END]

Above normal

Anticipate a hot start. If EGT exceeds approaches limits, shut down engine.

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FLIGHT CREW OPERATING MANUAL

HUNG START

NOTE

Engine does not continue acceleration to idle and other indications are in normal range.

Associated ENG HYD PUMPS Switch OFF

Move the associated ENG HYD PUMPS switch to OFF to remove the hydraulic load from the engine.

Associated Throttle ADVANCE ABOVE IDLE

Engine Indications OBSERVE



Does not accelerate to Idle RPM within 2 minutes after fuel on or Indications abnormal

Shut down engine. Refer to Engine - Normal Operation, Clearing procedure.

[END]

Idle RPM within 2 minutes of fuel on, Indications normal

Associated ENG HYD PUMPS Switch HI

Engine Indications OBSERVE



Abnormal

Shut down engine. Refer to Engine - Normal Operation, Clearing procedure.

[END]

Normal

[END]

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FLIGHT CREW OPERATING MANUAL

OIL PRESS LOW LIGHT ON AFTER START

OIL PRESS Gage OBSERVE

Above 40 psi

OIL PRESS LOW Light/OIL PRESS Gage OBSERVE

With normal pressure, regardless of light condition (on or off), continue operation, observe OIL QUANTITY and OIL TEMP gage indications.

[END]

Below 40 psi

Shut down engine, maintenance action required.

NO OIL PRESSURE RISE DURING START

Discontinue start.

Associated ENGINE OIL PRESSURE Circuit Breaker (Upper EPC) CHECK

Tripped

Reset circuit breaker and start engine.

CAUTION

A tripped circuit breaker may be reset only once. If a circuit breaker trips after it has been reset, the cause should be determined and corrected before attempting a subsequent reset.

If applicable, allow drainage period or perform clearing procedure.

[END]

Not tripped

Maintenance action is required.

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FLIGHT CREW OPERATING MANUAL

NO ROTATION, N₁ TACHOMETER

NOTE

Tachometer circuits do not require airplane electrical power.

Discontinue Start, indicates possible N₁ rotor seizure.

Confirm N₁ rotor rotation with ground crew.



Confirmed

Proceed with engine start utilizing N₂ and remaining engine indications.

[END]

No rotation

Maintenance action required.

NO ROTATION, N₂ TACHOMETER (START VALVE OPEN LIGHT ON)

NOTE

Tachometer circuits do not require airplane electrical power.

N₁ Tachometer and/or OIL PRESS Gage OBSERVE



Rotation not confirmed

Discontinue start.

[END]

Rotation confirmed

Continue start, use 5% N₁ RPM for fuel on. START switch OFF at 12 to 20% N₁ RPM.

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FLIGHT CREW OPERATING MANUAL

STARTER VALVE FAILS TO FUNCTION

ENGINE START VALVE RIGHT & LEFT Circuit Breaker (Lower EPC) RESET (IF TRIPPED)

CAUTION

A tripped circuit breaker may be reset only once. If a circuit breaker trips after it has been reset, the cause should be determined and corrected before attempting a subsequent reset.

If unable to electrically open start valve,

Start Checklist COMPLETE

Ground Crew INTERPHONE

Request ground crew to go on interphone at engine.

When ready to start, command energize starter and observe VALVE OPEN light come on.

■ When N₂ RPM reaches maximum motoring (20% minimum),

FUEL Lever ON

After EGT rise and N₂ RPM 30 to 40%,

PNEU X-FEED VALVE(L,R) (starting engine) CLOSE

Command ground crew to close start valve. Observe START VALVE OPEN light goes off.

Obtain ground clearance prior to starting other engine.

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FLIGHT CREW OPERATING MANUAL

TAILPIPE FIRE OR TORCHING

FUEL Lever OFF

Starter



Disengaged

Allow N₂ to decrease to 20% or less then,

ENG IGN Selector SYS A OR SYS B

ENG START Switch ON

NOTE

If tailpipe fire occurs during engine shutdown, motoring will not be possible if other engine has been shut down and APU air is not available. If tailpipe fire persists, it will be necessary to extinguish fire using ground equipment.

Engaged

After fire is extinguished,

ENG START Switch OFF

ENG IGN Selector OFF

Call maintenance.

[END]

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FLIGHT CREW OPERATING MANUAL

TAILPIPE FIRE OR TORCHING (Continued)

Phase Of Flight (Continued)

Allow N₂ rpm to decrease to 20% then,

ENG START Switch ON

After fire extinguishes,

ENG START Switch OFF

Call maintenance.

[END]

During shutdown

When N₂ rpm is less than 20%,

ENG IGN Selector SYS A OR SYS B

ENG START Switch ON

NOTE

Motoring will not be possible if engine ignition is off or other engine has been shut down and APU is not running. Under these conditions, it will be necessary to extinguish fire using ground equipment.

After fire is extinguished,

ENG START Switch OFF

ENG IGN Selector OFF

Call maintenance.

[END]

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FLIGHT CREW OPERATING MANUAL

ENGINES - ABNORMAL OPERATION

ENGINE(S) SURGING OR POPPING IN FORWARD THRUST

CAUTION

Avoid operating an engine in a persistent surging condition by reducing thrust to point where surge condition is cleared. Multiple surges can cause compressor damage and possible engine failure.

NOTE

For any loss of thrust during takeoff, ENGINE FIRE/FAILURE TAKEOFF CONTINUED profile should be flown until reaching a safe altitude, or until obstacle clearance is assured. In the event of dual engine surging, both engines may be reduced to CLIMB thrust at or above 400 feet AGL.

Autothrottles OFF

Throttle(s) (Affected Engine(s)) REDUCE THRUST (MINIMUM FOR SAFE FLIGHT)

Condition



Surging or popping continues

Number Of Engines Originally Surging



Dual engine surge

Operate at minimum thrust for safe flight.

[END]

Single engine surge

Shut down affected engine.

[END]

Surging or popping stops

ENG IGN Selector SYS A OR SYS B

ENG Anti-Ice Switches ON

PNEU X-FEED VALVE Lever (Affected Side(s)) OPEN

AIR FOIL Anti-Ice Switch ON

Throttle SLOWLY ADVANCE (TO MAINTAIN SAFE FLIGHT)

(Continued)

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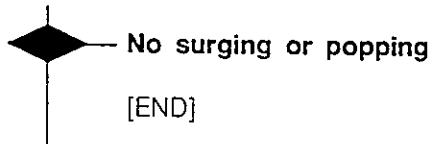
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FLIGHT CREW OPERATING MANUAL

ENGINE SURGING OR POPPING IN FORWARD THRUST (Continued)

Condition



Surging or popping returns

ENG Anti-Ice Switch (Affected Engine(s)) OFF

NOTE

Under certain conditions, moving affected ENG anti-ice switch(es) to OFF will minimize possibility of surging or popping. This will cause a NO MODE light on the thrust rating indicator to come on, which may be disregarded due to the abnormal engine bleed configuration.

Operate engine(s) below level that causes surging or popping and avoid icing conditions.

Normally an engine should not be restarted if it was shut down because of surging or popping. However, at Captain's discretion, a restart may be attempted if engine is critical for sustained safe flight. In this case, engine operation should be carefully monitored after restart and for remainder of flight to ensure that surging or popping has not resulted in engine damage.

[END]

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FLIGHT CREW OPERATING MANUAL

EGT INOPERATIVE OR READS HIGH

Thrust REDUCE
EGT, N₁, N₂, FUEL FLOW Indications OBSERVE



EGT constant, all others decrease

Assume EGT circuit malfunction.

[END]



EGT exceeds 630°C and cannot be decreased

Shut down engine.

[END]



EGT exceeds 630°C but does not go beyond 645°C and thrust reduction decreases EGT below 625°C (other indications normal)

Continued engine operation is permissible. Make log entry of over limit and time.

[END]

EGT exceeded 645°C

Accomplish precautionary engine shutdown at Captain's discretion.

[END]

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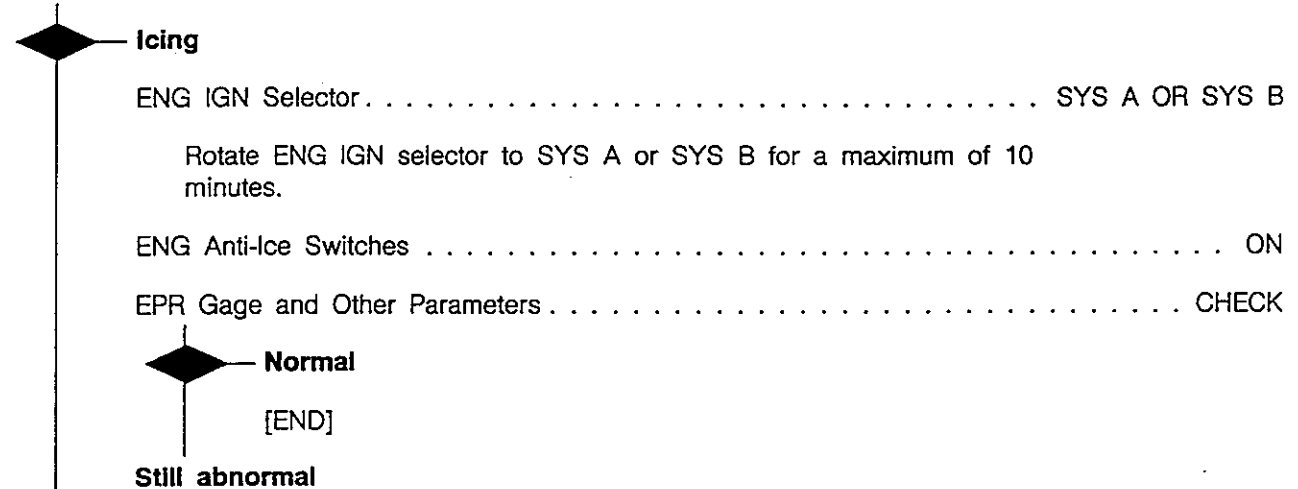
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EPR ERRATIC OR FIXED

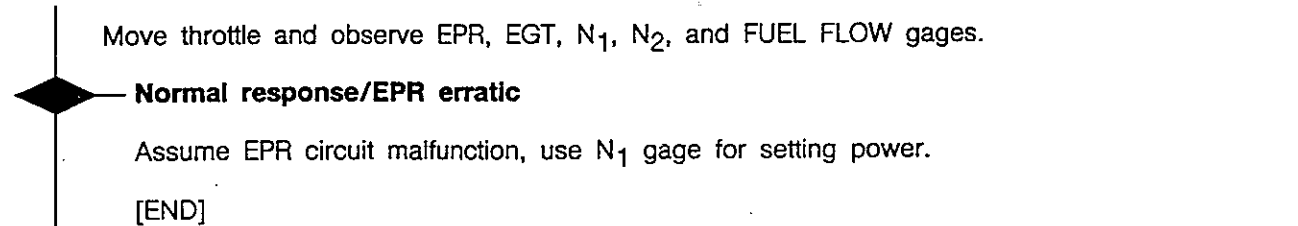
NOTE

This condition may occur due to icing or EPR indicator malfunction.

Flight Conditions DETERMINE



No icing
Throttle/Indications ADJUST/OBSERVE



EPR fixed
Associated PRESSURE RATIO Circuit Breaker (Upper EPC) RESET (IF TRIPPED)

CAUTION

A tripped circuit breaker may be reset only once. If a circuit breaker trips after it has been reset, the cause should be determined and corrected before attempting a subsequent reset.

If EPR gage remains fixed, use N₁ gage for setting power.
[END]

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FLIGHT CREW OPERATING MANUAL

FUEL FLOW GAGE INOPERATIVE OR READS HIGH

FUEL FLOW Gage. OBSERVE

Inoperative

Adjust throttle.

If FUEL FLOW gage does not respond,

Associated FUEL FLOW Circuit Breakers (Upper EPC). RESET (IF TRIPPED)

CAUTION

A tripped circuit breaker may be reset only once. If a circuit breaker trips after it has been reset, the cause should be determined and corrected before attempting a subsequent reset.

[END]

Indicates high

Affected Engine IDLE

Associated Fuel Indications. OBSERVE

FUEL FLOW gage does not respond

FUEL FLOW gage is inoperative.

Continue normal engine operation.

[END]

Normal consumption observed

Continue normal engine operation. Monitor fuel usage and balance.

[END]

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FLIGHT CREW OPERATING MANUAL

FUEL FILTER PRESS DROP LIGHT ON

NOTE

FUEL HEAT switches should be in OFF for takeoff, final approach and go-around.

Phase Of Flight



On ground

Maintenance action required.

[END]

In flight

FUEL TEMP Gages OBSERVE



Greater than 15°C

L or R FUEL FILTER PRESS DROP light on with temperature above 15°C may be due to fuel filter clogging by solid contaminants other than ice. Continued engine operation is permissible if engine oil temperature is maintained within normal limits.

CAUTION

If both L and R FUEL FIL PRES DROP lights are illuminated, consider possibility of fuel containment and land at nearest suitable airport.

[END]

Less than 15°C

FUEL HEAT Switches BOTH MOMENTARILY ON

Move both FUEL HEAT switches momentarily to ON. Observe FUEL HEAT lights come on and remain on for approximately 1 minute.

(Continued)

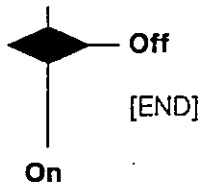
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FLIGHT CREW OPERATING MANUAL

FUEL FILTER PRESS DROP LIGHT ON (Continued)

After 1 minute,

FUEL FILTER PRESS DROP Light. OBSERVE



Repeat procedure.

NOTE

Fuel heat applications may be repeated if required. Do not exceed oil temperature limitations.

[END]

HIGH OIL PRESSURE

Engine Instruments

Oil pressure above 55 psi, other indications normal

Reduce thrust for completion of flight. Normal engine operation may be maintained if flight conditions require.

[END]

Oil pressure above 55 psi and OIL QUANTITY increases above normal range

Shut down engine.

[END]

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FLIGHT CREW OPERATING MANUAL

HIGH OIL TEMPERATURE

NOTE

An increase in oil temperature can be associated with thrust reduction.

OIL TEMP Gage



Approaching limits

NOTE

Increasing thrust will provide higher fuel flow to improve oil cooling until lower fuel flow is capable of maintaining oil temperature in limits. Oil temperature stabilization may take several minutes following thrust changes.

Exceeds 135°C for more than 15 minutes or exceeds 165°C at any time

Shut down engine.

[END]

N₁ AND/OR N₂ OVERSPEED

Thrust REDUCE



N₁ exceeded 101.6% but did not exceed 102.8% and/or N₂ exceeded 102.5% but did not exceed 103.5% (all other indications normal)

Continue engine operation and make log entry of RPM above maximum limit.

[END]

N₁ exceeded 102.8% and/or N₂ exceeded 103.5%

Accomplish precautionary engine shutdown at Captain's discretion. Make log entry of RPM overspeed.

[END]

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FLIGHT CREW OPERATING MANUAL

(L/R) OIL PRESS LOW LIGHT ON/(L/R) OIL PRESSURE LOW INDICATION

NOTE

Oil pressure between 35 and 40 PSI is not desirable and should be tolerated only for completion of flight, preferably at a reduced thrust setting to as low a level as flight conditions permit.

Engine Thrust. REDUCE

 **OIL PRESS LOW light illuminated**

OIL PRESS, OIL TEMP, OIL QUANTITY

 **Normal**

Continue normal engine operation.

[END]

Abnormal

Shut down engine.

Refer to Emergency Procedures – ENGINE FAILURE/INFLIGHT ENGINE SHUTDOWN.

[END]

OIL PRESS gage indicates below 35 PSI – OIL PRESS LOW light extinguished

OIL TEMP, OIL QUANTITY

 **Normal**

Continue normal engine operation.

[END]

Abnormal

Shut down engine.

Refer to Emergency Procedures – ENGINE FAILURE/INFLIGHT ENGINE SHUTDOWN.

[END]

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FLIGHT CREW OPERATING MANUAL

OIL QUANTITY DECREASING OR INCREASING

NOTE

Normal oil consumption is less than 0.25 US quarts per hour. An engine which exceeds 0.64 US quarts per hour should be investigated.

OIL QUANTITY Gage OBSERVE

◆ Increases above normal level

OIL PRESS/FUEL FLOW Gages OBSERVE

◆ Normal

Continue normal operation.

[END]

Pressure exceeds 55 psi

Shut down engine.

[END]

Decreases

OIL PRESS/OIL TEMP Gages OBSERVE

◆ Normal

Anticipate engine oil pump cavitation or oil pressure loss.

[END]

OIL PRESS fluctuates

Reduce thrust. If oil pressure loss is experienced, shut down engine.

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FLIGHT CREW OPERATING MANUAL

**REVERSER INTERLOCK WILL
NOT RELEASE,
OR
REVERSER LEVER RETURNS TO
REDUCED THRUST**

Affected Reverser FWD IDLE

Use unaffected thrust reverser as necessary for deceleration within limits of directional controllability.

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FLIGHT CREW OPERATING MANUAL

REVERSER ACCUMULATOR LOW LIGHT ON

Assoc ENG HYD PUMP Switch HI

Assoc REVERSER ACCUM SHUT-OFF Circuit Breaker
(Lower EPC) PULL FOR 3 SECONDS/RESET

NOTE

Pull and reset circuit breaker one time only.

REVERSER ACCUMULATOR LOW Light CHECK



**Off and stays off for 5 minutes or longer with no decrease on associated
HYD FLUID QUANTITY gage**

Continue normal operation.

[END]

On or comes on again within 5 minutes or HYD FLUID QUANTITY decreases

Continued flight is permissible.

After landing,

Upon nose gear contact, apply down elevator and apply reverse thrust to idle reverse thrust detent. After reverse thrust is verified, gradually increase reverse thrust as required.

NOTES

During reverse thrust operation, if difficulty is experienced in maintaining directional control, reduce reverse thrust as required. Do not attempt to maintain directional control by using asymmetric reverse thrust.

Affected reverser may not extend and hydraulic supply system may be subject to quantity loss.

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FLIGHT CREW OPERATING MANUAL

REVERSER DEPLOYED OR REVERSE THRUST/UNLOCK LIGHT(S) ON IN FLIGHT

Autothrottle System OFF
Affected Throttle IDLE
Affected Reverser Lever FULL DOWN

NOTE

Reverser may not stow above 200 knots. Throttle should be left in idle position until reverser is stowed.

Associated ENG HYD PUMPS Switch HI

Airplane Behavior

Buffeting or yawing

Affected FUEL Lever OFF

Refer to Section 1, EMERGENCY PROCEDURES - ENGINE FAILURE/INFLIGHT ENGINE SHUTDOWN.

Land at nearest suitable airport.

[END]

Normal

Associated REVERSER ACCUM SHUT-OFF
Circuit Breaker (Lower EPC) PULL AND THEN RESET
AFTER 3 SECONDS

ENG REVERSE THRUST/ENG REVERSE UNLOCK Lights

Off

Adjust throttles as required.

[END]

On

Monitor engine operation.

[END]

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FLIGHT CREW OPERATING MANUAL

REVERSER INTERLOCK WILL
NOT RELEASE,
OR
REVERSER LEVER RETURNS TO
REDUCED THRUST

Affected Reverser FWD IDLE

Use unaffected thrust reverser as necessary for deceleration within limits of directional controllability.

[END]

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FLIGHT CREW OPERATING MANUAL

START VALVE OPEN LIGHT ON/ANNUNCIATION

Phase Of Flight



On ground after start

Affected PNEU X-FEED VALVE Lever CLOSE

NOTE

Closing pneumatic crossfeed valve isolates engine from opposite engine or APU pneumatic supply.

Fuel Control Lever (Affected Engine) OFF

ENG IGN Selector OFF

CAUTION

Shutdown should be completed prior to ground personnel approaching the engine.

Maintenance action is required.

[END]

Flight

Throttle (Affected Engine) IDLE

PNEU X-FEED VALVE Levers (AFFECTED ENGINE) CLOSE
(UNAFECTED ENGINE) AS REQUIRED

AIR CONDITIONING SUPPLY Switches (AFFECTED ENGINE) HP BLD OFF
(UNAFECTED ENGINE) AUTO

Start Switch (Affected Engine) OFF

ENGINE START VALVE RIGHT & LEFT Circuit Breaker (Lower EPC) OPEN (PULL)

CAUTION

Start valve open in flight could result in an uncontained starter failure leading to engine fire or severe damage.

NOTES

Continue normal engine operation at Captain's discretion. Monitor engine parameters (EPR, N₁, EGT, N₂, oil pressure/temperature, fuel flow, etc.) for indications of an engine fire or severe damage.

With both crossfeeds closed, pneumatic pressure can be verified using air conditioning pressure/flow gages. For anti-icing capability, open pneumatic crossfeed of unaffected engine as necessary.

[END]

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FLIGHT CREW OPERATING MANUAL

START VALVE OPEN LIGHT ON/ANNUNCIATION

Phase Of Flight DETERMINE

On ground after start

Affected PNEU X-FEED VALVE Lever CLOSE

NOTE

Closing pneumatic crossfeed valve isolates engine from opposite engine or APU pneumatic supply.

Fuel Control Lever (Affected Engine) OFF

ENG IGN Selector OFF

CAUTION

Shutdown should be completed prior to ground personnel approaching the engine.

Maintenance action is required.

[END]

Flight

Throttle (Affected Engine) IDLE

PNEU X-FEED VALVE Levers (AFFECTED ENGINE) CLOSE
(UNAFFECTED ENGINE) AS REQUIRED

AIR CONDITIONING SUPPLY Switches (AFFECTED ENGINE) HP BLD OFF
(UNAFFECTED ENGINE) AUTO

Start Switch (Affected Engine) OFF

ENGINE START VALVE RIGHT & LEFT Circuit Breaker (Lower EPC) OPEN (PULL)

CAUTION

Start valve open in flight could result in an uncontained starter failure leading to engine fire or severe damage.

NOTES

Continue normal engine operation at Captain's discretion. Monitor engine parameters (EPR, N₁, EGT, N₂, oil pressure/temperature, fuel flow, etc.) for indications of an engine fire or severe damage.

With both crossfeeds closed, pneumatic pressure can be verified using air conditioning pressure/flow gages. For anti-icing capability, open pneumatic crossfeed of unaffected engine as necessary.

Section 3

7-30-5

ZL-CODE 26

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FLIGHT CREW OPERATING MANUAL

TWO ENGINE FLAMEOUT

EMER PWR Switch ON

ENG IGN Selector OVRD

CABIN ALT Control Lever MANUAL (DOWN)

Push CABIN ALT control lever to manual (down) position.

OUTFLOW VALVE Position Indicator VALVE CLOSE

Push and rotate CABIN ALT control wheel until outflow valve position indicator moves to VALVE CLOSE.

Oxygen Masks ON

Oxygen Regulator Panel ON/100%

THNDRSTRM Light Switch (If Required) ON

Throttles IDLE

START PUMP Switch ON

LEFT, CTR, RIGHT Fuel Boost Pump Switches (FWD, AFT) ALL ON

Fuel Control Levers ON

FUEL X FEED Lever OFF

Airspeed MINIMUM MANEUVERING

ENG Anti-Ice Switches ON

Engine(s) Restarted DETERMINE

Neither

APU DOORS Switch AUTO

APU MASTER Switch START/RELEASE

NOTE

Attempt APU start regardless of altitude and airspeed.

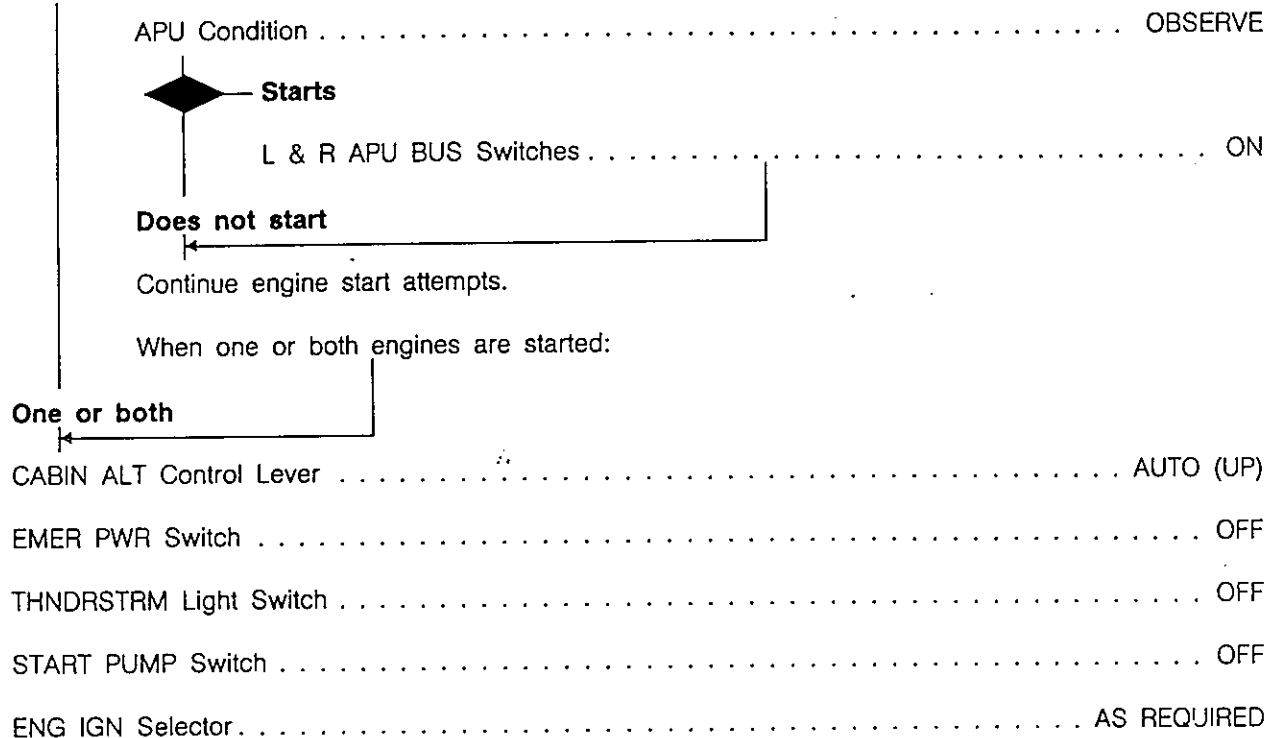
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FLIGHT CREW OPERATING MANUAL

TWO ENGINE FLAMEOUT (Continued)

Engine(s) Restarted (Continued)



NOTES

Continue engine and/or APU start until at least two are running.

If two engine flameout was caused by fuel starvation in left and right main tanks with fuel in center wing tank, optimum attitude for scavenging fuel out of right main tank for APU or right engine is 0° pitch attitude and 1.5° right wing up.

ENG Anti-Ice Switches AS REQUIRED

Land at nearest suitable airport.

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FLIGHT CREW OPERATING MANUAL

START VALVE OPEN LIGHT ON/ANNUNCIATION

Phase Of Flight DETERMINE

On ground after start

Affected PNEU X-FEED VALVE Lever CLOSE

NOTE

Closing pneumatic crossfeed valve isolates engine from opposite engine or APU pneumatic supply.

Fuel Control Lever (Affected Engine) OFF

ENG IGN Switch OFF

CAUTION

Shutdown should be completed prior to ground personnel approaching the engine.

Maintenance action is required.

[END]

Flight

Throttle (Affected Engine) IDLE

PNEU X-FEED VALVE Levers (AFFECTED ENGINE) CLOSE
(UNAFFECTED ENGINE) AS REQUIRED

AIR CONDITIONING SUPPLY Switches (AFFECTED ENGINE) HP BLD OFF
(UNAFFECTED ENGINE) AUTO

AIR FOIL Anti-Ice Switch (AFFECTED ENGINE) OFF

Start Switch (Affected Engine) OFF

ENGINE IGNITION Circuit Breaker (Lower EPC) OPEN (PULL)

CAUTION

Start valve open in flight could result in an uncontained starter failure leading to engine fire or severe damage.

NOTES

Continue normal engine operation at Captain's discretion. Monitor engine parameters (EPR, N₁, EGT, N₂, oil pressure/temperature, fuel flow, etc.) for indications of an engine fire or severe damage.

With both crossfeeds closed, pneumatic pressure can be verified using air conditioning pressure/flow gages. For anti-icing capability, open pneumatic crossfeed of unaffected engine as necessary.

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FLIGHT CREW OPERATING MANUAL

START VALVE OPEN LIGHT ON/ANNUNCIATION

Phase Of Flight DETERMINE

On ground after start

Affected PNEU X-FEED VALVE Lever CLOSE

NOTE

Closing pneumatic crossfeed valve isolates engine from opposite engine or APU pneumatic supply.

Fuel Control Lever (Affected Engine) OFF

ENG IGN Switch OFF

CAUTION

Shutdown should be completed prior to ground personnel approaching the engine.

Maintenance action is required.

[END]

Flight

Throttle (Affected Engine) IDLE

PNEU X-FEED VALVE Levers (AFFECTED ENGINE) CLOSE
(UNAFFECTED ENGINE) AS REQUIRED

AIR CONDITIONING SUPPLY Switches (AFFECTED ENGINE) HP BLD OFF
(UNAFFECTED ENGINE) AUTO

Start Switch (Affected Engine) OFF

ENGINE IGNITION Circuit Breaker (Lower EPC) OPEN (PULL)

CAUTION

Start valve open in flight could result in an uncontained starter failure leading to engine fire or severe damage.

NOTES

Continue normal engine operation at Captain's discretion. Monitor engine parameters (EPR, N₁, EGT, N₂, oil pressure/temperature, fuel flow, etc.) for indications of an engine fire or severe damage.

With both crossfeeds closed, pneumatic pressure can be verified using air conditioning pressure/flow gages. For anti-icing capability, open pneumatic crossfeed of unaffected engine as necessary.

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FLIGHT CREW OPERATING MANUAL

Chapter 8

FIRE WARNING AND PROTECTION

TABLE OF CONTENTS

AIR LIBERTE INDUSTRIES

(SERIES 80)

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
LIMITATIONS	8-10-0		(NOT USED)	
NORMAL OPERATION				
Fire Warning Test	8-20-0	4	1/2	All
ABNORMAL OPERATION				
ENG/APU Fire Detector LOOP Light And LOOP A Or B Light On With- out Fire Warning	8-30-0	2	1	All
Fire Warning Test Inoperative	8-30-0	2	2	All

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FLIGHT CREW OPERATING MANUAL

FIRE WARNING AND PROTECTION - NORMAL OPERATION

FIRE WARNING TEST

MASTER WARNING and MASTER CAUTION Lights. OFF

ENG and APU LOOPS Switches BOTH

LOOPS A and B TEST Buttons PUSH

Push LOOPS (A, B) TEST buttons simultaneously. Observe fire bell and vocal warnings sound and red lights in each ENG FIRE handle, all LOOP lights, FIRE DETECTOR LOOP light, APU FIRE light, MASTER WARNING and MASTER CAUTION lights come on. Release both TEST buttons and observe all lights go off.

NOTES

The following are the fire bell and vocal warnings associated with the test of the engine fire warning system: Fire bell sounds followed by a vocal warning of either "Fire left engine" or "Fire right engine", then fire bell sounds again followed by vocal warning of either "Fire right engine" or "Fire left engine". Lights will remain on until LOOPS TEST buttons are released. Bell and vocal warning may be silenced by pushing the FIRE BELL OFF button. One cycle of the bell and vocal warnings is required for a valid test.

If system fails test, refer to FIRE WARNING & PROTECTION - Abnormal Operation.

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FLIGHT CREW OPERATING MANUAL

FIRE WARNING AND PROTECTION - ABNORMAL OPERATION

ENG/APU FIRE DETECTOR LOOP LIGHT AND LOOP A OR B LIGHT ON WITHOUT FIRE WARNING

Appropriate LOOPS Switch. SET TO LOOP NOT LIGHTED

Move appropriate LOOPS switch from BOTH toward LOOP light not on.

Appropriate LOOPS TEST Button PUSH

NOTE

This tests integrity of loop selected by LOOPS switch.

Test Indications. OBSERVE



Satisfactory

Release LOOPS TEST button. No further action required. Continue flight with switch in LOOPS position successfully tested.

NOTE

Detection system is now limited to single loop but retains normal warning capability.

[END]

Unsatisfactory (fire warning not normal)

Release LOOPS TEST button.

Appropriate LOOPS Switch. SET TO OPPOSITE LOOP POSITION

Move LOOPS switch toward LOOP light that was on.

If fire warning is now received, refer to Emergency Procedures - APU FIRE or ENGINE FIRE OR SEVERE DAMAGE OR SEPARATION.

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FLIGHT CREW OPERATING MANUAL

FIRE WARNING TEST INOPERATIVE

NOTE

ENG FIRE handle lights and bell, vocal warning and/or APU
FIRE lights fail to operate during test. One LOOP light fails to
come on during test.

LOOPS Selector Switch. OPPOSITE FROM INOP LOOP

LOOP A and B TEST Buttons PUSH



Tests normal

Continue operation with a single loop system.

[END]

Abnormal

Call maintenance.

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FLIGHT CREW OPERATING MANUAL

Chapter 9

FLIGHT CONTROLS

TABLE OF CONTENTS

AIR LIBERTE INDUSTRIES

(SERIES 80)

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
LIMITATIONS	9-10-0	1	1	All
NORMAL OPERATION	9-20-0		(NOT USED)	
ABNORMAL OPERATION				
Airplane Oscillating Or Displaced In Yaw	9-30-0	4	1	All
AUTO SLAT FAIL Light On	9-30-0	4	2A	All
AUTO SPOILER DO NOT USE Light On Or Unable To Arm Auto Spoilers	9-30-0	4	2A	All
Mach Trim Inoperative	9-30-0	4	2B	All
No Flap/No Slat Or Flaps 0/Slats Extended Landing	9-30-0	4	3	All
Overspeed Warning Sys- tem Sounds Earlier Than Scheduled	9-30-0	4	4	All
RUDDER CONTROL MANUAL Light On	9-30-0	4	5	All
Rudder Restricted During Landing	9-30-0	4	6	All
RUDDER TRAVEL UNRE- STRICTED Light On (Above 180/201/192 KIAS)	9-30-0	4	7	All

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FLIGHT CREW OPERATING MANUAL

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
ABNORMAL OPERATION (Continued)				
SLAT DISAGREE Light On	9-30-0	4	8	All
Speed Brake Lever Not Fully Disarmed - In Flight	9-30-0	4	10	All
SPOILER/FLAP EXTENDED Light On	9-30-0	4	10	All
Spoiler Stuck In Extended Position	9-30-0	4	11	All
Stabilizer Inoperative - In Flight	9-30-0	4	13	All
STALL INDICATION FAILURE Light On	9-30-0	4	15	All
Stick Shaker On (Other Stall Indications Not Active)	9-30-0	4	16	All
Unscheduled Automatic Slat Extension	9-30-0	4	17/18	All

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FLIGHT CREW OPERATING MANUAL

FLIGHT CONTROLS - LIMITATIONS

AIRSPEED

For Models 81/82/83/88:

V_{MO} - 340 KIAS sea level to 27,300 feet.

M_{MO} - .84 Mach above 27,300 feet.

For Model 87:

V_{MO} - 340 KIAS sea level to 26,000 feet.

M_{MO} - .82 Mach above 26,000 feet.

FLAP LIMIT SPEEDS

For Models 81/82/87/88:

0 to 13 degrees - - 280 KIAS or .57 Mach

15 to 20 degrees - - 240 KIAS or .57 Mach

21 to 25 degrees - - 220 KIAS or .57 Mach

26 to 30 degrees - - 200 KIAS or .57 Mach

31 to 40 degrees - - 195 KIAS or .57 Mach

For Model 83:

0 to 13 degrees - - 280 KIAS or .57 Mach

15 to 20 degrees - - 240 KIAS or .57 Mach

21 to 25 degrees - - 220 KIAS or .57 Mach

26 to 30 degrees - - 205 KIAS or .57 Mach

31 to 40 degrees - - 200 KIAS or .57 Mach

Do not use flap settings between 13 and 15 degrees.

SLAT LIMIT SPEEDS

Mid position - - 280 KIAS or .57 Mach

Full extend - - 240 KIAS or .57 Mach

SPEEDBRAKES

Speedbrakes may be used only in the 0 degree flap configuration, with or without slats extended.

Do not move spoiler/speedbrake lever to ground spoiler position in flight.

STALL WARNING & AUTO SLATS

Stick shakers, Supplementary Stall Recognition System and Automatic Slat Extension System must be operative for takeoff.

(Continued)

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FLIGHT CREW OPERATING MANUAL

CROSSWIND

For Models 81/82/83/88:

The limiting crosswind value has not been determined. However, the maximum demonstrated crosswind component for takeoff and landing is 30 knots reported wind at the 50 foot height. This value was demonstrated on a dry runway with all engines operating for the following configurations:

	Hydraulics	Rudder Power	Yaw Damper
Takeoff	Normal	ON	OFF
Takeoff	R ENG HYD Pump Off	ON	ON & OFF
Landing	Normal	ON & OFF	OFF
Landing	R ENG HYD Pump Off	ON & OFF	ON & OFF

For Model 87:

The limiting crosswind value has not been determined. However, the maximum crosswind component shown to be acceptable for takeoff and landing is 30 knots reported at the 50 foot height. This value was determined for a dry runway with all engines operating for the following configurations:

	Hydraulics	Rudder Power	Yaw Damper
Takeoff	Normal	ON	OFF
Takeoff	R ENG HYD Pump Off	ON	ON & OFF
Landing	Normal	ON	OFF
Landing	R ENG HYD Pump Off	ON	ON

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FLIGHT CREW OPERATING MANUAL

FLIGHT CONTROLS - ABNORMAL OPERATION

AIRPLANE OSCILLATING OR DISPLACED IN YAW

DFGC 1-2 Switch SELECT OTHER POSITION

Airplane Flight Condition OBSERVE



Normal

Autopilot/Autothrottle. AS REQUIRED

[END]

Abnormal

RUD HYD CONT Lever MAN

Observe RUDDER CONTROL MANUAL annunciator light comes on.

NOTE

In MAN, rudder movement is controlled through control tab.

YAW DAMP Switch OFF

Move YAW DAMP switch to OFF and observe YAW DAMP OFF annunciator light comes on.

Airplane Control



Normal

YAW DAMP Switch ON

Observe YAW DAMP OFF annunciator light goes off.

Continue flight with RUD HYD CONT lever in MAN.

[END]

Abnormal

(Continued)

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FLIGHT CREW OPERATING MANUAL

AIRPLANE OSCILLATING OR DISPLACED IN YAW (Continued)

YAW DAMP Switch OVRD

Move YAW DAMP switch to OVRD and observe YAW DAMP OFF annunciator light comes on.

NOTES

With YAW DAMP switch in OVRD, actuator is deactivated, making yaw damper inoperative.

If required, RUD HYD CONT lever may be returned to PWR.

■ Autopilot/Autothrottle. AS REQUIRED

[END]

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FLIGHT CREW OPERATING MANUAL

AUTO SLAT FAIL LIGHT ON

NOTES

AUTO SLAT FAIL light on indicates failure of one or both stall warning systems. One operable system is capable of providing auto slats.

With dual system failure, pilot can still extend slats to at least midposition. Full extension may be possible, dependent upon which system component has failed.

CAUTION

Do not extend slats until below 240 KIAS (fully extended slat limit), as slats may extend to full position.

[END]

AUTO SPOILER DO NOT USE LIGHT ON OR UNABLE TO ARM AUTO SPOILERS

Phase Of Flight



Before takeoff

Maintenance action required.

[END]

Before landing

SPD BRK Lever DISARMED

Spoilers must be extended manually for landing. Add 470 feet to landing distance on dry runway (540 feet on wet runway).

After landing,

SPD BRK Lever UP/AFT/UP

[END]

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FLIGHT CREW OPERATING MANUAL

MACH TRIM INOPERATIVE

NOTE

Failure of the mach trim compensator is confirmed by the mach trim indicator failing to extend, retract or is oscillating.

MACH TRIM COMP Switch. OVRD

Mach Trim Indicator. OBSERVE

Not retracted

MACH TRIM OVERRIDE Circuit Breaker (Lower EPC) PULL/RESET

If mach trim indicator did not retract,

MACH TRIM COMP Switch. VERIFY OVRD

MACH TRIM OVERRIDE Circuit Breaker PULL

NOTE

This action prevents inadvertent retraction.

Retracted

Observe mach speed limitation of .78.

Retrim as required.

Use normal landing techniques.

MD-80 FLIGHT CREW OPERATING MANUAL

NO FLAP/NO SLAT
OR
FLAPS 0/SLATS EXTENDED LANDING

NOTES

Use longest available runway commensurate with conditions (wet or dry, crosswind, etc.).

Refer to ABNORMAL CONFIGURATION ARRIVAL AND REFERENCE (V_{REF}) SPEEDS - 2 ENGINES AND 1 ENGINE.

Gross Weight. REDUCE

Reduce gross weight to the lowest practicable.

IAS. DETERMINE

Determine UP/RET or 0/EXT maneuvering and reference speeds for existing gross weight.

Plan a wide pattern and longer than normal final approach for speed stabilization. Maintain a descent gradient of not less than 2.5°.

GND PROX WARN Switch OVRD

Landing Gear. EXTEND

Gear Lights. 3 GREEN

Anti-Skid ARMED

IAS. ESTABLISH

Establish UP/RET or 0/EXT minimum maneuvering speed on downwind and base legs.

After stabilization on final approach, reduce speed (while in level flight) until approach speed is established.

Make positive main gear touchdown to minimize float.

On touchdown, take positive action to lower nose gear to runway and apply brakes smoothly to full pedal.

Throttles. REVERSE THRUST

Use normal reverse thrust procedures. Do not use asymmetric reverse thrust to maintain directional control. Rudder control and differential braking should be used as required for directional control.

MD-80 FLIGHT CREW OPERATING MANUAL

OVERSPEED WARNING SYSTEM SOUNDS EARLIER THAN SCHEDULED

NOTE

Maximum speed warning will sound when V_{MO}/M_{MO} is exceeded or if slats are extended above 280 KIAS.

Speed REDUCE

Reduce speed below speed at which warning sounds.

If system activates below MACH 0.79/325 KIAS and slats are retracted,

CAWS OVERSPEED, ENG FIRE, HORIZ STAB Circuit Breaker PULL

CAUTION

With circuit breaker pulled, in addition to overspeed warning, engine fire and horizontal stabilizer aural warnings are disabled.

Observe the following speed limitation:

M_{MO} = 0.79 Above 25,300 feet

V_{MO} = 325 KIAS Below 25,300 feet.

CAUTION

With system deactivated carefully monitor airspeed/mach indicator(s).

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FLIGHT CREW OPERATING MANUAL

RUDDER CONTROL MANUAL LIGHT ON

Phase Of Flight



On ground

Maintenance action required.

[END]

In flight

RUD HYD CONT Lever MAN

Continue operating in manual mode.

WARNING

Minimum approach speed is 135 KIAS until landing is assured.

[END]

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FLIGHT CREW OPERATING MANUAL

RUDDER RESTRICTED DURING LANDING

NOTES

RUDDER TRAVEL UNRESTRICTED light should come on (during deceleration) at a minimum of 144 KIAS (Model 81/82), 165 KIAS (Model 83/88), 159 KIAS (Model 87).

If RUDDER TRAVEL UNRESTRICTED light does not come on during deceleration, momentarily centering rudder pedals and rudder trim may restore unrestricted rudder.

Annunciator Lights TEST

NOTE

Two main areas of concern with rudder restricted are crosswind landing capability and controllability with asymmetric thrust. The following restrictions assume rudder is limited to maximum restriction.

On approach,

Approach Speed DETERMINE

- 1.3 V_S + 5 KIAS in landing configuration but not below minimum approach speed of 135 KIAS until landing is assured.
- Observe crosswind landing limitation of 12 knots.
- During engine out go around, it may require up to approximately 8° of bank in direction of good engine to maintain constant heading at V_2 speed or 135 KIAS, whichever is higher.

[END]

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FLIGHT CREW OPERATING MANUAL

**RUDDER TRAVEL UNRESTRICTED
LIGHT ON (ABOVE 180/200/191 KIAS)**

- For flight above 180 KIAS (Model 81/82), 200 KIAS (Model 83), 191 KIAS (Model 87).

RUD HYD CONT Lever MAN

NOTE

Use light rudder forces. Yaw damper may be used.

- During approach, at or below 180 KIAS (Model 81/82), 200 KIAS (Model 83), 191 KIAS (Model 87).

RUD HYD CONT Lever PWR

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FLIGHT CREW OPERATING MANUAL

SLAT DISAGREE LIGHT ON

CAUTION

Do not move FLAP/SLAT handle until a safe altitude and airspeed have been attained.

NOTE

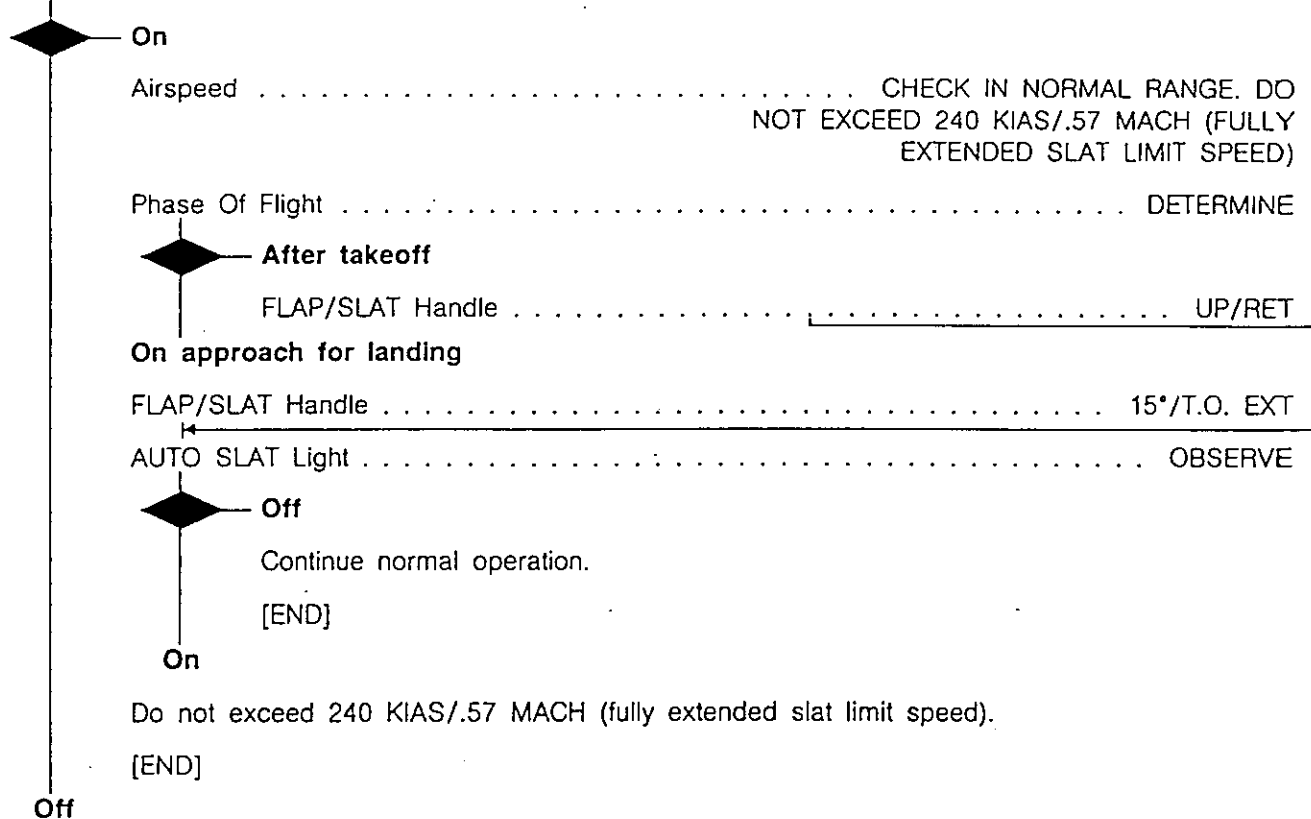
If slat asymmetry is indicated any time by a lateral trim change, return FLAP/SLAT handle to the last position where slats were symmetrical and do not exceed slat placard speed for remainder of flight.

AUTO THROT Switch OFF

CAUTION

Do not use autothrottle or speed command system as speed schedules may not be valid.

AUTO SLAT Light OBSERVE



(Continued)

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FLIGHT CREW OPERATING MANUAL

SLAT DISAGREE LIGHT ON (Continued)

FLAP/SLAT Handle Selection

When SLAT DISAGREE Light Came On DETERMINE

Extension

FLAP/SLAT Handle Position

and DISAGREE Light OBSERVE

Light on and stays on when FLAP/SLAT handle is moved from UP/RET to 0°/T.O. EXT or 11°/T.O. EXT, and no asymmetric condition exists

Do not exceed flap/slat limit speed (240 KIAS/.57 MACH) and move FLAP/SLAT handle to 15°/T.O. EXT.

SLAT DISAGREE Light OBSERVE

Light off

Plan landing using normal flap/slat settings and speeds.

[END]

Light remains on

Light on and stays on when FLAP/SLAT handle is moved from 0°/T.O. EXT or 11°/T.O. EXT to 15°/T.O. EXT and no asymmetric condition exists

Plan landing with flaps 28° or 40° and use slats retracted V_{REF} speed (refer to ABNORMAL CONFIGURATION ARRIVAL AND REFERENCE (V_{REF}) SPEEDS - 2 ENGINES AND 1 ENGINE chart).

NOTE

Ground spoilers will deploy upon main wheel spinup if spoiler lever has been armed.

[END]

Retraction - light on and stays on when FLAP/SLAT handle is moved from more than 15° to less than 11°/T.O. EXT or from 0°/T.O. EXT to UP/RET

Do not exceed 240 KIAS/.57 MACH (fully extended slat limit speed).

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FLIGHT CREW OPERATING MANUAL

**SPEED BRAKE LEVER NOT
FULLY DISARMED - IN FLIGHT**

NOTE

Until landing gear is retracted, red arming placard is partially exposed.

When speed brakes are required, pull lever up and aft to approximate speed brake stop position. Lever must be held in this position as long as speed brakes are required.

CAUTION

Speed brake stop and intermediate notches will not be engaged. Caution should be exercised to ensure lever is not inadvertently moved to full aft position as this would permit speed brakes to extend to full, 60 degree position.

[END]

**SPOILER/FLAP EXTENDED
LIGHT ON**

NOTE

Light is on any time flaps are extended in flight and spoiler/SPD BRK lever is not retracted. Light is inhibited on ground.

Spoiler/SPD BRK Lever RET

[END]

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FLIGHT CREW OPERATING MANUAL

SPOILER STUCK IN EXTENDED POSITION

Stuck Spoiler Panel IDENTIFY

Determine which wing has extended spoiler panel by control input required to maintain wings level. Make a visual inspection of spoiler panels if possible.

NOTE

If extended panel is located outboard, source of system pressure is right hydraulic system. If inboard, it is pressurized by left hydraulic system.

Time Available DETERMINE



Time is available

Associated Hydraulic System. CHECK/NORMAL

SPD BRK Lever CYCLE

Stuck Spoiler Panel OBSERVE



Does not retract

Associated ENG HYD PUMP Switch OFF

TRANS HYD PUMP Switch. OFF

AUX HYD PUMP Switch (Right System Affected) OFF

SPD BRK Lever CYCLE

NOTE

SPD BRK lever is cycled to depressurize hydraulic system.

(Continued)

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FLIGHT CREW OPERATING MANUAL

SPOILER STUCK IN EXTENDED POSITION (Continued)

Time Available (Continued)

Stuck Spoiler Panel (Continued)

Stuck Panel

Does not retract

Associated ENG HYD PUMP Switch HI/LOW

HYD PRESS and Quantity CHECK/NORMAL

Retracts

Affected Hydraulic System DEPRESSURIZE

NOTES

Spoilers may be armed for landing.

When extending slats on a single hydraulic system, move FLAP/SLAT handle directly to 15°/T.O. EXT.

Do not use auto brakes (if installed).

Anticipate longer than normal landing roll due to loss of 1/3 spoilers.

Before landing,

Affected Hydraulic System

Right

NOTE

Maintain a minimum of 135 KIAS until landing is assured.

Gear Handle DOWN

Emergency Gear Extension Lever PULL FULL UP

Raise cover, pull emergency gear extension lever to full up and check holding latch is engaged.

Gear Lights 3 GREEN

NOTES

GEAR DOOR OPEN light will remain illuminated.

After landing rollout, repressurize hydraulic system.

After landing, before moving airplane, ensure main gear doors are closed.

[END]

Left

NOTE

After landing rollout, repressurize hydraulic system.

[END]

Time not available or spoiler panel does not retract

(Continued)

MD-80

FLIGHT CREW OPERATING MANUAL

SPOILER STUCK IN EXTENDED POSITION (Continued)

Trim airplane as required.

NOTES

Full aileron trim and up to 70 degrees of control wheel input may be required to counteract stuck spoiler panel.

Use rudder trim as required to counteract spoiler drag and effect of aileron trim.

Use 28° flaps for landing and add 10 knots to V_{REF} . Spoilers may be armed for landing.

[END]

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FLIGHT CREW OPERATING MANUAL

STABILIZER INOPERATIVE - IN FLIGHT

STABILIZER TRIM (Red Guarded) Switch NORM

Verify stabilizer trim switch is in NORM and guarded.

PRIMARY LONGITUDINAL TRIM (EPC GEN BUS Panel)
and AUTOPILOT & ALTERNATE LONGITUDINAL TRIM
(Upper EPC) C/Bs (If Tripped) RESET

Autopilot. OFF

Primary Trim



Normal

Continue normal operation.

[END]

Inoperative

Alternate Trim



Normal

Allow for slower trim rate.

Autopilot may be used, as desired.

[END]

Inoperative

Flap/Trim Condition



Flaps 28° or 40°, airplane on speed and trimmed

Land with selected flaps.

[END]

Any other flap setting or airplane not trimmed

Use 15° flaps for landing and increase 15°/T.O. V_{REF} ($1.4 V_S$) by speed increment
from following table.

(Continued)

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FLIGHT CREW OPERATING MANUAL

STABILIZER INOPERATIVE - IN FLIGHT (Continued)

GND PROX WARN Switch OVRD

During landing flare, do not reduce approach thrust until landing flare has been initiated and sink rate has been reduced.

STABILIZER INOPERATIVE - SPEED INCREMENT CHART

NOTE

Use takeoff C.G. if landing C.G. is unknown.

		C.G. (% MAC)					
		-8	0	5	10	15	20
STABILIZER ANGLE	2°AND	40	40	32	24	17	8
	1°AND	35	34	27	19	12	4
	0	30	29	22	15	8	0
	1°ANU	25	24	18	11	4	0
	2°ANU	21	20	14	7	1	0
	3°ANU	17	16	10	4	0	0
	4°ANU	14	13	7	1	0	0
	5°ANU	10	9	4	0	0	0
	6°ANU	7	6	1	0	0	0
	7°ANU	4	3	0	0	0	0
	8°ANU	2	0	0	0	0	0

[END]

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FLIGHT CREW OPERATING MANUAL

STALL INDICATION FAILURE LIGHT ON

NOTE

One stick shaker or stall recognition system may be activated.

All Other Stall Warning Indications OBSERVE

Other indications are active

Airspeed and Attitude CHECK

Ensure that airspeed and attitude are adequate for existing configuration.

STALL TEST Switch SYS 1 OR SYS 2

Moving the STALL switch to SYS 1 or SYS 2 will dim the STALL lights.

When flight conditions permit,

CAPTAIN'S and FIRST OFFICER'S
STALL WARNING C/B's (Lower EPC) OPEN (PULL)

STALL TEST Switch OFF

CAPTAIN'S and FIRST OFFICER'S STALL
WARNING C/B's (One At a Time) RESET

Identify and isolate the malfunctioning system.

After malfunctioning system is isolated,

Operational System TEST

Continue flight with remaining system operating.

[END]

Other indications are not active

(Continued)

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FLIGHT CREW OPERATING MANUAL

STALL INDICATION FAILURE LIGHT ON (Continued)

Both Systems TEST

Test both systems by moving STALL TEST switch to SYS 1 and SYS 2.

◆ **One system test unsuccessful**

CAPTAIN'S/FIRST OFFICER'S STALL
WARNING C/B (Affected System) OPEN (PULL)

Continue flight with the failed system deactivated.

[END]

Both system tests successful

Continue normal operation. A false indication has occurred.

[END]

**STICK SHAKER ON
(OTHER STALL INDICATIONS
NOT ACTIVE)**

CAPTAIN'S and FIRST OFFICER'S STALL WARNING C/Bs (Lower EPC) PULL

CAPTAIN'S STALL WARNING C/B RESET

Stick Shaker

◆ **Off**

[END]

On

CAPTAIN'S STALL WARNING C/B PULL

FIRST OFFICER'S STALL WARNING C/B RESET

[END]

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FLIGHT CREW OPERATING MANUAL

UNSCHEDULED AUTOMATIC SLAT EXTENSION

NOTE

Automatic slat extension will occur only if FLAP/SLAT handle is at settings from 0°/T.O. EXT to 13°/T.O. EXT.

Airspeed OBSERVE

CAUTION

Do not exceed 240 KIAS (fully extended slat limit speed).

Do not move FLAP/SLAT handle until safe altitude has been attained.

Phase Of Flight DETERMINE



After takeoff

FLAP/SLAT Handle UP/RET

On approach for landing

FLAP/SLAT Handle 15°/T.O. EXT

SLAT AUTO/DISAGREE Lights OBSERVE



Off

Continue normal operation.

[END]

On

Do not exceed 240 KIAS (fully extended slat limit speed).

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FLIGHT CREW OPERATING MANUAL

Chapter 10

FUEL

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AIR LIBERTE INDUSTRIES

(SERIES 80)

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
LIMITATIONS	10-10-0	1	1	All
NORMAL OPERATION				
Crossfeed Operation	10-20-0	3	1	All
Fuel Management Schedule	10-20-0	3	2	All
Ground Fuel Transfer	10-20-0	3	4	All
ABNORMAL OPERATION				
Approach With Less Than 1000 LBS Fuel In Either Main Tank	10-30-0	7	1	All
CENTER FUEL PRESS LO Annunciated/Center Tank Fails To Feed In Flight	10-30-0	7	2	All
Fuel Leak	10-30-0	7	4	All
FUEL LEVEL LO Annunciated	10-30-0	7	4A	All
FWD/AFT AUX FUEL PUMP PRESS LOW Light On With Fuel Remaining In Aux Tank	10-30-0	7	5	All
L/R INLET FUEL PRESS LOW Light On	10-30-0	7	6	All
Premature Transfer Of Aux Tank Fuel	10-30-0	7	7/8	All

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FLIGHT CREW OPERATING MANUAL

FUEL LOADING AND MANAGEMENT (Continued)

The auxiliary tank pumps must be off for takeoff and landing.

For installation of tanks with unequal capacity: When dispatching with one pump inoperative in the larger auxiliary tank, fuel load in larger tank must equal that of smaller tank plus or minus 400 pounds/181 kilograms.

After takeoff, center tank and auxiliary tank(s) shall be emptied prior to using wing fuel, unless alternate fuel burn system is used.

BALLAST FUEL

NOTE

Fuel management and loading limitations do not apply to ballast fuel.

Ballast fuel is included in associated fuel quantity indicator and TOTAL FUEL QTY/GROSS WT indicator. To obtain usable fuel, ballast fuel quantity must be subtracted from the fuel quantity indicators.

When operating with ballast fuel, zero fuel weight input to fuel quantity gage should not include weight of ballast fuel.

Fuel may be loaded into the center tank for ballast purposes provided:

The center tank fuel quantity indicator is operative and

A placard stating the amount of ballast fuel and prohibiting its use is installed adjacent to the center tank pump switches and

The maximum allowable zero fuel weight is reduced by the amount of the ballast fuel and

Completion of the flight, including reserve fuel, does not require use of ballast fuel and

Fuel in the auxiliary tanks(s) (if installed) is declared untransferable or unusable and the auxiliary pumps are deactivated by placing in-op rings on the circuit breakers.

Fuel may be loaded into the auxiliary tanks for ballast purposes provided:

Fuel quantity indicators of tanks used for ballast fuel are operative and

Fuel pumps for auxiliary tanks with ballast fuel are deactivated by placing in-op rings on the circuit breakers and

(Continued)

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FLIGHT CREW OPERATING MANUAL

BALLAST FUEL (Continued)

A placard stating the amount of ballast fuel and prohibiting its use is installed adjacent to the ballast fuel tank pump switches and

Maximum allowable zero fuel weight is reduced by the amount of ballast fuel and

Ballast fuel is declared untransferable and

Completion of flight, including reserve fuel, does not require use of ballast fuel and

Service Bulletin 28-51 or production equivalent has been installed.

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FLIGHT CREW OPERATING MANUAL

FUEL - NORMAL OPERATION

CROSSFEED OPERATION

NOTE

Use this procedure to correct main tank fuel unbalance. If unbalance is accompanied by an INLET FUEL PRESS LOW light on, refer to Abnormal Procedure – INLET FUEL PRESS LOW LIGHT ON.

Fuel Boost Pump Switches (Supplying Tank) ON
FUEL X FEED Lever. ON
Fuel Boost Pump Switches (Tank Not Supplying). OFF (ONE AT A TIME)
CTR Tank Pump Switches OFF

■ Monitor fuel quantity in order to remain within lateral fuel unbalance limits.

When main tanks are at desired level,

○ Main Tank Pump Switches (All) ON
■ CTR Tank Pump Switches SET NORMAL (AS REQUIRED)
FUEL X FEED Lever. AS REQUIRED

NOTE

If unable to correct unbalance condition by crossfeed operation, refer to Abnormal Procedure – FUEL LEAK.

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FLIGHT CREW OPERATING MANUAL

FUEL MANAGEMENT SCHEDULE

WARNING

It is recommended that a takeoff not be initiated with less than 2400 pounds/1100 kilograms indicated fuel in each main tank.

After Engine Start, During Taxi, and Takeoff

FUEL X FEED Lever. OFF
Main Tank Pump Switches (All) ON
CTR Tank Pump Switches (If Tank Contains Usable Fuel). AS DESIRED

If takeoff gross weight is 156,000 pounds/70,760 kilograms or greater, both CTR tank pump switches must be in ON or AUTO.

AFT AUX and FWD AUX TRANS Pump Switches (All). OFF

After First Power Reduction, When Airplane Is Cleaned Up For Climb, During Climb, and Cruise

CTR Tank Pump Switches BOTH ON OR AUTO

(Continued)

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FLIGHT CREW OPERATING MANUAL

FUEL MANAGEMENT SCHEDULE (Continued)

NOTE

For airplanes with S/B 28-58 or production equivalent (AFB):
When operating with both center tank switches in AUTO, if any off schedule fuel usage is observed, move center tank pump switches to ON and resume normal fuel management schedule.

AFT AUX and FWD AUX TRANS Pump Switches. ALL AUTO

NOTES

The following notes are applicable only to those operators who possess AFM Appendix XIV:

Under certain conditions, a Sequential Aux Tank Fuel Transfer Schedule may be used. Using this sequence, fuel from the forward aux tank is transferred normally, but fuel from the aft aux tank is retained in the aft tank until the center tank is empty. This sequence may be used if:

Both aft aux tank fuel transfer pumps are verified operative prior to takeoff.

Both CENTER FUEL PRESS LO annunciations are verified operative prior to takeoff.

Zero fuel weight (ZFW) is 20% or forward.

Alternate Fuel Burn Sequence is not used.
(Exception: Alternate Fuel Burn Sequence may be used if the maximum ZFW is reduced by the weight of fuel in the aft aux tank.)

During climb, move only the FWD AUX TRANS pump switches to AUTO and allow forward aux tank fuel to transfer normally. When the center tank is empty, (as indicated by CENTER FUEL PRESS LO annunciation), move AFT AUX TRANS pump switches to AUTO and transfer all aft aux tank fuel to the center tank.

The sequential Aux Tank Fuel Transfer Schedule may not be used on MD-87 airplanes or during flights utilizing ETOPS procedures.

(Continued)

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FLIGHT CREW OPERATING MANUAL

FUEL MANAGEMENT SCHEDULE (Continued)

When AFT/FWD auxiliary tanks are empty,

AFT/FWD AUX TRANS Pump Switches OFF

When center tank is empty,

CTR Tank Pump Switches BOTH OFF

Descent, Approach and Landing

Main Tank Pump Switches (All) ON

■ CTR Tank Pump Switches (If Tank Contains Usable Fuel). AS DESIRED

Prior to final approach,

■ AFT AUX and FWD AUX TRANS Pump Switches (All). OFF

After Landing

During taxi in,

■ Fuel Pump Switches (All). AS DESIRED

After Engine Shutdown

Fuel Pump Switches (All). OFF UNLESS REQUIRED FOR APU

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FLIGHT CREW OPERATING MANUAL

GROUND FUEL TRANSFER

Interphone Contact With Ground Crew ESTABLISH

Fuel Pump Switches (Supplying Tank) ON

All Other Fuel Pump Switches OFF

Supplying Tank. DETERMINE

 **Left Main Tank**

Fuel X FEED Lever ON

CTR or Right Main Tank

Request ground crew to open defueling valve and fill valve (for tank to be filled)

Fuel Quantity Gages. MONITOR

When tanks are on schedule,

Fuel Pump Switches. OFF

Fuel X FEED Lever OFF

Request ground crew to close defueling and fill valves.

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FLIGHT CREW OPERATING MANUAL

FUEL - ABNORMAL OPERATION

APPROACH WITH LESS THAN
1000 LBS/450 KGS FUEL
IN EITHER MAIN TANK

AFT PUMP Switches (Both Main Tanks) ON
FWD PUMP Switches (Both Main Tanks) ON
CTR TANK PUMP Switches ON
AUX TRANS Pump Switches. OFF
FUEL X FEED Lever. ON
ENG IGN Selector SYS A OR SYS B

If go-around is required, avoid sustained nose up attitudes in excess of 10°.

NOTE

A go-around is not recommended with less than
500 pounds/225 kilograms in each main tank or if both main
tank aft pumps are inoperative.

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FLIGHT CREW OPERATING MANUAL

**CENTER FUEL PRESS LO
ANNUNCIATED/CENTER TANK
FAILS TO FEED IN FLIGHT**

NOTE

This procedure is applicable when:

Center tank fuel boost pump is inoperative
OR

Center tank fuel stops feeding with greater than 11,000
pounds/4975 kilograms or fails to feed with main fuel below
3800 pounds/1725 kilograms with center tank boost pumps
in AUTO (airplanes with S/B 28-53 or production equivalent).

FUEL X FEED Lever. OFF

CTR AFT and FWD PUMPS Switches BOTH ON

LEFT and RIGHT AFT and FWD PUMPS Switches ONE OR BOTH ON

■ FWD/AFT CENTER FUEL TANK BOOST PUMP Circuit Breakers (Upper EPC) RESET IF TRIPPED

CAUTION

A tripped circuit breaker may be reset only once. If a circuit breaker trips after it has been reset, the cause should be determined and corrected before attempting a subsequent reset.

Center Tank Fuel Quantity OBSERVE



Quantity decreases at normal rate

Continue normal operations.

[END]

Quantity does not decrease

■ Boost Pumps In One Main Tank BOTH OFF

(Continued)

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FLIGHT CREW OPERATING MANUAL

CENTER FUEL PRESS LO ANNUNCIATED/CENTER TANK FAILS TO FEED IN FLIGHT (Continued)

Associated (L/R) INLET FUEL PRESS LOW Annunciation OBSERVE



Assume center (and aux, if installed) tank fuel is unavailable and move one or both main boost pump switches to ON. Plan remainder of flight using main tank fuel only.

[END]

Off (Indicates center tank fuel is still available and feeding)

Boost Pump Switches In Other Main Tank. BOTH OFF

Center Tank Fuel Quantity OBSERVE DECREASE

When center tank indicates 500 pounds/225 kilograms,

Main Tank Boost Pumps ONE ON IN EACH TANK

NOTE

If required, remaining center tank fuel may be used by operating (functioning) center tank pump to supply one engine. Remaining engine should be operated using its associated main tank pump. Monitor fuel quantity and maintain fuel distribution within maximum lateral unbalance limits.

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FLIGHT CREW OPERATING MANUAL

FUEL LEAK

NOTE

Fuel leaks may be indicated by main tank unbalance and/or L or R INLET FUEL PRESS LOW light on, significant differences between fuel quantity and fuel used, or uncommanded filling of a tank.

Fuel Boost Pump Switches
(For Tank With Greater Quantity) ON

Fuel Boost Pump Switches
(For Tank With Lesser Quantity) OFF

Type Of Leak DETERMINE

 Uncommanded filling of a tank (tank quantity increasing/decreasing at other than normal rate)

FUEL X FEED Lever. AS REQUIRED

Move FUEL X FEED lever to ON (as required) and move fuel boost pump switches for supplying tank(s) to ON intermittently as required to make fuel available and to maintain balance.

NOTE

Maintaining 2500 pounds/1134 kilograms in right main tank will minimize chance of left engine drawing air (if it is on suction feed).

Land at nearest suitable airport.

[END]

Overboard (difference between fuel quantity decrease and fuel used)

FUEL X FEED Lever. OFF

Engine Operation. OBSERVE

 Failure of engine using suction feed

Throttle (Affected Engine). IDLE

FUEL Control Lever (Affected Engine) OFF

ENG FIRE Handle (Affected Engine) PULL (DO NOT ROTATE)

(Continued)

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FLIGHT CREW OPERATING MANUAL

FUEL LEAK (Continued)

Engine Operation (Continued)

FUEL X FEED Lever. AS REQUIRED

Move FUEL X FEED lever to ON (as required) and move fuel boost pumps switches for supplying tank(s) to ON intermittently as required to make fuel available and to maintain balance.

Both engines operating

Land at nearest suitable airport.

FUEL LEVEL LO ANNUNCIATED

(Applicable to airplanes with S/B 28-54 or production equivalent)

NOTE

If main tank fuel quantities are above 2500 pounds/1134 kilograms, but are less than full, FUEL LEVEL LO may annunciate during climbout due to momentary grounding of one or both fuel level low float switches.

Center Tank Fuel Quantity

◆ Quantity zero

Main Tanks Fuel Quantity

◆ 2500 pounds/1134 kilograms or less in either main tank

Plan remainder of flight based on indicated fuel remaining.

[END]

More than 2500 pounds/1134 kilograms in each main tank

LOW FUEL LEVEL C/B (Lower EPC) PULL/RESET

(Continued)

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FLIGHT CREW OPERATING MANUAL

FUEL LEVEL LO ANNUNCIATED (Continued)

Center Tank Fuel Quantity (Continued)

FUEL LEVEL LO Annunciation



[END]

Displayed

Consider 5000 pounds/2250 kilograms or less total fuel remaining.

WARNING

Fuel indicating system may be inaccurate. If actual fuel quantity remaining is unknown, land at nearest suitable airport.

[END]

Quantity indicates fuel in tank

CTR TANK PUMPS Switches. ON

Verify fuel feed from center tank is normal. If fuel feed is abnormal, refer to CTR FUEL PRESS ANNUN/CTR TANK FAILS TO FEED IN FLIGHT in this section.

NOTE

If main tank quantities are above 2500 pounds/1134 kilograms, FUEL LEVEL LO circuit may be reset by resetting LOW FUEL LEVEL C/B (lower EPC).

[END]

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FLIGHT CREW OPERATING MANUAL

FWD/AFT AUX FUEL PUMP PRESS LOW LIGHT ON WITH FUEL REMAINING IN AUX TANK

■ AUX TRANS Pump Switches (Affected Tank) BOTH AUTO

Fuel Transfer CHECK

 **Normal**
[END]

Not normal

AUX TRANS Pump Switches (Affected Tank) HOLD IN TEST

Fuel Transfer CHECK

 **Normal**
Continue to hold switches in TEST until tank is empty.
[END]

Not normal

Affected Aux Tank DETERMINE

 **Forward aux tank**
The remaining fuel in the forward aux tank is unusable. If CG at takeoff was 7% MAC or more, all aft aux fuel may be used if needed using normal speeds and configurations. If CG at takeoff was less than 7% MAC and aft aux fuel must be used, land with flaps 40 and increase approach and landing speeds by 10 KIAS.
[END]

Aft aux tank

The remaining fuel in aft aux tank is unusable. Fuel in forward aux tank may be used if required to complete the flight.

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FLIGHT CREW OPERATING MANUAL

L/R INLET FUEL PRESS LOW LIGHT ON

NOTES

Under all fuel temperature conditions, suction feed capability is enhanced with an increase in fuel flow. If required, descents should be made at a higher engine power and with speed brakes extended.

When using kerosene, engines will operate on suction feed throughout airplane operating envelope.

When using JP-4, engines will operate on suction feed below 25,000 feet with indicated fuel temperatures of 25°C or less. As fuel temperature increases, altitude for satisfactory suction feed is reduced as follows:

30°C - 24,000 feet
35°C - 22,500 feet
40°C - 18,500 feet
45°C - 10,000 feet

Main Tank Pump Switches ON

INLET FUEL PRESS LOW Light

◆ Off

Continue normal fuel management.

[END]

On

Fuel Consumption/Main Tank Balance

◆ Normal

Monitor engine operation.

NOTE

Quantity remaining in each main tank should be approximately equal, indicating normal fuel consumption.

[END]

Abnormal

If consumption is not normal and/or a lateral unbalance condition exists, refer to FUEL LEAK in this section.

[END]

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FLIGHT CREW OPERATING MANUAL

PREMATURE TRANSFER OF AUX TANK FUEL

AUX TRANS Pump Switches. OFF

When center tank quantity depletes to 13,000 pounds/5900 kilograms,

AUX TRANS Pump Switches. AUTO

NOTE

Do not allow fuel quantity in center tank to go above 20,500
pounds/9360 kilograms.

When AUX FUEL PUMP PRESS LOW light comes on,

AUX TRANS Pump Switches. OFF

[END]

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FLIGHT CREW OPERATING MANUAL

Chapter 11

HYDRAULICS

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AIR LIBERTE INDUSTRIES

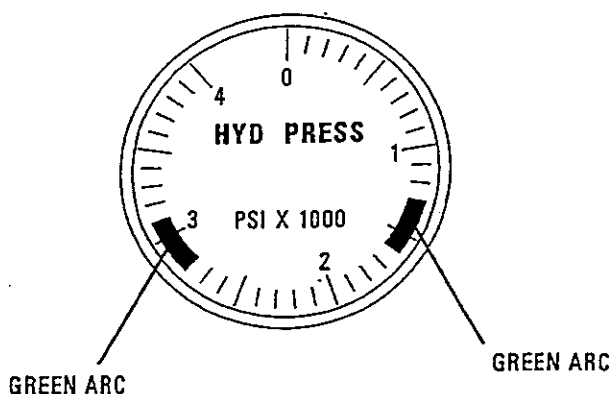
(SERIES 80)

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
LIMITATIONS	11-10-0	1	1/2	All
NORMAL OPERATION	11-20-0		(NOT USED)	
ABNORMAL OPERATION				
ENG HYD PUMP Switch At LOW, Pressure Indication Approximately 3000 PSI	11-30-0	1	1	All
Quantity Low Or Dropping	11-30-0	1	2	All
(L/R) HYD PRESS LOW	11-30-0	1	3/4	All
HYD TEMP HI Light On	11-30-0	1	6	All
Landing With No Hydraulic Pressure	11-30-0	1	7	All

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FLIGHT CREW OPERATING MANUAL

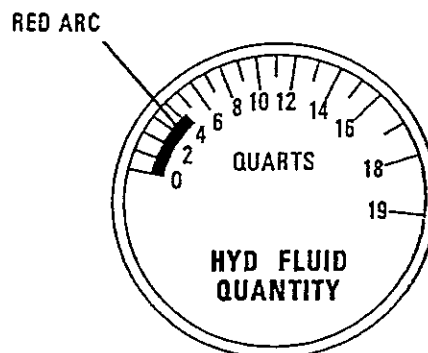
HYDRAULICS - LIMITATIONS



HYDRAULIC PRESSURE GAGE

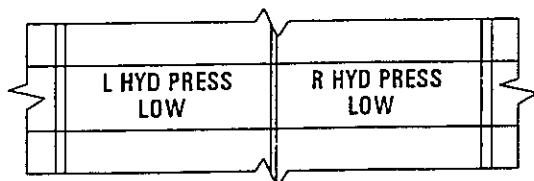
2800 to 3100 psi (green arc). Readings as high as 3200 psi are acceptable (electric pump and/or engine pump high mode).

1300-1600 psi (green arc). Readings as high as 1700 psi are acceptable in engine pump low mode.



HYDRAULIC QUANTITY GAGE

0 to 4.25 quarts (red arc)



ANNUNCIATOR PANEL LIGHTS

LIGHT GOES OFF — When pressure increases above 1200 psi.

LIGHT COMES ON — When pressure decreases to and remains below 900 ± 100 psi for 3 sec.

TRANS HYDRAULIC MOTOR/PUMP

For functional check 3000 psi input from Right Hydraulic System.

2000-3000 psi to left Hydraulic System. (Left Engine Pump OFF.)

CAG(IGDS)

CHANGE: Editorial.

RA1-130J

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FLIGHT CREW OPERATING MANUAL

HYDRAULICS - ABNORMAL OPERATION

**ENG HYD PUMP SWITCH AT LOW,
PRESSURE INDICATION
APPROXIMATELY 3000 PSI**

NOTE

Allow sufficient time for system to decrease from 3000 psi to 1500 psi after selecting LOW.

Affected HYD PUMP CONTROL Circuit Breaker (Lower EPC) RESET (IF TRIPPED)

CAUTION

A tripped circuit breaker may be reset only once. If a circuit breaker trips after it has been reset, the cause should be determined and corrected before attempting a subsequent reset.

Affected PRESS Gage OBSERVE

Remains approximately 3000 psi

Affected ENG HYD PUMP Switch HI

Continue flight with full system pressure.

[END]

Approximately 1500 psi

[END]

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FLIGHT CREW OPERATING MANUAL

QUANTITY LOW OR DROPPING

NOTE

When extending slats on a single hydraulic system, slow to not less than up/retract VREF speed (1.25 VS) nor more than 240 KIAS/.57 Mach. Move FLAP/SLAT handle directly to 15° detent.

TRANS HYD PUMP Switch. OFF

Affected System

Right system

AUX HYD PUMPS Switch. OFF

R ENG HYD PUMPS Switch. OFF

NOTE

Right system may be turned on for landing if any hydraulic fluid remains.

Before landing, if system cannot be repressurized,

WARNING

Minimum approach speed is 135 KIAS until landing is assured.

Gear Handle. DOWN

Emergency Gear Extension Lever. PULL FULL UP

Raise cover, pull emergency gear extension lever to full up position and check holding latch is engaged.

Gear Lights. 3 GREEN

NOTES

GEAR DOOR OPEN light will remain on.

For ground operations with right hydraulic system unpressurized, nosewheel steering is restricted when turning to the left, and unrestricted when turning to the right.

Left system

L ENG HYD PUMPS Switch. OFF

NOTES

Left system may be turned on for landing if any hydraulic fluid remains.

For ground operations with left hydraulic system unpressurized, nosewheel steering is restricted when turning to the right, and unrestricted when turning to the left.

[END]

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FLIGHT CREW OPERATING MANUAL

(L/R) HYD PRESS LOW

NOTE

The loss of hydraulic fluid may result in an increasing quantity indication on the affected side due to foaming.

TRANS HYD PUMPS Switch OFF

Affected Hydraulic Quantity Indication

 **Low or abnormally high**

CAUTION

Do not operate transfer pump or both systems may lose hydraulic pressure. Several minutes and/or descent to FL 300 or below may be required to regain hydraulic pressure in an operating system after the TRANS HYD PUMPS switch is moved to OFF.

Refer to QUANTITY LOW OR DROPPING, in this section.

[END]

Normal

Affected Hydraulic System Pressure

 **Normal**

Spoiler/speed brake efficiency will be reduced.

[END]

Low

NOTE

Verify rudder is neutral and rudder trim is zero before pressurizing right hydraulic system.

Associated ENG HYD PUMPS Switch HI

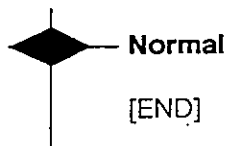
(Continued)

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FLIGHT CREW OPERATING MANUAL

(L/R) HYD PRESS LOW (Continued)

Associated Hydraulic System Pressure



Low

Use AUX or TRANS HYD PUMPS for approach and landing as required.

CAUTION

If operating hydraulic system pressure is lost when TRANS HYD PUMPS switch is moved to ON, move TRANS HYD PUMPS switch to OFF. Several minutes may be required for the operating hydraulic system to regain pressure.

[END]

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FLIGHT CREW OPERATING MANUAL

HYD TEMP HI LIGHT ON

TRANS HYD PUMP Switch. OFF

Affected ENG HYD PUMP Switch. OFF

AUX HYD PUMP Switch (Right System Affected Only). OFF

■ Repressurize affected system for approach and landing.

[END]

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FLIGHT CREW OPERATING MANUAL

LANDING WITH NO HYDRAULIC PRESSURE

NOTES

If flaps and/or slats are extended, they will tend to remain in their last selected position. Refer to either NORMAL or ABNORMAL CONFIGURATION ARRIVAL AND REFERENCE (V_{REF}) SPEEDS - 2 ENGINE AND 1 ENGINE, as appropriate.

Speedbrakes/spoilers are not available.

Use longest available runway commensurate with conditions (wet or dry, crosswind, etc.).

Reverse thrust and anti-skid are available through accumulators.

Auto brakes (if installed) should not be armed for landing.

In order to preserve maximum accumulator capacity, do not depress brake pedals prior to touchdown.

Gross Weight. REDUCE

Reduce gross weight to lowest practicable.

IAS. DETERMINE

Using appropriate chart, determine maneuvering, approach and V_{REF} speeds for existing configuration.

Plan a wide pattern and longer than normal final approach for speed stabilization on final. Maintain a descent gradient of not less than 2.5°.

GND PROX WARN Switch (If Installed). OVRD

Landing Gear Handle DOWN

Emergency Gear Extension Lever PULL FULL UP

Gear Lights. 3 GREEN

NOTE

It may be necessary to slow to 1.3 V_S to allow nose gear to latch down.

GEAR DOOR OPEN Light. ON

(Continued)

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FLIGHT CREW OPERATING MANUAL

LANDING WITH NO HYDRAULIC PRESSURE (Continued)

Anti-Skid ARMED
RUD HYD CONT Lever MAN
IAS. ESTABLISH

After stabilization on final approach, reduce speed (while in level flight) until approach speed is established.

NOTE

With RUD HYD CONT lever in MAN, minimum approach speed is 135 KIAS until landing is assured.

Make positive main gear touchdown to minimize float.

On touchdown, take positive action to lower nose gear to runway and apply brakes smoothly to full pedal.

Throttles IDLE REVERSE
THRUST DETENT

Apply symmetrical idle reverse thrust. Do not use asymmetric reverse thrust to maintain directional control.

Increase reverse thrust above idle reverse thrust only if necessary for runway length considerations. Apply reverse thrust smoothly and symmetrically. If directional control cannot be maintained, reduce thrust to idle reverse.

Apply steady symmetrical brake pedal force to mechanical stops after nosewheel touchdown to minimize accumulator pressure loss. As rudder control deteriorates with lower speed, use differential braking for directional control only as necessary.

Maintain maximum possible braking to a complete stop. Turn anti-skid off. Set parking brake before releasing pedals. Do not attempt to taxi.

Before moving airplane, insure gear safety pins have been installed and manually close main gear doors in order to minimize door damage.

[END]

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Chapter 12

ICE AND RAIN PROTECTION

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FLIGHT CREW OPERATING MANUAL

ICE AND RAIN PROTECTION - LIMITATIONS

FOR MODEL 87 AIRPLANES, IF THE TAIL DE-ICE SYSTEM IS INOPERATIVE, FLIGHT INTO KNOWN ICING CONDITIONS MUST BE AVOIDED.

THERE ARE NO AIRSPEED LIMITS ON THE CENTER WINDSHIELD AND THE CAPTAIN'S OR FIRST OFFICER'S SIDE WINDSHIELD, ABOVE 10,000 FEET.

THERE ARE NO AIRSPEED LIMITS ON THE CLEARVIEW OR EYEBROW WINDSHIELDS, ABOVE OR BELOW 10,000 FEET.

WINDSHIELD ANTI-ICE INOPERATIVE LIMITS BELOW 10,000 FEET

Center windshield UNDER 315 KIAS

Captain's or First Officer's windshield UNDER 315 KIAS

CRACKED WINDSHIELD OPERATING LIMITS BELOW 10,000 FEET

Outer glass of center, Captain's
or First Officer's windshield UNDER 315 KIAS

Inner glass of center, Captain's
or First Officer's windshield UNDER 235 KIAS

WARNING

**Do not operate windshield heat on a cracked glass
(pane) ply.**

NOTE

Pull respective circuit breaker.

ICE PROTECTION SUPPLY PRESS HI annunciator is illuminated when pressure reaches 23.5 to 26.0 PSIG.

When runway is cluttered with wet snow/slush/standing water or dry snow, observe the following:

Maximum depth of wet snow/slush/water is 1/2 inch (12.7 mm) or for dry snow is 4 inches (10 cm).

Refer to performance chart, CONTAMINATED RUNWAY TAKEOFF WEIGHT CORRECTIONS in the TAKEOFF section of the FCOM Performance Volume.

If depth of wet snow/slush/water is less than 1/4 inch (6.3 mm) or depth of dry snow is less than 2 inches (5 cm), use performance appropriate to 1/4 inch (6.3 mm).

If depth of wet snow/slush/water is between 1/4 inch (6.3 mm) and 1/2 inch (12.7 mm) or depth of dry snow is between 2 inches (5 cm) and 4 inches (10 cm), use performance appropriate to 1/2 inch (12.7 mm).

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FLIGHT CREW OPERATING MANUAL

ICE AND RAIN PROTECTION - NORMAL OPERATION

AIRFOIL ICE PROTECTION OPERATION

NOTES

Airfoil and engine anti-ice should be on whenever icing conditions exist or are expected.

When icing conditions exist in immediate vicinity of departure airport, airfoil anti-ice should be on prior to start of takeoff roll.

Airfoil icing conditions can exist when ram air temperature is below 6°C (42°F) and there is visible moisture in the air. In addition to temperatures below 6°C (42°F), be alert for ice buildup on windshield wipers or edges of windshields.

The higher the temperature, the higher the cloud liquid water content and the more severe will be the icing conditions. At temperatures below -20°C (-4°F), icing conditions encountered should be less severe. However, heavy icing has on occasion been reported at temperatures as low as -60°C (-76°F).

ENG Anti-Ice Switches	ON
PNEU X-FEED VALVE Levers	OPEN
AIR FOIL Anti-ice Switch	ON
WING ANTI-ICE ON Light.	CHECK ON
When airborne,	
PNEU PRESS Gage	ABOVE YELLOW ARC

NOTE

L and R ICE PROT TEMP LOW and AIRFOIL ICE PROT PRESS ABNORMAL lights may come on but will go off within 1 minute. This is a normal indication. However, the L and R ICE PROT TEMP LOW lights may also come on with engines at low power. In order to provide adequate ice protection, power should be increased enough to extinguish the light(s).

(Continued)

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FLIGHT CREW OPERATING MANUAL

AIRFOIL ICE PROTECTION OPERATION (Continued)

NOTES (Continued)

Once each 15 minutes of operation of wing anti-ice system, tail de-ice system will automatically be operated for 2-1/2 minutes. During that time, the wing will not be anti-iced. At completion of the 2-1/2 minute period, system will revert to wing anti-ice and start a new 15 minute cycle.

Manual tail de-ice should be initiated 1 minute prior to extension of landing flaps (normally just prior to landing gear extension).

When icing conditions no longer exist,

AIR FOIL Anti-Ice Switch OFF

NOTE

With X-FEED valves open, tail de-ice will be provided for 2-1/2 minutes after AIR FOIL anti-ice switch is moved to OFF.

When TAIL DE-ICE ON light goes off,

PNEU X-FEED VALVE Levers CLOSE

NOTE

One or both ICE PROTECT TEMP HIGH lights may come on upon completion of the 2-1/2 minute tail de-ice cycle if PNEU X-FEED VALVE levers are left in OPEN.

■ ENG Anti-Ice Switches OFF

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FLIGHT CREW OPERATING MANUAL

ENGINE ANTI-ICE GROUND AND FLIGHT

CAUTION

Periodic engine run-up (with engine anti-icing system on), to as high a thrust setting as practical, (70% N_1 for a minimum of 15 seconds is desired or alternately 60% N_1 for a minimum of 40 seconds) should be performed to minimize possibility of ice build-up during extended ground idle operation in severe icing conditions. It is suggested that such run-ups need not be made more frequently than at ten minute intervals. Subsequent airplane takeoff under these severe icing conditions should be preceded by a static run-up to as high a thrust level as practical with observation of EPR and EGT to assure normal engine operation. Engine run-ups on the ground are equally applicable to taxi-in as well as to ground holding and taxi-out.

NOTES

Engine and airfoil anti-ice should be on whenever icing conditions exist or are expected.

Engine anti-ice should be used during ground operation if outside air temperature is less than 6°C (42°F) and visible moisture is present or dewpoint and outside air temperature (RAT or SAT) are within 3°C (5°F) of each other.

Engine anti-ice should be used during flight when ram air temperature is less than 6°C (42°F) and visible moisture is present or if ice buildup occurs on windshield wipers or edges of windshields.

The higher the temperature, the higher the cloud liquid water content and the more severe will be the icing conditions. At temperatures below -20°C (-4°F), icing conditions encountered should be less severe. However, heavy icing has on occasion been reported at temperatures as low as -60°C (-76°F).

(Continued)

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FLIGHT CREW OPERATING MANUAL

ENGINE ANTI-ICE GROUND AND FLIGHT (Continued)

ENG IGN Selector SYS A OR SYS B

NOTES

Duty cycle for ignition in SYS A or SYS B is 10 minutes on, 10 minutes off. Alternately selecting SYS A and SYS B at 10 minute intervals will conform to engine ignition limitations.

When encountering engine inlet icing conditions and before engine anti-icing system is turned on, verify ENG IGN selector is in SYS A or SYS B.

After stabilized engine operation is established, ENG IGN selector may be rotated to OFF.

ENG Anti-Ice Switches ON (ONE AT A TIME)

Move ENG anti-ice switches to ON (one at a time). Wait until engine is stabilized before turning on opposite engine anti-ice.

L and R ENG ANTI-ICE ON Lights CHECK ON

L and R ENG VALVE Lights CHECK OFF

NOTES

During ground operation, if a L or R ENG VALVE light remains on, call maintenance.

In flight, if a L or R ENG VALVE light is on, one or more engine anti-ice valves has malfunctioned. Depart icing area as soon as possible. Maintain engine operation at desired thrust level. Minimize throttle movement until clear of icing area. Make log entry.

While operating in EPR LIM mode with autothrottles engaged, icing of engine pressure ratio probes may cause throttles to retard. EPR indication will be same as limit shown in TRI. If engines are icing at different rates, autothrottles may disconnect. If throttles retard, degradation of climb performance may occur. If allowed to continue in indicated airspeed or mach mode, a descent will be initiated. If in vertical speed mode, airspeed will decrease.

(Continued)

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FLIGHT CREW OPERATING MANUAL

ENGINE ANTI-ICE GROUND AND FLIGHT (Continued)

If in flight,

AIR FOIL Anti-Ice Switch ON

When engine anti-ice is no longer required,

AIR FOIL Anti-Ice Switch OFF

ENG Anti-Ice Switches OFF

NOTE

Engine thrust will increase when ENG anti-ice switches are moved to OFF. It may be necessary to adjust throttles to avoid exceeding engine limits or to maintain desired thrust setting.

ENG ANTI-ICE ON Lights, ENG VALVE Lights. CHECK OFF

NOTE

An ENG ANTI-ICE ON light on, or an ENG VALVE light on indicates one or more engine anti-ice valves did not close. If it occurs during ground operation, call maintenance. If it occurs during flight, make log entry.

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FLIGHT CREW OPERATING MANUAL

RAIN REPELLENT OPERATION

WARNING

The chemical used in rain repellent systems may cause eye or respiratory irritation or cardiac sensitization.

Some formulations may contain an additive with a strong citrus odor. If such an odor is detected, or if a leak in the rain repellent system is suspected, don oxygen mask and goggles.

CAUTION

Do not apply repellent to a dry windshield because impaired visibility may result. Do not turn on wipers if repellent is inadvertently applied to a dry windshield.

WINDSHIELD WIPER Selector SLOW/FAST (AS REQUIRED)

One RAIN REPELLENT Button PUSH

Push one RAIN REPELLENT button, observe repellent application and release button. Usually one application per windshield is sufficient.

CAUTION

A slight clouding effect may exist until windshield wipers spread fluid.

Do not apply repellent to second windshield until visibility has been established through first windshield.

When visibility has been established through first windshield.

Remaining RAIN REPELLENT Button PUSH

Push remaining RAIN REPELLENT button, observe repellent application and release button.

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FLIGHT CREW OPERATING MANUAL

ICE AND RAIN PROTECTION - ABNORMAL OPERATION

AIRFOIL ICE PROTECTION INOPERATIVE

Prior to final approach,

Add 5 knots to all minimum maneuvering speeds. Do not extend flaps beyond 28/EXT as a decrease in airplane controllability may result.

For final approach,

Flaps/Slats 28/EXT

Speed V_{REF} FOR 28/EXT + 5-KNOTS

If go-around is initiated,

Flaps/Slats RETRACT TO 15/EXT

Speed MAINTAIN

NOTE

Do not use 0/EXT through 13/EXT for maneuvering or go-around when wing icing is present or suspected due to possible adverse characteristics.

AIRFOIL ICE PROT PRESS ABNORMAL LIGHT ON

Phase Of Flight DETERMINE



Ground

PNEU X-FEED VALVE Levers CLOSE

APU AIR Switch OFF

[END]

In flight

(Continued)

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FLIGHT CREW OPERATING MANUAL

AIRFOIL ICE PROT PRESS ABNORMAL LIGHT ON (Continued)

AIR FOIL Anti-Ice Switch CHECK

 Off

NOTE

With switch off, light on indicates failure of ice protection pressure regulator to shut off.

PNEU X-FEED VALVE Levers CLOSE

[END]

On

PNEU X-FEED VALVE Lever(s) VERIFY OPEN

PNEU PRESS Gage ABOVE 22 PSI

■ SUPPLY AIR PRESS REGULATOR VALVE Circuit Breaker (Lower EPC). CHECK/RESET

AIRFOIL ICE PROT PRESS ABNORMAL Light OBSERVE

 Off

Continue normal operation.

[END]

On

AIR FOIL Anti-Ice Switch OFF

PNEU X-FEED VALVE Levers CLOSE

Avoid icing areas.

If unable to avoid icing areas, refer to Abnormal Procedure – AIRFOIL ICE PROTECTION INOPERATIVE.

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FLIGHT CREW OPERATING MANUAL

ICE FOD ALERT ANNUNCIATION

(Airplanes with Service Bulletin 30-64 or production equivalent)

NOTES

Ice on the wing upper surface is often clear and difficult to detect. The most probable location of ice formation due to super-cooled fuel is near the inboard, aft corner of the main wing fuel tanks.

Flight crew must ensure compliance with cold weather procedures. Refer to Section 3, PROCEDURES & TECHNIQUES-COLD WEATHER PROCEDURES.

Phase Of Flight DETERMINE



After takeoff

WING ICE DETECTION Circuit Breaker (Lower EPC) PULL

Make log entry

[END]

On ground

Wing Upper Surface. INSPECT FOR ICE

De-ice if necessary.

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FLIGHT CREW OPERATING MANUAL

ICE PROTECT SUPPLY PRESS HI LIGHT ON

PNEU X-FEED VALVE Levers MOVE TOWARD CLOSE

PNEU PRESS Gage OBSERVE

When PNEU PRESS gage reads approximately 22 psi,

Stop moving PNEU X-FEED VALVE Levers.

Readjust when power, speed or altitude is changed.

ICE PROTECT TEMP HI LIGHT ON

Associated PNEU X-FEED VALVE Lever CLOSED

NOTE

Closing affected system PNEU X-FEED VALVE lever deactivates temperature control of associated augmentation valve. Augmentation is now controlled by associated air conditioning system pressure demands.

ICE PROTECT TEMP LOW LIGHT ON

Associated PNEU X-FEED VALVE Lever OPEN

NOTE

If at low engine power, advance power.

Associated ICE PROTECT AUGMENT VALVE Circuit Breaker RESET (IF TRIPPED)

CAUTION

A tripped circuit breaker may be reset only once. If a circuit breaker trips after it has been reset, the cause should be determined and corrected before attempting a subsequent reset.

If light does not go off,

Associated PNEU X-FEED VALVE Lever CLOSED

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FLIGHT CREW OPERATING MANUAL

PITOT/STALL HEATER OFF LIGHT ON

Verify METER SEL & HEAT selector is not in OFF.

Failed Unit DETERMINE

Rotate METER SEL & HEAT selector and check for heater current. If any unit indicates no heater current, crosscheck appropriate instruments for valid indications.

NOTE

If in icing conditions, airspeed and Mach may be restored by moving CADC selector to BOTH ON 1 or BOTH ON 2 as appropriate.

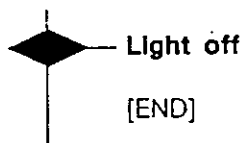
Applicable Circuit Breakers. RESET (IF TRIPPED)

Reset (if tripped), applicable circuit breakers – CAPTAIN'S PITOT HEATER (Overhead panel), AUX and FIRST OFFICER'S PITOT HEATER, ANGLE OF ATTACK & VANE HEATER and RUDDER Q LIMITER HEATER (Lower EPC).

CAUTION

A tripped circuit breaker may be reset only once. If a circuit breaker trips after it has been reset, the cause should be determined and corrected before attempting a subsequent reset.

PITOT/STALL HEATER OFF Light CHECK



Light on

Depart icing area.

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FLIGHT CREW OPERATING MANUAL

**PRESSURIZATION SURGE OCCURS
WHEN AIR FOIL ICE PROTECTION
SYSTEM IS SWITCHED ON**

NOTE

This condition indicates a leak from wing anti-ice duct into pressurized area.

AIR FOIL Anti-Ice Switch OFF

PNEU X-FEED VALVE Levers CLOSE

Avoid icing area.

If unable to avoid icing areas, refer to Abnormal Procedure – AIRFOIL ICE PROTECTION INOPERATIVE.

NOTE

Difficulty may be encountered in maintaining cabin differential pressure due to pressurization loss through ruptured airfoil anti-ice duct.

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FLIGHT CREW OPERATING MANUAL

SEVERE RAIN/ICE/TURBULENCE

ENG IGN Selector SYS A OR SYS B

NOTE

Ignition duty cycle for SYS A, SYS B, BOTH or OVRD is 10 minutes on, 10 minutes off.

PNEU X-FEED VALVE Levers OPEN

ENG/AIR FOIL Anti-Ice Switches AS REQUIRED

NOTE

Engine and airfoil anti-ice systems should be off if RAT is above 6°C or no icing is encountered or anticipated. Reduced engine bleeds will increase engine flameout margin during periods of heavy water ingestion.

APU START

TURB Mode Button PUSH

Push TURB mode button and observe autothrottle system disengages. Push ATS disconnect button (on throttle) to turn off flashing red lights. If system does not disengage, move AUTO THROT switch to OFF and push TURB mode button again. Verify YAW DAMP switch is in ON.

During an extreme turbulence encounter, fly attitude indicator as primary pitch reference. Sacrifice altitude to maintain attitude. Descend if necessary to improve buffet margin. Do not chase airspeed.

ENG SYNC Selector OFF

Airspeed MONITOR

NOTES

The recommended turbulence penetration air speed is 275 to 285 KIAS or Mach .75 to .79 (whichever is lower). At 10,000 feet and below, minimum recommended speed is 250 KIAS or minimum maneuvering (whichever is greater). Do not fly less than minimum maneuvering speed for existing configuration.

When flying PMS (if installed), disengage when turbulence exceeds moderate then fly to recommended speed schedule.

(Continued)

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FLIGHT CREW OPERATING MANUAL

SEVERE RAIN/ICE/TURBULENCE (Continued)

Throttles

SET

NOTES

Use speedbrakes to slow airplane. Adjust throttles only as necessary to avoid excessive airspeed variations. Use smooth power changes and maintain thrust as high as practicable. Do not chase airspeed.

If throttles are at idle when extreme precipitation is encountered, N_2 should be monitored for spool-down below idle rpm (GEN OFF light may come on). Delay throttle advance as long as possible and, when necessary, very slowly advance one throttle at a time while monitoring N_2 for response. If no response is noted, return throttle to idle and wait for indications of spool-up to idle rpm.

During the unavoidable encounter of exceptionally severe icing conditions (those that occur on an infrequent basis), it is desirable to maintain a minimum of 70% N_1 . Necessary thrust reductions below this level should be limited in duration with a maximum of one minute but to not less than 55% N_1 . A minimum of 70% N_1 should be maintained following re-acceleration for at least one minute and preferably longer before reducing thrust again.

The left and right windshields consist of primary and secondary de-ice areas. Under severe icing conditions, the secondary de-ice areas may not completely de-ice. Due to the geometry of these windshields, the heat flow to the secondary de-ice area is not adequate to remove the ice.

Increased engine vibration during low thrust operation in severe icing conditions, with or without engine anti-ice, may be due to fan blade icing. This is especially suspect if more than one engine experiences higher than normal vibration levels. If fan blade icing is suspected, verify ENG IGN selector is in SYS A or SYS B. If engine anti-ice is off, reduce thrust (one engine at a time) to idle and turn on engine anti-ice. Accelerate affected engine to 70% N_1 while closely monitoring engine instruments (especially EGT) for any abnormalities. If vibration decreases (indicating ice removal), resume normal operation for existing conditions. If vibration does not decrease after one minute, consider engine shutdown.

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FLIGHT CREW OPERATING MANUAL

**TAIL DE-ICE ON LIGHT GOES OFF
IMMEDIATELY AFTER TAIL
DE-ICE IS ACTIVATED**

When tail de-ice is required,

Push and hold TAIL de-ice button in for 2-1/2 minutes.

TAIL DE-ICE INOPERATIVE

NOTE

TAIL DE-ICE ON light does not come on when TAIL DE-ICE is selected.

Prior to final approach,

Add 5 knots to all minimum maneuvering speeds. Do not extend flaps beyond 28/EXT as a decrease in controllability may result.

For final approach,

Flaps/Slats 28/EXT

Speed VREF FOR 28° FLAPS + 5 KNOTS

If go-around is initiated,

Flaps/Slats RETRACT TO 15/EXT

Speed APPROPRIATE MAN SPD FOR 15/EXT + 5 KNOTS

NOTE

If approach climb limited, consider using 11/EXT.

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FLIGHT CREW OPERATING MANUAL

TAIL DE-ICE ON LIGHT ON CONTINUOUSLY

WING & TAIL VALVES C/B (Lower EPC) OPEN (PULL)

NOTE

Opening the WING & TAIL VALVES C/B will cause the wing anti-ice valve to open and the tail anti-ice valve to close.

AIRFOIL ICE PROT PRESS ABNORMAL Light OBSERVE



On

When tail de-ice is required, reset WING & TAIL VALVES C/B for 2.5 minutes. Observe AIRFOIL ICE PROT PRESS ABNORMAL light goes off. After 2.5 minutes, pull C/B. Repeat as required.

[END]

Off

AIR FOIL Anti-Ice Switch OFF

PNEU X-FEED VALVE Levers CLOSE

Avoid icing areas.

If unable to avoid icing areas, refer to Abnormal Procedure – AIRFOIL ICE PROTECTION INOPERATIVE.

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FLIGHT CREW OPERATING MANUAL

WINDSHIELD HEAT INOPERATIVE

NOTE

Ice buildup at the edges of windshields is not a positive indication of inoperative windshield heat. The left and right windshields consist of primary and secondary de-ice areas. Under severe icing conditions, the secondary de-ice area may not completely de-ice. Due to the geometry of these windshields, the heat flow to the secondary de-ice area is not adequate to remove the ice.

Altitude DETERMINE



Above 10,000 feet

No restrictions.

Below 10,000 feet

When below 10,000 feet, limit speed to 315 KIAS if outer anti-ice glass (pane) ply is cracked or 235 KIAS if inner defog glass (pane) ply is cracked.

NOTE

Do not operate windshield heat on a cracked glass (pane) ply. Pull respective WINDSHIELD ANTI-ICE circuit breaker for a cracked outer glass (pane) ply and/or ANTI-FOG circuit breaker for a cracked inner glass (pane) ply (lower EPC).

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FLIGHT CREW OPERATING MANUAL

**WING ANTI-ICE ON LIGHT IS OFF
WITH AIR FOIL ANTI-ICE
SWITCH ON**

AIRFOIL ADVISORY & PRESSURE ABNORMAL CAUTION

Circuit Breaker (Lower EPC) RESET (IF TRIPPED)

CAUTION

A tripped circuit breaker may be reset only once. If a circuit breaker trips after it has been reset, the cause should be determined and corrected before attempting a subsequent reset.

PNEU X-FEED VALVE Levers/AIRFOIL ICE PROT ABNORMAL Light. CLOSE/OBSERVE

Move PNEU X-FEED VALVE levers to close and observe AIRFOIL ICE PROT PRESS ABNORMAL light.



Light off

Confirms inoperative anti-ice system.

AIR FOIL Anti-Ice Switch OFF

On

PNEU X-FEED VALVE Levers OPEN

After one minute,

AIRFOIL ICE PROTECT ABNORMAL Light OBSERVE



On

AIR FOIL Anti-Ice Switch OFF

PNEU X-FEED VALVE Levers CLOSE

Avoid icing areas.

If unable to avoid icing areas, refer to Abnormal Procedure – AIRFOIL ICE PROTECTION INOPERATIVE.

[END]

Off

Confirms WING ANTI-ICE ON light malfunction.

Continue normal operation.

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FLIGHT CREW OPERATING MANUAL

Chapter 13

INSTRUMENTATION AND NAVIGATION

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NORMAL OPERATION – OMEGA NAVIGATION SYSTEM (Continued)				
Forced Absolute Mode	13-20-5	2	39	All
Forced Relative Mode	13-20-5	2	40	All
Position Uncertainty Estimate	13-20-5	2	40	All
Manual Initiation Of LAR (Lane Ambiguity Resolution)	13-20-5	2	41	All
Display Of Signal Quality Readings	13-20-5	2	42	All
Failures and Negative Status Changes	13-20-5	2	43	All
Ambiguity Message Procedure	13-20-5	2	44	All
Dead Reckoning (DR) Mode	13-20-5	2	45	All
Operation With Failed Heading Input	13-20-5	2	47	All
Manual Deselection Of Unreliable TAS Input	13-20-5	2	48	All
Manual Deselection Of Unreliable Heading Input	13-20-5	2	49	All
Restoring Power To ONS After Power Interruption	13-20-5	2	50	All
Entry Error, System Status and Failure Messages	13-20-5	2	51	All
ABNORMAL OPERATION				
Operation Without Radome Or Airspeed Indicator	13-30-0	5	1	All

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FLIGHT CREW OPERATING MANUAL

INSTRUMENT AND NAVIGATION - LIMITATIONS

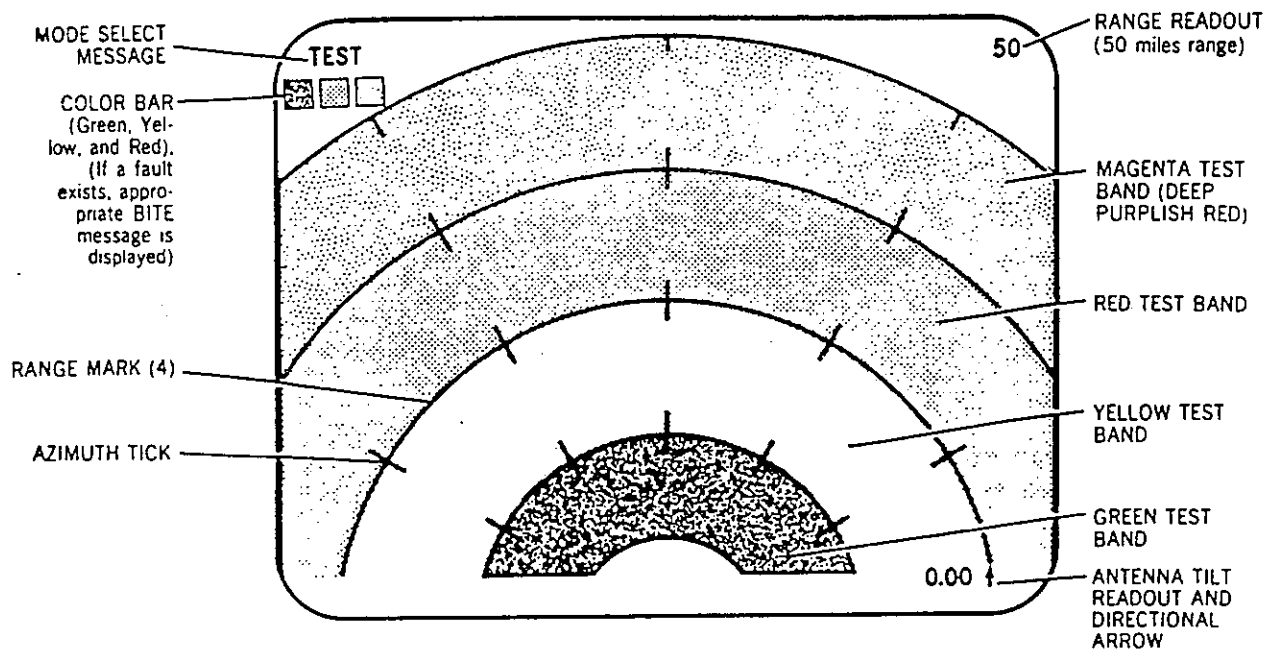
- There are no instrumentation and navigation limitations.

DC-9 *Super 80*

FLIGHT CREW OPERATING MANUAL

INSTRUMENTATION AND NAVIGATION - NORMAL OPERATION

TYPICAL WEATHER RADAR TEST PATTERN



RA1-604F

MD-80

FLIGHT CREW OPERATING MANUAL

WEATHER RADAR TEST PROCEDURES

PWR Button PUSH

Push button to apply power to system.

STAB Select Button PUSH

INT Control Knob ADJUST

Rotate INT control knob to adjust indicator brightness to a comfortable level.

Observe the indicator for the following:

- Antenna tilt readout and directional arrow cycles to 15.00 ↑, to 15.00 ↓ and then stabilizes at 0.00.
- Four distinct color bands (green, yellow, red and magenta) are displayed.
- Mode select message annunciates TEST.
- Color bar (green, yellow, red) is displayed. No BITE (T/R, ANT, CTL or IND) are annunciated. Alert message slot is blank.
- Stabilization status message slot is blank.
- Range readout displays 50.

WX Select Button PUSH

RNG Select Button PUSH

Push any RNG select button that is not already displayed in range readout.

TILT Control Knob SET

Rotate TILT knob until 5.00 ↑ appears in antenna tilt readout.

Observe the indicator for the following:

- Mode select message annunciates WX.
- Range readout agrees with RNG select button that was pushed.
- No appreciable noise (no more than approximately 6 random dots) is present on the display.
- Color bar (green, yellow, red) is displayed. No BITE messages (T/R, ANT, CTL or IND) are annunciated. Alert message slot is blank.
- Stabilization status message slot is blank.

PWR Button PUSH

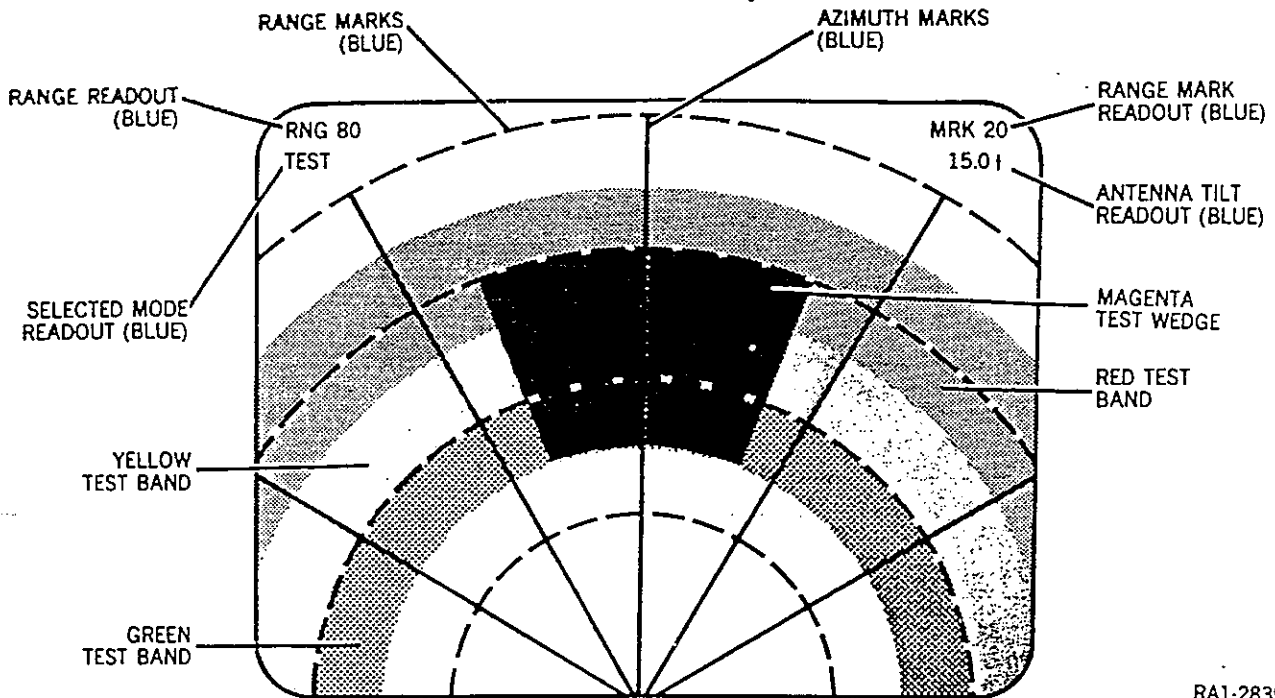
If test pattern is satisfactory, push PWR button to remove power from system.

MD-80

FLIGHT CREW OPERATING MANUAL

INSTRUMENTATION AND NAVIGATION – Normal Operation

TYPICAL WEATHER RADAR TEST PATTERN



RA1-2839

MD-80

FLIGHT CREW OPERATING MANUAL

WEATHER RADAR TEST PROCEDURES

Mode Selector TEST
GAIN Control AUTO
STAB Switch ON
BRT Control AS DESIRED

Rotate brightness control knob until indicator brightness is at a comfortable level.

Range Selector AS DESIRED

Range selector can be in any desired position.

Observe indicator sweep trace is scanning smoothly from 90° one side of center to 90° the other side of center in approximately 4 seconds.

Antenna Tilt Control CHECK

Rotate antenna tilt control knob to +15 and observe antenna tilt control readout displays 15.0 ↑. Rotate knob to -15 and observe antenna tilt control readout displays 15.0 ↓.

Observe the test pattern for the following display:

- Range and azimuth marks.
- Green, yellow and red test bands.
- Magenta test wedge.
- The word TEST should appear in selected mode readout.
- Digital range (RNG) readout should read programmed selection for range selector position. (Example - With range selector set at 80, four range marks at 20 NM intervals will appear on indicator).
- Antenna tilt readout should agree with value selected on antenna tilt control.

NOTE

If system monitor detects a line replaceable unit (LRU) fault during test, a fault legend for one or more LRU's will be displayed on indicator.

Mode Selector OFF

If the test pattern is satisfactory, rotate mode selector to OFF.

MD-80

FLIGHT CREW OPERATING MANUAL

INSTRUMENTATION AND NAVIGATION - NORMAL OPERATION

OMEGA NAVIGATION SYSTEM (MARCONI 771-A)

ONS START-UP PROCEDURE

Verify all relevant circuit breakers are set.

STS PWR Key PUSH

Push STS PWR key on CDU to initiate automatic start-up sequence.

Observe STS PWR annunciator comes on, last six digits of operational program number appears in upper right-hand display and program revision level number appears in upper left-hand display. At the same time, primary operating mode is annunciated in lower display by the appearance of ABS for absolute mode or REL for relative mode.

Verify that operational program number and primary operating mode are correct.

After ten seconds, automatic lamp test will be initiated.

Following completion of lamp test, observe DATA annunciator comes on and identifier GMT-DT appears in lower display. Current Greenwich Mean Time and date are displayed in upper left and right-hand displays respectively.

Verify GMT and date are correct.

ENT Key PUSH

Push ENT key. If GMT requires updating, use data entry keys to insert correct GMT.

ENT Key PUSH

Push ENT key. If date requires correction, use data entry keys to insert correct date.

ENT Key PUSH

Push ENT key and observe DATA annunciator goes off and POS annunciator comes on, previously stored present position coordinates appear in upper display and the word LATLON is annunciated in the lower display.

Verify present position coordinates are correct.

(Continued)

MD-80

FLIGHT CREW OPERATING MANUAL

ONS START-UP PROCEDURE (Continued)

ENT Key PUSH

Push ENT key. If latitude requires updating, use data entry keys to insert correct latitude.

NOTE

If latitude is to be corrected, it must be preceded by pushing either N(2) or S(8) data key for north or south latitude.

ENT Key PUSH

Push ENT key. If longitude requires updating, use data entry keys to insert correct longitude.

NOTE

If longitude is to be corrected it must be preceded by pushing either W(4) or E(6) data key for east or west longitude.

ENT Key PUSH

Push ENT key and observe POS annunciator goes off and FLT PLN annunciator comes on, ACT-RT is annunciated in lower display and number of last active route appears in upper right display with the number of waypoints in the upper left display.

ENT Key PUSH

Push ENT key. If a different active route is desired, use data entry keys to enter route number in upper right-hand display.

ENT Key PUSH

Push ENT key. If a different active route had been selected, it has now been loaded from the library.

A scrolling list of all existing status/fault messages (if any) will automatically appear in the lower display.

(Continued)

MD-80

FLIGHT CREW OPERATING MANUAL

ONS START-UP PROCEDURE (Continued)

After viewing these messages.

CLR/BK Key PUSH

Push CLR/BK key to cancel display of status/fault messages and allow lower display to revert to its normal state.

NOTES

If ONS is still in the process of achieving synchronization following completion of start-up procedure, MSG annunciator on the CDU and the remote OMEGA MESSAGE annunciator will remain on.

Pushing STS PWR key on the CDU will display the message DR. ONS will continue synchronization process during remaining pre-flight procedures. When ONS is ready to navigate, MSG and remote annunciators will go off.

If MSG and remote annunciators do not go off by pushing CLR/BK key, then ONS is in DR mode or has a major fault.

MD-80

FLIGHT CREW OPERATING MANUAL

DEFINING AN ACTIVE FLIGHT PLAN BY MANUAL ENTRY

NOTES

An active flight plan can consist of up to 99 waypoints.

Once defined, an active flight plan will remain stored by the ONS (even during power interruptions) until it is modified, deleted or replaced by a new active flight plan.

FLT PLN Key. PUSH/HOLD/RELEASE

Push and hold FLT PLN key. When ACT-RT appears in lower display, release key. An identifying route number of up to four digits will appear in upper right-hand display.

NOTES

If the number zero is displayed, no route number was assigned to the previous active route.

The one or two digit number appearing in upper left-hand display indicates total number of waypoints contained in previous active route.

ENT Key PUSH

Push ENT key and observe upper right-hand display goes blank.

0 (DIM) Key PUSH

Push 0 (DIM) key to delete former active flight plan.

ENT Key PUSH

Push ENT key and observe 0 appears in left-hand display. ONS is now ready to accept entry of waypoint coordinates.

NOTE

When active route is deleted (no defined waypoints), From/To display will indicate XX-XX and BRG DIS, XTK TKE, ETE, ETA and DTK displays will be blanked to indicate these parameters are not available.

(Continued)

MD-80

FLIGHT CREW OPERATING MANUAL

DEFINING AN ACTIVE FLIGHT PLAN BY MANUAL ENTRY (Continued)

WPT Key PUSH

Push WPT key. Observe WPT key comes on and lower display reads WPT-01 and all 9's (undefined coordinates) appear in upper display.

Two types of waypoints can be created, numbered waypoints or alpha waypoints.

To enter a waypoint,

Type Of Waypoint Desired DETERMINE

Numbered waypoint

ENT Key PUSH

Push ENT key and observe upper left-hand display blanks.

Desired Latitude ENTER

Use data entry keys to enter desired latitude.

NOTE

If an incorrect value is entered for a waypoint coordinate (latitude greater than 90 degrees, longitude greater than 180 degrees or minutes greater than 59), the entry is rejected and the words ENTRY ERROR will alternately appear in lower display. If this occurs, push CLR BK key to clear message, then re-enter data.

ENT Key PUSH

Push ENT key and observe upper right-hand display blanks.

Desired Longitude ENTER

Enter desired longitude using data entry keys. Verify displayed data is correct.

ENT Key PUSH

Push ENT key. Waypoint has now been loaded into active flight plan.

NOTE

After a short delay, display will automatically increment to next waypoint.

[END]

Alpha waypoints

(Continued)

MD-80

FLIGHT CREW OPERATING MANUAL

DEFINING AN ACTIVE FLIGHT PLAN BY MANUAL ENTRY (Continued)

IDENT Key PUSH

Push IDENT key and observe _____ 01 (indicating undefined identifier for waypoint 01) appears in lower display.

ENT Key PUSH

Push ENT key and observe lower display blanks.

Alphanumeric Identifier ENTER

Enter alphanumeric identifier into lower display using data entry keys.

NOTE

Any combination of up to six alphabetic and numeric characters is an acceptable waypoint identifier, with the single exception that the first character must not be a dash.

ENT Key PUSH

Push ENT key. Observe alphanumeric identifier is automatically adjusted to left of lower display.

NOTES

ONS will now search through library to find if coordinates have already been assigned for selected identifier. If so, coordinates will automatically appear in upper display. Display will then increment to next waypoint after a short delay. In this case (if there are more waypoints to be added), repeat previous three steps for entry of next waypoint.

If coordinates have not been previously assigned, upper left-hand display will go blank.

Desired Latitude ENTER

Use data entry keys to enter desired latitude of waypoint.

(Continued)

MD-80

FLIGHT CREW OPERATING MANUAL

DEFINING AN ACTIVE FLIGHT PLAN BY MANUAL ENTRY (Continued)

NOTE

If an incorrect value is entered for a waypoint coordinate (latitude greater than 90 degrees, longitude greater than 180 degrees or minutes greater than 59), entry is rejected and words ENTRY ERROR will alternately appear in lower display. If this occurs, push CLR BK key to clear message, then re-enter data.

ENT Key PUSH

Push ENT key and observe upper right-hand display goes blank.

Desired Longitude ENTER

Use data entry keys to enter desired longitude. Verify displayed data is correct.

ENT Key PUSH

Push ENT key. After a short delay, display automatically increments to identifier and coordinates for next waypoint.

NOTE

If another alpha waypoint is to be added, repeat the previous seven steps.

MD-80

FLIGHT CREW OPERATING MANUAL

FLIGHT PLAN VERIFICATION

NOTE

There are two methods of verifying an active flight plan. One is to step through and verify the coordinates of each waypoint of the route. The other is to display and verify bearing and distance between waypoints of the route.

Type of Verification Desired DETERMINE

Bearing and distance between waypoints

BRG DIS Key PUSH

NOTE

If IDNT annunciator is on, push IDNT key.

Verify displayed bearing and distance to waypoint 01.

0 and 1 Data Entry Keys. PUSH

Push 0 and 1 data entry keys and observe 01 appears in right-hand portion of lower display

NOTES

Arrow in lower display flashes to indicate bearing and distance display may no longer correspond to active leg.

If an undefined waypoint is selected as being the From or To waypoint, a two-part alternating message WAYPNT UNDEFD will appear in lower display and leg selection will be rejected.

0 and 2 Data Entry Keys. PUSH

Push 0 and 2 data entry keys. Observe 02 appears in right-hand portion of lower display and 01 has shifted to the left. Upper displays will blank momentarily while bearing and distance calculations are performed.

Verify displayed bearing and distance are reasonable.

CLR/BK Key PUSH

Push CLR/BK key and observe From/To waypoint display increments to 02 and 03 respectively. Repeat until all sequential legs have been checked.

(Continued)

MD-80

FLIGHT CREW OPERATING MANUAL

FLIGHT PLAN VERIFICATION (Continued)

Type of Verification Desired (Continued)

NOTE

To exit this mode, push any other DMS key.

[END]

Stepping through waypoints

WPT Key PUSH

NOTE

If IDNT key is on, push IDNT key and observe IDNT annunciation goes off.

0 and 1 Keys PUSH

Push 0 key then push 1 key. Observe coordinates for waypoint 01 are now displayed.

NOTE

If waypoint has an identifier, push IDNT key to view identifier.

WPT Key PUSH

Push WPT key and observe coordinates for next waypoint are displayed. Push WPT key as many times as required to verify all waypoints.

NOTE

For high-speed viewing of waypoint display, push and hold WPT key. Observe waypoints slew at a gradually increasing rate. For backward slewing, push and hold CLR/BK key.

MD-80

FLIGHT CREW OPERATING MANUAL

RANGING ALONG FLIGHT PLAN (DURING FLIGHT PLANNING)

NOTE

Cumulative distance, ETE and ETA from present position to any waypoint can be displayed. ETE and ETA are determined using estimated TAS and wind.

DATA Key PUSH/HOLD/RELEASE

Push and hold DATA key until FPTAS appears in lower display then release.

ENT Key/Estimated TAS PUSH/ENTER

Push ENT key, then use data entry keys to enter estimated TAS. Push ENT key again.

DATA Key PUSH/HOLD/RELEASE

Push and hold DATA key until FPWIND appears in lower display then release.

ENT Key/Wind Direction PUSH/ENTER

Push ENT key, then use data entry keys to enter wind direction. Push ENT key again.

Wind Speed ENTER

Use data entry keys to enter estimated wind speed, then push ENT key.

DATA Key PUSH/HOLD/RELEASE

Push and hold DATA key until desired mode appears in lower display (ETE-XX, ETA-XX or DIS-XX).

Waypoint Desired ENTER

Enter two-digit number for desired waypoint. Observe desired data now appears in upper left-hand display.

NOTE

To exit mode, push any other DMS key.

MD-80

FLIGHT CREW OPERATING MANUAL

SELECTION OF INITIAL FLIGHT LEG

NOTE

Initial flight leg is automatically set as leg 00 to 01 whenever a new active flight plan is defined.

When a different initial leg is desired,

POS or XTK/TKE Key PUSH

Push either POS key or XTK/TKE key and observe current From and To waypoint numbers appear in lower display.

NOTE

If IDNT annunciator is on, push IDNT key and observe annunciator goes off.

ENT Key PUSH

Push ENT key and observe ENT annunciator comes on and From and To waypoint numbers are blanked from display.

Desired From Waypoint ENTER

Enter desired From waypoint number using data entry keys.

NOTE

If From waypoint is to be present position, push 0 (DIM) key twice.

Desired To Waypoint ENTER

Use data entry keys to enter desired To waypoint number.

NOTES

If an undefined waypoint is selected as being either the From or To waypoint, the two-part alternating message WAYPNT UNDEFD will appear in lower display and leg selection will be rejected. If this occurs, push CLR/BK key to cancel message then repeat appropriate steps using a valid leg selection.

If 00 is entered as being the To waypoint, the two-part alternating message ILLEGL LEG will appear in lower display. If this occurs, push CLR/BK key to cancel message then repeat appropriate steps using valid entries.

ENT Key PUSH

Push ENT key and observe ENT annunciator goes off and new From/To waypoint numbers are displayed.

MD-80

FLIGHT CREW OPERATING MANUAL

REVERSE DIRECTION FLIGHT PLAN

If it is desired to fly a flight plan in reverse direction (descending order of waypoints instead of ascending order),

POS or XTK/TKE Key PUSH

Push either POS key or XTK/TKE key and observe current From and To waypoint numbers appear in lower display.

NOTE

If IDNT annunciator is on, push IDNT key and observe annunciator goes off.

ENT Key PUSH

Push ENT key and observe ENT annunciator comes on and From and To waypoint numbers are blanked from display.

Desired From Waypoint. ENTER

Use data entry keys to enter desired From waypoint number. Define initial leg such that From waypoint number is greater than To waypoint number (for example: first enter 21 for From waypoint then enter 20 or less for To waypoint).

Desired To Waypoint ENTER

Use data entry keys to enter desired To waypoint number.

NOTES

If an undefined waypoint is selected as being either the From or To waypoint, the two-part alternating message WAYPNT UNDEFD will appear in lower display and leg selection will be rejected. If this occurs, push CLR/BK key to cancel message then repeat appropriate steps using a valid leg selection.

If 00 is entered as being the To waypoint, the two-part alternating message ILLEGL LEG will appear in lower display. If this occurs, push CLR/BK key to cancel message then repeat appropriate steps using valid entries.

ENT Key PUSH

Push ENT key and observe ENT annunciator goes off. Verify new From/To waypoints are displayed and are in proper sequence.

MD-80

FLIGHT CREW OPERATING MANUAL

STORING OF ACTIVE FLIGHT PLAN INTO PROTECTED MEMORY

NOTE

Active flight plans stored in this manner are called Company Routes.

FLT PLN Key. PUSH/HOLD/RELEASE

Push and hold FLT PLN key until STR-RT appears in lower display.

ENT Key PUSH

Push ENT key and observe upper left-hand display blanks.

Data Key 1. PUSH

Push data key 1. Observe 1 appears in upper left-hand display indicating protected memory is unlocked.

ENT Key PUSH

Push ENT key and observe right-hand display goes blank.

Desired Identifier. ENTER

Use data entry keys to enter desired identifier into right-hand display. Route identifier number can be up to four digits. Observe identifier appears in upper right-hand display.

ENT Key PUSH

Push ENT key and observe ENT annunciator goes off. Active flight plan is now stored in protected memory.

NOTE

Left-hand display should now read 0 (zero) (to indicate memory is now locked to protect against inadvertent entry).

MD-80

FLIGHT CREW OPERATING MANUAL

FLIGHT PLAN INTERMEDIATE STOPS

Unless planned for, ONS assumes every newly-defined active flight plan is a non-stop flight to last waypoint in the route. Consequently, automatic leg changes are made throughout the route until final waypoint is approached.

To define an intermediate waypoint as a destination,

FLT PLN Key. PUSH/HOLD/RELEASE

Push and hold FLT PLN key until RT-LMT appears in lower display, then release.

NOTE

Automatic leg changes are inhibited when waypoint number appearing in upper right-hand display is that of current To waypoint. Unless otherwise selected, number in right-hand display is automatically set to last waypoint in the flight plan so that no intermediate stop is in effect.

ENT Key PUSH

Push ENT key and observe upper right-hand display goes blank.

Waypoint Desired/ENT Key ENTER/PUSH

Insert number of waypoint at which leg change is to be inhibited, then push ENT key to complete the procedure.

MD-80

FLIGHT CREW OPERATING MANUAL

DEFINING AN ACTIVE FLIGHT PLAN USING PRE-STORED COMPANY ROUTES

To copy an exact replica of a company route,

FLT PLN Key. PUSH/HOLD/RELEASE

Push and hold FLT PLN key until ACT-RT appears in lower display, then release.

ENT Key PUSH

Push ENT key and observe upper right-hand display goes blank.

Desired Identifying Number. ENTER

Enter identifying number for desired company route.

ENT Key PUSH

Push ENT key. Desired company route is automatically loaded into active flight plan. Observe number of waypoints in flight plan appears in upper left-hand display.

NOTE

The remaining steps are necessary only to join one or more company routes together with the existing active flight plan.

FLT PLN Key. PUSH/HOLD/RELEASE

Push and hold FLT PLN key until ADD-RT appears in lower display then release.

ENT Key PUSH

Push ENT key and observe right-hand display goes blank.

Desired Identifying Number. ENTER

Enter identifying number of company route desired for appending active flight plan.

ENT Key PUSH

Push ENT key. Desired company route is automatically appended to active flight plan with its waypoints renumbered accordingly.

NOTE

To add additional company routes to the active flight plan, repeat previous three steps as many times as necessary.

MD-80

FLIGHT CREW OPERATING MANUAL

MODIFYING AN ACTIVE FLIGHT PLAN

NOTE

Several methods are available for modification of an already defined active flight plan.

Type of Modification Desired. DETERMINE

Single waypoint modification

WPT Key PUSH

Push WPT key and observe WPT key comes on.

NOTE

If IDNT annunciator is on, push IDNT key and observe annunciator goes off.

Waypoint Number ENTER

Use data entry keys to enter number of waypoint to be modified.

Waypoint Identifier Needed DETERMINE

Identifier needed

IDNT Key PUSH

Push IDNT key and observe IDNT annunciator comes on.
Enter new waypoint identifier in normal manner.

[END]

Identifier not needed

Enter or confirm new coordinates of modified waypoint in the normal manner.

[END]

Insertion of an additional waypoint

NOTES

Following procedure allows insertion of an extra waypoint into an already-defined active flight plan.

Waypoints following newly-inserted waypoint are automatically renumbered to make space for the additional waypoint.

(Continued)

MD-80

FLIGHT CREW OPERATING MANUAL

MODIFYING AN ACTIVE FLIGHT PLAN (Continued)

Type of Modification Desired (Continued)

NOTES (Continued)

To insert a group of additional waypoints into the active flight plan, it is necessary to repeat procedure as many times as there are waypoints to be added.

An attempt to add a waypoint to an active flight plan containing 99 waypoints will result in the message ACT RT FULL being displayed.

WPT Key PUSH

Push WPT key and observe WPT key comes on.

IDNT Key PUSH

Push IDNT key and observe IDNT annunciator comes on.

ENT Key PUSH

Push ENT key and observe lower display goes blank.

9(YZ-) Key PUSH/HOLD/RELEASE

Push and hold the 9(YZ-) key until - appears in lower display then release.

1(ABC) Key PUSH

Push 1(ABC) key one time, observe lower display now reads -A to indicate that a waypoint is to be added.

Waypoint Number ENTER

Enter two-digit number of waypoint which precedes new waypoint (for example; to add a new waypoint after existing waypoint 5, entry of -A05 in lower display indicates new waypoint 6 is to be defined and existing waypoints 6,7,8, etc. are to be renumbered 7,8,9 etc.).

ENT Key PUSH

Push ENT key and observe lower display goes blank.

Enter identifier and coordinates for new waypoint in normal manner.

[END]

(Continued)

MD-80

FLIGHT CREW OPERATING MANUAL

MODIFYING AN ACTIVE FLIGHT PLAN (Continued)

Type of Modification Desired (Continued)

Deletion of a single waypoint

NOTES

The following procedure allows deletion of a waypoint from within an already-defined active flight plan.

Waypoints following the deleted waypoint will be automatically renumbered accordingly.

To delete a group of waypoints from an active flight plan, it is necessary to repeat the following procedure as many times as there are waypoints to delete.

WPT Key PUSH

Push WPT key and observe WPT key comes on.

IDNT Key PUSH

Push IDNT key and observe IDNT annunciator comes on.

ENT Key PUSH

Push ENT key and observe lower display goes blank.

9(YZ-) Key PUSH/HOLD/RELEASE

Push and hold 9(YZ-) key until - appears in lower display then release.

2(DEF) Key PUSH

Push 2(DEF) key once. Observe lower display reads -D to indicate waypoint is to be deleted.

Waypoint Number ENTER

Use data entry keys to enter waypoint number to be deleted.

ENT Key PUSH

Push ENT key to complete deletion procedure.

[END]

Deleting remainder of flight plan

(Continued)

MD-80

FLIGHT CREW OPERATING MANUAL

MODIFYING AN ACTIVE FLIGHT PLAN (Continued)

NOTE

Use this procedure to delete all waypoints extending from one particular waypoint to end of active flight plan.

WPT Key PUSH

Push WPT key and observe WPT key comes on.

IDNT Key PUSH

Push IDNT key and observe IDNT annunciator comes on.

ENT Key PUSH

Push ENT key and observe lower display goes blank.

9(YZ-) Key PUSH/HOLD/RELEASE

Push and hold 9(YZ-) key until - appears in lower display then release.

3(GHI) Key PUSH

Push 3(GHI) key once. Observe lower display reads -G to indicate waypoints are to be deleted.

Waypoint Number ENTER

Use data entry keys to enter number of first waypoint to be deleted.

ENT Key PUSH

Push ENT key to complete deletion procedure.

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FLIGHT CREW OPERATING MANUAL

COMPANY ROUTE LIST DISPLAY

A complete list of route numbers currently stored in the company route library can be recalled at any time as follows:

FLT PLN Key. PUSH/HOLD/RELEASE

Push and hold FLT PLN key until RT-LST appears in lower display then release.
Observe RT-LST remains in lower display for 3 seconds and upper displays are blanked.

Observe route number of first stored company route appears in upper right-hand display and number of waypoints in route appears in upper left-hand display. Lower display will contain identifier of last waypoint in route or _____ if no identifier was defined for that waypoint.

NOTES

Pushing CLR/BK key will display identifier of first waypoint in route.

Display will automatically scroll through complete list of company routes.

MD-80

FLIGHT CREW OPERATING MANUAL

FLIGHT PLAN CROSSFILLING (NOT APPLICABLE TO SINGLE OMEGA SYSTEM)

Use this procedure to transmit or receive flight plan to or from other systems.

Mode of Operation DETERMINE

Transmit

Load or create desired active flight plan.

FLT PLN Key. PUSH/HOLD/RELEASE

Push and hold FLT PLN key until XLD-TX appears in lower display then release key.

ENT Key PUSH

Data Entry Key 1 PUSH

Push data entry key 1 and observe 1 appears in upper right-hand display.

ENT Key PUSH

Push ENT key. When all waypoints have been transferred, XLD-TX will appear in lower display and 0's (zeros) will appear in upper display.

NOTE

Check receiving system(s) for successful transfer. If receiving system(s) failed to receive all waypoints, repeat procedure.

[END]

Receive

On receiving system prior to initiating transmission from sending system,

FLT PLN Key. PUSH/HOLD/RELEASE

Push and hold FLT PLN key until XLD-RX appears in lower display then release key.

ENT Key PUSH

Data Entry Key 1 PUSH

Push data entry key 1 and observe 1 appears in upper right-hand display.

ENT Key PUSH

Push ENT key and observe upper displays now contain status of cross-load.

NOTE

If crossfilling is not successful (status indicating a non-zero value), repeat procedure.

MD-80

FLIGHT CREW OPERATING MANUAL

MODIFICATION OF COMPANY ROUTE LIBRARY

NOTE

Several methods are available for modifying the company route library.

Type of Modification Desired. DETERMINE

Deletion of a company route

FLT PLN Key. PUSH/HOLD/RELEASE

Push and hold FLT PLN key until DEL-RT appears in lower display then release.

ENT Key PUSH

Push ENT key and observe upper left-hand display goes blank.

Data Entry Key 1 PUSH

Push data entry key 1 to unlock the protected memory.

ENT Key PUSH

Push ENT key and observe upper right-hand display goes blank.

Route Number ENTER

Use data entry keys to enter number of route to be deleted.

ENT Key PUSH

Push ENT key to delete route. Observe 0 (zero) appears in upper left-hand display indicating library is re-locked.

[END]

Modification of a specific company route

NOTE

This is a general method applying to all types of modifications, excluding the special case of modification of coordinates assigned to a company route identifier.

(Continued)

MD-80

FLIGHT CREW OPERATING MANUAL

MODIFICATION OF COMPANY ROUTE LIBRARY (Continued)

Type of Modification Desired (Continued)

Load company route to be modified into active flight plan.

Delete unmodified company route from library by using procedure Deletion Of a Company Route.

Modify route using procedure Modifying An Active Flight Plan.

Insert modified route into company route library using procedure Storing Of Active Flight Plan Into Protected Memory.

[END]

Modification of coordinates assigned to a company route identifier

NOTE

Using this method to correct coordinates of a waypoint identifier will change that waypoint in every company route in which it appears.

Load route containing waypoint to be modified into active flight plan.

WPT Key PUSH/HOLD/RELEASE

Push and hold WPT key until desired waypoint is displayed then release.

ENT Key PUSH

Push ENT key twice and observe upper left-hand display goes blank.

Latitude/Longitude ENTER

Enter new coordinates for latitude and longitude in the normal manner.

Delete unmodified company route from library by using procedure Deletion Of a Company Route.

(Continued)

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FLIGHT CREW OPERATING MANUAL

MODIFICATION OF COMPANY ROUTE LIBRARY (Continued)

Type of Modification Desired (Continued)

Insert modified route back into company route library using procedure
Storing Of Active Flight Plan into Protected Memory.

NOTE

Coordinates are now modified for all routes in which the
modified waypoint appear.

[END]

Restoration of company route library to full capacity

NOTE

When company route library is filled to capacity, the two-part
alternating message WPTLIB FULL or RTLIB FULL will
appear in lower display if an attempt is made to store
additional company routes.

CLR/BK Key PUSH

Push CLR/BK key and observe lower display goes blank.

FLT PLN Key PUSH

Push and hold FLT PLN key until RT-LST appears in lower display then release.
As right-hand display scans through all existing company routes, decide which
ones are now obsolete.

Use Deletion Of a Company Route procedure to delete obsolete company routes, one at a time.

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FLIGHT CREW OPERATING MANUAL

IN-FLIGHT LEG CHANGE

NOTE

Active flight leg can be changed either prior to or after takeoff.

POS or XTK/TKE Key PUSH

Push either POS or XTK/TKE key and observe current From/To waypoint numbers appear in lower display. If IDNT annunciator is on, push IDNT key and observe annunciator goes off.

ENT Key PUSH

Push ENT key and observe ENT annunciator comes on and lower display goes blank.

Desired From Waypoint. ENTER

Use data entry keys to enter desired From waypoint number.

Desired To Waypoint ENTER

Use data entry keys to enter desired To waypoint number.

ENT Key PUSH

Push ENT key and observe ENT annunciator goes off and new From/To waypoint numbers appear in lower display.

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FLIGHT CREW OPERATING MANUAL

FLYING A PARALLEL TRACK (CROSS-TRACK OFFSET)

XTK/TKE Key PUSH

ENT Key PUSH

Push ENT and observe ENT annunciator comes on.

NOTE

Push ENT key twice if IDNT annunciator is off.

L(1) or R(3) Key PUSH

Push either L(1) or R(3) key for left or right offset.

Desired Offset Distance ENTER

Enter desired offset distance to the nearest tenth of a nautical mile.

ENT Key PUSH

Push ENT key. If autopilot is receiving inputs from ONS, airplane will fly parallel to track between the two active waypoints.

NOTES

When XTK/TKE is being displayed, L or R annunciator (as applicable) will blink continuously and remote OMEGA/VLF status annunciator will be on continuously to indicate a cross-track offset is in effect.

XTK display will read actual distance to left or right of original track.

To display selected offset distance in XTK display, push and hold CLR/BK key.

Cross-track offset can be cancelled by:

- Performing a leg change from present position to any waypoint.
- Repeating this procedure using an offset of 00.0 NM.
- Power up on while on the ground.

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FLIGHT CREW OPERATING MANUAL

PSEUDO VOR

NOTES

Any defined waypoint can be designated as a pseudo VOR by defining the waypoint number and the new desired track to that waypoint.

ONS will provide guidance at an intercept angle of 45 degrees to the new desired track to the pseudo VOR.

FMS Key PUSH/HOLD/RELEASE

Push and hold FMS key until PSVOR appears in lower display then release.

ENT Key PUSH

Waypoint Number ENTER

Enter number of waypoint to be used as pseudo VOR.

ENT Key PUSH

Desired Track ENTER

Enter new desired track to waypoint.

ENT Key PUSH

NOTES

When designated waypoint becomes current To waypoint, autopilot will steer airplane to intercept desired track to designated waypoint.

Automatic leg changes are inhibited until either the route limit is changed or a leg change is performed.

To cancel pseudo VOR, enter 0 as pseudo VOR waypoint number or perform a leg change to a waypoint beyond designated pseudo VOR waypoint.

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FLIGHT CREW OPERATING MANUAL

BEARING & DISTANCE DIRECT TO ANY WAYPOINT (INFLIGHT)

NOTE

Use this procedure to display great circle bearing and distance from present position to any waypoint.

BRG/DIS Key PUSH

Push BRG/DIS key. If IDNT key is on, push IDNT key and observe IDNT key goes off.

Data Entry Key 0 PUSH

Push data entry key 0 twice and observe 00 appears in lower right-hand display.

NOTE

Arrow in lower display will flash to indicate that displayed bearing and distance may no longer relate to active leg.

Desired Waypoint Number ENTER

Enter desired waypoint number and observe number is displayed in lower right-hand display with 00 now in left-hand display. Great circle bearing and distance from present position to selected waypoint are displayed in upper left and right-hand displays respectively.

NOTES

Bearing and distance direct between any two waypoints can be displayed by repeating last two steps and entering the first waypoint number instead of 00.

If an undefined waypoint is selected as being either the From or To waypoint, the two-part alternating message WAYPNT UNDEFD will appear in lower display and leg selection will be rejected.

If an attempt is made to enter 00 as the To waypoint, the two-part alternating message ILLEGL LEG will appear in lower display and leg selection will be rejected.

MD-80

FLIGHT CREW OPERATING MANUAL

RANGING ALONG FLIGHT PLAN (INFLIGHT)

NOTE

Cumulative distance, ETE and ETA from present position to any waypoint can be displayed. ETE and ETA are determined using current ground-speed and wind velocity.

DATA Key PUSH/HOLD/RELEASE

Push and hold DATA key until lower display shows required display (DIS-XX, ETA-XX or ETE-XX).

Waypoint Desired PUSH

Enter two digit number for desired waypoint. Observe desired data appears in upper right-hand display.

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FLIGHT CREW OPERATING MANUAL

POSITION CHECK AND UPDATING

Present position can be checked and, if necessary, updated as follows,

POS Key PUSH

Push POS key and observe POS key is now on.

NOTE

If IDNT annunciator is on, push IDNT key and observe annunciator goes off.

When directly overhead a known reference point or at the time a reliable position fix is obtained,

ENT Key PUSH

Push ENT key and observe present position display is now frozen, ENT key is on, POS key flashes and lower display goes blank.

Display/Fix Coordinates COMPARE

Compare displayed coordinates with known fix coordinates.

Position Update DETERMINE



Position update not required

CLR/BK Key PUSH

Push CLR/BK key and observe ENT key goes off and ONS returns to normal mode display.

[END]

If position updating is required

ENT Key PUSH

Push ENT key and enter coordinates of position fix using normal procedure.

NOTE

Coordinates will be automatically updated to reflect distance traveled during the time display was frozen.

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FLIGHT CREW OPERATING MANUAL

POSITION CHECK AND UPDATING OVERHEAD A VOR STATION

NOTES

This procedure assumes that latitude/longitude coordinates of VOR station to be used for a position check have previously been entered as a waypoint.

Due to cone of confusion, accurate positioning overhead a VOR station is difficult at high altitude, indiscriminate updating based on VOR passage should be avoided.

BRG/DIS Key PUSH

Push BRG/DIS key prior to reaching VOR.

NOTE

If IDNT annunciator is on, push IDNT key and observe IDNT annunciator goes off.

ENT Key PUSH

Push ENT key prior to reaching VOR. Observe POS key flashes and data in upper display is frozen.

NOTE

Use VOR To/From indicator to determine station passage.

VOR Current To Waypoint DETERMINE

 **VOR Is not the current To waypoint**

Waypoint Number ENTER

Enter waypoint number of VOR station. Observe number appears in right-hand lower display. From/To arrow flashes and 00 appears in lower left-hand display.

Observe upper displays go blank momentarily then great circle bearing and distance from frozen present position to VOR station appear in upper displays.

VOR Is the current To waypoint

(Continued)

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FLIGHT CREW OPERATING MANUAL

POSITION CHECK AND UPDATING OVERHEAD A VOR STATION (Continued)

Distance Display Within Limits DETERMINE



Distance within limits

ENT Key PUSH

Push ENT key twice and observe POS annunciator stops flashing and system reverts to displaying normal bearing and distance to To waypoint.

[END]

Distance not within limits

ENT Key PUSH

Push ENT key and observe right-hand display goes blank.

0 (DiM) Key PUSH

Push 0 (DIM) key and observe displayed distance now reads 0.

ENT Key PUSH

Push ENT key to complete update. Observe ENT annunciator goes off. ONS position has now been updated. New displayed position includes airplane movement during the time display was frozen.

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FLIGHT CREW OPERATING MANUAL

INHIBITING AUTO LEG CHANGE AT ANY WAYPOINT

FLT PLN Key PUSH/HOLD/RELEASE

Push and hold FLT PLN key until RT-LMT appears in lower display.

NOTE

Automatic leg changes are inhibited when (and only when) waypoint number appearing in upper right-hand display is that of current To waypoint.

ENT Key PUSH

Push ENT key and observe upper right-hand display goes blank.

Waypoint Desired ENTER

Enter desired waypoint number at which automatic leg change is to be inhibited.

ENT Key PUSH

Push ENT key to complete insertion procedure.

NOTES

Inhibiting of an automatic leg change can be nullified by performing a manual leg change to any waypoint beyond that one used in procedure or by repeating above procedure but entering a new waypoint.

Two minutes before reaching waypoint at which automatic leg change has been inhibited, the message LST-WP will appear in lower display (in addition to normal ALERT message). Push CLR/BK key to clear message.

After waypoint has been overflown, message OVRFLN will appear in lower display. To clear message from display, push CLR/BK key. Message will reappear every three minutes as long as automatic leg change remains inhibited.

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FLIGHT CREW OPERATING MANUAL

AIR MILES DISPLAY

DATA Key PUSH/HOLD/RELEASE

Push and hold DATA key until TAS-AM appears in lower display then release key.
Observe upper left-hand display shows TAS in knots and right-hand display shows
total air miles flown in nautical miles.

NOTE

Air miles display can be reset to zero at any time by
pushing ENT key twice, then 0 (DIM) key and then ENT key.

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FLIGHT CREW OPERATING MANUAL

LOG OF OMEGA STATIONS USED

NOTE

This procedure provides a display which identifies those Omega stations that were used for the last navigation fix and permits manual deselection of any of those stations, if desired.

STS/PWR Key PUSH/HOLD/RELEASE

Push and hold STS/PWR key until OMEGA appears in lower display then release key. Observe numbers representing Omega stations used to generate last navigation fix appear in upper displays.

NOTES

The following is a list of Omega stations and their visual digital identifiers used by the ONS:

Norway	1	Reunion	5
Liberia	2	Argentina	6
Hawaii	3	Australia	7
North Dakota	4	Japan	8

ONS is programmed to automatically deselect certain stations when operating in specific areas where signals from those stations are subject to known anomalies.

Station status is displayed as follows:

- Identifier displayed - Station use is normal.
- Blank display - Station unusable due to poor signal quality, range conditions or predicted modal interference.
- 0 displayed - Station has been manually deselected.
- Flashing 0 displayed - Station has been automatically deselected.

To deselect a particular Omega station:

ENT Key PUSH

Push ENT key and observe ENT key comes on and upper display goes blank.

(Continued)

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FLIGHT CREW OPERATING MANUAL

LOG OF OMEGA STATIONS USED (Continued)

Number of Station ENTER

Use data entry keys to enter number of station to be deselected.

ENT Key PUSH

Push ENT key and observe ENT key goes out. Number of deselected Omega station is replaced by 0 in the displayed station log.

NOTE

Station deselection can be cancelled by repeating deselection procedure. Deselected stations are automatically restored when ONS is sequenced through initialization procedure with airplane on ground.

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FLIGHT CREW OPERATING MANUAL

LOG OF VLF STATIONS USED

NOTE

This procedure provides a display which identifies those VLF stations that were used for the last navigation fix and permits manual deselection of any of those stations, if desired.

STS/PWR Key PUSH/HOLD/RELEASE

Push and hold STS/PWR key until VLFLOG appears in lower display, then release key. Observe numbers representing VLF stations used to generate last navigation fix appear in upper displays.

NOTES

The following is a list of VLF stations and their identifiers used by the ONS:

NWC Australia	1	NAU Puerto Rico	5
NDT Japan	2	NSS Maryland	6
GBR England	3	NLK Washington State	7
NAA Maine	4		

ONS is programmed to automatically deselect certain stations when operating in specific areas where signals from those stations are subject to known anomalies.

Station status is displayed as follows:

- Identifier displayed - Station use is normal.
- Blank display - Station unusable due to poor signal quality, range conditions or predicted modal interference.
- 0 displayed - Station has been manually deselected.
- Flashing 0 displayed - Station has been automatically deselected.

To deselect a particular VLF station:

ENT Key PUSH

Push ENT key and observe ENT key comes on and upper display goes blank.

(Continued)

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FLIGHT CREW OPERATING MANUAL

LOG OF VLF STATIONS USED (Continued)

Number of Station ENTER

Use data entry keys to enter number of station to be deselected.

ENT Key PUSH

Push ENT key and observe ENT key goes off. Number of deselected VLF station is replaced by 0 in displayed station log.

NOTE

Station deselection can be cancelled by repeating deselection procedure. Deselected stations are automatically restored when ONS is sequenced through initialization procedure with airplane on ground.

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FLIGHT CREW OPERATING MANUAL

NAVIGATION MODE DISPLAY

STS/PWR Key PUSH/HOLD/RELEASE

Push and hold STS/PWR key until ABS or REL appears in lower display then release.

NOTE

If ABS appears, the absolute navigation mode is active. If REL appears, the relative navigation mode is active.

FORCED ABSOLUTE MODE

If primary operating mode for the ONS is relative, the ONS can be forced into absolute mode as follows:

STS/PWR Key PUSH/HOLD/RELEASE

Push and hold STS/PWR key until REL appears in lower display then release.

ENT Key PUSH

Push ENT key and observe ENT key comes on and lower display goes blank. Push ENT key again and observe ENT key goes off and ABS appears in lower display.

Provided sufficient Omega station signals are received, ONS will now operate in absolute mode.

NOTE

ONS will automatically revert to its primary mode when sequenced through initialization procedure with airplane on ground.

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FLIGHT CREW OPERATING MANUAL

FORCED RELATIVE MODE

If primary operating mode for ONS is absolute, ONS can be forced into relative mode as follows:

STS/PWR Key PUSH/HOLD/RELEASE

Push and hold STS/PWR key until ABS appears in lower display then release.

ENT Key PUSH

Push ENT key and observe ENT key comes on and lower display goes blank.
Push ENT key again and observe ENT key goes off and REL appears in lower display. ONS will now operate in relative mode.

NOTES

ONS will automatically revert to its primary mode when sequenced through initialization procedure with airplane on ground.

To return to primary absolute mode, repeat steps. When ENT key is first pushed, observe ABS is in lower display. If sufficient Omega station signals are available, ONS is now operating in absolute mode.

POSITION UNCERTAINTY ESTIMATE

NOTE

This procedure provides a measure of quality or confidence level of position fix accuracy (based on quality of received signals and LOP geometry).

STS/PWR Key PUSH/HOLD/RELEASE

Push and hold STS/PWR key until QUAL appears in lower display then release.
Observe estimated radius of the circle of uncertainty (to the nearest tenth of NM) appears in right-hand display.

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FLIGHT CREW OPERATING MANUAL

MANUAL INITIATION OF LAR (LANE AMBIGUITY RESOLUTION)

NOTE

Manual initiation of LAR routine can be performed only when
ONS is in absolute mode.

STS/PWR Key PUSH/HOLD/RELEASE

Push and hold STS/PWR key until LAR appears in lower display then release.

ENT Key/Data Entry Key 1 PUSH/PUSH

Push ENT key and observe ENT key comes on then push data entry key 1.

ENT Key PUSH

Push ENT key and observe ENT key goes off.

NOTES

If signal and/or geometry conditions are inadequate, LAR
procedure will not be completed.

Status of the LAR procedure is indicated by a status code
which appears as the extreme right digit in the right-hand
display. LAR status codes are as follows:

- 0 - LAR off
- 1 - LAR in progress
- 2 - LAR aborted, insufficient signals
- 3 - LAR aborted, bad geometry

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FLIGHT CREW OPERATING MANUAL

DISPLAY OF SIGNAL QUALITY READINGS

STS/PWR Key PUSH/HOLD/RELEASE

Push and hold STS/PWR key until MAINT appears in lower display then release.

ENT Key PUSH

Push ENT key and observe ENT key comes on and upper right-hand display goes blank.

Data Entry Key 1 PUSH

Push data entry key 1 and observe 1 appears in upper right-hand display.

ENT Key PUSH

Push ENT key and observe ENT key goes off.

STS/PWR Key PUSH/HOLD/RELEASE

Push and hold STS/PWR key until desired signal quality parameters appear in lower display.

NOTE

Signal quality parameters will appear as follows:

SNR-10 for Omega on 10.2 KHz
SNR-11 for Omega on 11.3 KHz
SNR-13 for Omega on 13.6 KHz
SNRVLH for VLF upper side band
SNRVLL for VLF lower side band

Number now displayed in upper display represents signal quality readings. From left to right on display, they relate to the Omega or VLF stations in the normal manner.

NOTE

Signal quality will be displayed as a single digit number between 0 and 9. A quality reading of 2 or greater is considered satisfactory for use.

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FLIGHT CREW OPERATING MANUAL

FAILURES AND NEGATIVE STATUS CHANGES

Negative change in system status and occurrences of system failures or abnormal inputs will automatically be brought to crews attention by flashing of MSG annunciator. At the same time, a description of status will appear in lower display.

NOTES

Messages of this type will override whatever data is normally present in lower display.

If there is more than one message, lower display will automatically scroll through all messages.

For a list of possible messages, refer to Section 3,
INSTRUMENTATION & NAVIGATION - ENTRY ERROR,
SYSTEM STATUS AND FAILURE MESSAGES.

To restore lower display to its normal state,

CLR/BK Key PUSH

Push CLR/BK key and observe MSG annunciator goes out and lower display reverts to previous annunciation.

NOTE

DMS keyboard is disabled as long as a failure or negative status message appears in lower display. If an attempt to access DMS keyboard is made before clearing message, the message CLR MSG will appear while DMS key is pushed.

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FLIGHT CREW OPERATING MANUAL

AMBIGUITY MESSAGE PROCEDURE

NOTE

If line of position geometry is degraded sufficiently to reduce confidence in position fix accuracy to below satisfactory levels, MSG annunciator will come on and AMB message will appear in lower display.

To clear AMB message and MSG annunciator,

POS Key PUSH

Present Position CHECK

Check present position against available reference and manually update in normal manner, if required. Observe MSG annunciator goes off and AMB message no longer appears in lower display.

NOTE

MSG annunciator may subsequently come back on if line of position geometry continues to be unsatisfactory.

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FLIGHT CREW OPERATING MANUAL

DEAD RECKONING (DR) MODE

During periods of DR operation, ONS relies solely on inputs of heading and velocity for navigation. This results in position accuracy which degrades continuously during prolonged intervals of DR operation.

NOTES

Rate at which accuracy degrades depends upon quality of the source of heading and velocity inputs.

ONS will automatically recover its normal accuracy only if DR operation does not exceed three to five minutes duration (5 minute value applies only to cruise portion of flight).

Navigational accuracy during prolonged DR operation can be improved by manual updating of ONS track angle and groundspeed based on external information.

To manually update ONS track angle and groundspeed,

DATA Key PUSH/HOLD/RELEASE

Push and hold DATA key until DTK-TK appears in lower display then release.

ENT Key PUSH

Push ENT key and observe upper right-hand display goes blank.

Track Angle Update ENTER

Enter track angle update (three digits in the range of 000 to 359) in degrees using data entry keys.

ENT Key PUSH

Push ENT key to complete entry.

DATA Key PUSH

Push DATA key and observe GS-ETE appears in lower display.

ENT Key PUSH

Push ENT key and observe upper left-hand display goes blank.

(Continued)

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FLIGHT CREW OPERATING MANUAL

DEAD RECKONING (DR) MODE (Continued)

Groundspeed Update ENTER

Use data entry keys to enter groundspeed update.

ENT Key PUSH

Push ENT key to complete entry.

NOTE

Track angle and ground speed will be automatically updated
when ONS resumes normal non-DR operation.

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FLIGHT CREW OPERATING MANUAL

OPERATION WITH FAILED HEADING INPUT

NOTES

When no heading input is available to ONS, there will be no available display of drift angle (DA) and wind.

ONS accuracy may be permanently degraded during turns exceeding 20 degrees. In order to prevent this loss of accuracy, it is necessary to manually enter a new track angle each 10 to 20 seconds during a turn and upon completion of turn.

To enter a new track angle,

DATA Key PUSH/HOLD/RELEASE

Push and hold DATA key until DTK-TK appears in lower display then release.

ENT Key PUSH

Push ENT key and observe ENT key comes on and upper right-hand display goes blank.

Track Angle Update ENTER

Use data entry keys to enter track angle update (three digits in the range 000 to 359) in degrees.

ENT Key ENTER

Push ENT key to complete entry.

NOTE

Repeat procedure as many times as is required during turn.

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FLIGHT CREW OPERATING MANUAL

MANUAL DESELECTION OF UNRELIABLE TAS INPUT

NOTE

If TAS input is observed to be intermittent or unreliable, input should be manually deselected to prevent possibility of navigation errors.

If TAS input is to be deselected,

STS/PWR Key PUSH/HOLD/RELEASE

Push and hold STS/PWR key until STATUS appears in lower display then release.

ENT Key PUSH

Push ENT key and observe ENT key comes on and right-hand display goes blank.

1,0 Data Entry Keys. PUSH/PUSH

Push data entry key 1 then push 0 key and observe 10 appears in right-hand display.

ENT Key PUSH

Push ENT key to complete deselection of TAS input.

NOTES

TAS input is now deselected for duration of flight.

Long-term navigational accuracy is not degraded due to loss of TAS input. However, short-term accuracy is degraded during periods of rapidly changing groundspeed and ONS display of WIND is unavailable.

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FLIGHT CREW OPERATING MANUAL

MANUAL DESELECTION OF UNRELIABLE HEADING INPUT

NOTE

If heading input is intermittent or unreliable, input should be manually deselected to prevent possibility of navigation errors.

If heading input is to be deselected,

STS/PWR Key PUSH/HOLD/RELEASE

Push and hold STS/PWR key until STATUS appears in lower display then release.

ENT Key PUSH

Push ENT key and observe ENT key comes on and right-hand display goes blank.

1,0 Data Entry Keys. PUSH/PUSH

Push data entry key 1 and then data entry key 0 twice. Observe 100 appears in right-hand display.

ENT Key PUSH

Push ENT key to complete deselection of heading input.

NOTES

Heading input is now deselected for remainder of flight.

Refer to Operation With Failed Heading Input procedure for remainder of flight.

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FLIGHT CREW OPERATING MANUAL

RESTORING POWER TO ONS AFTER POWER INTERRUPTION

NOTE

When power to the ONS is interrupted for more than several seconds, ONS must be manually repowered and displayed position must be updated by reference to another navigation system or a known visual reference.

STS/PWR Key PUSH

Push STS/PWR key to re-power ONS.

STS/PWR Key PUSH/HOLD/RELEASE

Push and hold STS/PWR key until MAINT appears in lower display then release.

ENT Key PUSH

Data Entry Key 1 PUSH

ENT Key PUSH

STS/PWR Key PUSH/HOLD/RELEASE

Push and hold STS/PWR key until OLDGMT appears in lower display then release.

Observe Greenwich Mean Time at which power was interrupted appears in upper left-hand display and duration of power interruption appears in upper right-hand display.

NOTE

Duration of power interruption is displayed in hours and minutes.

Use duration of power interruption to determine if a position update is required. If position update is required, refer to Position Check/Update procedure.

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FLIGHT CREW OPERATING MANUAL

ENTRY ERROR, SYSTEM STATUS AND FAILURE MESSAGES

Alternating two word messages.

NOTE

All alternating two word messages are entry errors and will occur only during an entry sequence. These messages can be cancelled by pushing CLR BK key.

TWO WORD MESSAGES	
Message	Definition
ENTER N or S	N or S was not pressed when attempting to enter position or waypoint latitude coordinates.
ENTER E or W	E or W was not pressed when attempting to enter position or waypoint longitude coordinates.
ENTRY ERROR	An illegal or out of range value was entered or an invalid key sequence used.
RTE-NO IN-USE	Attempt to use a previously defined route number to store a route.
WAYPNT UNDEFD	Waypoint is undefined. A defined waypoint must be used.
PREVWP MISSED	Previous waypoint undefined when attempting to define a new one, e.g., trying to define #7 when #6 is not defined.
SHORT RT-XFR	All of company route could not be appended to active flight plan when using ADD-RT function due to lack of space (waypoint count exceeds 99).
RTELIB FULL	Route library of company routes is full. Maximum is 1800 stored waypoints, 400 company routes or 4000 route points - whichever occurs first.
WPTLIB FULL	The number of individual waypoints in the company route library exceeds 1800.
ACT RT FULL	Active flight plan is full. Maximum is 99 waypoints.

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FLIGHT CREW OPERATING MANUAL

ENTRY ERROR, SYSTEM STATUS AND FAILURE MESSAGES (Continued)

TWO WORD MESSAGES (Continued)	
Message	Definition
CLR MSG	Error or status message has not been acknowledged by pressing CLR-BK key. Do so now. DMS keyboard will remain locked until this is done.
ILLEGL LG-CHG	Illegal leg change attempted, e.g., 05→00 or 05→05.
NOSUCH ROUTE	Route number requested is not defined. Enter a defined route number only.
LIBRY LOCKED	Attempt to modify a stored library waypoint in protected memory without unlocking the library as detailed in Section 3.
EMPTY ROUTE	Attempt to store a route with no defined waypoints.
ENTER L OR R	L or R was not pressed when attempting to enter a track offset.

Single word scrolling messages

NOTES

Negative changes in system status and occurrences of system malfunctions or abnormal inputs will automatically appear in lower display.

Messages will override whatever data is normally present in lower display.

If there is more than one message, lower display automatically scrolls or alternates through all messages.

To restore lower display to normal state, push CLR BK key.

Display mode selection keyboard is disabled when messages are present in lower display. Therefore, messages must be cleared before selecting other display modes.

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FLIGHT CREW OPERATING MANUAL

ENTRY ERROR, SYSTEM STATUS AND FAILURE MESSAGES (Continued)

SINGLE WORD MESSAGES	
Message	Definition
HDG-FL (HeadinG input FailLure)	ONS builds up errors during rapid turns – use with caution.
MEMR-F (MEMoRy Failure)	ONS not reliable for navigation. MSG light not cancellable.
OS-DRF (OScillator DRiFt Failure)	ONS not reliable for navigation. MSG light not cancellable.
A/D-FL (Analog to Digital converter FailLure)	ONS heading and true airspeed inputs unreliable. MSG light not cancellable.
DR (Dead Reckoning)	ONS receiving insufficient signals. Navigates using heading and speed inputs only, error increases with time spent in DR. MSG light not cancellable for DR.
TAS-FL (True Air Speed input FailLure)	ONS navigates satisfactorily but secondary displays (groundspeed, wind, etc.) inaccurate or unavailable.
AMB (AMBiguity)	Loss of confidence in ONS accuracy.
RV-MIN (ReceiVer MINor failure- single channel)	Possibility of slight degradation in ONS accuracy. MSG light not cancellable.
RV-MAJ (ReceiVer MAJor failure multiple channels)	ONS unreliable for navigation.
RMT1-F (ReMoTe system No. 1 Failed)	ONS performance not affected, except cannot receive digital data from No. 1 external navigation system.
RMT2-F (ReMoTe system No. 2 Failed)	ONS performance not affected, except cannot receive digital data from No. 2 external navigation system.
PWR-FL (Primary PoWeR FailLure)	ONS performance unaffected. MGS light not cancellable.

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FLIGHT CREW OPERATING MANUAL

ENTRY ERROR, SYSTEM STATUS AND FAILURE MESSAGES (Continued)

SINGLE WORD MESSAGES (Continued)	
Message	Definition
HWY1-F (Digital HighWaY No. 1 Failure)	ONS navigational performance not affected, but may not accept input data from external systems.
HWY2-F (Digital HighWaY No. 2 Failure)	ONS navigational performance not affected, but may not accept input data from external systems.
SYNC (Not SYN Chronized)	ONS not synchronized to OMEGA signals and remains in DR mode. MSG light not cancellable.
ANT-FL (ANTenna Failure)	ONS unreliable for navigation.
IN VLF	ONS is now relying on use of VLF stations, but performance is reliable.
OVRFLN	Automatic leg changes now inhibited and TO waypoint has been overflowed.
ALERT	ONS within 2 minutes of arrival at TO waypoint.
LST-WP	ONS within 2 minutes of arrival at last WPT enroute.
SYOPFL (Synchro Output Failure)	ONS performance unaffected but synchro outputs to HSI may be affected.
DB-EXP	Navigation data base out of date. ONS performance unaffected but data coming from data base should be verified.
DB-FL	Navigation data base (NDB-2) failure. ONS performance unaffected but cannot receive data from data base.

MD-80

FLIGHT CREW OPERATING MANUAL

OPERATION WITHOUT RADOME OR AIRSPEED INDICATOR

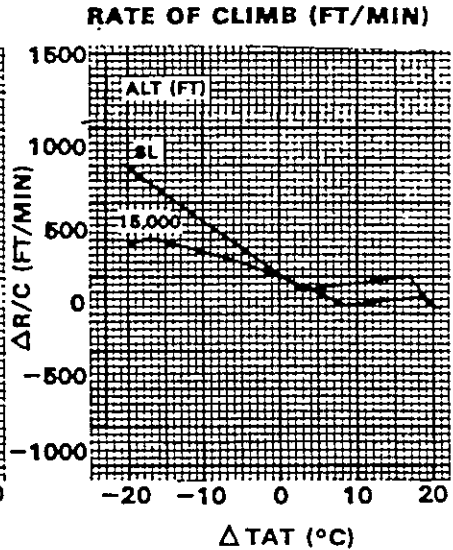
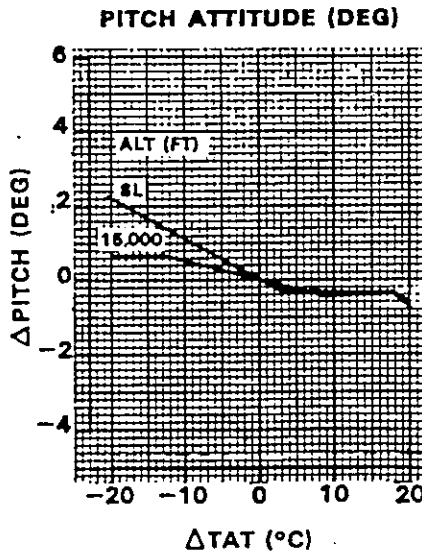
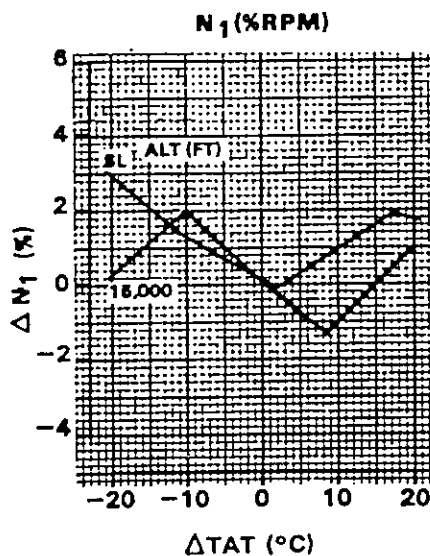
MD-81/-82/-83/-88
JT8D-219 ENGINES
MAX CLIMB

	FLAPS/ SLAT (deg.)	ALTITUDE (ft.)	WEIGHT (1000 lb.)	TARGET PITCH ATTITUDE (deg.)	APPROX N ₁ RPM REQUIRED (%)	APPROX AIRSPEED (KIAS)	APPROX RATE OF CLIMB (FPM)	STD TAT (°C)
Max Climb (1.5 V _S +10 KIAS) Fly to Pitch Attitude	0/RET	0	80	21.4	86.5	193	6080	19.9
			120	13.6	86.5	234	4160	22.2
			160	9.8	86.5	270	2990	24.5
		5000	80	18.7	87.4	193	5610	10.8
			120	12.0	87.5	234	3760	13.4
			160	8.7	87.6	270	2640	16.2
		10,000	80	16.2	89.6	193	5100	1.8
			120	10.5	89.4	234	3350	4.9
			160	7.7	88.9	270	2270	8.0
		15,000	80	13.9	91.3	195	4490	7.0
			120	9.0	90.7	237	2850	-3.3
			160	6.6	90.3	273	1860	.4

CHANGE IN N₁, PITCH AND R/C VS CHANGE OF INDICATED TAT FROM STANDARD

Instructions:

1. Subtract the standard TAT presented in the table above, from the indicated TAT to calculate Δ TAT.
2. Using the Δ TAT determine in 1, enter the graphs below to obtain the corrections for N₁, pitch and R/C.



DATA SOURCE: A739-8.2, DATED 7-31-88

RA1-2971B

MD-80

FLIGHT CREW OPERATING MANUAL

OPERATION WITHOUT RADOME OR AIRSPEED INDICATOR

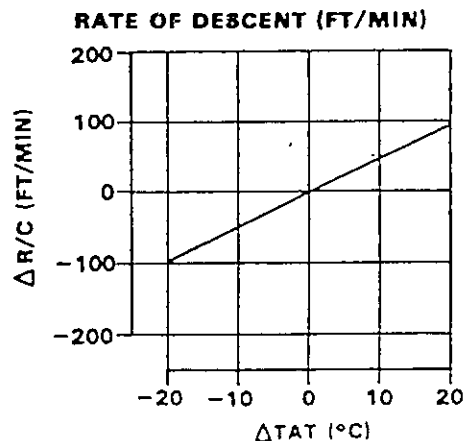
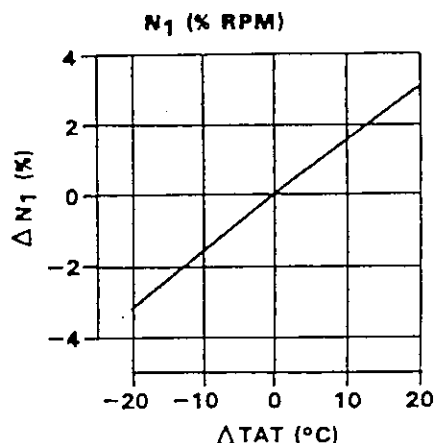
MD-81/-82/-83/-88
JT8D-219 ENGINES
CRUISE/DESCENT

	FLAPS/ SLATS (deg.)	ALTITUDE (ft.)	WEIGHT (1000 lb.)	TARGET PITCH ATTITUDE (deg.)	APPROX N ₁ RPM REQUIRED (%)	APPROX AIRSPEED (KIAS)	APPROX RATE OF DESCENT (FPM)	STD TAT (°C)
CRUISE	0/RET	20,000	80 120 160	0.6 1.9 3.3	71.8 73.8 77.4	285	0	-5.5
		25,000	80 120 160	0.6 2.0 3.4	74.4 77.0 80.4	285	0	-12.3
		30,000	80 120 160	0.7 2.1 3.6	77.1 79.9 84.5	285	0	-18.5
		35,000	80 120	1.2 2.8	78.2 84.5	268 (0.79 IMN)	0	-27.5
DESCENT Fly to pitch attitude	0/RET	10,000	80 120 160	-4.8 -2.2 -0.4	IDLE THRUST	285	3060 2290 1980	9.4
		20,000	80 120 160	-4.2 -1.7 0.0	IDLE THRUST	285	3210 2430 2150	-5.5
		30,000	80 120 160	-3.5 -1.1 0.6	IDLE THRUST	285	3290 2540 2250	-18.4

CHANGE IN N₁ AND R/D VS CHANGE OF INDICATED TAT FROM STANDARD

Instructions:

1. Subtract the standard TAT presented in the table above from the indicated TAT to calculate ΔTAT .
2. Using the ΔTAT determined in 1, enter the graphs below to obtain the corrections for N₁ and R/D.



DATA SOURCE: PAGE 7554-20.95, DATED 7-11-83

RA1-3188B

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FLIGHT CREW OPERATING MANUAL

OPERATION WITHOUT RADOME OR AIRSPEED INDICATOR

MD-81/-82/-83/-88

JT8D-219 ENGINES

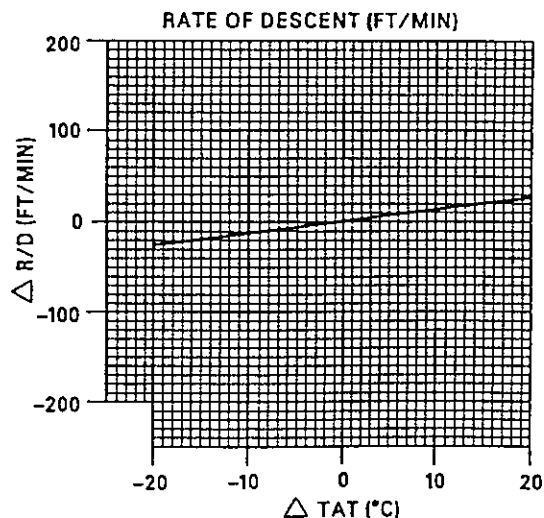
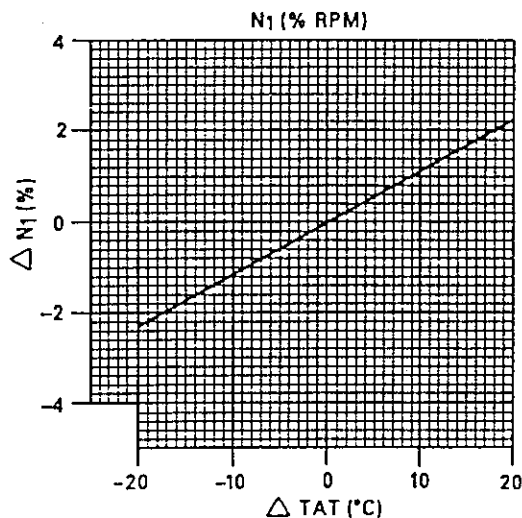
HOLDING/TERMINAL AREA FLIGHT/FINAL APPROACH

	FLAPS/ SLATS (deg.)	ALTITUDE (ft.)	WEIGHT (1000 lb.)	TARGET PITCH ATTITUDE (deg.)	APPROX N ₁ RPM REQUIRED (%)	APPROX AIRSPEED (KIAS)	APPROX RATE OF DESCENT (FPM)	STD TAT (°C)
HOLDING Adjust power to maintain pitch attitude, level flight	0/RET	10,000	80	4.1	56.3	183	0	1.2
			120	4.1	64.4	224	0	4.2
			160	4.1	70.2	259	0	7.2
TERMINAL AREA FLIGHT Adjust power to maintain pitch attitude, level flight	0/RET	0	80	4.1	50.2	183	0	19.4
			120	4.1	58.9	224	0	21.6
			160	4.1	64.9	259	0	23.8
	15/EXT	0	80	8.3	53.3	122	0	17.0
			120	8.3	62.2	150	0	18.0
			160	8.3	68.4	173	0	19.0
	28/EXT	0	80	6.8	58.1	115	0	16.8
			120	6.8	66.5	140	0	17.7
			160	6.8	72.5	161	0	18.6
FINAL APPROACH Based on 3° glide slope. Adjust power to maintain pitch attitude. Fly glide slope or, if not available, fly to rate of descent.	40/EXT	0	80	2.2	51.7	110	590	16.7
			120	2.2	61.0	135	730	17.5
			160	2.2	66.9	156	840	18.4

CHANGE IN N₁ AND R/D VS CHANGE OF INDICATED TAT FROM STD

INSTRUCTIONS:

1. Subtract the standard TAT presented in the table above, from the indicated TAT to calculate Δ TAT.
2. Using the Δ TAT determined in 1, enter the graphs below to obtain the corrections for N₁ and R/D.



CAG(IGDS) DATA SOURCE: PAGE 7554-20.94, DATED 7-11-83

RA1-3189B

MD-80

FLIGHT CREW OPERATING MANUAL

OPERATION WITHOUT RADOME OR AIRSPEED INDICATOR

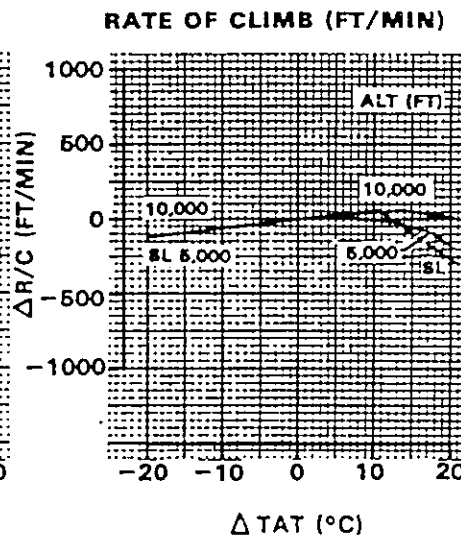
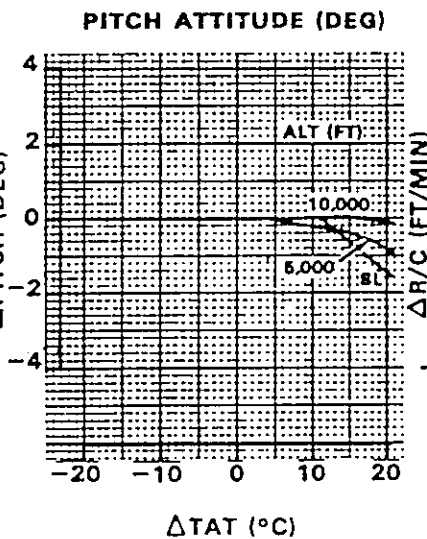
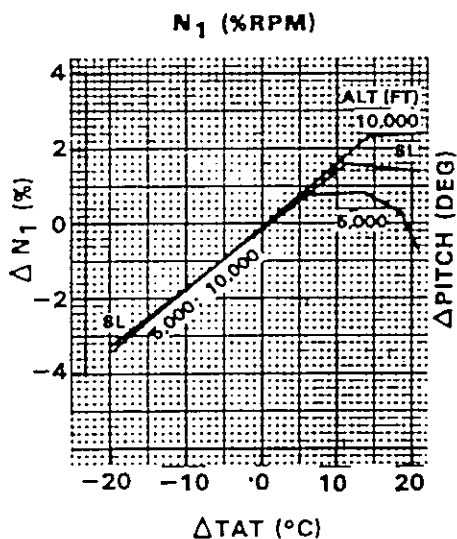
MD-81/-82/-83/-88
JT8D-219 ENGINES
GO-AROUND

	FLAPS/ SLAT (deg.)	ALTITUDE (ft.)	WEIGHT (1000 lb.)	TARGET PITCH ATTITUDE (deg.)	APPROX N ₁ RPM REQUIRED (%)	APPROX AIRSPEED (KIAS)	APPROX RATE OF CLIMB (FPM)	STD TAT (°C)
Go-Around (V ₂ + 20 KIAS) Fly to Pitch Attitude	15/EXT	0	80	24.3	92.8	149	5560	18.0
			120	19.2	92.9	157	3420	18.3
			160	15.2	93.1	178	2450	19.2
		5,000	80	22.6	94.9	141	4820	8.1
			120	17.1	95.1	157	3040	8.9
			160	13.7	95.3	178	2120	10.0
		10,000	80	20.1	93.1	132	3780	-1.7
			120	14.4	93.4	157	2390	-0.4
			160	11.7	93.7	178	1550	0.9

CHANGE IN N₁, PITCH AND R/C VS CHANGE OF INDICATED TAT FROM STANDARD

Instructions:

1. Subtract the standard TAT presented in the table above, from the indicated TAT to calculate Δ TAT.
2. Using the Δ TAT determine in 1, enter the graphs below to obtain the corrections for N₁, pitch and R/C.



DATA SOURCE: A739-8.3, DATED 7-31-85

RA1-2972C

MD-80

FLIGHT CREW OPERATING MANUAL

Chapter 14

LANDING GEAR AND BRAKES

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AIR LIBERTE INDUSTRIES

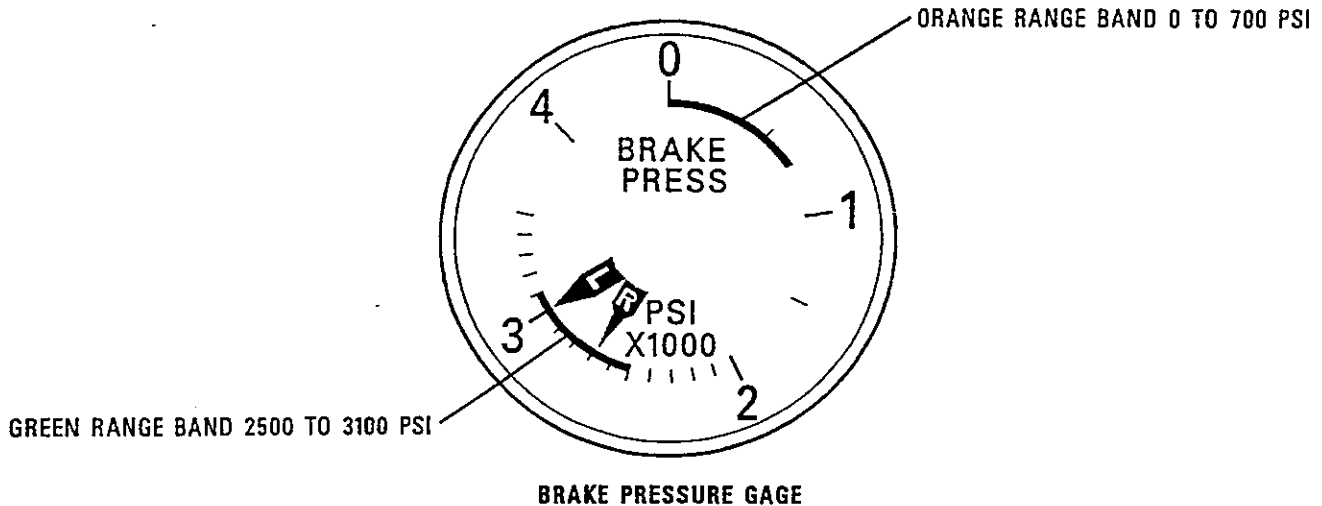
(SERIES 80)

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
LIMITATIONS	14-10-0	1	1/2	All
NORMAL OPERATION	14-20-0		(NOT USED)	
ABNORMAL OPERATION				
Brake Overheat Light On	14-30-0	6	1	All
In Flight - GEAR DOOR OPEN Light On - LEFT, NOSE, RIGHT Gear Lights Green	14-30-0	6	2	All
Landing Gear Handle Down, One or More Red Lights On	14-30-0	6	3/4	All
Landing Gear Handle Jammed In UP Position	14-30-0	6	5	All
Landing With Abnormal Landing Gear Configuration	14-30-0	6	6	All
L or R OUTBD or INBD ANTI-SKID Light(s) On	14-30-0	6	9	All
PARKING BRAKES ON (In Flight, Gear Down)	14-30-0	6	10	All
Red Light On With Landing Gear Handle UP	14-30-0	6	10	All
Unable To Raise Landing Gear Handle After Takeoff	14-30-0	6	12	All
Wheel Not Turning Light On	14-30-0	6	13/14	All

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FLIGHT CREW OPERATING MANUAL

LANDING GEAR AND BRAKES - LIMITATIONS



Gear Up	8.5 SECONDS
Gear Down.....	15 SECONDS
Free Fall (FLAPS 0°, Speed 165 Knots).....	25 SECONDS
Gear Extension and Full Down Speed	300 KIAS or MACH .70

NOTE

Cumulative systems tolerances on an in service airplane may dictate a maximum of 230 KIAS to achieve positive gear retraction.

Brake Pressure At Wheels	0 TO 3000 POUNDS
Parking Brake Pressure At Wheels	1400 TO 1700 PSI MINIMUM TO ASSURE AT LEAST 8 HOURS PARKING TIME
Gear Load Limit	10 FEET/SECOND FOR MAXIMUM LANDING WEIGHT 6 FEET/SECOND FOR MAXIMUM TAKEOFF WEIGHT
Brake Temperature	DO NOT TAKE OFF IF ANY BRAKE TEMPERATURE EXCEEDS 205°C UNLESS OTHER DATA IS AVAIL- ABLE AND UTILIZED.
Maximum Temperature To Set Parking Brake	300°C

CAG(IGDS)

RA1-135F

Vol. II
Apr 1/96

Section 3
14-10-0
ZL-CODE 1
Page 1/2

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FLIGHT CREW OPERATING MANUAL

LANDING GEAR AND BRAKES - ABNORMAL OPERATION

BRAKE OVERHEAT LIGHT ON

NOTE

OVHT light comes on when any one brake temperature exceeds 305°C and goes off when brakes cool to 260°C.

Phase Of Flight



On ground

Stop airplane as soon as practical. Do not set parking brake.

WARNING

Ground crew must remain clear of main gear. Fuse plugs may melt. If brake temperature exceeds gage limit, loss of braking may result.

[END]

In flight

Flight conditions permitting, extend landing gear until brake OVHT light goes off.

[END]

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FLIGHT CREW OPERATING MANUAL

**IN FLIGHT - GEAR DOOR
OPEN LIGHT ON, LEFT, NOSE,
RIGHT GEAR LIGHTS GREEN**

NOTES

This procedure assumes hydraulic pressure is normal and gear handle is down.

Gear door position may be verified by using periscope or control tower observation.

If gear door(s) is open,

Emergency Gear Extension Lever PULL FULL UP

Raise cover, pull emergency gear extension lever to full up position and check holding latch is engaged.

CAUTION

Do not stow emergency gear extension lever until malfunction has been corrected.

NOTES

Gear doors will remain open and GEAR DOOR OPEN light will be on.

Minimize landing rollout.

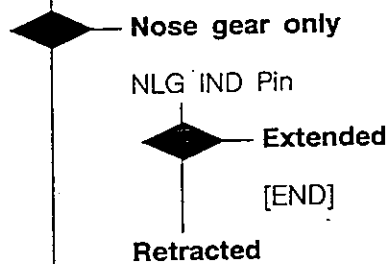
Before taxiing, install gear safety pins and close main gear doors.

MD-80

FLIGHT CREW OPERATING MANUAL

**LANDING GEAR HANDLE DOWN,
ONE OR MORE RED LIGHTS ON**

Unsafe Gear Indication



One or both main gear or any main and nose gear

Emergency Gear Extension Lever PULL FULL UP/LATCHED

NOTE

When emergency gear extension lever is raised, GEAR
DOOR OPEN light will remain on.

GEAR Lights

3 green

Emergency Gear Extension Lever STOW

Gear Lights

GEAR lights green and GEAR DOOR OPEN light off

[END]

GEAR lights red or GEAR DOOR OPEN light on

Emergency Gear Extension Lever PULL FULL UP/LATCHED

NOTE

Nosewheel steering to the left is restricted.

Stop airplane on runway.

Install gear safety pins and close main gear doors before taxi in.

[END]

Any GEAR light red

Emergency Gear Extension Lever STOW

Refer to LANDING WITH ABNORMAL LANDING GEAR CONFIGURATION in this section.

[END]

MD-80

FLIGHT CREW OPERATING MANUAL

LANDING GEAR HANDLE JAMMED IN UP POSITION

NOTES

It may be necessary to decrease airspeed to $1.3 V_S$ to allow the nose gear to latch down.

Observe gear extension and full down speed of 300 KIAS or Mach .70.

■ Emergency Gear Extension Lever PULL FULL UP

■ Raise cover, pull emergency gear extension lever to full up position and check that holding latch is engaged.

Gear Lights 3 GREEN

Landing Gear Handle TRY TO MOVE DOWN

◆ Moves down

■ Stow emergency gear extension lever to allow gear doors to close.

[END]

Will not move down

CAUTION

Do not stow emergency gear extension lever until malfunction has been corrected.

NOTES

Gear doors will remain open and GEAR DOOR OPEN light will be on.

■ Minimize landing rollout.

■ Before taxiing, install gear safety pins and close main gear doors.

MD-80

FLIGHT CREW OPERATING MANUAL

LANDING WITH ABNORMAL LANDING GEAR CONFIGURATION

NOTES

Complete normal descent/approach/landing checklists, Cockpit Preparation For Passenger Evacuation Checklist, and Crash Landing Checklist prior to landing.

Excess fuel should be burned off to decrease landing gross weight.

GROUND PROXIMITY WARNING COMPUTER Circuit Breaker (Upper EPC) PULL

APU MASTER Switch OFF

APU should be shut down for landing unless it is the sole source of electrical power.

Landing Configuration

Nose gear unsafe, both main gear extended

Perform normal approach for landing.

Ensure gear handle is down and spoilers are armed for deployment.

At touchdown,

PF begin actuating trim control to nose up to assist in holding nose off runway.

PNF monitor spoiler deployment and manually deploy spoilers if necessary.

(Continued)

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FLIGHT CREW OPERATING MANUAL

LANDING WITH ABNORMAL LANDING GEAR CONFIGURATION (Continued)

Landing Configuration (Continued)

After touchdown the PF should,

Hold nose off until approximately 80 KIAS. Idle reverse thrust may be used with caution for deceleration. Under normal conditions, deployment of thrust reversers while airplane is in excess of 8° (Model 81/82/83/88), 10° (Model 87) nose high attitude may result in thrust reversers striking runway.

While elevator control is still effective, lower nosewheel gently to runway.

Upon nose contact, use maximum braking (within limits of directional control) to stop airplane.

[END]

One main gear partially or fully retracted

NOTE

Consideration should be given to selecting the widest runway available for landing due to possibility of severe directional control difficulties. Consider touching down on side of runway corresponding to extended main landing gear.

Perform normal approach for landing.

Ensure gear handle is down and spoilers are disarmed and not used during landing.

Touch down on the extended main gear. While elevator control is still effective, lower nose gear gently to runway and hold wings level with ailerons as long as possible.

Maintain directional control with nosewheel steering.

[END]

Any other combination of extended/retracted landing gear

Any landing gear which can be extended should be extended for landing whether on a prepared or unprepared surface.

(Continued)

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FLIGHT CREW OPERATING MANUAL

LANDING WITH ABNORMAL LANDING GEAR CONFIGURATION (Continued)

Nosewheel will provide some additional directional control if extended and main landing gear is designed to shear as required and will provide protection for fuselage.

Perform normal approach for landing.

Ensure gear handle is down and spoilers are disarmed and not used during landing.

Touch down on main gear, if extended, and hold nose off as long as possible.

Lower nose gently to runway and hold wings level with ailerons as long as possible.

Maintain directional control with nosewheel steering (if available).

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FLIGHT CREW OPERATING MANUAL

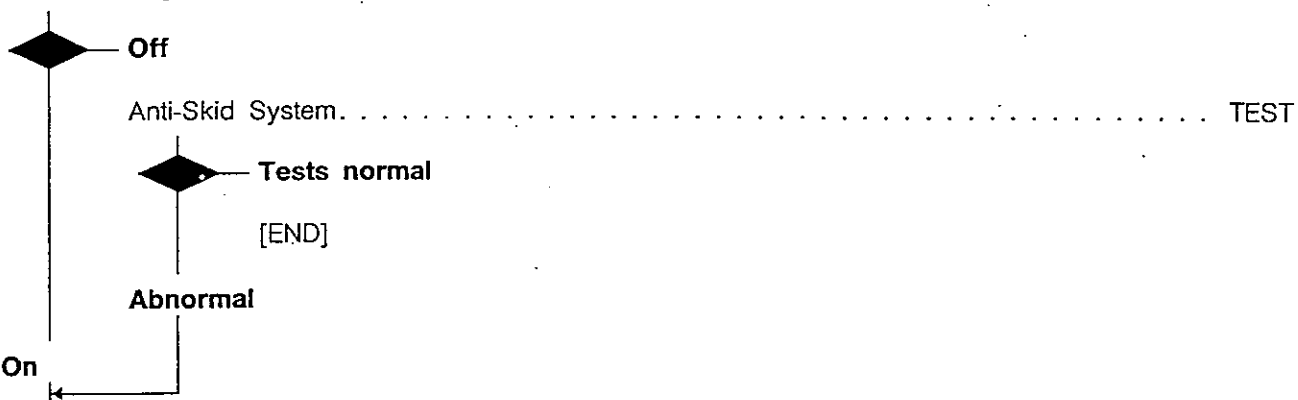
L OR R OUTBD OR INBD
ANTI-SKID LIGHT(S) ON

NOTE

Applicable light comes on to indicate malfunction of anti-skid protection for a specific wheel.

ANTI-SKID Switch CHECK ARM

ANTI-SKID Lights. CHECK



Landing Performance CHECK

Refer to appropriate performance chart to determine additional stopping distance with anti-skid inoperative. Make a normal landing.

Brakes. APPLY AS IN FULL
MANUAL BRAKE LANDING

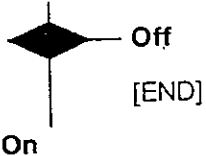
MD-80

FLIGHT CREW OPERATING MANUAL

PARKING BRAKES ON (IN FLIGHT, GEAR DOWN)

Rudder Pedal Brakes DEPRESS

PARKING BRAKES ON Light



During landing,

- Assume anti-skid inoperative.
- Refer to appropriate performance chart to determine additional stopping distance with anti-skid inoperative.

[END]

RED LIGHT ON WITH LANDING GEAR HANDLE UP

Airspeed MAX 230 KIAS

SPD BRK Lever VERIFY DISARMED

CAUTION

If SPD BRK lever cannot be disarmed, speedbrake stop and intermediate notches will not be engaged. Ensure lever is not inadvertently moved to full aft position as this would extend speedbrakes to full 60 degree position.

If damage to landing gear is suspected or if previous gear malfunction has been indicated, do not cycle gear as this may cause further damage and make it impossible to re-extend gear.

HYD PUMPS Switches ALL HI/ON

Move left and right ENG PUMPS switches to HI and TRANS and AUX switches to ON.

Gear Handle DOWN

Move Gear handle to DOWN and observe gear lights are green and GEAR DOOR OPEN light is off.

(Continued)

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FLIGHT CREW OPERATING MANUAL

RED LIGHT ON WITH LANDING GEAR HANDLE UP (Continued)

Gear Handle UP

Gear Lights And GEAR DOOR OPEN Light

 **All off**

ENG/AUX/TRANS HYD PUMPS Switches AS REQUIRED

Reconfigure hydraulic pump switches for cruise.

[END]

One or more on

Airspeed MAX 300 KIAS/.70 MACH

Electrical Circuits

NOTE

Check operation of electrical circuits. Inoperative automatic
pressurization, and takeoff warning after flap retraction
indicate ground shift is in ground mode.

 **Flight mode**

[END]

Ground mode

GROUND CONTROL RELAY C/B's (Upper EPC) PULL

CAUTION

To prevent premature system actuation, such as automatic
spoiler deployment, do not reset GROUND CONTROL RELAY
circuit breakers until after landing.

Before landing,

CABIN ALT Control Lever/Outflow Valve MANUAL/VALVE OPEN

SPD BRK Lever DISARMED

Spoilers must be extended manually for landing.

NOTE

Add 470 feet to landing distance on dry runway (540 feet on
wet runway).

During taxi,

GROUND CONTROL RELAY C/B's (Upper EPC) RESET

[END]

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FLIGHT CREW OPERATING MANUAL

UNABLE TO RAISE LANDING GEAR HANDLE AFTER TAKEOFF

Nosewheel Steering

Using normal force, attempt to turn steering wheel to left or right.

Wheel does not turn and index is centered

GEAR HDL REL Button PUSH AND HOLD

GEAR Handle. UP

[END]

Wheel is steerable or index is not centered

GEAR Handle. DO NOT RAISE

CAUTION

Do not retract gear. Nosewheel may not remain centered and damage may occur if gear is retracted. Do not exceed 300 KIAS/.70 Mach.

GROUND CONTROL RELAY Circuit Breakers (Upper EPC) PULL

Before landing,

CABIN ALT Control Lever MANUAL

SPD BRK Lever DISARMED

NOTE

With SPD BRK lever disarmed, ground spoilers must be extended manually during landing. Add 470 feet to landing distance on dry runway (540 feet on wet runway).

After touchdown,

Ground Spoilers MANUALLY EXTEND

During taxi,

GROUND CONTROL RELAY Circuit Breakers (Upper EPC) RESET

[END]

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FLIGHT CREW OPERATING MANUAL

WHEEL NOT TURNING LIGHT ON

Phase Of Flight

Takeoff

Airspeed

Prior to V_1-20 knots

Reject takeoff. Return to ramp and have maintenance determine cause.

[END]

After V_1-20 knots

Continue takeoff. If light remains on, make subsequent landing with anti-skid on.

[END]

Landing

If light is on prior to touchdown, verify anti-skid is on. Brake normally. Minimize landing roll if practicable.

If light comes on after touchdown, momentarily release brake pedals to allow wheel spin-up then continue normal anti-skid braking.

[END]

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FLIGHT CREW OPERATING MANUAL

Chapter 15

PNEUMATICS

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AIR LIBERTE INDUSTRIES

(SERIES 80)

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
LIMITATIONS	15-10-0	1	1/2	All
NORMAL OPERATION	15-20-0		(NOT USED)	
ABNORMAL OPERATION	15-30-0		(NOT USED)	

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FLIGHT CREW OPERATING MANUAL

Chapter 16

PROCEDURES AND TECHNIQUES

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AIR LIBERTE INDUSTRIES

(SERIES 80)

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
GENERAL	16-05-0	1	1/2	All
LIMITATIONS	16-10-0		(NOT USED)	
GROUND OPERATIONS				
Towing (Pushback) Procedures	16-20-0	1	1	All
Powerback Procedures	16-20-0	1	2	All
Taxi Procedures	16-20-0	1	3	All
TAKEOFF				
Normal Takeoff	16-20-5	1	2	All
Noise Abatement Takeoff	16-20-5	1	5	All
Engine Fire/Failure Takeoff	16-20-5	1	8	All
Rejected Takeoff	16-20-5	1	11	All
CLIMB AND DESCENT PROFILES				
Short Climb (2000 Feet Or Less)	16-20-10	1	2	All
Long Climb	16-20-10	1	4	All
Takeoff/Climb And Cruise (FMS)	16-20-10	1	6	All
Takeoff/Climb And Cruise (PMS)	16-20-10	1	7	All

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FLIGHT CREW OPERATING MANUAL

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
CLIMB AND DESCENT PROFILES (Continued)				
Descent	16-20-10	1	8	All
Short Descent (2000 Feet Or Less)	16-20-10	1	10	All
Cruise/Descent And Approach (FMS)	16-20-10	1	12	All
Cruise/Descent And Approach (PMS)	16-20-10	1	13/14	All
APPROACH & LANDING PROFILES				
Holding	16-20-15	1	2	All
ILS Approach	16-20-15	1	4	All
Autoland Approach	16-20-15	1	7	All
Localizer Approach	16-20-15	1	10	All
VOR Approach	16-20-15	1	13	All
NDB Approach	16-20-15	1	16	All
Missed Approach/Go-Around	16-20-15	1	19	All
Circling Approach	16-20-15	1	23	All
Visual Approach	16-20-15	1	26	All
No Flap/No Slat Approach	16-20-15	1	28	All
PILOT EYE ORIENTATION				
Airplane On Ground	16-20-20	1	1	All
Approach & Landing - Flaps 28 (1.3 VS)	16-20-20	1	2	All
Approach & Landing - Flaps 40 (1.3 VS)	16-20-20	1	3	All

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FLIGHT CREW OPERATING MANUAL

Title	Chapter Subject Unit	CODE	Page	Airplane Effectivity
PILOT EYE ORIENTATION (Continued)				
Approach & Landing - Visual Ground Segments	16-20-20	1	4	All
MISCELLANEOUS				
Emergency Descent	16-20-25	1	2	All
Recovery From Approach To Stall	16-20-25	1	2B	All
Windshear Procedures	16-20-25	1	4	All
Windshear Alert & Guidance System (WAGS)	16-20-25	1	13	All
GPWS Procedures	16-20-25	1	19	All
Volcanic Ash Procedures	16-20-25	1	21	All
Cold Weather Procedures	16-20-25	1	25	All
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FLIGHT CREW OPERATING MANUAL

Chapter 16

PROCEDURES AND TECHNIQUES

GENERAL

This chapter contains the procedures and techniques for operating the MD-80 airplane under varying conditions.

The illustrations in this chapter are intended for reference only. Refer to the applicable NORMAL/ABNORMAL chapters of this manual for detailed procedures for airplane operation.

MD-80

FLIGHT CREW OPERATING MANUAL

GROUND OPERATIONS

TOWING (PUSHBACK) PROCEDURES

GENERAL

Normally, flight crew personnel will only be involved with pushback operations from the gate. The following safety and operating precautions apply to all airplane towing procedures and should be strictly adhered to. These precautions include the following:

- Prior to any movement, ensure cabin is properly prepared, all cargo doors and main landing gear doors are closed and wheel chocks are removed.
- Ensure NAV alignment has been completed, if required.
- Establish positive contact with towing personnel and ramp control.

NOTE

Prior to pushback or tow, ensure that an emergency signal is agreed upon between the Captain and the towing vehicle operator which may be used in the event an immediate stop is required and the primary means of communication fails.

- Verify hydraulic power is available and the brake pressure is within the normal range.
- Verify anti-collision lights are on.
- Release or set parking brakes only when so directed by towing personnel.
- In congested areas, request wing walkers to ensure clearance between the airplane, adjacent airplanes, equipment and buildings.
- Ensure towing speed is not excessive.
- Be alert for any situation which may require cockpit crew intervention with towing operation.
- Ensure last few feet of towing are in a straight line to align gear and relieve tire and tow bar twisting stresses.
- Ensure all towing personnel are well clear of airplane, pins removed, and a positive all clear signal has been received prior to taxi.

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FLIGHT CREW OPERATING MANUAL

POWERBACK PROCEDURES

GENERAL

The powerback maneuver can be an efficient means for the MD-80 series airplane to depart the gate and transition to the taxi phase. There are, however, several factors of safety and passenger comfort that must be considered before commencing the maneuver and during the maneuver itself. These considerations are as follows:

- Flight and ground crew must have completed an appropriate powerback procedures training program.
- Powerback can be performed only in approved ramp areas.
- Thrust reversers on both engines must be operative.
- Ramp must be clear of contamination.
- There must be no more than moderate precipitation.
- Use a maximum of 1.3 EPR in reverse thrust.
- Do not use brakes while the airplane is moving rearward.
- Both pilots should have their feet on the floor during the powerback maneuver.
- Ensure all personnel and equipment are clear of engines fore and aft prior to initiating movement of thrust levers.

EXECUTING THE MANEUVER

Check that the FLAP/SLAT handle is in the UP/RET position and that the ground crewman (coordinator) is in position and in visual contact with the captain. Having received ground control clearance for powerback, the captain will signal readiness to begin powerback with thumbs up (during darkness, flash the nose wheel light). Coordinator responds with all clear and commences rolling motion with both hands to indicate start of powerback. Captain applies reverse thrust to reverse idle detent and checks both engines in reverse thrust condition. Captain releases parking brakes and ensures both pilots' feet are on the floor.

NOTE

To facilitate backward movement in some instances of tire flat spots, chocks or ramp conditions, a few feet of forward taxi may be appropriate prior to applying reverse thrust. Use normal brakes to stop forward roll.

(Continued)

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FLIGHT CREW OPERATING MANUAL

POWERBACK PROCEDURES (Continued)

Apply reverse thrust to a maximum of 1.3 reverse EPR to initiate movement. Once motion has commenced, reduce EPR to maintain a safe speed. If the speed is too fast, move one reverse thrust lever to forward thrust idle. If the airplane does not move initially with 1.3 reverse EPR, discontinue powerback operation. The coordinator advises the speed of reverse taxi by varying the speed of wand(s) rotation. To signal a turn, the coordinator points downward with his right or left hand. The downward pointing hand indicates the direction the tail should move and the direction the captain should turn the nose gear steering wheel. When reverse taxi is complete, the coordinator will give the come ahead signal. The captain should then place the reverse thrust levers full down and apply forward thrust as required and transition to normal taxi phase.

EMERGENCY STOP

If an emergency stop is required, the coordinator will discontinue the rolling motion of the wands and immediately signal forward taxi. The captain should respond immediately by placing reverse levers full down and applying forward thrust as required.

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FLIGHT CREW OPERATING MANUAL

TAXI PROCEDURES

GENERAL

A lightly loaded airplane may develop a slight bounce during taxi. This may be corrected by decreasing or increasing taxi speed.

The airplane is very sensitive to inputs from the nose gear steering wheel. In order to make a smooth entry into a turn, it is advisable to lead the entry with rudder pedal steering. A very positive nose wheel centering action, if not smoothly controlled, may cause discomfort in the passenger compartment. In order to relieve stress, the nose wheel should always be centered before coming to a stop. With both hydraulic systems in operation, the nose gear steering wheel provides steering through a maximum of 82° right or left of centerline. With only one hydraulic system operating, steering is restricted (both in degrees and rate of turn) to approximately 55° in the direction of the operating system and, unrestricted through a maximum of 82° in the direction of the inoperative system.

Nose gear steering through the rudder pedals is very smooth and effective and provides steering through an arc of approximately 17° right or left of centerline. Rudder pedal steering can be overridden by the nose gear steering wheel. When checking rudder throw, hold the nose gear steering wheel to prevent scrubbing the nose tires.

Attempt to roll forward before turning to avoid use of high power settings and when approaching a turn, slow down to avoid unnecessary braking and nose tire scrubbing.

When possible, avoid using brakes during a turn. If braking is necessary during a turn, brake the outside wheels first. If additional power is required during a turn, use the engine on the outside of the turn.

The distance from the pilots' seats to the main gear (approximately 70 feet) requires an overshoot of the centerline on all turns. For visual reference, taxi with the centerline under the pilots' seats in order to maintain the nose wheel on the centerline. (Refer to Section 4, AIRPLANE GENERAL, Turning Radius).

Fuel consumption during taxi is approximately 30-50 pounds/14-23 kilograms per minute.

USE OF THRUST

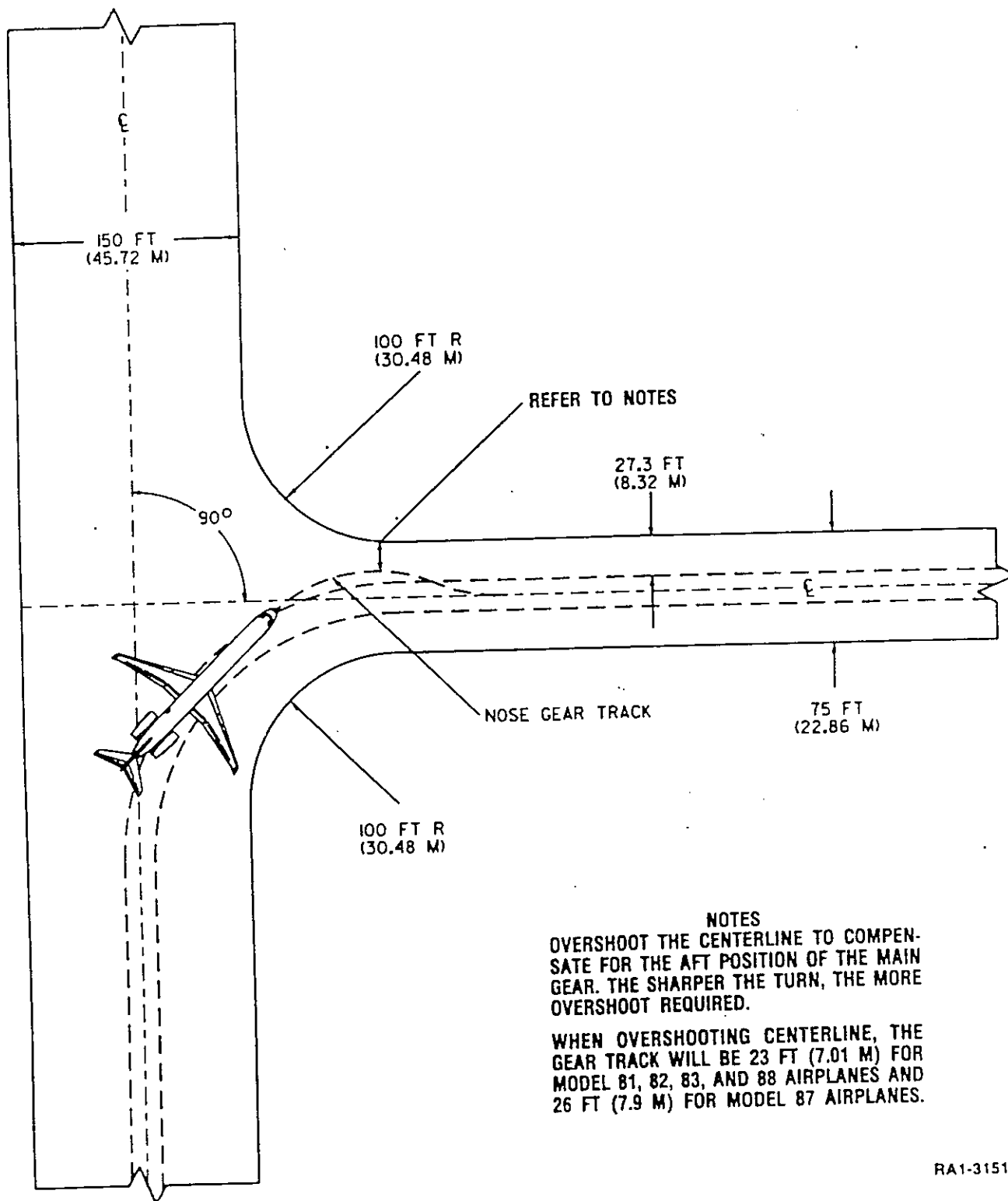
Unless the airplane is very heavy or headed uphill, a momentary application of thrust to 1.2 EPR is the maximum required to initiate movement. Do not exceed 1.2 EPR without ground crewman clearance in order to avoid possible personnel injury or equipment damage. After the airplane is moving, idle power may cause acceleration. Control taxi speed with intermittent braking.

(Continued)

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FLIGHT CREW OPERATING MANUAL

TAXI TURNING PATH



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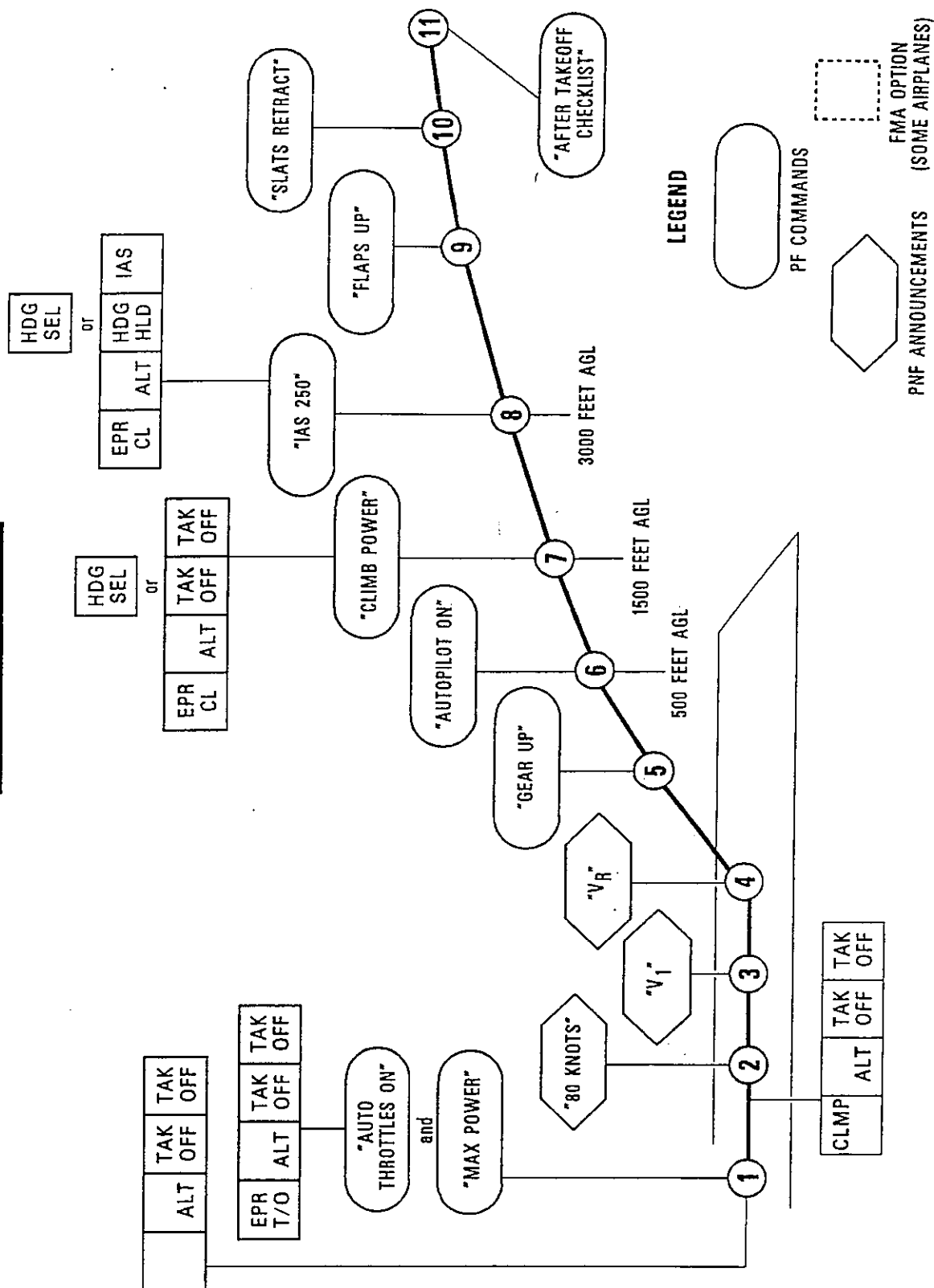
MD-80

FLIGHT CREW OPERATING MANUAL

TAKEOFF PROFILES

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NORMAL TAKEOFF



CAG(IIGDS)

CHANGE: New illustration.

RA1-6157

MD-80

FLIGHT CREW OPERATING MANUAL

NORMAL TAKEOFF (Continued)

PROCEDURE/PARAMETER

1. Pilot Flying (PF) advances throttles to vertical and calls "AUTOTHROTTLES ON," "MAX POWER." Pilot Not Flying (PNF) moves auto throttle system switch to AUTO THROT (on). PNF verifies maximum power for takeoff, trims takeoff EPR and observes CLMP at 60 knots.
2. PNF calls "80 KNOTS." PF verifies airspeed.
3. PNF calls "V₁." PF verifies airspeed and places both hands on control wheel.
4. PNF calls "V_R." PF verifies airspeed then smoothly rotates to initial takeoff attitude (maximum 20 degrees). Rotation rate should be approximately 2-1/2 seconds to lift-off, 8 degrees pitch and 2-1/2 seconds from lift-off to takeoff attitude in one smooth continuous pitch change.

CAUTION

Tail strike may occur at 10.5 degrees nose-up attitude.

5. At positive rate-of-climb and V₂, PF calls "GEAR UP," PNF verifies "POSITIVE RATE-OF-CLIMB" and moves landing gear handle to UP. PF maintains minimum V₂ + 10 and limits maximum pitch to 20 degrees nose-up. Speeds in excess of V₂ + 10 are acceptable.
6. At 500 feet AGL, PF may call "AUTOPILOT ON." PNF moves autopilot switch to AP ON.

NOTE

500 feet AGL is minimum altitude for autopilot operation under FAR 121. Autopilot is certified for engagement at 200 feet AGL.

7. At 1500 feet AGL, PF calls "CLIMB POWER." PNF pushes CL button. PF verifies throttles reduce to climb power.

PREFERRED TECHNIQUE

PNF cross checks engine instruments and annunciator panel for normal/abnormal indications. Advises PF of any abnormal indications.

PNF confirms positive rate-of-climb on barometric altimeter and repeats "GEAR UP."

PNF states position of DFGC switch if not selected to PF side.

PNF insures FMA indicates EPR CL.

(Continued)

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FLIGHT CREW OPERATING MANUAL

NORMAL TAKEOFF (Continued)

PROCEDURE/PARAMETER

8. At 3000 feet AGL, PF calls "IAS 250." PNF pushes IAS button and sets 250 in SPD/MACH readout.
9. At flap retract speed, PF calls "FLAPS UP." PNF moves flap/slat handle to 0/EXT.
10. At slat retract speed, PF calls "SLATS RETRACT." PNF moves flap/slat handle to UP/RET.
11. When passing minimum maneuvering speed, select bank angle 30 degrees, and PF calls "AFTER TAKEOFF CHECKLIST." PNF commences AFTER TAKEOFF checklist.

CAUTION

For after takeoff clean-up, limit bank angle to 15 degrees until minimum maneuvering speed for existing flap/slat configuration is achieved. When maneuvering is the priority, bank angle may be increased by retaining flap/slat configuration.

NOTE

At heavier gross weights, minimum maneuver speed may be higher than 250 knots. This may require a flap/slat configuration retention should a speed restriction apply.

PREFERRED TECHNIQUE

After confirming speed is at or above flap retract speed, PNF retracts flaps.

NOTE

If flaps/slats are to remain extended after achieving the required retract speed, bank angle may be increased up to 30 degrees.

After confirming speed is at or above slat retract speed, PNF retracts slats. Confirm appropriate FMA indications.

PNF accomplishes AFTER TAKEOFF checklist silently. When complete, PNF reports "AFTER TAKEOFF CHECKLIST COMPLETE," normally after altimeter is set leaving FL 180.

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FLIGHT CREW OPERATING MANUAL



NOISE ABATEMENT TAKEOFF

CAG(IGDS)

CHANGE: New illustration.

RA1-6158

MD-80

FLIGHT CREW OPERATING MANUAL

NOISE ABATEMENT TAKEOFF (Continued)

PROCEDURE/PARAMETER

1. Pilot Flying (PF) advances throttles to vertical and calls "AUTOTHROTTLES ON," "MAX POWER." PNF moves auto throttle system switch to AUTO THROT (on). PNF verifies maximum power for takeoff, trims takeoff EPR and observes CLMP at 60 knots.
2. PNF calls "80 KNOTS." PF verifies airspeed.
3. PNF calls "V₁." PF verifies airspeed and places both hands on control wheel.
4. PNF calls "V_R." PF verifies airspeed then smoothly rotates to initial takeoff attitude (maximum 20 degrees). Rotation rate should be approximately 2-1/2 seconds to lift-off, 8 degrees pitch and 2-1/2 seconds from lift-off to takeoff attitude in one smooth continuous pitch change.

CAUTION

Tail strike may occur at 10.5 degrees nose-up attitude.

5. At positive rate-of-climb and V₂, PF calls "GEAR UP," PNF verifies "POSITIVE RATE-OF-CLIMB" and moves landing gear handle to UP. PF maintains minimum V₂ + 10 and limits maximum pitch to 20 degrees nose-up. Speeds in excess of V₂ + 10 are acceptable.
6. At 500 feet AGL, PF may call "AUTOPILOT ON." PNF moves autopilot switch to AP ON.

NOTE

500 feet AGL is minimum altitude for autopilot operation under FAR 121. Autopilot is certified for engagement at 200 feet AGL.

7. At cutback altitude, PF calls "CUTBACK." PNF pushes EPR SEL button for semi-auto cutback (some airplanes) or manually sets thrust for manual cutback. PF verifies throttles reduce to cutback EPR.

PREFERRED TECHNIQUE

PNF cross checks engine instruments and annunciator panel for normal/abnormal indications. Advises PF of any abnormal indications.

PNF confirms positive rate of climb on barometric altimeter and repeats "GEAR UP."

PNF states position of DFGC switch if not selected to PF side.

(Continued)

MD-80

FLIGHT CREW OPERATING MANUAL

NOISE ABATEMENT TAKEOFF (Continued)

PROCEDURE/PARAMETER

NOTE

Minimum cutback altitude in the U.S.A. is 800 feet above field elevation.

8. To exit cutback, PF calls "CLIMB POWER, IAS 250." PNF selects climb power and pushes IAS button and sets 250 in SPD MACH readout.
9. At flap retract speed, PF calls "FLAPS UP." PNF moves flap/slat handle to O/EXT.

10. At slat retract speed, PF calls "SLATS RETRACT." PNF moves flap/slat handle to UP/RET.
11. When passing minimum maneuvering speed, select bank angle 30 degrees and PF calls "AFTER TAKEOFF CHECKLIST." PNF commences AFTER TAKEOFF checklist.

CAUTION

For after takeoff clean-up, limit bank angle to 15 degrees until minimum maneuvering speed for existing flap/slat configuration is achieved. When maneuvering is the priority bank angle may be increased by retaining flap/slat configuration.

NOTE

At heavier gross weights, minimum maneuver speed may be higher than 250 knots. This may require a flap/slat configuration should a speed restriction apply.

PREFERRED TECHNIQUE

After confirming speed is at or above flap retract speed, PNF retracts flaps.

NOTE

If flaps/slats are to remain extended after achieving retract speed, bank angle may be increased up to 30 degrees.

After confirming speed is at or above slat retract speed, PNF retracts slats. Confirm appropriate FMA indications.

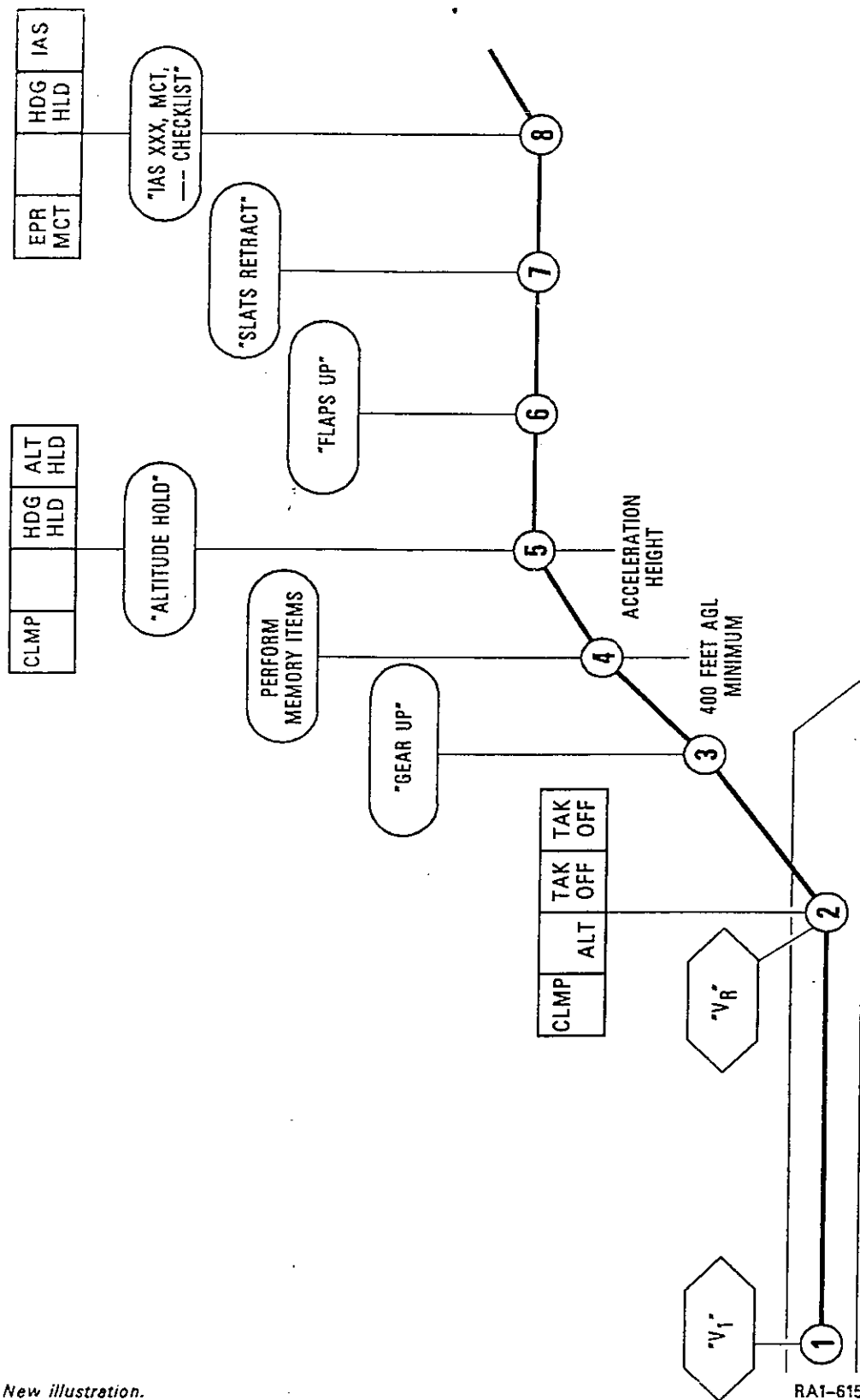
PNF accomplishes AFTER TAKEOFF checklist silently. When complete, PNF reports "AFTER TAKEOFF CHECKLIST COMPLETE," normally after altimeter is set leaving FL 180.

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FLIGHT CREW OPERATING MANUAL

MD-80

ENGINE FIRE/FAILURE TAKEOFF



CAG(IIGDS) CHANGE: New illustration.

RA1-6159

MD-80

FLIGHT CREW OPERATING MANUAL

ENGINE FIRE/FAILURE TAKEOFF (Continued)

PROCEDURE/PARAMETER

1. Engine fire/failure occurs after V_1 . PNF calls appropriate failure.
2. PNF calls " V_R " and silences fire bell as required. Initial pitch target is 13 degrees nose-up.
3. At positive rate of climb and minimum V_2 , PF calls "GEAR UP." PNF moves landing gear handle to UP. PF maintains airspeed V_2 to $V_2 + 10$. Airspeed indicator is primary speed reference. Rudder is the primary means of heading control and keeping a wings level attitude. Minimize aileron inputs. While still on ground with nosewheel steering, directional control on one engine can be maintained with $1/3$ to $1/2$ rudder throw. After rotation, additional rudder inputs will be required for directional control. Keep ball centered with constant rudder, wings level with little or no aileron and a steady pitch attitude.
4. Minimum altitude to initiate appropriate action is 400 feet AGL. With airplane under control, PF calls out memory items.
5. At acceleration height, PF calls "ALTITUDE HOLD." PNF pushes ALT HOLD button.
6. At flap retract speed, PF calls "FLAPS UP." PNF moves flap/slat handle to 0/EXT.
7. At slat retract speed, PF calls "SLATS RETRACT." PNF moves flap/slat handle to UP/RET.

PREFERRED TECHNIQUE

PF maintains directional control with rudder input. Approximately $1/3$ to $1/2$ rudder pedal deflection is required for directional control with nosewheel still in contact with runway. After lift off more rudder will be required due to loss of nosewheel steering. Use minimum aileron to avoid rolling and yawing.

NOTE

Flight director will command heading existing at nosewheel lift off. PNF identifies specific type of failure and engine number.

PNF confirms positive rate of climb on the barometric altimeter and V_2 speed minimum and repeats "GEAR UP."

PNF confirms appropriate system control action with PF before activation. Notify ATC as soon as time and circumstances permit. If conditions warrant, PF may delay callout of memory items until after step 8.

PNF confirms acceleration height achieved and pushes ALT HOLD button.

PNF confirms flap retract speed and retracts flaps.

PNF confirms slat retract speed and retracts slats.

(Continued)

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FLIGHT CREW OPERATING MANUAL

ENGINE FIRE/FAILURE TAKEOFF (Continued)

PROCEDURE/PARAMETER

8. PF accelerates airplane to slat retract speed plus 20 knots and calls "IAS XXX, MCT" and calls for appropriate checklists. Continue climb to assigned/safe altitude. PNF pushes IAS button and pushes MCT button on TRI/TRP. PNF completes appropriate checklists. After airplane is trimmed, PF may call for autopilot on.

NOTE

TRI/TRP "NO MODE" annunciator light will remain on until air conditioning shutoff switch is moved to override.

PREFERRED TECHNIQUE

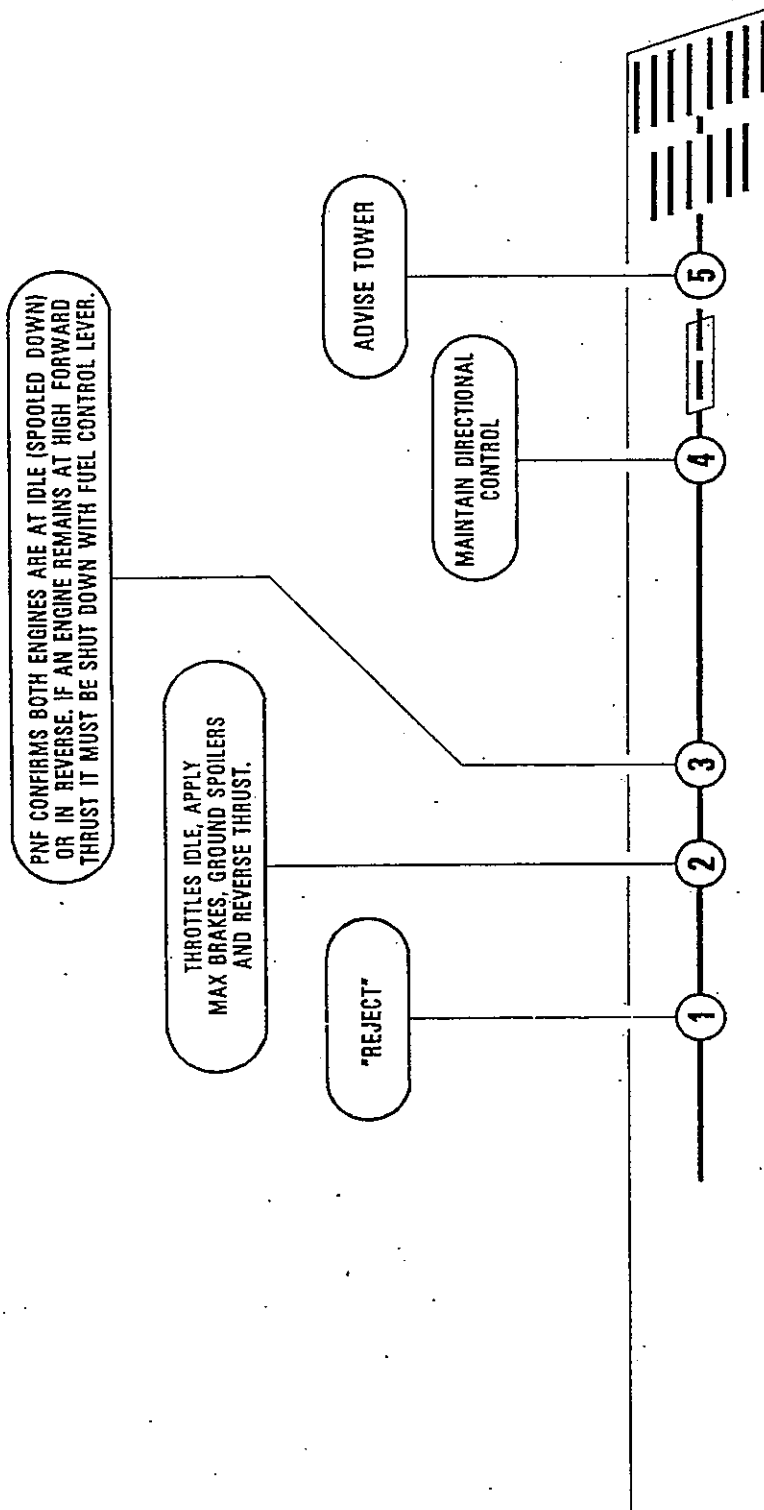
PNF pushes IAS button and insures proper speed is set. MCT is then selected and manual throttle adjustment accomplished.

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FLIGHT CREW OPERATING MANUAL

MD-80

REJECTED TAKEOFF



CAG(IGDS) CHANGE: Added text to step 3.

RA1-6160B

MD-80

FLIGHT CREW OPERATING MANUAL

REJECTED TAKEOFF (Continued)

PROCEDURE/PARAMETER

1. PIC commands "REJECT."
2. PF retards throttles to idle and simultaneously applies maximum anti-skid braking, ground spoilers, and reverse thrust as required. PNF monitors spoiler activation and reverse thrust.
3. PNF confirms both engines are at idle (spooled down) or in reverse. If an engine remains at high forward thrust it must be shut down with the fuel control lever.
4. PF maintains directional control with rudder pedals and applies slight forward pressure on control column.
5. PNF advises tower of rejected takeoff and any assistance required.

CAUTION

Should directional control become a problem while in reverse thrust, reduce reverse thrust to reverse idle (or forward idle thrust if required), regain directional control and re-apply reverse thrust as necessary.

PREFERRED TECHNIQUE

When autobrakes are installed and armed, ground spoilers are normally extended by reverse thrust. If ground spoilers are not extended automatically, they must be extended manually.

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FLIGHT CREW OPERATING MANUAL

CLIMB AND DESCENT PROFILES

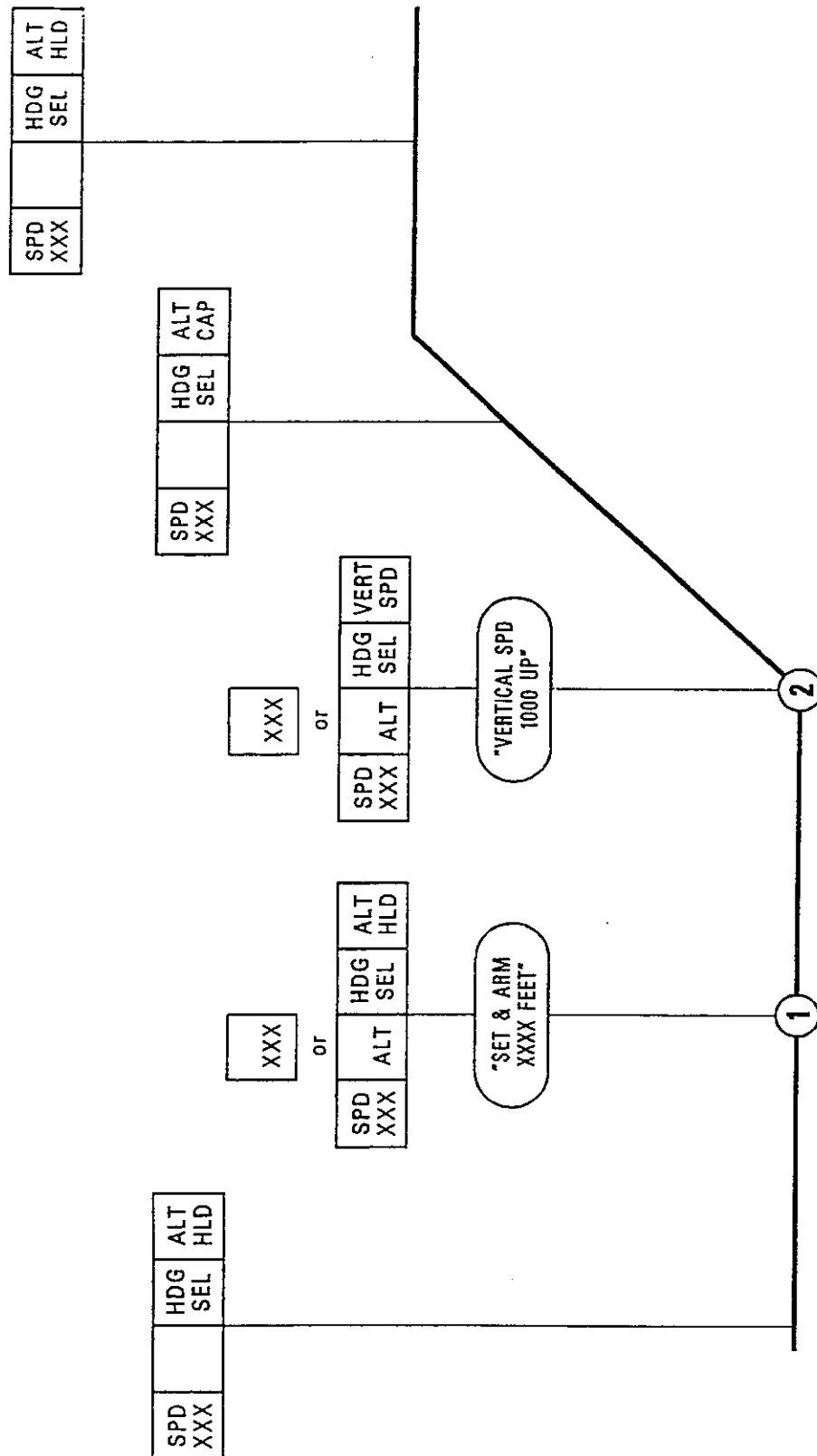
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FLIGHT CREW OPERATING MANUAL

MD-80 / 90

**SHORT CLIMB
2000 FEET OR LESS**



CAG(IGDS)

RA1-6237

MD-80

FLIGHT CREW OPERATING MANUAL

SHORT CLIMB (2000 FEET OR LESS) (Continued)

PROCEDURE/PARAMETER

1. PF calls "SET AND ARM XXXX." PNF sets and arms XXXX.
2. PF calls "VERTICAL SPEED 1000 UP," PNF sets V + 1000.

NOTE

The amount of vertical speed is a pilot preference item. For passenger comfort considerations, large vertical speed selections (+ 2000) should normally be avoided.

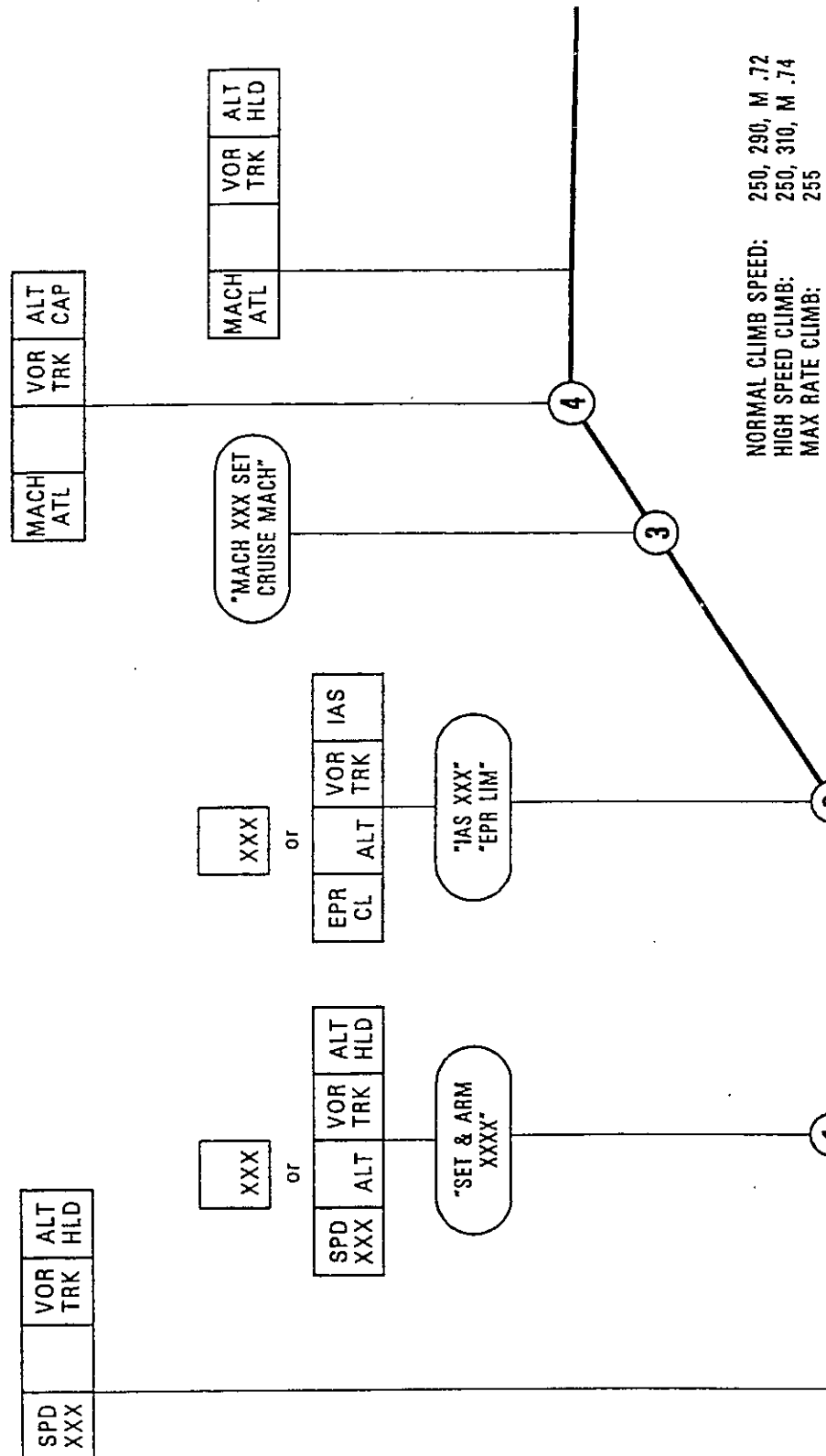
PREFERRED TECHNIQUE

PNF confirms ALT or XXX annunciation in ARM FMA.

PNF calls 1000 feet below altitude.

MD-80 / 90

LONG CLIMB



NORMAL CLIMB SPEED:	250, 290, M .72
HIGH SPEED CLIMB:	250, 310, M .74
MAX RATE CLIMB:	255

CAG(IGDS)

RA1-6238

MD-80

FLIGHT CREW OPERATING MANUAL

LONG CLIMB (Continued)

PROCEDURE/PARAMETER

1. PF calls "SET & ARM XXXX." PNF sets and arms XXXX.
2. PF calls "IAS XXX, EPR LIM." PNF pushes IAS/MACH and EPR LIM, and sets IAS speed to XXX KTS.
3. Passing IAS/MACH transition point, PF calls "MACH XXX, SET CRUISE MACH." PNF pushes IAS/MACH, sets XXX and sets cruise Mach.
4. Monitor altitude capture and MACH select.

PREFERRED TECHNIQUE

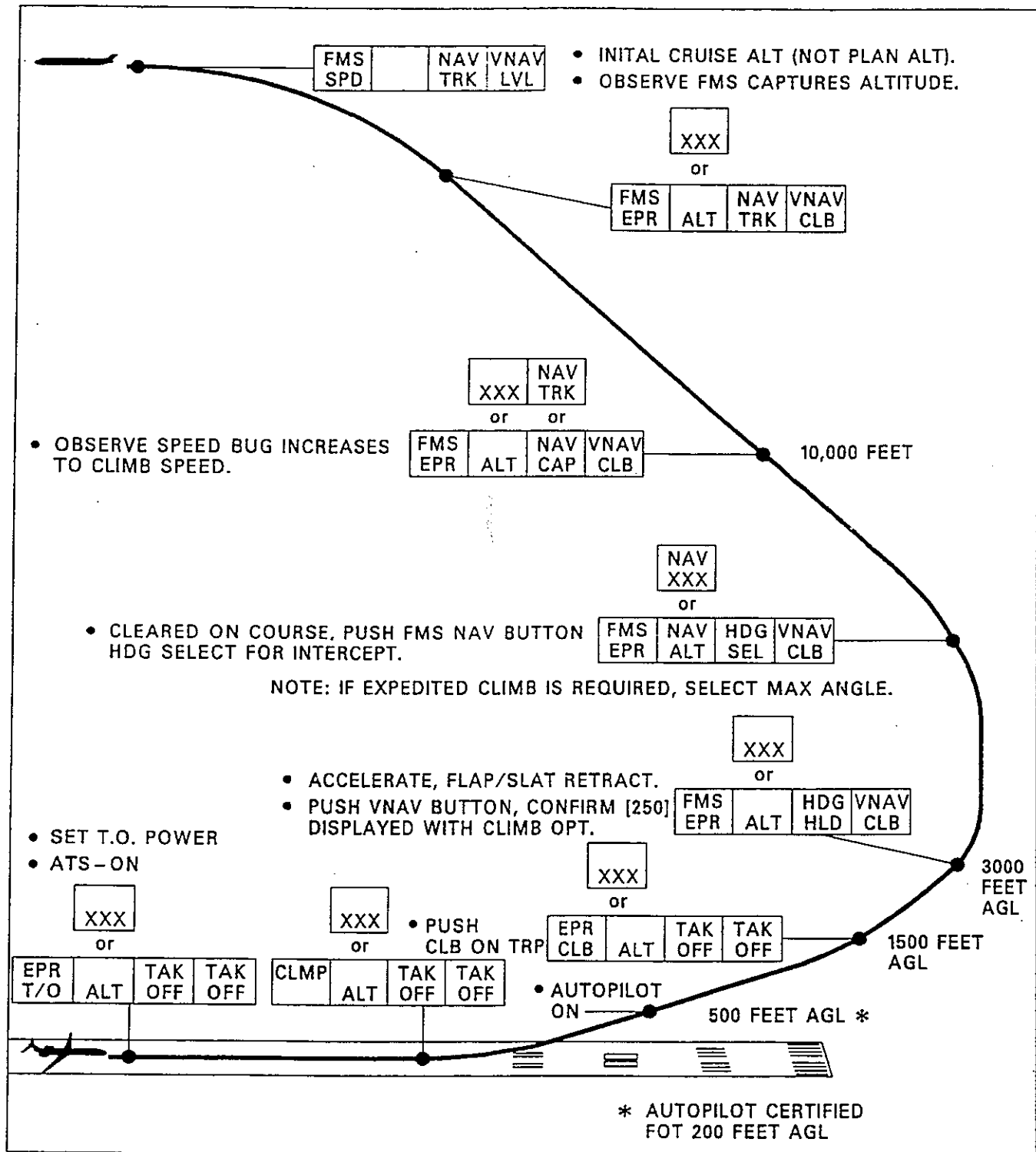
PNF confirms ALT or XXX annunciation in ARM FMA.

PNF calls 1000 feet below altitude.

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FLIGHT CREW OPERATING MANUAL

TAKEOFF/CLIMB AND CRUISE (FMS)



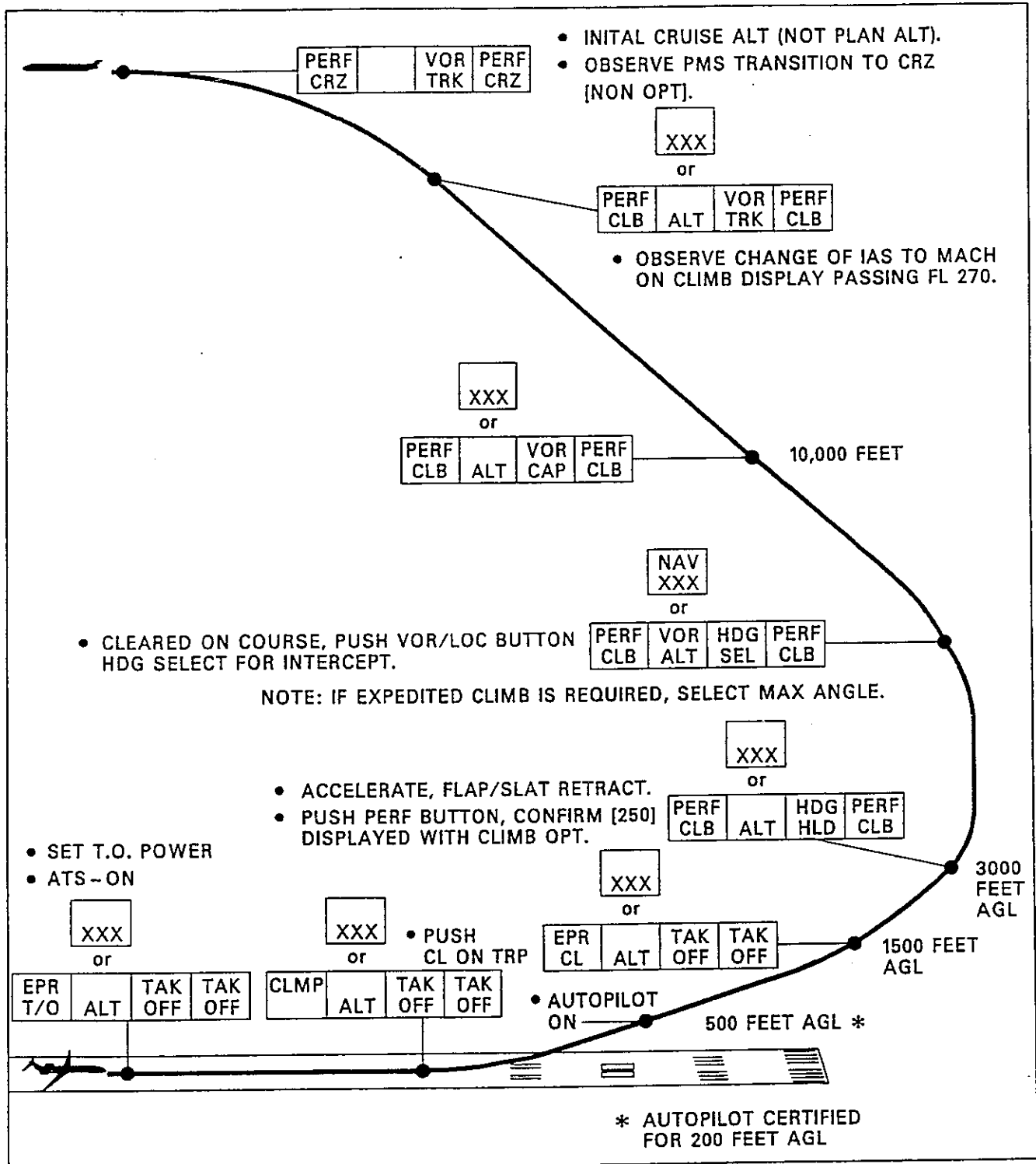
CAG(IGDS)

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FLIGHT CREW OPERATING MANUAL

TAKEOFF/CLIMB AND CRUISE (PMS)



CAG(IGDS)

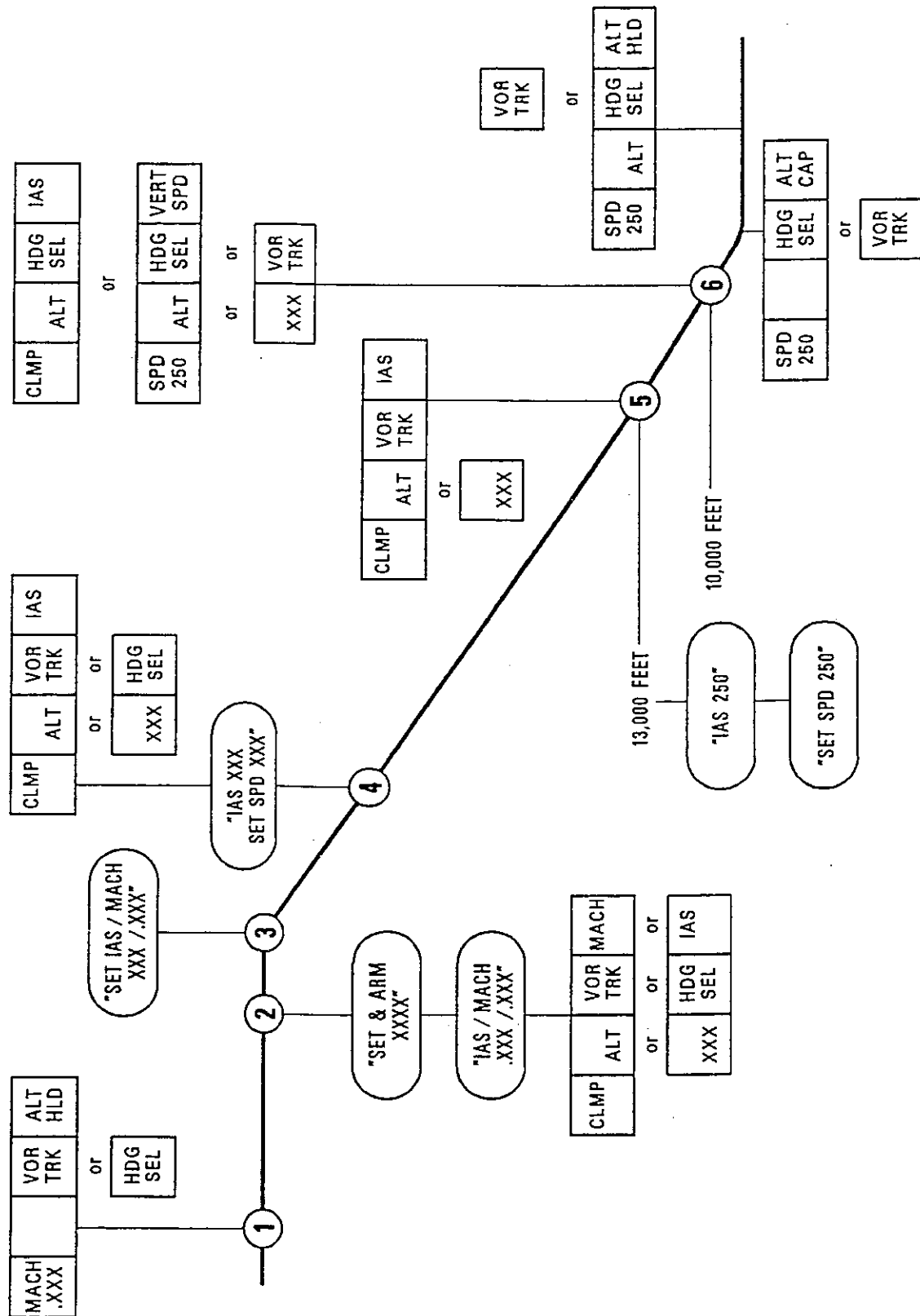
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FLIGHT CREW OPERATING MANUAL

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DESCENT



CAG(IGDS)

RA1-6240

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FLIGHT CREW OPERATING MANUAL

DESCENT (Continued)

PROCEDURE/PARAMETER	PREFERRED TECHNIQUE
1. Cruise altitude.	
2. PF calls "SET & ARM XXXX". PNF sets and arms XXXX. PF calls "IAS/MACH XXX," PNF pushes IAS/MACH, sets IAS/MACH XXX and confirms ATS CLAMP. PF smoothly retards throttles to idle.	PNF confirms ALT or XXX annunciation in ARM FMA.
3. PF calls "SET MACH XXX," PNF sets MACH XXX as required.	
4. At MACH/IAS TRANSITION ALT. PF calls "IAS XXX, SET SPD XXX." PNF sets IAS XXX and SPD XXX.	
5. At 13,000 feet PF calls "IAS 250, SET SPD 250." PNF sets IAS 250 and SPD 250. Airplane should reach 250 KIAS by 10,000 feet if required.	
6. PF continues descent and adjusts speed according to ATC clearance and proximity to approach facility. Use of VERT SPEED, SPEED SELECT, and HDG SELECT is recommended when appropriate.	PNF calls 1000 feet above altitude.

NOTE

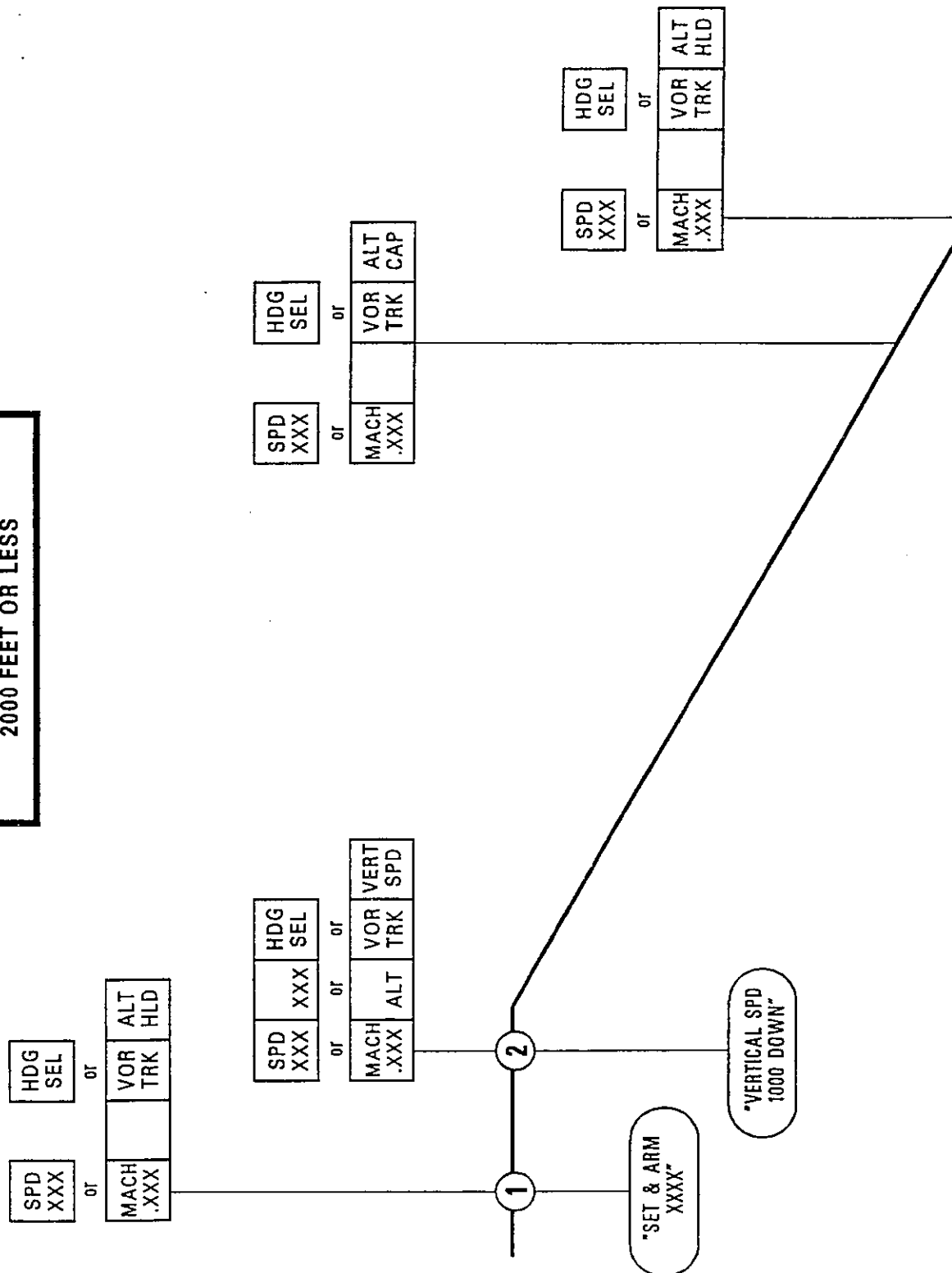
If a lesser rate of descent is desired, set throttles accordingly.

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FLIGHT CREW OPERATING MANUAL

MD-80 / 90

SHORT DESCENT
2000 FEET OR LESS



CAG(IGDS)

RA1-6241

MD-80

FLIGHT CREW OPERATING MANUAL

SHORT DESCENT (2000 FEET OR LESS) (Continued)

PROCEDURE/PARAMETER

1. PF calls "SET AND ARM XXXX." PNF sets and arms XXXX.
2. PF calls "VERTICAL SPEED 1000 DOWN," PNF sets V-1000.

NOTE

The amount of vertical speed is a pilot preference item. For passenger comfort considerations, large vertical speed selections (2000 +) should normally be avoided.

PREFERRED TECHNIQUE

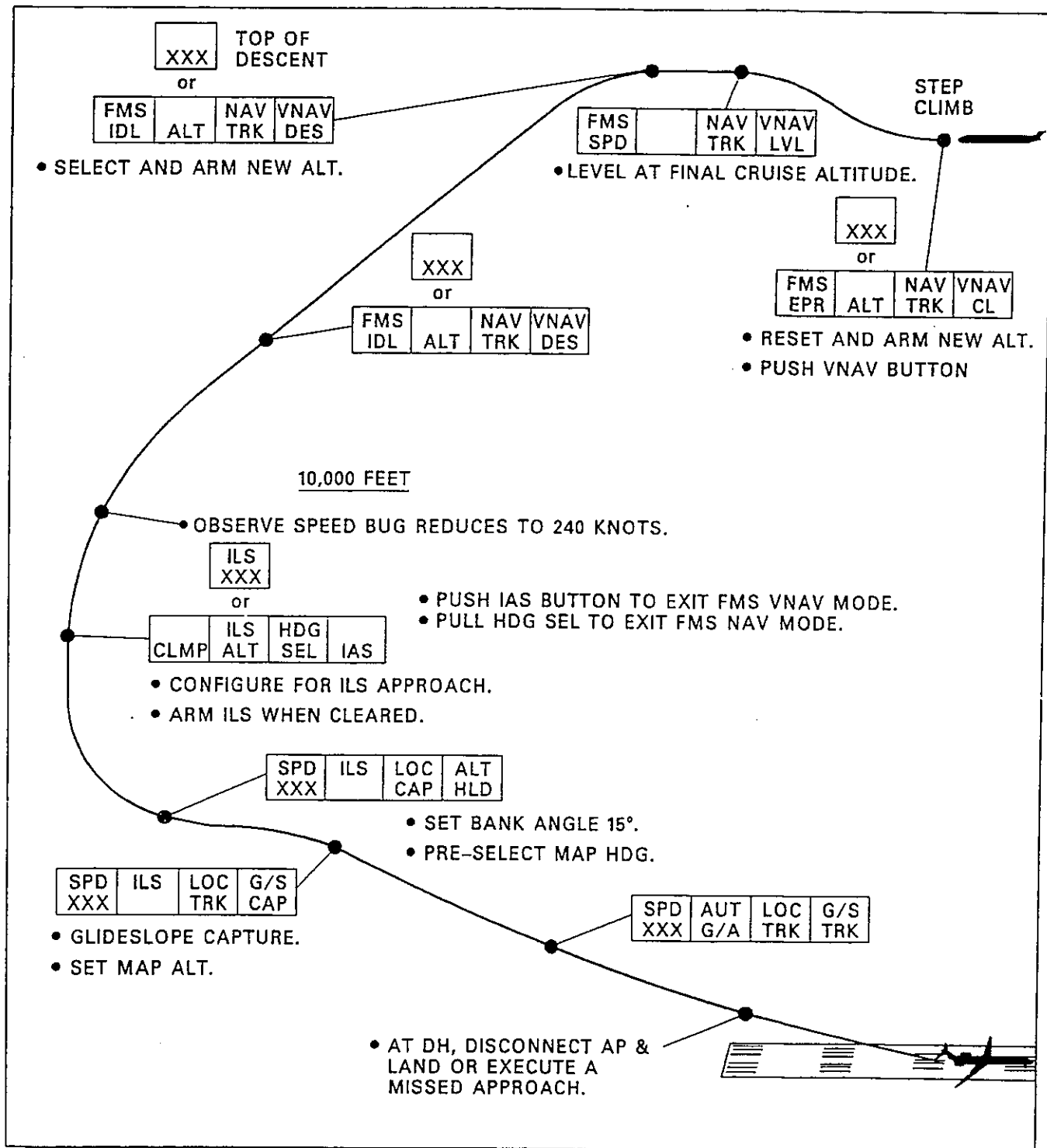
PNF confirms ALT or XXX annunciation in ARM FMA.

PNF calls 1000 feet above altitude.

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FLIGHT CREW OPERATING MANUAL

CRUISE/DESCENT AND APPROACH (FMS)



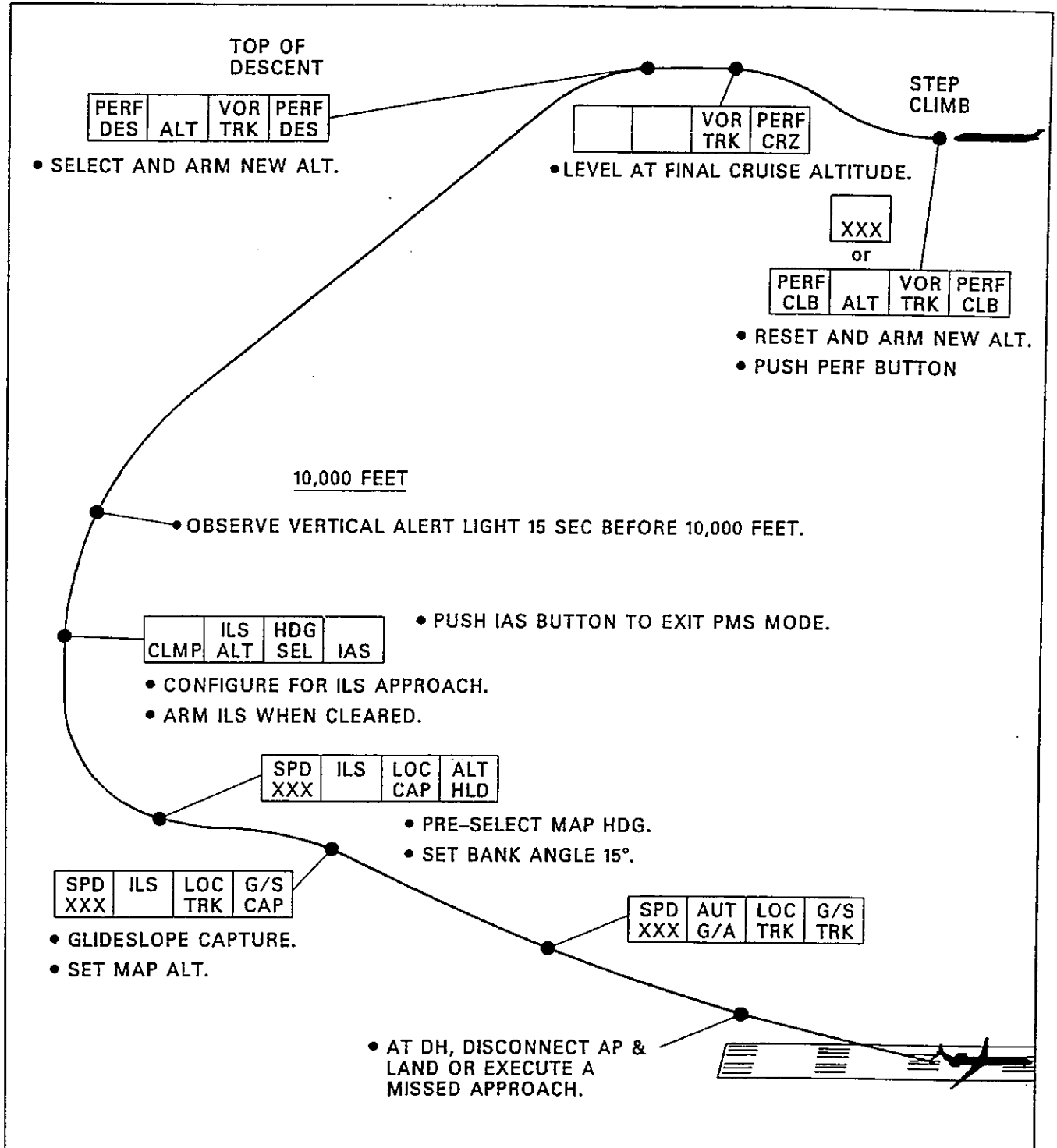
CAG(IGDS)

RA1-6242

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FLIGHT CREW OPERATING MANUAL

CRUISE/DESCENT AND APPROACH (PMS)



CAG(IGDS)

RA1-6258

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FLIGHT CREW OPERATING MANUAL

APPROACH AND LANDING PROFILES

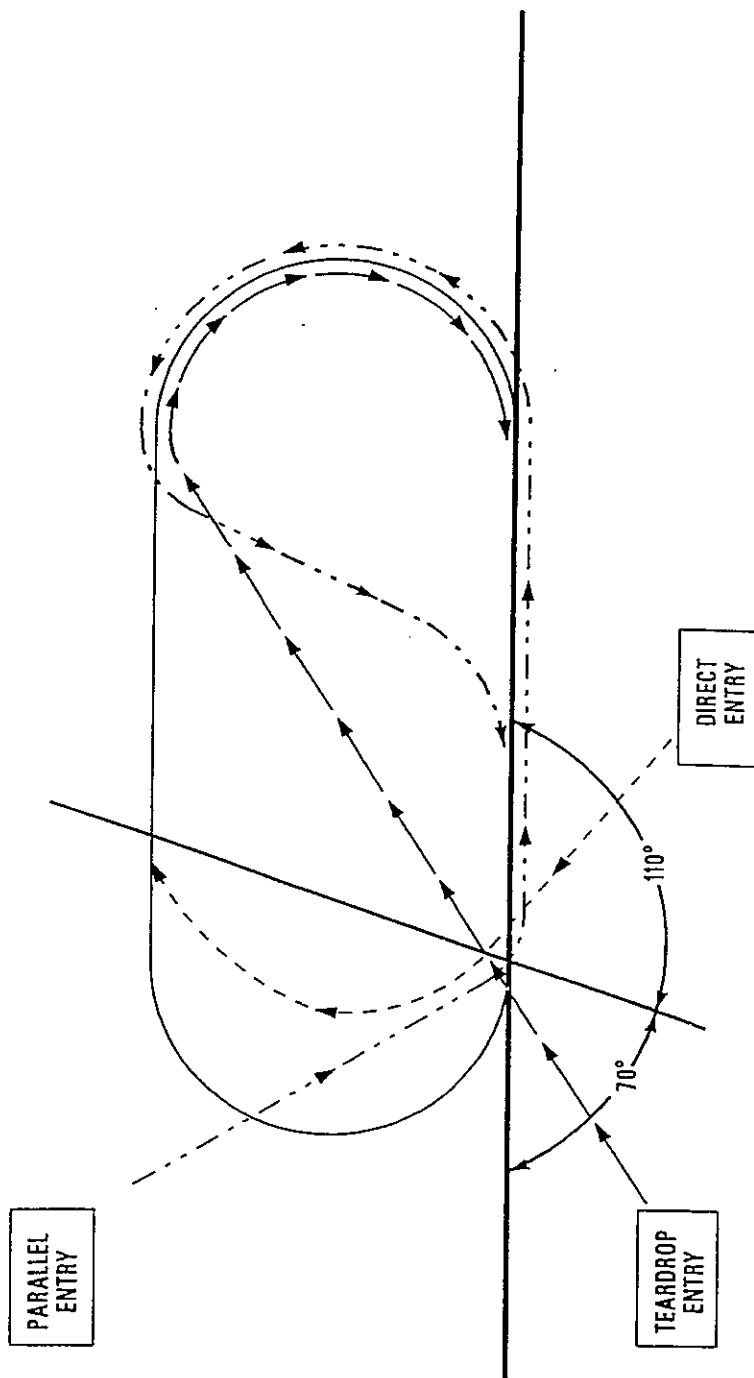
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MD-80

FLIGHT CREW OPERATING MANUAL

MD-80 / 90

HOLDING



- DIRECT ENTRY: TURN OUTBOUND IN DIRECTION OF PATTERN AND FLY HOLDING PATTERN.
 → TEARDROP ENTRY: PROCEED ON A HEADING OF 30° TO OUTBOUND TRACK. AFTER 1 MINUTE, INTERCEPT INBOUND TRACK
 - - - PARALLEL ENTRY: TURN SHORTEST WAY TO PARALLEL HOLDING TRACK. AFTER 1 MINUTE, RETURN TO HOLDING FIX OR INTERCEPT HOLDING TRACK.

CAG(IGDS)

RA1-6243

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FLIGHT CREW OPERATING MANUAL

HOLDING (Continued)

Enroute to a holding fix, tune and identify appropriate radios.

Reduce speed to appropriate maximum holding speed or less within 3 minutes prior to ET at holding fix. Make all turns during entry and while holding with a 30 degree bank angle or flight director computer bank angle.

ALTITUDES or FLIGHT LEVELS	MAXIMUM KIAS		STILL AIR OUTBOUND TIMING
	ICAO	U.S.	
Above FL 200	265	265	1.5 minute
Above 14,000 feet to FL 200	240		
Above 6000 feet, Up to and including 14,000 feet	230	210	1 minute
6000 feet or below	230	200	1 minute

For maximum fuel economy, hold at flaps up/slats retract minimum maneuvering speed. If flaps up/slats retract minimum maneuvering speed exceeds maximum holding pattern airspeed, use minimum slat/flap setting which meets speed restriction.

Compensate for known effect of wind except when turning. Once established in holding pattern, drift correction angle can be determined along inbound course. On outbound leg of 1-minute patterns, inbound drift correction should be tripled and applied to outbound course. In 1-1/2- minute patterns, inbound drift correction should be multiplied by 2.5 and applied to outbound course. Size of pattern is governed by inbound times.

Outbound timing begins over or abeam of the fix, whichever is later. If the abeam position cannot be determined, start timing when turn to outbound heading is completed.

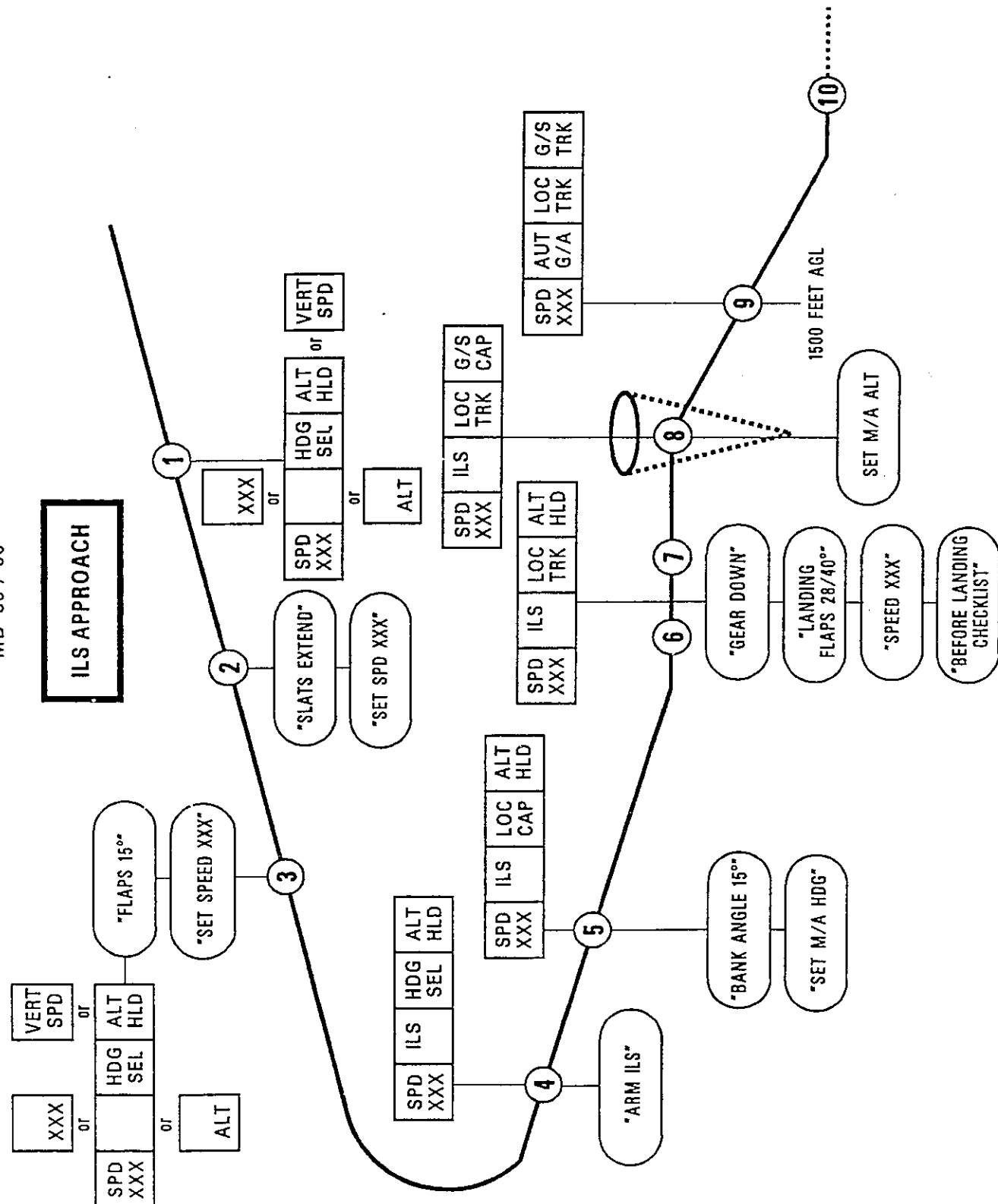
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FLIGHT CREW OPERATING MANUAL

MD-80 / 90

CAG(IGDS)

RA1-6244



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FLIGHT CREW OPERATING MANUAL

ILS APPROACH (Continued)

PROCEDURE/PARAMETER

1. Appropriate checklists completed. Flap/slat handle at UP/RET. Speed - minimum maneuvering to 250 KIAS. Both flight directors on, autopilot on or off, and autothrottles on. Use HDG select knob and pitch control wheel to maneuver. Tune and identify ILS and ADF. Set inbound course. Set altitude reference bug to DH on barometric altimeter. (Radio altimeter is advisory only for standard ILS approaches.)
2. Commence speed reduction as desired. PF calls "SLATS EXTEND, SET SPEED XXX." (Fly 0/T.O. minimum maneuvering to 250 KIAS.) PNF moves flap/slat handle to 0/EXT and sets speed XXX.
3. PF calls "FLAPS 15, SET SPEED XXX." PNF moves flap/slat handle to 15/T.O. and sets speed XXX.
4. On intercept heading and after being cleared for ILS approach, PF calls "ARM ILS." PNF pushes ILS button.
5. Following localizer capture, PF calls "SET BANK ANGLE 15 DEGREES, SET MISSED APPROACH HEADING." PNF sets bank angle at 15 degrees and sets missed approach heading.
6. At 1-1/2 to 2 dots below glideslope, PF calls "GEAR DOWN." PNF moves landing gear handle to DOWN.
7. At one dot below glideslope, PF calls "LANDING FLAPS 28/40°, SET SPEED XXX, BEFORE LANDING CHECKLIST." PNF moves flap/slat handle to 28/40, sets speed XXX, commences BEFORE LANDING CHECKLIST.

NOTE

Use flaps 40 if runway is contaminated or if available landing distance is a factor.

8. Upon glideslope capture, PF calls "SET MISSED APPROACH ALTITUDE." PNF sets missed approach altitude.

PREFERRED TECHNIQUE

PNF confirms appropriate speed. If approach is in conjunction with holding, the 15° flap setting should be accomplished on the inbound turn.

PNF confirms both FMAs read correctly and calls localizer alive.

PNF after setting missed approach heading confirms FMAs read correctly.

PNF completes necessary radio calls.

(Continued)

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FLIGHT CREW OPERATING MANUAL

ILS APPROACH (Continued)

PROCEDURE/PARAMETER

9. Monitor raw data, fail flags and FMA annunciations throughout approach.

NOTE

Selecting a roll or pitch mode will cancel the ILS mode.

10. At decision height PNF makes appropriate call. PF disconnects autopilot and lands or pushes TOGA button and initiates a missed approach.

NOTE

Autopilot may be used on a single engine condition until final approach fix, at which time it should be disconnected. Maximum flaps for single engine approach is 28°, and rudder trim should be zeroed prior to landing.

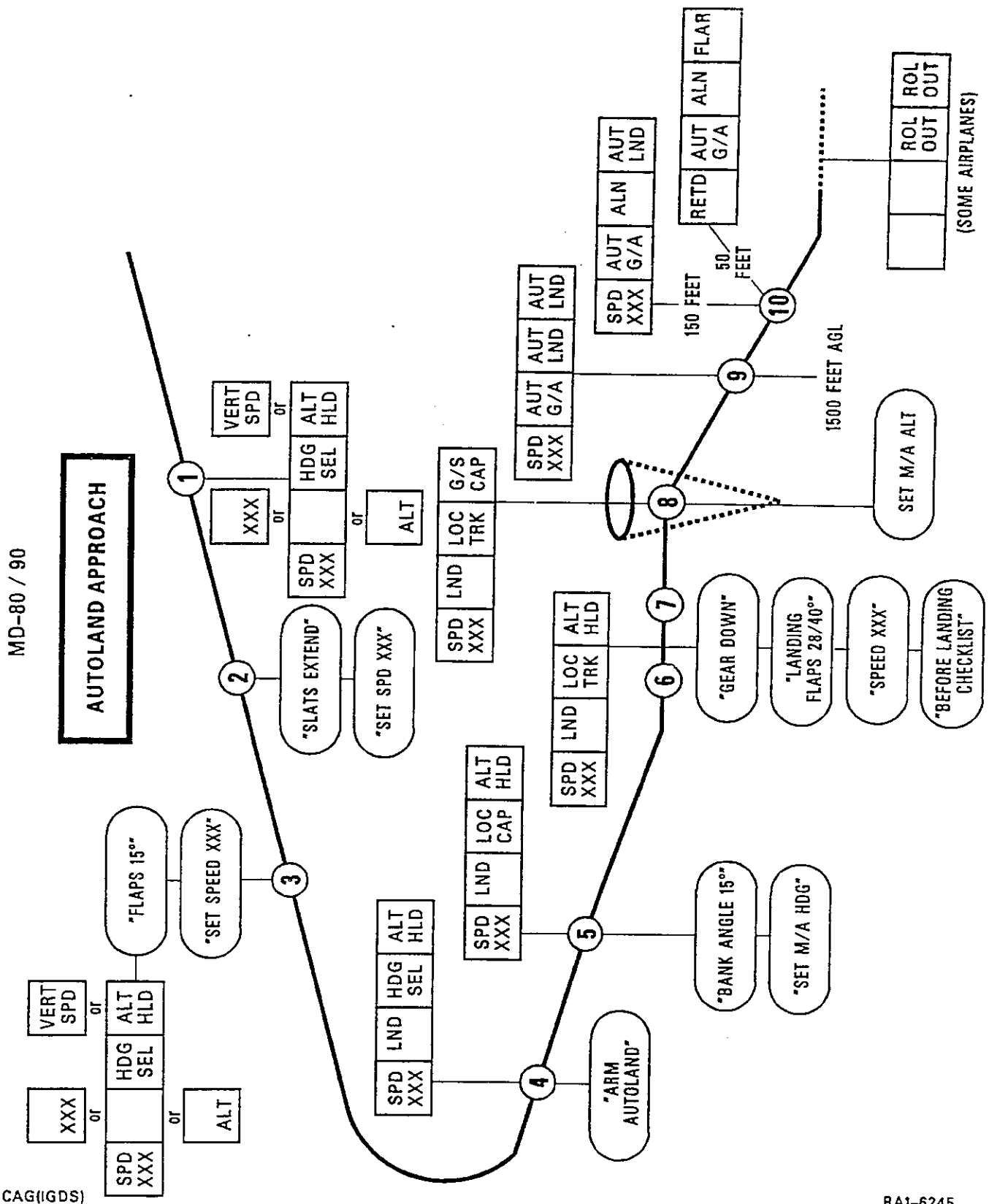
PREFERRED TECHNIQUE

At 1000 feet AGL PNF verbalizes flight instrument conditions and altitude cross check. Example: "1000 FEET AGL, NO FLAGS."

PNF will call AGL altitudes starting at 500 feet down to 100 feet AGL at 100 foot intervals and then every 10 feet from 50 feet AGL to touchdown. Barometric altitude of 100 feet above decision height and decision height will also be called out.

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FLIGHT CREW OPERATING MANUAL



CAG(IIGDS)

RA1-6245

MD-80

FLIGHT CREW OPERATING MANUAL

AUTOLAND APPROACH (Continued)

PROCEDURE/PARAMETER

1. Appropriate checklists completed. Flap/slat handle at UP/RET. Speed - minimum maneuvering to 250 KIAS. Both flight directors on, autopilot on, and autothrottles on. Use HDG select knob and pitch control wheel to maneuver. Tune and identify ILS and ADF. Set inbound course. Set altitude reference bug to decision height on radio altimeter and barometric altimeter as applicable.
2. Commence speed reduction as desired. PF calls, "SLATS EXTEND, SET SPEED XXX." (Fly 0/T.O. minimum maneuvering to 250 KIAS.) PNF moves flap/slat handle to 0/EXT and sets speed XXX.
3. PF calls "FLAPS 15, SET SPEED XXX." PNF moves flap/slat handle to 15/T.O. and sets speed XXX.
4. On intercept heading and after being cleared for ILS approach, PF calls "ARM AUTOLAND." PNF pushes AUTOLAND button.
5. Following localizer capture, PF calls "SET BANK ANGLE 15 DEGREES, SET MISSED APPROACH HEADING." PNF sets bank angle at 15 degrees and sets missed approach heading.
6. At one and one-half to two dots below glideslope, PF calls "GEAR DOWN." PNF moves landing gear handle to DOWN.
7. At one dot below glideslope, PF calls "LANDING FLAPS 28/40°, SET SPEED XXX, BEFORE LANDING CHECKLIST." PNF moves flap/slat handle to 28/40, sets speed XXX, commences BEFORE LANDING checklist.

NOTE

Use flaps 40 if runway is contaminated or if available landing distance is a factor.

8. Upon glideslope capture, PF calls "SET MISSED APPROACH ALTITUDE." PNF sets missed approach altitude.

PREFERRED TECHNIQUE

PNF confirms appropriate speed. If approach is in conjunction with holding, 15° flap setting should be accomplished on inbound turn.

PNF confirms both FMAs read correctly and calls localizer alive.

PNF after setting missed approach heading confirms FMAs read correctly.

PNF completes necessary radio calls.

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FLIGHT CREW OPERATING MANUAL

AUTOLAND APPROACH (Continued)

PROCEDURE/PARAMETER

9. Monitor raw data, fail flags and FMA annunciations throughout approach. Confirm AUT LND is annunciated in roll and pitch windows of FMA.

NOTES

Selecting a roll or pitch mode will cancel the ILS mode.

The only actions which will disengage autoland mode are autopilot disconnect or pushing TOGA button.

10. At decision height, PNF makes appropriate call. PF completes autoland or pushes TOGA button and initiates a go-around. At approximately 150 feet AGL, align mode is initiated. At approximately 50 feet AGL, autothrottles retard and autopilot flare mode is initiated. At main gear wheel spin-up, roll-out mode begins.

NOTE

Align mode must be annunciated by 100 feet radio altitude to continue autoland.

PREFERRED TECHNIQUE

At 1000 feet AGL, PNF verbalizes flight instrument conditions and altitude cross check. Example: "1000 AGL, NO FLAGS."

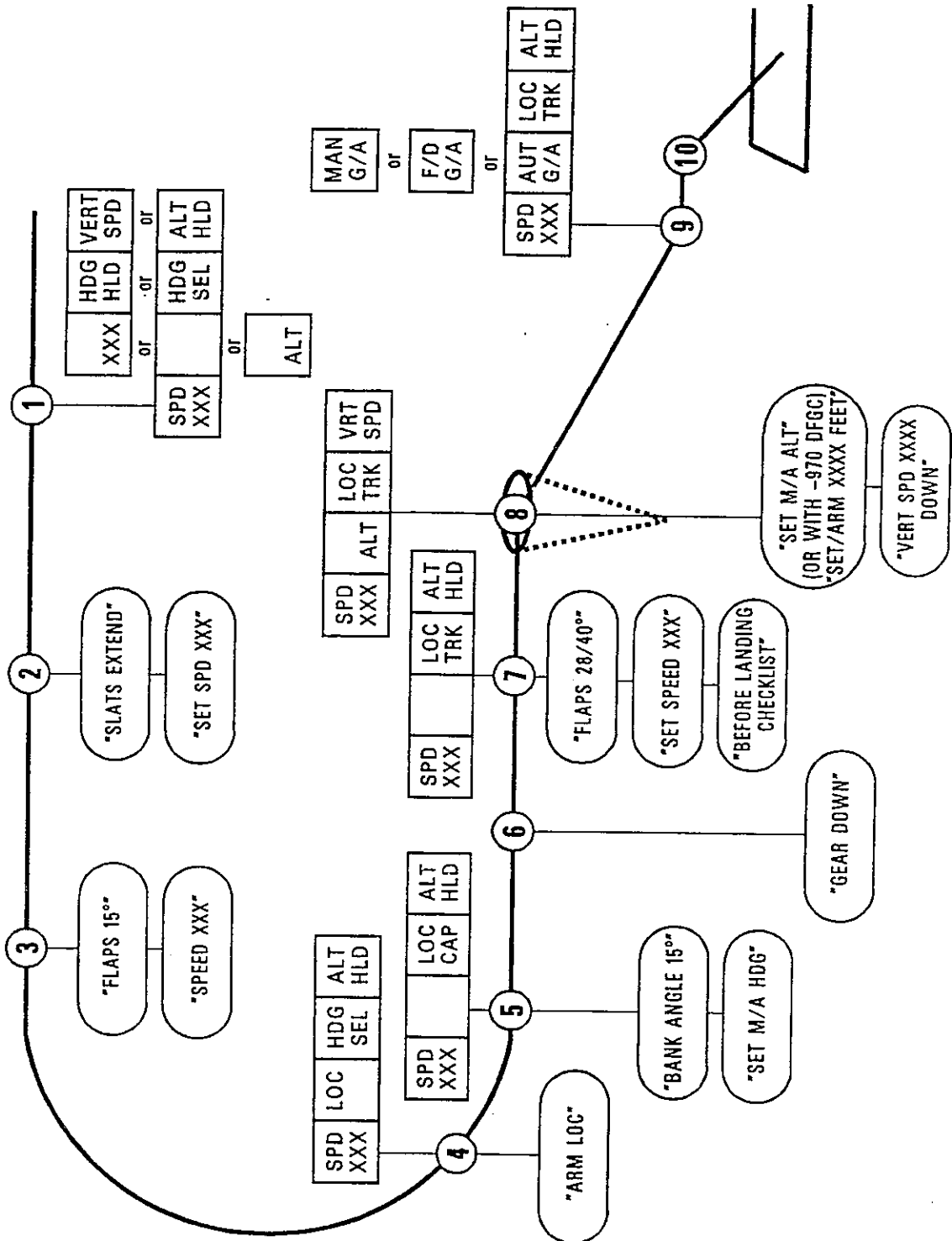
PNF will call AGL altitudes starting at 500 feet down to 100 feet AGL at 100 foot intervals and then every 10 feet from 50 feet AGL to touchdown. Barometric altitude of 100 feet above decision height and decision height will also be called. In addition "ALIGN," "FLARE," "NO FLARE" and "NO ROLL-OUT" will be called.

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FLIGHT CREW OPERATING MANUAL

MD-80 / 90

LOCALIZER APPROACH



CAG(IIGDS)

RA1-6246

MD-80

FLIGHT CREW OPERATING MANUAL

LOCALIZER APPROACH (Continued)

PROCEDURE/PARAMETER

1. Appropriate checklists completed, flap/slat handle at UP/RET, speed – minimum maneuvering to 250 KIAS. Both flight directors on, autopilot on or off, and autothrottles on. Use HDG select knob and pitch control wheel (as required) to maneuver. Tune and identify navigation/approach radio, set altitude reference bug to MDA.
2. Commence speed reduction as desired. PF calls, "SLATS EXTEND, SET SPEED XXX." PNF moves flap/slat handle to 0/EXT and sets speed XXX (minimum maneuvering to 250 KIAS).
3. PF calls "FLAPS 15, SET SPEED XXX." PNF moves flap/slat handle to 15/T.O. and sets speed XXX.
4. On intercept heading and after cleared for approach, PF calls "ARM LOC." PNF pushes VOR/LOC button.
5. Following localizer capture, PF calls "SET BANK ANGLE 15 DEGREES, SET MISSED APPROACH HEADING." PNF sets bank angle at 15 degrees and sets missed approach heading.
6. When established inbound to final approach fix, PF calls, "GEAR DOWN," PNF moves landing gear handle to DOWN.

NOTE

For circling maintain 30 degrees bank.

7. Prior to final approach fix, PF calls, "LANDING FLAPS 28/40, SET SPEED XXX. BEFORE LANDING CHECKLIST." PNF moves flap/slat handle to 28/40, sets final approach speed XXX and commences BEFORE LANDING Checklist.

CAUTION

For single engine approach, do not select a flap setting beyond 28°.

PREFERRED TECHNIQUE

If approach is in conjunction with holding, the 15° flap setting and setting of speed should be accomplished on inbound turn.

PNF confirms both FMAs read correctly and calls localizer alive.

PNF after setting missed approach heading confirms FMAs read correctly.

NOTE

When an approach requires circling the missed approach heading cannot be set at this time.

Achieve final approach speed prior to final approach fix to insure any required timing is accurate.

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FLIGHT CREW OPERATING MANUAL

LOCALIZER APPROACH (Continued)

PROCEDURE/PARAMETER

NOTE

If distance from fix to runway is unusually long or if final approach is to be circling, maintain flaps 28 configuration and minimum maneuvering speed until visual contact or turning final. On final set speed and bank angle 15 degrees. Use flaps 40 if runway is contaminated or if available landing distance is a factor.

8. Start timing over final approach fix, PF calls, "SET MISSED APPROACH ALTITUDE XXXX FEET, VERTICAL SPEED XXXX DOWN." PNF sets altitude XXXX feet and rotates pitch control wheel until XXXX feet down is indicated.

9. Monitor raw data, fail flags, FMA and oral warnings throughout approach. If required, use vertical speed and altitude hold to refine MDA.

NOTE

Selecting a roll mode will cancel the VOR/LOC capture mode.

10. No later than missed approach point, PNF makes appropriate call. PF either executes a landing or go-around.

PREFERRED TECHNIQUE

PNF completes radio calls.

NOTES

Those approaches accomplished with -970 DFGC set MDA.

A 1000 feet per minute vertical speed down is recommended to insure reaching MDA prior to the missed approach point.

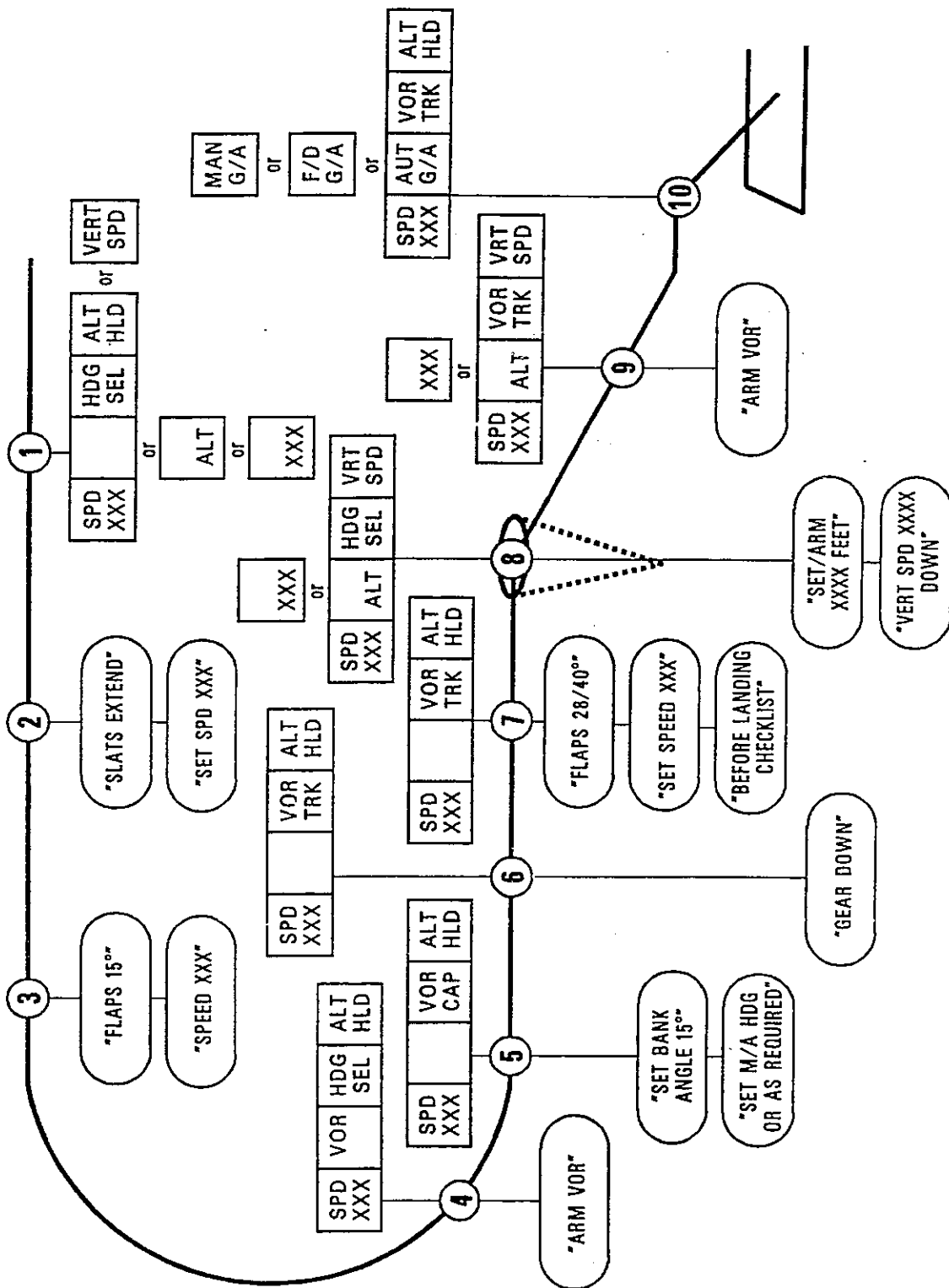
PNF calls 100 feet barometric altitude above MDA and arrival at MDA. Any deviation below MDA will be called when runway environment is not in sight.

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FLIGHT CREW OPERATING MANUAL

MD-80 / 90

VOR APPROACH



CAG(IGDS)

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FLIGHT CREW OPERATING MANUAL

VOR APPROACH (Continued)

PROCEDURE/PARAMETER

1. Appropriate checklists completed. Flap/slat handle at UP/RET. Speed – minimum maneuvering to 250 KIAS. Both flight directors on, autopilot on or off, autothrottles on. Use HDG select knob and pitch control wheel (as required) to maneuver. Tune and identify navigation/approach radios, set altitude reference bug to MDA.
2. Commence speed reduction as desired. PF calls "SLATS EXTEND, SET SPEED XXX." PNF moves flap/slat handle to 0/EXT and sets speed XXX (0/EXT minimum maneuvering to 250 KIAS).
3. PF calls "FLAPS 15, SET SPEED XXX." PNF moves flap/slat handle to 15/T.O. and sets speed XXX.
4. On intercept heading and after cleared for approach, PF calls "ARM VOR." PNF pushes VOR/LOC button.
5. Following VOR inbound course capture, PF calls "SET BANK ANGLE 15 DEGREES," PNF sets bank angle at 15 degrees.

NOTE

For circling maintain 30 degree bank.

6. When established inbound to final approach fix, PF calls, "GEAR DOWN," PNF moves landing gear handle to DOWN.
7. Prior to final approach fix, PF calls, "LANDING FLAP 28/40, SET SPEED XXX, BEFORE LANDING CHECKLIST." PNF moves flap/slat handle to 28/40, and sets final approach speed XXX and commences BEFORE LANDING Checklist.

CAUTION

For single engine approach, do not select a flap setting beyond 28°.

PREFERRED TECHNIQUE

PNF confirms appropriate speed. If approach is in conjunction with holding, 15° flap setting should be accomplished on inbound turn.

PNF confirms both FMAs read correctly and calls "APPROACHING COURSE."

Achieve final approach speed prior to final approach fix to insure any required timing is accurate.

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FLIGHT CREW OPERATING MANUAL

VOR APPROACH (Continued)

PROCEDURE/PARAMETER

NOTE

If distance from fix to runway is unusually long, maintain flaps 28 configuration and minimum maneuvering speed until visual contact or turning final. Use flaps 40 if runway is contaminated or if available landing distance is a factor.

CAUTION

When a turn to a different VOR course is required, use heading select to turn the airplane to intercept the VOR course. Rearm VOR mode to intercept and track the VOR course.

8. Start timing over final approach fix, PF calls, "SET AND ARM ALTITUDE XXXX FEET, VERTICAL SPEED XXXX DOWN." PNF sets and arms altitude XXXX feet and rotates pitch control wheel until V-XXXX is indicated. Preselect altitude to nearest 100-foot level above published MDA.
9. Monitor raw data, fail flags, FMA annunciations and oral warnings throughout approach. If required, use vertical speed and altitude hold to refine MDA.

NOTE

Selecting a roll mode will cancel the VOR/LOC capture mode.

10. No later than missed approach point, PNF makes appropriate call. PF either executes a landing or go-around.

PREFERRED TECHNIQUE

PNF completes radio calls. A 1000 feet per minute vertical speed down is recommended to insure reaching MDA prior to missed approach point.

PNF calls 100 feet barometric above MDA and arrival at MDA. Any deviation below MDA will be called when runway environment is not in sight.

MD-80 / 90



MD-80

FLIGHT CREW OPERATING MANUAL

NDB APPROACH (Continued)

PROCEDURE/PARAMETER

1. Appropriate checklists completed. Flap/slat handle at UP/RET, speed – minimum maneuvering to 250 KIAS, both flight directors on, autopilot on or off and autothrottles on. Use HDG select knob and pitch control wheel (as required) to maneuver. Tune and identify navigation/approach radios, set altitude reference bug to MDA.
2. Commence speed reduction as desired. PF calls, "SLATS EXTEND, SET SPEED XXX." PNF moves flap/slat handle to 0/EXT and sets speed XXX (0/EXT minimum maneuvering to 250 KIAS).
3. PF calls "FLAPS 15, SET SPEED XXX." PNF moves flap/slat handle to 15/T.O. and sets speed XXX.
4. On intercept heading and after cleared for approach, use HDG select knob to intercept and maintain published course.
5. When established on inbound course, PF calls, "SET BANK ANGLE 15 DEGREES, GEAR DOWN." PNF sets bank angle at 15 degrees and moves landing gear handle to DOWN.

NOTE

For circling maintain 30 degree bank.

6. Prior to final approach fix, PF calls, "LANDING FLAPS 28/40/SET SPEED XXX, BEFORE LANDING CHECKLIST." PNF moves flap/slat handle to 28/40, and sets final approach speed XXX and commences BEFORE LANDING Checklist.

CAUTION

For single engine approach, do not select flaps beyond 28°.

PREFERRED TECHNIQUE

PNF confirms appropriate speed. If approach is in conjunction with holding 15° flap setting should be accomplished on inbound turn.

Achieve final approach speed prior to final approach fix to insure any required timing is accurate.

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FLIGHT CREW OPERATING MANUAL

NDB APPROACH (Continued)

PROCEDURE/PARAMETER

NOTE

However, if distance from fix to runway is unusually long, maintain flaps 28 configuration and minimum maneuvering speed until visual contact, or turning final. Use flaps 40 if runway is contaminated or if available landing distance is a factor.

7. Start timing over final approach fix, PF calls, "SET AND ARM ALTITUDE XXXX FEET, VERTICAL SPEED XXXX DOWN." PNF sets and arms altitude XXXX feet and rotates pitch control wheel until V-XXXX is indicated. Preselect altitude to nearest 100-foot level above published MDA.
8. Monitor raw data, fail flags, FMA annunciations and aural warnings throughout approach. If required, use vertical speed and altitude hold to refine MDA.
9. No later than missed approach point, PNF makes appropriate call. PF either executes a landing or go-around.

PREFERRED TECHNIQUE

PNF completes radio calls. A 1000 feet per minute vertical speed down is recommended to insure reaching MDA prior to missed approach point.

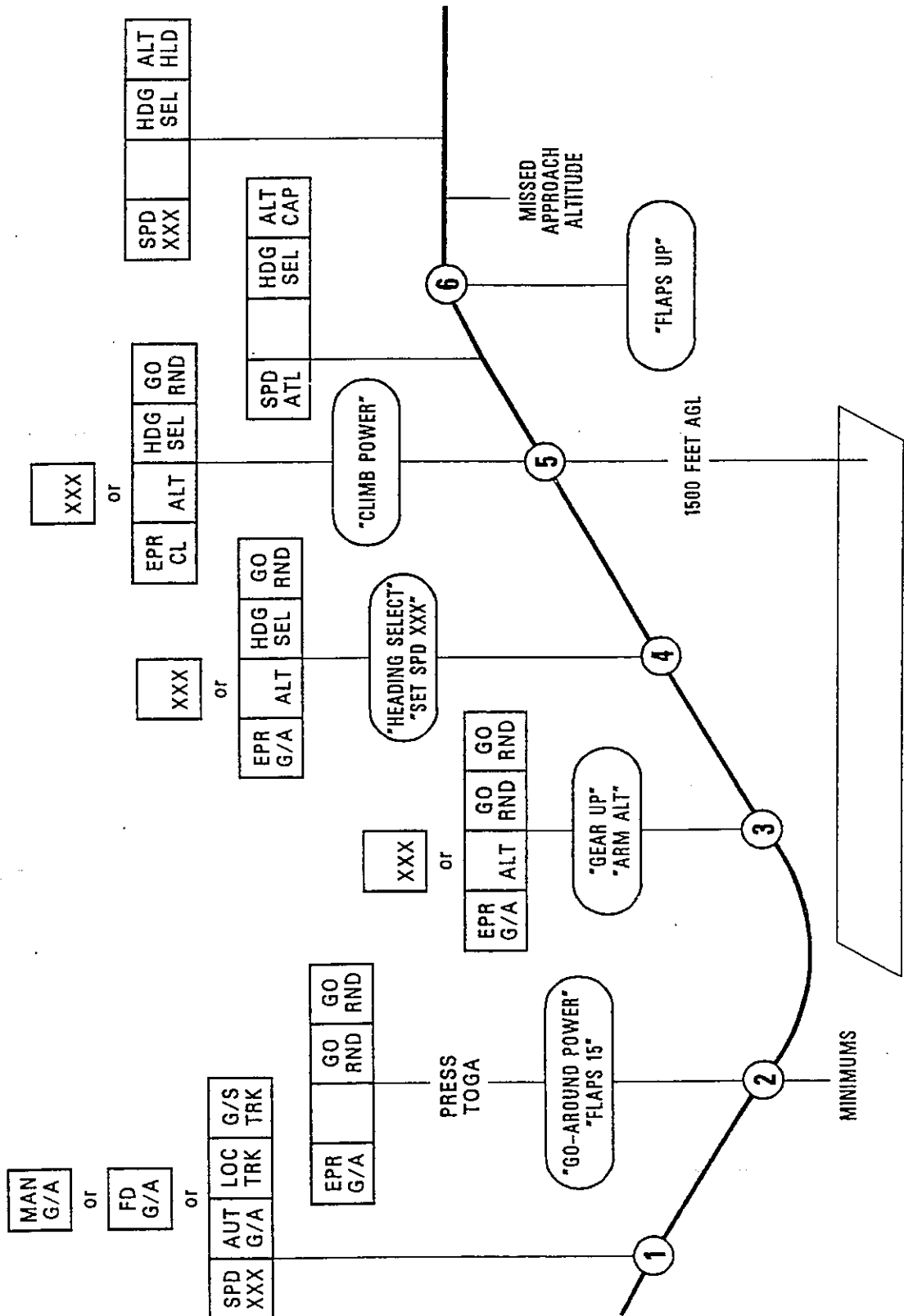
PNF calls 100 feet barometric above MDA and arrival at MDA. Any deviation below MDA will be called when runway environment is not in sight.

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FLIGHT CREW OPERATING MANUAL

MD-80 / 90

MISSED APPROACH/GO-AROUND



CAG(IIGDS)

RA1-6249

MD-80

FLIGHT CREW OPERATING MANUAL

MISSED APPROACH/GO-AROUND (Continued)

PROCEDURE/PARAMETER

1. On final approach, landing gear down, flaps/slats 28/40 LAND. Speed is VREF plus additive and bank angle set at 15 degrees. Missed approach heading and altitude set. Auto throttles and autopilot on. Automatic go-around logic satisfied.

NOTE

For nonprecision approaches, annunciations of manual, flight director, or automatic go-around will be displayed in the arm window of the FMA when radio altitude is less than 1500 feet AGL and flaps are in landing configuration. Altitude preselect will have arm mode display priority and will displace the go-around annunciation.

2. Upon decision to execute a missed approach, PF pushes TOGA button, begins rotation to go-around attitude (maximum pitch 20 degrees, minimum speed VREF plus 5 knots) and calls "GO-AROUND POWER, FLAPS 15°." PNF assures go-around power is set and moves flap/slat handle to 15/T.O.
3. When positive rate of climb is established, PF calls "GEAR UP, ARM ALTITUDE." PNF moves landing gear handle to UP and arms missed approach altitude if not automatically armed.
4. If missed approach procedure requires heading change, PF calls "HEADING SELECT, SET SPEED XXX, DISARM SPOILERS." (If heading change is not required, PF deletes heading select call.) PNF pulls HDG select knob, sets speed XXX and disarms spoilers.
5. At 1500 feet AGL, PF calls "CLIMB POWER." PNF pushes CL button.

NOTE

For single engine missed approach maintain go-around thrust to altitude capture, monitor time limitation.

PREFERRED TECHNIQUE

PF aggressively pushes throttles toward go around power limits. PNF refines go-around power setting as required.

PNF confirms positive rate of climb on barometric altimeter and repeats "GEAR UP." PNF confirms ALT or XXX in ARM FMA.

PNF confirms EPR CL on FMA.

(Continued)

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FLIGHT CREW OPERATING MANUAL

MISSED APPROACH/GO-AROUND (Continued)

PROCEDURE/PARAMETER

6. Complete published missed approach. If continuing to alternate airport, retract flaps and slats on schedule while accelerating to appropriate enroute speed.

NOTES

If autopilot is not used, follow FD go-around commands or manual go-around using primary flight instruments. Selection of any pitch mode during autopilot go-around will result in disengagement of go-around mode, and autopilot will revert to selected pitch and heading hold modes. Altitude capture mode will automatically cancel go-around mode or selected pitch mode. Any roll mode may be selected during go-around without affecting pitch mode.

In the event of an engine failure during the missed approach, additional considerations are:

- If the approach was an ILS coupled or autoland, parallel rudder mode would be operative during go-around to assist in controlling yaw forces. Parallel rudder will remain until a mode change is initiated or go-around mode is cancelled. PF should be prepared for manual rudder inputs should parallel rudder disengage unexpectedly.
- For noncoupled ILS approaches, PF must be prepared to make prompt rudder inputs as go-around power is applied to operating engine.
- VREF plus 5 knots minimum climb speed should be maintained until missed approach altitude is reached. An engine out missed approach climb to missed approach altitude may exceed 5 minute go-around thrust limit. Should 5 minute limit be exceeded and MCT power is insufficient, expedite acceleration and clean up so as to resume climb to missed approach altitude.

PREFERRED TECHNIQUE

PNF insures appropriate FMA indications.

(Continued)

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FLIGHT CREW OPERATING MANUAL

MISSED APPROACH/GO-AROUND (Continued)

PROCEDURE/PARAMETER

PREFERRED TECHNIQUE

NOTES (Continued)

- Remaining engine out procedures are essentially the same as for a two-engine go-around.

If approach climb limited, consider using 11/T.O.

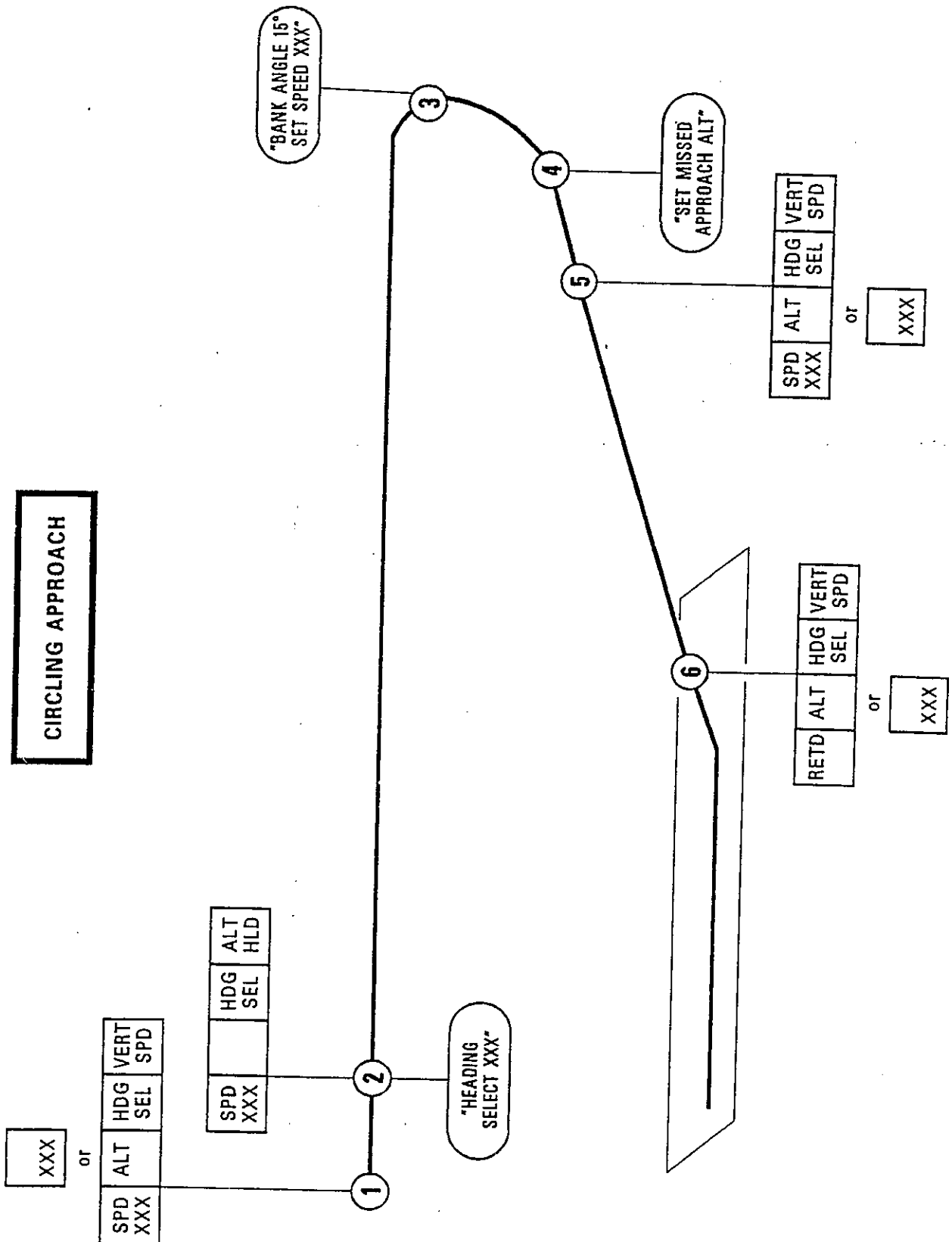
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FLIGHT CREW OPERATING MANUAL

MD-80 / 90

CIRCLING APPROACH

CAG(IIGDS)



RA1-6250

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FLIGHT CREW OPERATING MANUAL

CIRCLING APPROACH (Continued)

PROCEDURE/PARAMETER

5. Establish runway alignment no lower than 300 feet AFE.
6. Cross threshold at approximately 50 feet AGL. Aim for touchdown target of 1000 feet from approach end of runway.

PREFERRED TECHNIQUE

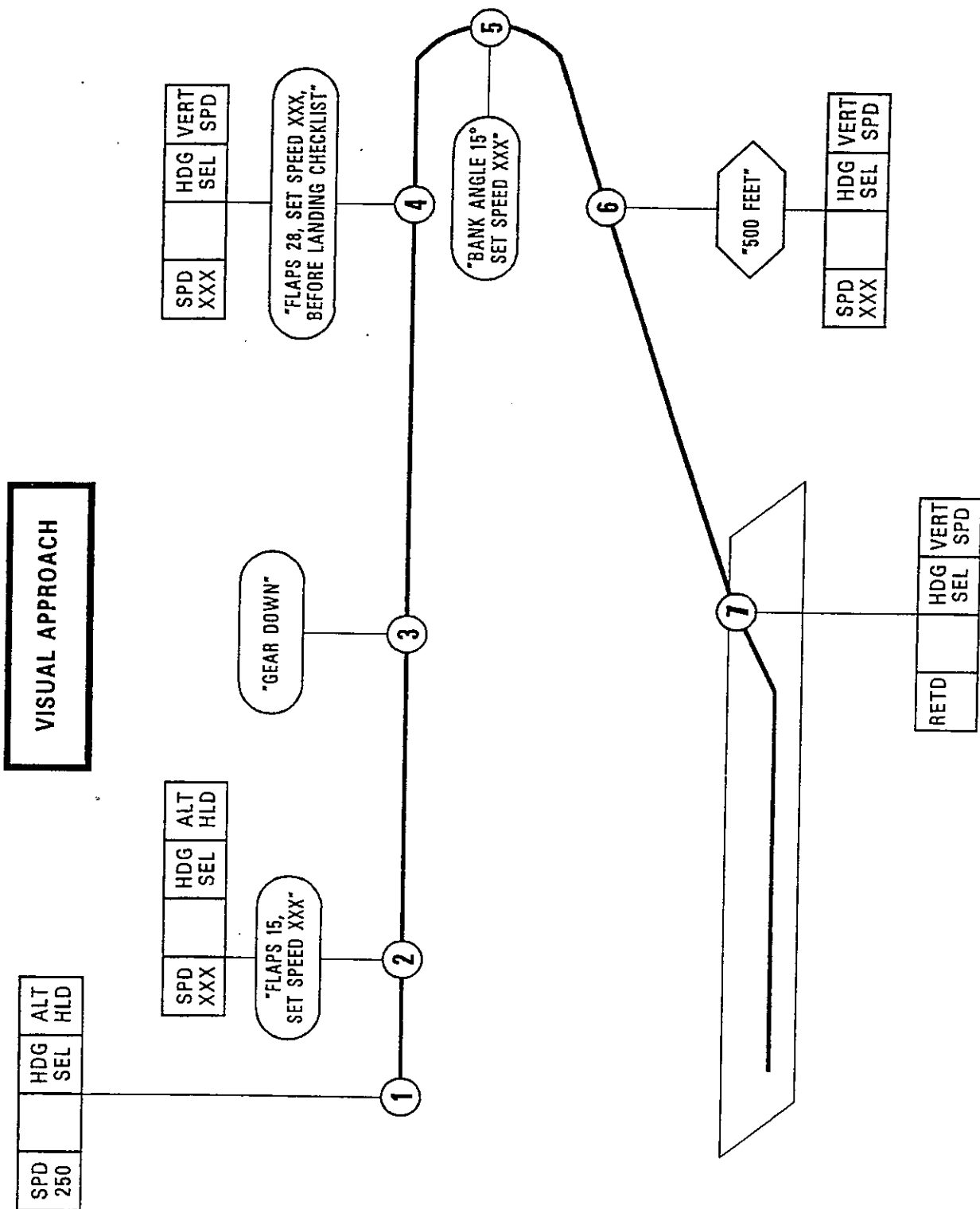
Runway alignment preferred by 500 feet AFE.

PNF calls out altitudes in 10 foot increments from 50 feet to 10 feet AFE.

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FLIGHT CREW OPERATING MANUAL

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CAG(IGDS)

RA1-6251

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FLIGHT CREW OPERATING MANUAL

VISUAL APPROACH (Continued)

PROCEDURE/PARAMETER

1. DESCENT Checklist completed, continue descent as required with speed between minimum maneuvering and 250 KIAS. Both flight directors on, autopilot on or off. Use HDG select knob and pitch control wheel to maneuver.
2. Enter downwind at 200 KIAS maximum. PF calls "FLAPS 15, SET SPEED XXX." PNF moves flap/slat handle to 15 EXT and sets commanded speed.
3. At traffic pattern altitude and abeam end of runway, PF calls "GEAR DOWN." PNF moves landing gear handle to DOWN.
4. Turn base approximately 45 seconds past abeam end of runway. PF calls "FLAPS 28, SET SPEED XXX, BEFORE LANDING CHECKLIST." PNF moves flap/slat handle to 28/LAND, sets commanded speed (minimum maneuvering flaps 28) and commences BEFORE LANDING Checklist. PF disengages autopilot and begins normal descent from traffic pattern altitude. If desired, PF calls "VERTICAL SPEED XXX" (600-800 feet per minute). PNF rotates pitch control wheel until commanded descent rate is indicated.
5. Turning final, PF intercepts approach path for normal descent and calls "BANK ANGLE 15 DEGREES, SET SPEED XXX". PNF sets bank limit selector to 15 degrees, sets final approach speed and completes BEFORE LANDING Checklist.

NOTE

If flaps 40 landing is desired, PF calls "FLAPS 40, SET SPEED XXX." PNF moves flap/slat handle as required.

6. When stabilized on final and at 500 feet AGL, PNF calls "500 FEET."
7. Cross threshold at approximately 50 feet AGL. Aim for touchdown target of 1000 feet from approach end of runway.

PREFERRED TECHNIQUE

Start initial turn from downwind to final at normal bank angle of 25 to 30 degrees. When at mid-turn point, shallow bank as required to properly line up with runway.

NOTE

Bank angle should not be increased.

PNF calls out altitudes in 100 foot increments from 500 feet to 100 feet AFE.

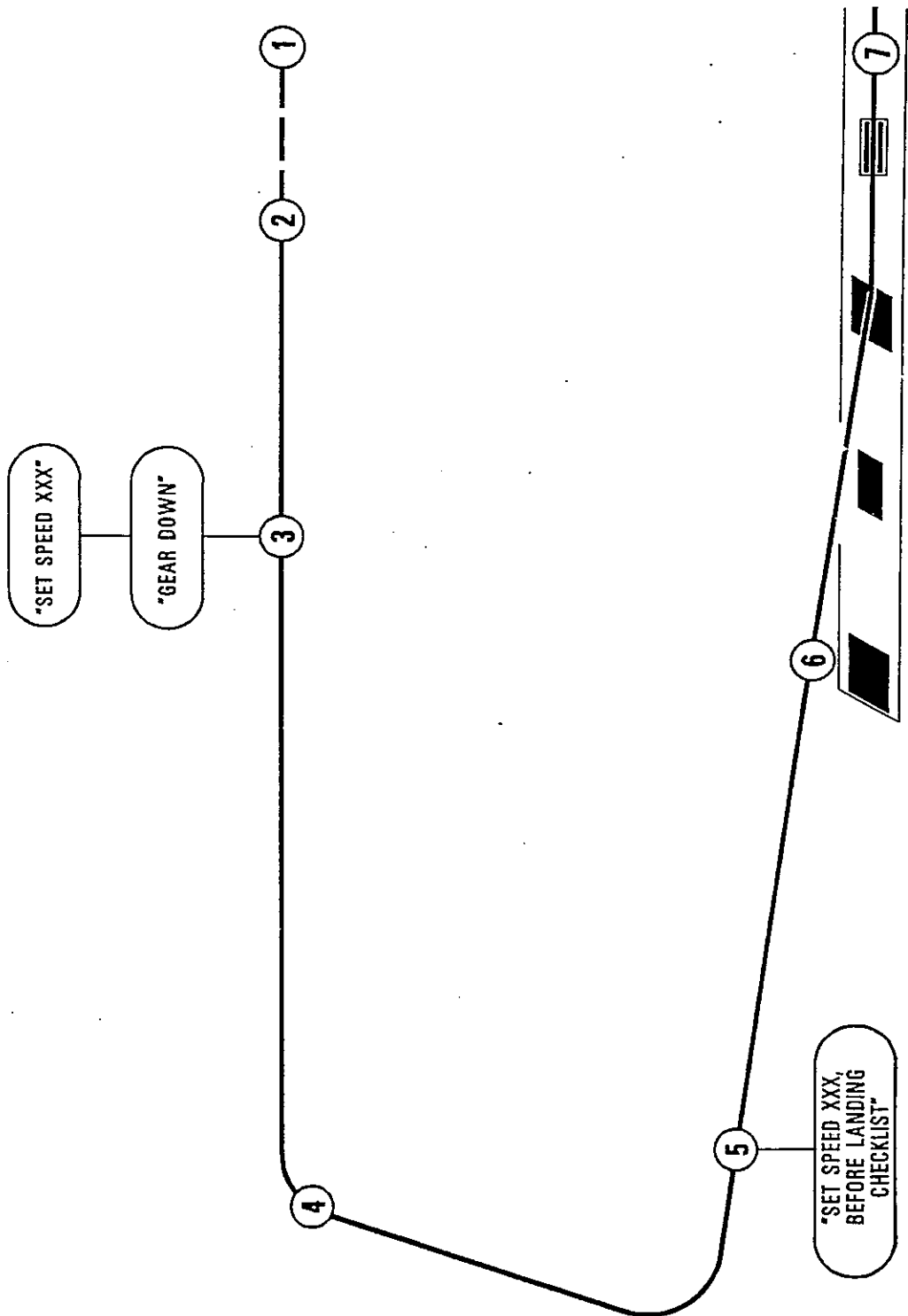
PNF calls out altitudes in 10 foot increments from 50 feet to 10 feet AFE.

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FLIGHT CREW OPERATING MANUAL

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NO FLAP/NO SLAT APPROACH



CAG(IGDS)

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FLIGHT CREW OPERATING MANUAL

NO FLAP/NO SLAT APPROACH (Continued)

PROCEDURE/PARAMETER

1. When DESCENT and abnormal checklists completed, continue descent as required maintaining speed between minimum maneuvering and 250 KIAS. Use HDG select knob and pitch control wheel to maneuver.

NOTE

Reduce gross weight to lowest practicable and land on longest available runway with consideration given to runway conditions such as dry, wet or crosswind factor.

2. Entering downwind, PF makes wider than normal pattern due to increased airspeed.
3. When downwind at traffic pattern altitude (1500 Feet AGL) PF calls "SET SPEED XXX" (minimum maneuvering for UP/RET). PNF sets speed XXX. PF calls "GEAR DOWN," PNF moves landing gear handle to DOWN.
4. Delay turning base to ensure a long, straight final approach.
5. When stabilized on final approach course, PF disconnects autopilot and autothrottles and calls "SET SPEED XXX" (VREF for UP/RET bank angle 15°, BEFORE LANDING CHECKLIST). PNF sets speed XXX bank angle 15° and commences BEFORE LANDING CHECKLIST. Do not fly less than 2.5 degree glide path. At 500 feet AGL, PNF calls "500 FEET."
6. Cross threshold at approximately 50 feet AGL. Aim for touchdown target of 1000 feet from approach end of runway. Fly airplane onto runway for a positive touchdown.
7. PF applies brakes smoothly to full pedal. Apply reverse thrust to idle. Adequate directional control can be maintained by rudder until approximately 60 knots.

NOTE

With no hydraulic pressure, set parking brakes prior to coming out of idle reverse thrust. Do not attempt to taxi.

PREFERRED TECHNIQUE

Reduce speed while in level flight until approach speed is established. Airplane body angle on approach is 4 to 5 degrees ANU for a 2.5 degree gradient. PNF calls out altitudes in 100 foot increments from 500 feet to 100 feet AFE.

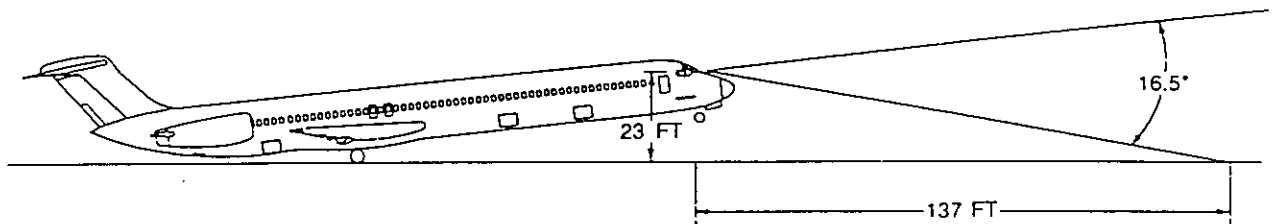
PNF calls out altitudes in 10 foot increments from 50 feet to 10 feet AFE. Normal landing flare may cause airplane to go back into air.

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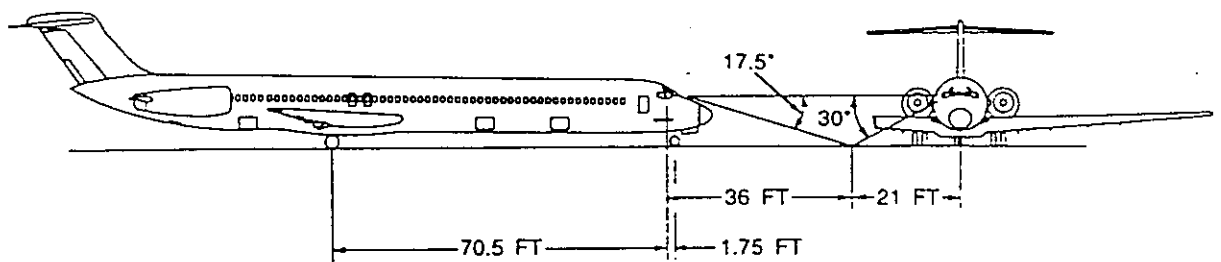
FLIGHT CREW OPERATING MANUAL

PILOT EYE ORIENTATION

PILOT EYE ORIENTATION AIRPLANE ON GROUND



BODY ANGLE AT TOUCHDOWN POSITION
(ATTITUDE AT 7° PITCH ANGLE)



PILOT DISTANCE FROM NOSE AND MAIN
LANDING GEAR
(GROUND STATIC POSITION, 1° PITCH DOWN)

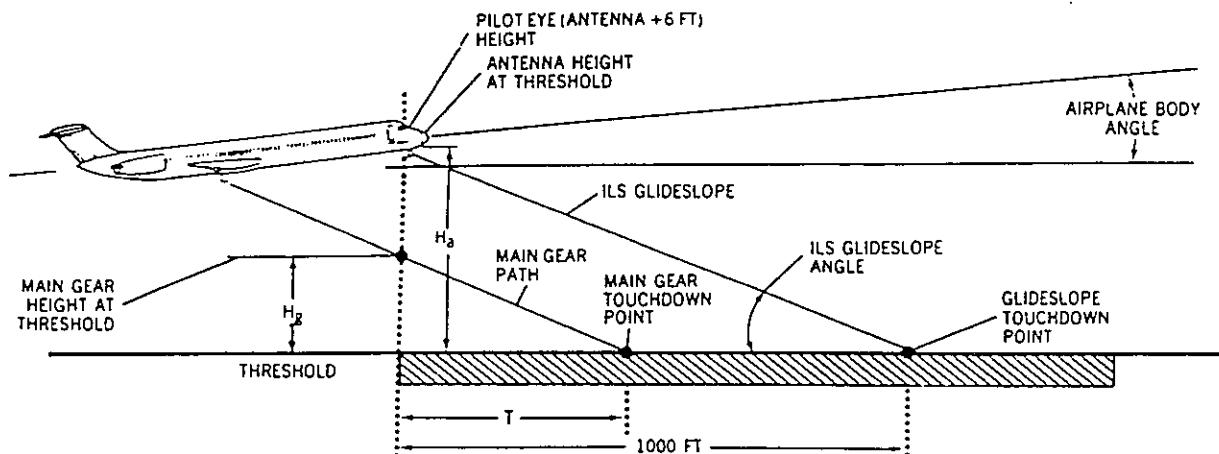
RA1-2697A

FLIGHT CREW OPERATING MANUAL

PILOT EYE ORIENTATION APPROACH AND LANDING - FLAPS 28 (1.3 V_S)

ILS APPROACH

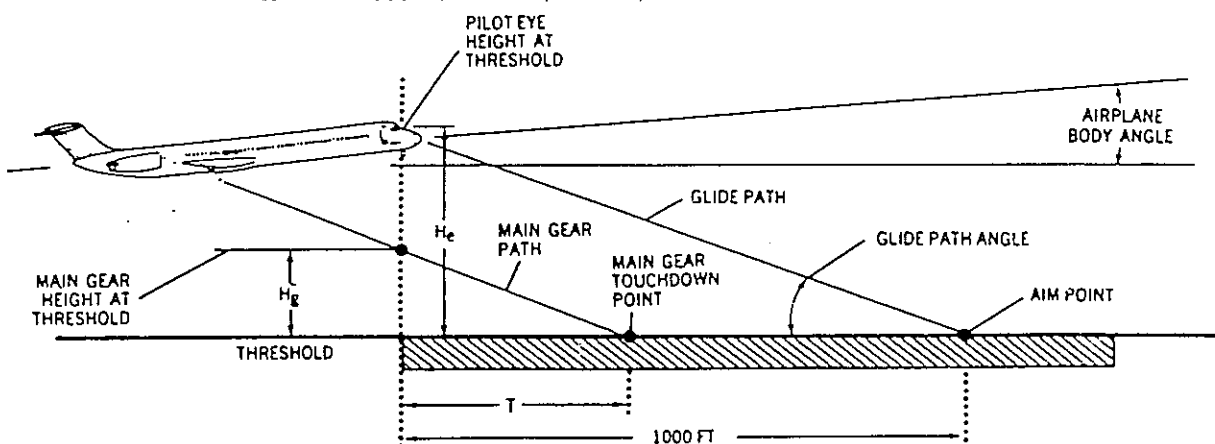
ESTIMATED TOUCHDOWN POINT (NO FLARE) ASSUMING G/S TRANSMITTER AT 1000 FT.



GLIDE PATH ANGLE (DEGREES)	ESTIMATED BODY ANGLE (DEGREES)		ANTENNA HEIGHT H_a AT THRESHOLD (FEET)	MAIN GEAR HEIGHT H_g AT THRESHOLD (FEET)		MAIN GEAR TOUCH- DOWN POINT, T (FEET)	
	①	②		①	②	①	②
2.5	6.9	5.5	44	24	25	539	581
2.75	6.65	5.25	48	28	30	581	619
3.0	6.4	5.0	52	32	33	616	638

VISUAL APPROACH

ESTIMATED TOUCHDOWN POINT (NO FLARE) ASSUMING AN AIM POINT OF 1000 FT.



GLIDE PATH ANGLE (DEGREES)	ESTIMATED BODY ANGLE (DEGREES)		PILOT EYE HEIGHT H_e AT THRESHOLD (FEET)	MAIN GEAR HEIGHT H_g AT THRESHOLD (FEET)		MAIN GEAR TOUCH- DOWN POINT, T (FEET)	
	①	②		①	②	①	②
2.5	6.9	5.5	44	18	20	412	450
2.75	6.65	5.25	48	22	24	466	500
3.0	6.4	5.0	52	27	28	510	542

① C.G. @ 0.8% MAC ② C.G. @ 33.4% MAC

RA1-2698A

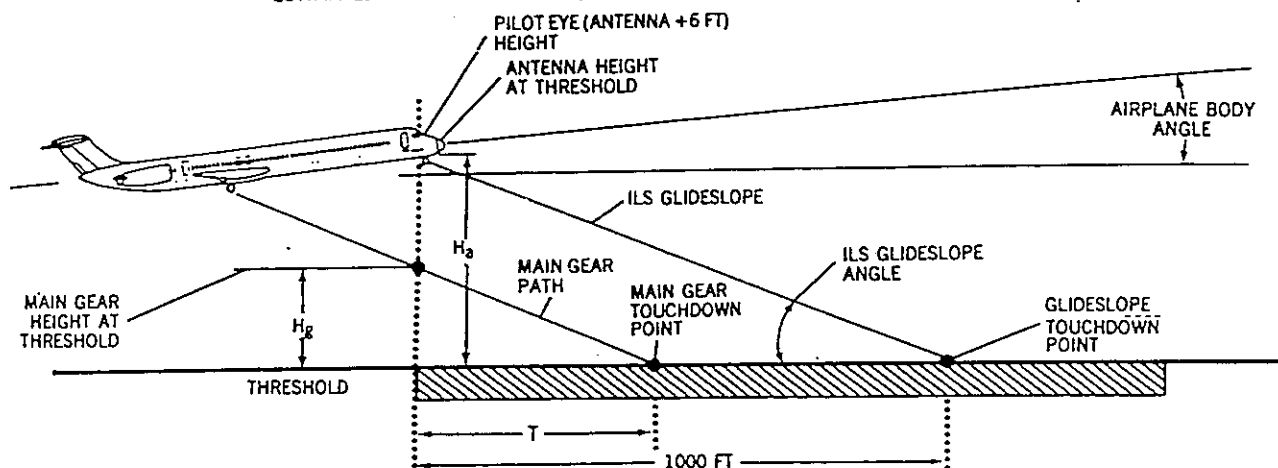
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FLIGHT CREW OPERATING MANUAL

PILOT EYE ORIENTATION APPROACH AND LANDING - FLAPS 40 (1.3 V_S)

ILS APPROACH

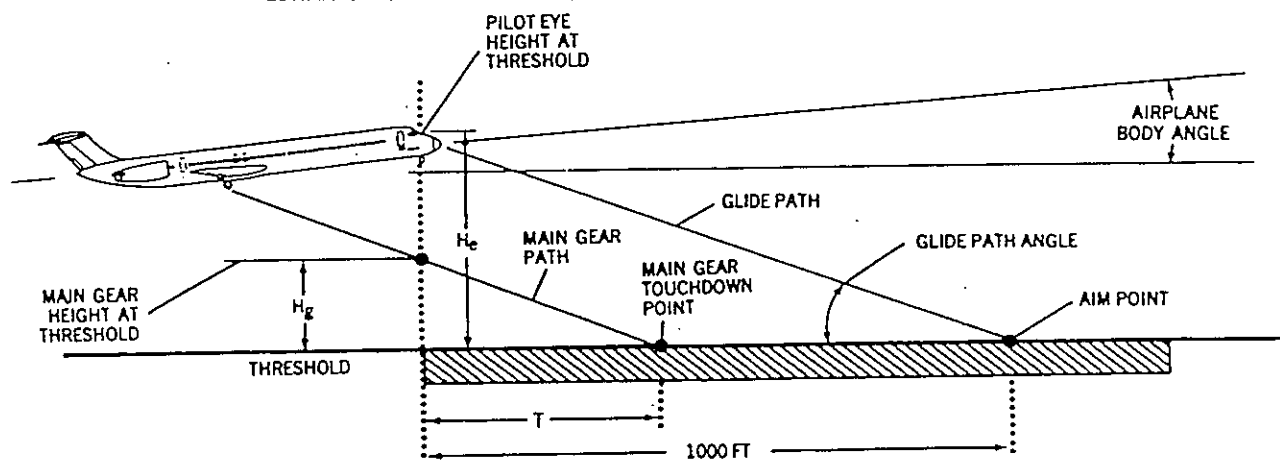
ESTIMATED TOUCHDOWN POINT (NO FLARE) ASSUMING G/S TRANSMITTER AT 1000 FT.



GLIDE PATH ANGLE (DEGREES)	ESTIMATED BODY ANGLE (DEGREES)		ANTENNA HEIGHT H_a AT THRESHOLD (FEET)	MAIN GEAR HEIGHT H_g AT THRESHOLD (FEET)		MAIN GEAR TOUCH- DOWN POINT, T (FEET)	
	①	②		①	②	①	②
2.5	5.3	4.0	44	26	27	587	627
2.75	5.05	3.75	48	30	32	625	661
3.0	4.8	3.5	52	34	36	656	689

VISUAL APPROACH

ESTIMATED TOUCHDOWN POINT (NO FLARE) ASSUMING AN AIM POINT OF 1000 FT.



GLIDE PATH ANGLE (DEGREES)	ESTIMATED BODY ANGLE (DEGREES)		PILOT EYE HEIGHT H_e AT THRESHOLD (FEET)	MAIN GEAR HEIGHT H_g AT THRESHOLD (FEET)		MAIN GEAR TOUCH- DOWN POINT, T (FEET)	
	①	②		①	②	①	②
2.5	5.3	4.0	44	20	21	456	491
2.75	5.05	3.75	48	24	26	506	537
3.0	4.8	3.5	52	29	30	546	576

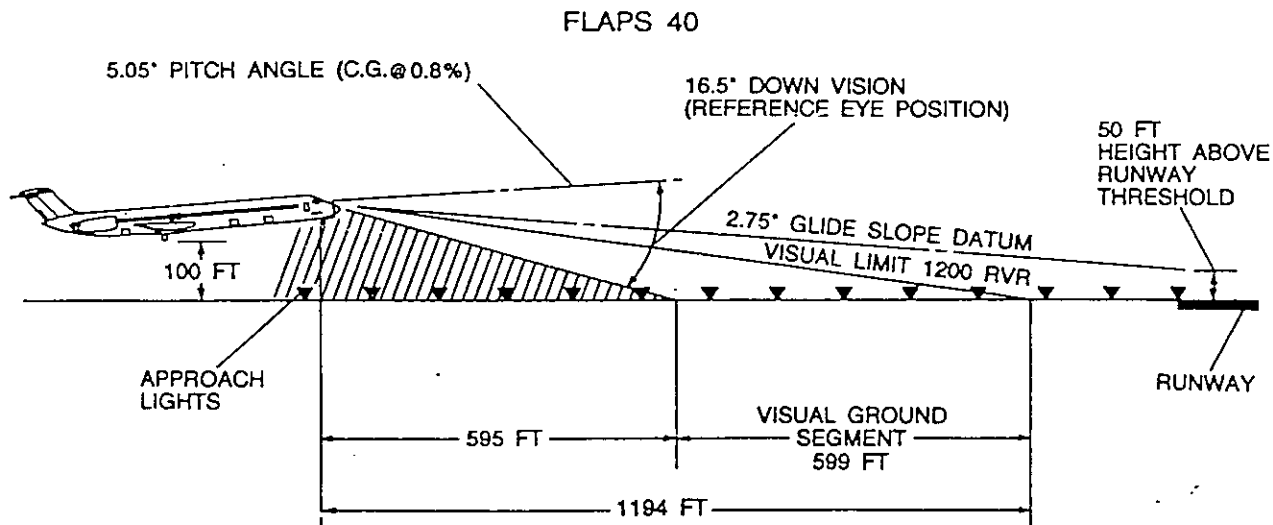
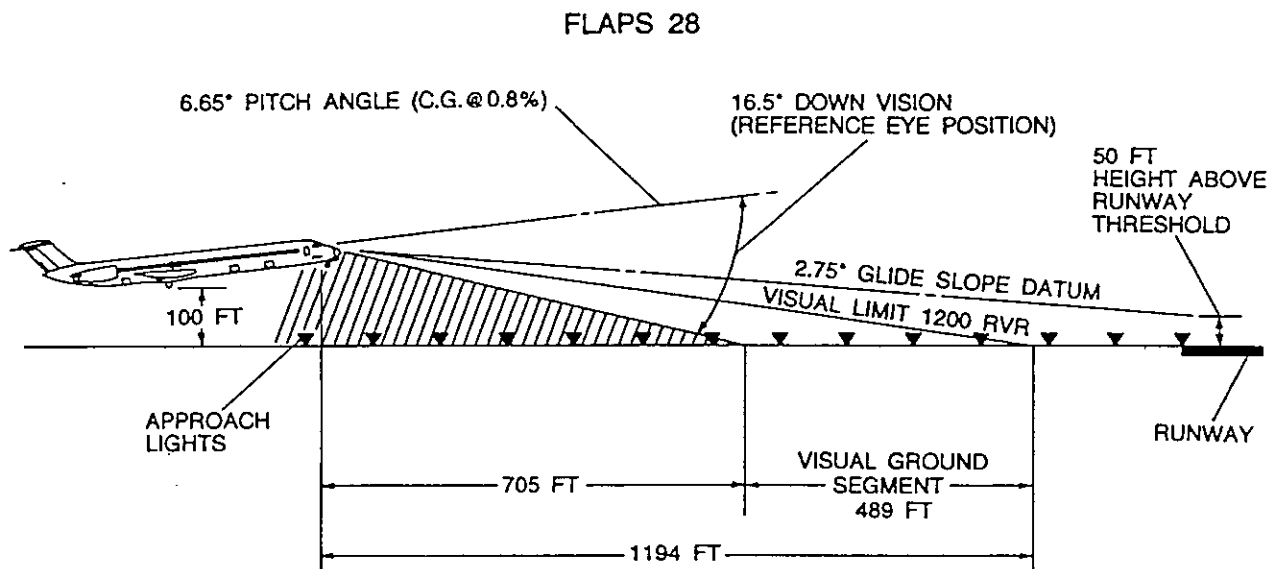
① C.G. @ 0.8% MAC ② C.G. @ 33.4% MAC

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FLIGHT CREW OPERATING MANUAL

PILOT EYE ORIENTATION APPROACH AND LANDING - VISUAL GROUND SEGMENTS



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MISCELLANEOUS

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EMERGENCY DESCENT

"EMERG DESCENT CHKLIST"
INITIATE DESCENT.

SPD XXX	or	MACH .XXX
HDG SEL	or	HDG HLD
		ALT HLD

CLMP	ALT	HDG HLD	MACH
		HDG SEL	IAS

LEVEL FLIGHT

1

ADJUST SPEED

2

CLMP	ALT	HDG HLD	IAS
		HDG SEL	IAS

CLMP	ALT	HDG HLD	MACH
		HDG SEL	IAS

CLMP	ALT	HDG SEL	IAS

MONITOR FMA FOR
ALT CAP

3

SPD XXX	HDG SEL	ALT HLD

LOW LIM	HDG SEL	ALT CAP

LEVEL FLIGHT

4

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FLIGHT CREW OPERATING MANUAL

EMERGENCY DESCENT (Continued)

PROCEDURE/PARAMETER

1. PF calls "EMERGENCY DESCENT CHECKLIST" and reduces thrust to idle, extends speed brakes and commences descent, limiting pitch to 10 degrees nose down. If desired, a 30 degree banked turn may be initiated. PNF completes EMERGENCY DESCENT checklist.
2. PF adjusts IAS/Mach to maintain 320-340 KIAS/.80-.82M. If structural integrity is in doubt, recommended speed is 275-285 KIAS/.75-.79M.
3. PF monitors FMA for ALT CAP.
4. Level flight.

PREFERRED TECHNIQUE

After a lower altitude has been armed in the altitude preselect window, autopilot and autothrottle may be used to execute this maneuver. When in ALT HLD (speed on throttles mode) pushing IAS/MACH button places throttles in CLMP. Retarding throttles then commences descent. Extending speed brakes increases rate of descent. Speed may then be adjusted with pitch control wheel.

NOTE

If autothrottles are in an EPR limit mode, pressing ALT HOLD button places flight guidance system in ALT HLD (speed on throttles).

At IAS/MACH changeover, press IAS/MACH button.

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FLIGHT CREW OPERATING MANUAL

RECOVERY FROM APPROACH TO STALL

At first indication of approach to stall, simultaneously apply maximum available thrust, level wings and adjust pitch as required to minimize altitude loss. In an emergency situation (i.e., encountering a downdraft or decreased performance wind shear condition), positive climb performance and limited maneuver margins still exist at or near stick shaker actuation speed. High pitch attitudes are to be expected; however, pitch attitude should not be increased so rapidly that airspeed decreases below stick shaker actuation speed.

First indication of approach to stall may be one or any combination of the following:

- Rapid decrease of airspeed below bug setting.
- Rapid decrease of climb rate during takeoff or go-around.
- Rapid increase of sink rate during approach.
- Stick shaker or initial stall buffet.

If ground contact is imminent, apply maximum thrust (up to throttle mechanical stops) for the time required to recover from the situation.

NOTE

After a maximum thrust application (overboost), those engine parameters which exceeded the limits and the duration will require a log entry.

At first indication of a stall with the autopilot engaged, immediately disconnect the autopilot and initiate stall recovery. Be alert to counteract excessive nose-up trim condition.

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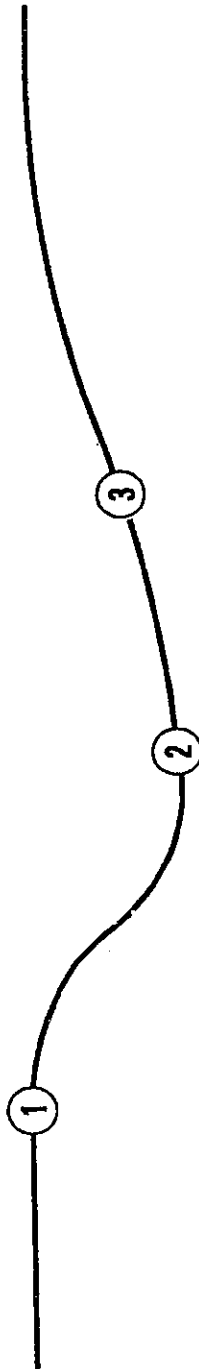
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RECOVERY FROM APPROACH TO STALL

Takeoff, Approach, Landing or Go-Around Configuration
(First indication of approach to stall)



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FLIGHT CREW OPERATING MANUAL

RECOVERY FROM APPROACH TO STALL

Takeoff, Approach, Landing or Go-Around Configuration

(First indication of approach to stall) (Continued)

PROCEDURE/PARAMETER

PREFERRED TECHNIQUE

1. Apply maximum certified thrust. If ground contact is a factor, apply thrust to the mechanical stops.

NOTE

If in a turn, PF calls "HDG HLD."

2. Adjust pitch as required while rolling wings level, to minimize altitude loss or to provide obstacle clearance. Maintain existing flap/slat and gear configuration.
3. Accelerate to minimum maneuvering speed for existing configuration then adjust configuration as desired.

(Continued)

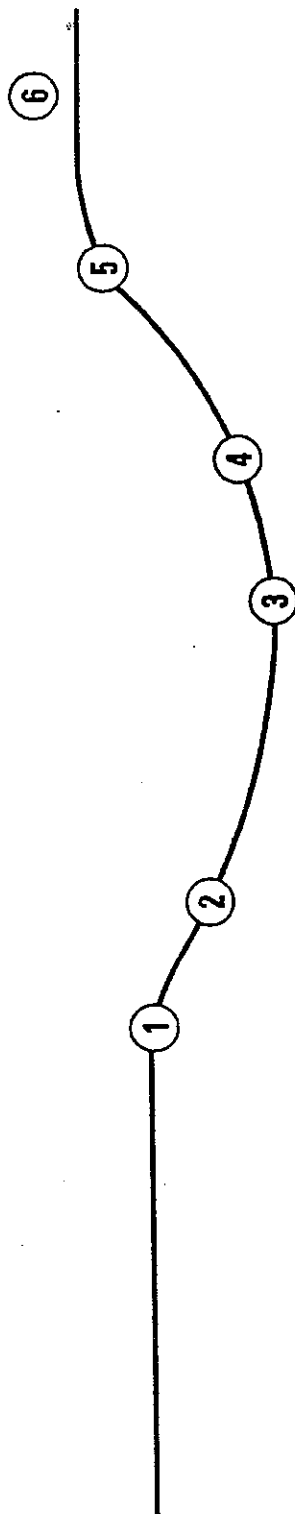
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FLIGHT CREW OPERATING MANUAL

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RECOVERY FROM APPROACH TO STALL (Continued)

Clean Configuration
(First indication of approach to stall)



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FLIGHT CREW OPERATING MANUAL

RECOVERY FROM APPROACH TO STALL

Clean Configuration (First Indication Of Approach To Stall) (Continued)

PROCEDURE/PARAMETER	PREFERRED TECHNIQUE
1. Apply maximum certified thrust. If ground contact is a factor, apply thrust to the mechanical stops.	
2. Adjust pitch as required to minimize altitude loss.	
3. Extend slats (below IAS/Mach slat limit speed).	
4. Accelerate to clean minimum maneuvering airspeed.	
5. Adjust configuration as appropriate.	
6. Return to desired altitude and airspeed.	

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FLIGHT CREW OPERATING MANUAL

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RECOVERY FROM APPROACH TO STALL (Continued)

Clean Configuration
(At altitudes where performance is limited)



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FLIGHT CREW OPERATING MANUAL

RECOVERY FROM APPROACH TO STALL

Clean Configuration (At Altitudes Where Performance Is Limited)

(Continued)

PROCEDURE/PARAMETER	PREFERRED TECHNIQUE
1. Apply maximum certified thrust. 2. Accept an altitude loss while accelerating to clean minimum maneuvering speed.	
NOTE Premature recovery may result in a secondary stall or inability to accelerate to cruise Mach with thrust available.	
3. Adjust configuration as appropriate. 4. Return to desired altitude and airspeed.	

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FLIGHT CREW OPERATING MANUAL

WINDSHEAR PROCEDURES

GENERAL

The most important policy for the flight crew in coping with a windshear is to avoid areas of known windshear.

DEFINITION

Severe windshear may be defined as a rapid change in wind direction and/or velocity that results in airspeed changes greater than 15 knots or vertical speed changes greater than 500 feet per minute.

FLIGHT CREW ACTIONS

Flight crew actions preparatory to encountering possible windshear events are divided into five areas. They are:

1. Evaluate The Weather.
2. Avoid Known Windshear.
3. Consider Precautions.
4. Follow Standard Operating Techniques.
5. Windshear Recovery Technique.

The following figure summarizes how flight crew actions may be incorporated into everyday operations. From a crewmember's viewpoint, use of this model will simplify operational windshear decisions.

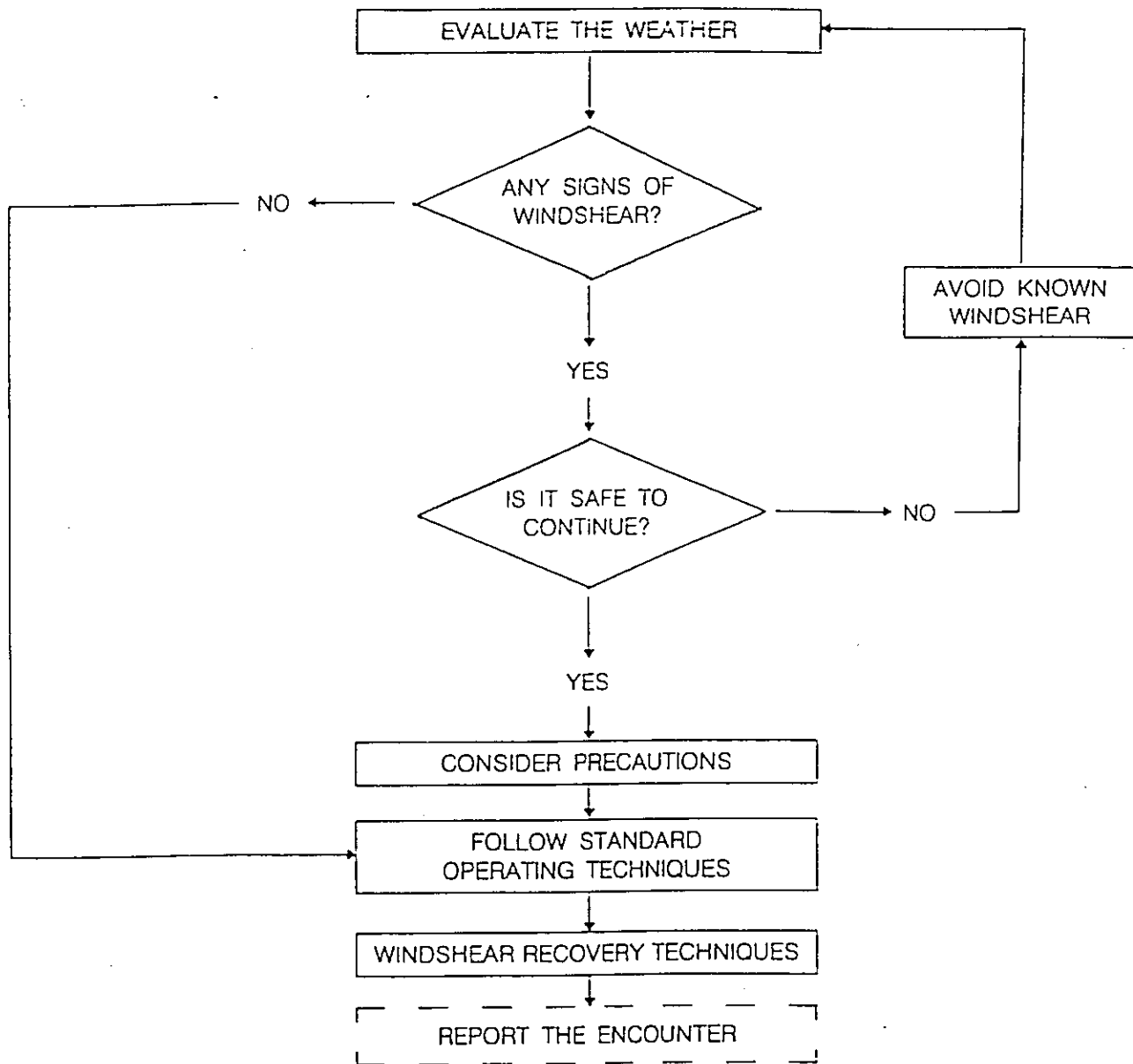
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FLIGHT CREW OPERATING MANUAL

WINDSHEAR PROCEDURES (Continued)

Model Of Flight Crew Actions



(Continued)

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FLIGHT CREW OPERATING MANUAL

WINDSHEAR PROCEDURES (Continued)

Evaluate The Weather

Detection of windshear is difficult with today's technology. Develop an awareness of the Causes and Danger Signals of windshear to successfully avoid windshear.

The most dangerous form of windshear is a convective weather microburst of either the dry or wet type. As shown in the table below, convective weather conditions have produced the majority of known windshear accidents.

<u>Cause Of Windshear</u>	<u>Approximate Percentage Of Windshear Accidents</u>
Convective Conditions (thunderstorms, rain and snow showers)	65
Frontal Systems	15
Low Altitude Jet Streams	5
Strong Or Gusty Surface Winds	5
All Other Causes (temperature inversions, mountain waves, sea breeze circulations, unknown causes)	10

Danger Signals Of Dry Microbursts

PIREPS	Caution - Due to the rapid intensification of microbursts, actual windshear may be up to twice as severe as the PIREP.
LLWAS	Caution - LLWAS in its present state of development is not completely accurate in detecting microbursts and is prone to false alarms.
Virga	Rain falling from high based convective clouds evaporating before it reaches the ground.
Temperature/ Dewpoint	Watch for a spread of 30 to 50°F (17 to 28°C).
Localized Strong Winds	Blowing dust, rings of dust, dust devils, other tornado-like features and other evidence of strong local outflow near the surface.

(Continued)

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FLIGHT CREW OPERATING MANUAL

WINDSHEAR PROCEDURES (Continued)

Turbulence	Moderate or greater turbulence may be associated with the outflow from a microburst.
Airborne Weather Radar	Indications of weak (green) cells with bases from 5000 to 15,000 feet AGL which indicate weak precipitation, usually virga. In addition, in doppler mode, areas of red (doppler turbulence) surrounding weak precipitation may indicate microburst windshear conditions in their formative stages aloft.
Weather Forecast	The potential for a microburst is indicated by mid-level moisture, very dry surface conditions and a 30 to 50°F (17 to 28°C) temperature/dewpoint spread.

Danger Signals Of Wet Thunderstorm Microbursts

PIREPS	Caution - Due to the rapid intensification of microbursts, actual windshear may be up to twice as severe as the PIREP.
LLWAS	Caution - LLWAS in its present state of development is not completely accurate in detecting microbursts and is prone to false alarms.
Thunderstorms	In addition to the well known hazards of thunderstorms, an estimated 5% of thunderstorms accompanied by heavy rain and/or lightning contain embedded microbursts.
Localized Strong Winds	Blowing dust, rings of dust, dust devils, other tornado-like features and other evidence of strong local outflow. (Caution - Visual clues may be obscured by low visibilities in wet thunderstorm microburst situations.)
Turbulence	Moderate or greater turbulence may be associated with the outflow from a microburst.
Airborne Weather Radar	Search the area above and along the takeoff and approach paths for heavy precipitation.
Weather Forecast	Although no techniques currently exist to forecast wet microbursts, crews should consider the thunderstorm forecasts contained in the terminal forecasts and severe weather advisories as a possible indication of the presence of wet microbursts.

(Continued)

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FLIGHT CREW OPERATING MANUAL

WINDSHEAR PROCEDURES (Continued)

The following table (designed specifically for convective weather conditions) provides a subjective evaluation of various observational clues to aid in making appropriate real time avoidance decisions. Although encountering weather conditions described in the table above 1000' AGL may be less critical in terms of flight path, such encounters may present other significant weather related risks. Windshear clues should be considered cumulative. The probability of each single observation is given. However, if more than one windshear clue is observed, the probability rating may be increased to reflect the total set of observations. Use of the table should not replace sound judgement in making avoidance decisions. Crewmembers are urged to exercise caution when determining a course of action.

MICROBURST WINDSHEAR PROBABILITY GUIDELINES

OBSERVATION	PROBABILITY OF WINDSHEAR
PRESENCE OF CONVECTIVE WEATHER NEAR INTENDED FLIGHT PATH: With localized strong winds (tower reports or observed blowing dust, rings of dust, tornado-like features, etc.) With heavy precipitation (observed or radar indications of contour, red or attenuation shadow) With rainshower With lightning With virga With moderate or greater turbulence (reported or radar indications) With temperature/dew point spread of 30 to 50°F (-1 to 10°C)	HIGH HIGH MEDIUM MEDIUM MEDIUM MEDIUM MEDIUM
ONBOARD WINDSHEAR DETECTION SYSTEM ALERT: Reported or observed	HIGH
PIREP OR AIRSPEED LOSS OR GAIN: 20 KIAS or greater Less than 20 KIAS	HIGH MEDIUM
FORECAST OF CONVECTIVE WEATHER:	LOW
HIGH Critical attention needs to be given to this classification. A decision to avoid (e.g., divert or delay) is appropriate. MEDIUM Consideration should be given to avoiding. Precautions are appropriate. LOW Consideration should be given but a decision to avoid is not generally indicated. NOTE: These guidelines apply to operations in the airport vicinity (within 3 miles of the point of takeoff or landing along the intended flight path and below 1000 feet AGL). The hazard increases with proximity to the convective weather. Weather assessment should be continuous. CAUTION: Currently no quantitative means exists for determining the presence or intensity of microburst windshear. Crewmembers are urged to exercise caution in determining a course of action.	

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FLIGHT CREW OPERATING MANUAL

WINDSHEAR PROCEDURES (Continued)

Avoid Known Windshear

The policy is to avoid areas of known windshear. Consider one or more of the following actions as appropriate:

- Delay takeoff until conditions improve.
- In flight, divert around the area of known windshear.
- If windshear is indicated during approach, initiate a go-around or hold until conditions improve.

Consider Precautions

Precautions are recommended whenever probability of windshear exists but avoidance action is not considered necessary.

Takeoff Precautions -

- Use maximum takeoff thrust instead of reduced thrust.
- Use the longest suitable runway away from potential windshear.
- Consider using the recommended flap settings (unless limited by obstacle clearance and/or climb gradient) of 5 to 15 degrees.
- Consider using increased V_R speed. The delayed rotation speed must not exceed either the runway limit V_R speed or a 20 KIAS increase.

Example: Actual gross weight: 140,000 pounds/63,500 kilograms. Performance limited gross weight: 150,000 pounds/68,040 kilograms. Set the "bugs" for the actual gross weight (140,000 pounds/63,500 kilograms) but remember to rotate at the V_R speed which corresponds to the performance limited gross weight (150,000 pounds/68,040 kilograms). Use normal continuous rotation to the normal target pitch attitude.

- Do not use any pitch mode of a speed referenced flight director for takeoff.

Approach Precautions -

- Achieve a stabilized approach no later than 1000 feet AGL.
- Avoid large thrust reductions or trim changes in response to sudden airspeed increases as these may be followed by airspeed decreases.
- Use the longest suitable runway away from potential windshear.
- Consider using the recommended flap setting. (Recommended landing flap setting is minimum flap setting authorized for normal landing configuration.)

(Continued)

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FLIGHT CREW OPERATING MANUAL

WINDSHEAR PROCEDURES (Continued)

- Consider using increased approach speed (correction applied in the same manner as gusts) up to a maximum of 20 knots.
- Use the autopilot and autothrottles for the approach to provide more monitoring and recognition time. If using the autothrottles, manually back-up the throttles to prevent excessive power reduction during an increasing performance shear.

Follow Standard Operating Techniques

Certain procedures and techniques can prevent a dangerous flight path situation from developing if windshear is inadvertently encountered. These procedures and techniques are of such importance that they should be incorporated into each crewmember's personal standard operating techniques and practiced on every takeoff and landing whether or not windshear is anticipated. Develop a cockpit atmosphere which encourages awareness and effective crew coordination, particularly at night and during marginal weather conditions.

Takeoff Standard Operating Techniques -

- Be alert for any airspeed fluctuations during takeoff and initial climb.
- Know the all-engine initial climb pitch attitude.
- Make a continuous rotation at the normal rotation rate to this target pitch attitude for all non-engine failure takeoffs.
- Minimize reductions from the initial climb pitch attitude until terrain and obstruction clearance is assured.
- Develop an awareness of normal values of airspeed, attitude, vertical speed and airspeed build up.
- The pilot not flying closely monitor the vertical flight path instruments such as vertical speed and altimeters and call out any deviations from normal.

Approach Standard Operating Techniques -

- Develop an awareness of normal values of vertical speed, thrust and pitch.
- Cross-check flight director commands using the vertical flight path instruments.
- Know the go-around decision criteria and be prepared to execute an immediate go-around if the parameters are exceeded.
- The pilot not flying closely monitor the vertical flight path instruments such as vertical speed, altimeters and glideslope displacement and call out any deviations from normal.

(Continued)

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FLIGHT CREW OPERATING MANUAL

WINDSHEAR PROCEDURES (Continued)

Windshear Recovery Techniques

This section is specifically applicable when the Windshear Alert and Guidance System (WAGS) is not installed or is inoperative and a manual recovery is required.

The following actions are recommended whenever flight path control becomes marginal below 1000 feet AGL on takeoff or approach. As guidelines, marginal flight path control may be indicated by deviations from target conditions in excess of:

- $\pm$ 15 KIAS.
- $\pm$ 500 feet per minute vertical speed.
- $\pm$ 5° pitch attitude.
- $\pm$ 1 dot displacement from the glideslope.
- Unusual throttle position for a significant period of time.

If flight path control becomes marginal at low altitudes, initiate the recommended windshear recovery technique without delay. Accomplish the first three steps simultaneously.

Thrust -

Disengage the autothrottles and aggressively apply necessary thrust to ensure adequate airplane performance. Avoid engine overboost unless necessary to avoid ground contact. When airplane safety has been ensured, adjust thrust to maintain engine parameters within specific limits.

Autopilot -

Disengage the autopilot.

Pitch -

For a windshear encounter after lift-off or on approach, increase or decrease pitch attitude as necessary (at a normal pitch rate) toward an initial target attitude of 15°. On takeoff where a normal all engine pitch attitude has been established before a windshear is encountered, it is not necessary to decrease pitch to 15°. The all engine pitch attitude may be maintained until either the shear has been exited or stick shaker is encountered. Always respect stick shaker. Use intermittent stick shaker as the upper limit for pitch. Rapidly changing vertical winds can also cause momentary stick shaker at any attitude. If attitude has been limited to less than 15° to stop stick shaker, increase attitude toward 15° as soon as stick shaker stops.

(Continued)

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FLIGHT CREW OPERATING MANUAL

WINDSHEAR PROCEDURES

If the vertical flight path or altitude loss is still unacceptable after reaching 15°, further increase pitch attitude smoothly in small increments.

Rapidly changing winds may cause rapid excursions in pitch and roll with little or no pilot input. Control pitch in a smooth, steady manner (in approximately 2° increments) to avoid excessive overshoot/undershoot of the desired attitude. Once the airplane is climbing and ground contact is no longer an immediate concern, airspeed should be increased by cautious reductions in pitch attitude.

Flight Director -

Turn flight director off or disregard commands.

WARNING

A flight director and/or autoflight system which is not specifically designed for operations in windshear may command a pitch attitude change to follow target airspeeds or a fixed pitch attitude regardless of flight path degradation. This guidance may be in conflict with the proper procedures for windshear recovery. Such systems must not be used for windshear recovery.

If windshear is encountered on the runway during takeoff and an abort is not practical, rotate toward 15° at the normal rate of rotation but no later than 2000 feet of usable runway remaining. After becoming airborne, follow after lift off/on approach recovery technique.

Configuration -

Do not change flap, gear or trim position until terrain contact is no longer a factor. However, stabilizer trim may be used to trim out stick force due to thrust application.

NOTE

It is recognized that a change in flap position may improve windshear recovery. However, this procedure is not recommended since the risk of moving the flaps in the wrong direction or amount is considered to be greater than the risk of encountering a shear so great that a flap change is needed for recovery.

Report The Encounter

Report the airspeed change, shear encounter location and altitude and airplane type to ATC as quickly as possible. Use the term PIREP in making the report in order to encourage rebroadcast to other airplanes.

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FLIGHT CREW OPERATING MANUAL

WINDSHEAR ALERT AND GUIDANCE SYSTEM (WAGS)

GENERAL

The following procedures and techniques are applicable when the Windshear Alert and Guidance System (WAGS), which provides detection, alerting and guidance through hazardous windshear conditions, is inoperative. There is no change to the first four flight crew actions (1. Evaluate The Weather; 2. Avoid Known Windshear; 3. Consider Precautions; 4. Follow Standard Operating Techniques) as listed in the Windshear Procedures. The fifth action, Windshear Recovery Technique, is addressed here through the operational use of the windshear detection and recovery system. The WAGS is enabled for detection and guidance from 60 knots on takeoff roll to 1500 feet AGL. On approach, the WAGS is enabled from 1500 feet AGL down to 50 feet AGL. The system receives information from the Digital Flight Guidance Computer (DFGC), the Central Air Data Computer (CADC), and the stall warning computer (SWC). When the CADC's and the DFGC's provide data to the WAGS indicating an adverse wind condition, the WAGS provides windshear alerting on the glareshield, the Electronic Flight Instrumentation System (EFIS), and through the Central Aural Warning System (CAWS). Flight Director (FD) and autopilot (AP) functions are provided through the DFGS. In addition, under specific conditions, the Post Stall Recovery System (PSRS), the Ground Proximity Warning System (GPWS) and the Traffic Alert and Collision Avoidance System (TCAS) will be inhibited during windshear guidance.

DETECTION

When the WAGS detects a windshear condition, it provides both aural and visual cockpit annunciations. A red windshear warning (decreasing performance windshear) or an amber windshear caution (increasing performance windshear) will be displayed on the glareshield and the EFIS Primary Flight Display (PFD) top left corner when WAGS detects the appropriate windshear condition. CAWS will be enabled to generate an alert tone followed by the aural message, "TAILWIND SHEAR" or "HEADWIND SHEAR", annunciated three times. The Flight Mode Annunciators (FMA's) will display appropriate windshear modes.

The WAGS provides pitch guidance commands for windshear encounters during takeoff and go-around operations. Using data provided by the DFGC, CADC's and SWC, the WAGS provides guidance commands for the FD and AP through the DFGS and will be displayed on the PFD.

A visual indication of the relationship between the airplane angle of attack and stick shaker angle of attack is provided by the Pitch Limit Indicator (PLI). PLI is intended as an information indicator and is not to be used as a guidance command. PLI provides pitch margin relative to stick shaker angle of attack. During a windshear, this is very useful information to the pilot when following windshear guidance commands. PLI is an angle of attack based presentation which is valid during windshear guidance conditions.

(Continued)

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FLIGHT CREW OPERATING MANUAL

WINDSHEAR ALERT AND GUIDANCE SYSTEM (WAGS) (Continued)

GUIDANCE

The WAGS provides guidance to achieve an energy conserving flight path during windshear. When a decreasing performance windshear is detected and guidance activated (with sufficient energy available), WAGS provides FD and/or AP pitch guidance to achieve and maintain a 1 1/2 degree flight path angle. This flight path angle provides a near optimal energy conservation flight path through the windshear field while also providing a positive flight path relative to the ground until airplane performance is degraded to the point where stick shaker angle of attack is attained. The system will then provide pitch commands which will, if necessary, sacrifice altitude to maintain stick shaker angle of attack.

When above 450 feet radio altitude, even when an energy margin is available, the system will allow a zero or even slightly decreasing flight path in the presence of a strong downdraft to be more energy efficient when proximity to the ground is not a factor.

When below 450 feet of radio altitude, and degradation of kinetic energy no longer makes maintaining a positive flight path angle of +1 1/2 degrees possible, the windshear system will guide to stick shaker angle of attack and loss of altitude will occur as necessary to prevent a stall.

When an increasing performance windshear is detected and guidance is active, WAGS provides energy gaining FD and/or AP guidance during takeoff and go-around. WAGS will command an inertial flight path angle of +1 1/2 degrees until appropriate airspeed is achieved. WAGS will then command pitch guidance to maintain this speed. In this case, inertial flight path angle is no longer limited to +1 1/2 degrees. During takeoff, this is a speed of $V_2 + 30$ knots. For go-around, the speed is $1.3V_S + 20$ knots, or higher, limited by flap placard speed.

WINDSHEAR SYSTEM OPERATION DURING TAKEOFF ROLL, TAKEOFF AND INTIAL CLIMB

The windshear system is enabled above 60 knots to detect and provide alerting to the presence of windshear. When windshear is detected, WAGS will cause the alerts to be displayed on the glareshield, on the PFD, on the FMA, and aurally through the CAWS.

Decreasing performance windshears always have annunciation priority over increasing performance windshears. When either an increasing or decreasing performance windshear is detected on takeoff, the autothrottles will remain clamped and the Automatic Reserve Thrust System (ARTS) will activate (if armed). During a flex takeoff, the autothrottles will unclamp, set maximum takeoff thrust, and reclamp.

The FMA Thrust, Roll and Pitch windows will reflect the changes in WAGS system modes. For a decreasing performance windshear, the system will go to heading hold, and the Roll and Pitch windows will flash HDG HLD and WINDSHR respectively five times. For increasing performance windshear, the Roll window will remain unchanged and the Pitch window will flash WINDSHR five times.

(Continued)

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FLIGHT CREW OPERATING MANUAL

WINDSHEAR ALERT AND GUIDANCE SYSTEM (WAGS) (Continued)

Transition to windshear guidance is automatic as long as the system is in a takeoff or go-around mode. If takeoff or go-around modes are not engaged, pushing the takeoff and go-around (TO/GA) button or advancing the throttles to at least 95% of go-around thrust will activate windshear guidance when windshear is detected.

When a windshear is detected, the windshear warning or caution annunciations will flash three times then remain steady. The CAWS activates an aural alert tone and in some airplanes this is followed by three cycles of TAILWIND SHEAR or HEADWIND SHEAR.

During a windshear encounter on takeoff roll, the system does not initiate rotational guidance but does provide increasing or decreasing windshear guidance after nose strut extension. If the takeoff is rejected by the pilot, retarding the throttles to idle will cancel all windshear functions.

When either an increasing or decreasing performance windshear is detected during the takeoff roll prior to V_1 , the takeoff should be aborted.

Detection of windshear after V_1 requires continuing the takeoff. During a decreasing performance windshear, if V_R has not yet been reached prior to 2000 feet from the end of the runway, rotation should be initiated. Advancing the throttles to the stop is recommended in this situation.

After rotation, when a windshear is detected, either increasing or decreasing performance guidance will be automatically provided as appropriate. When the windshear condition is exited, the WAGS will transition to reversionary guidance.

WINDSHEAR REVERSIONARY GUIDANCE

When windshear conditions no longer exist, all windshear detection annunciations cease. Windshear pitch and roll guidance will continue until safe conditions are achieved. Safe conditions are defined as a minimum rate of climb of 750 feet/minute and a speed of $V_2 + 5$ knots on takeoff or go-around reference speed -5 knots on go-around. These conditions must be satisfied for at least 15 seconds. At that time, the guidance system will revert to normal DFCS modes. Although reversion to takeoff or go-around modes will occur automatically, other pitch modes and HDG HOLD occur when the pilot manually deselects windshear guidance.

The pilot can exit windshear guidance manually at any time by selecting any other pitch mode. However, this is not recommended when a decreasing performance windshear is being detected. If the pilot has manually exited windshear guidance while windshear is being detected, windshear guidance can be regained by pushing the TO/GA button.

WINDSHEAR SYSTEM OPERATION DURING APPROACH AND GO-AROUND

During approach and go-around, the windshear aural and visual alerts are the same as takeoff. The thrust rating mode will automatically be switched to go-around if not already in go-around and WINDSHR will be displayed in the FMA Speed window. WAGS is equally effective on all types of approaches. If a windshear is detected with the FD turned off, the FD will automatically come into view and provide windshear guidance when the pilot pushes the TO/GA button or thrust reaches 95% of go-around thrust.

(Continued)

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FLIGHT CREW OPERATING MANUAL

WINDSHEAR ALERT AND GUIDANCE SYSTEM (WAGS) (Continued)

On approach, when either an increasing or decreasing performance windshear is detected (as indicated by the CAWS and appropriate indications on the PFD), the speed bug will move to indicate $1.3V_S + 20$ knots, if selected lower. The autothrottles will reference to a minimum of $1.3V_S + 20$ or the pilot selected approach speed, whichever is higher. If the detected windshear dissipates before guidance is initiated, the throttles will reference back to the pilot selected speed (if lower than $1.3V_S + 20$ knots) at a rate of approximately 1 knot/second.

When a windshear is detected on approach, there are three ways to engage FD and/or AP windshear guidance:

1. Push the TO/GA button.
2. Advance the throttles to at least 95% of go-around thrust.
3. Automatic advancement of the throttles to at least 95% of go-around thrust by the autothrottle system.

In all cases, initiation of windshear guidance will cause the autothrottle system to advance to go-around thrust and clamp.

Once windshear guidance is activated, the FMA will annunciate the same as a windshear encounter on takeoff. The autothrottles will set go-around thrust. Windshear guidance continues until the windshear is no longer present and reversion criteria have been met. The DFSG will then revert to normal go-around.

If a windshear is detected after a go-around has been initiated, the aural and visual alerts will be activated and windshear guidance will be initiated automatically as during takeoff. DFSG reversion is as previously described.

On approach, whenever an increasing or decreasing performance windshear is detected, the pilot should discontinue the approach by pushing the TO/GA button thereby engaging the windshear guidance. Once the go-around is completed, the pilot should then carefully re-assess the weather situation using all means at his disposal, then proceed to the alternate airport or make another approach as appropriate.

GENERAL INFORMATION AND RECOMMENDATIONS

CONFIGURATION

Whenever windshear guidance is activated, airplane configuration should be maintained until safe flight conditions are achieved.

(Continued)

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FLIGHT CREW OPERATING MANUAL

WINDSHEAR ALERT AND GUIDANCE SYSTEM (WAGS) (Continued)

POP-UP FLIGHT DIRECTOR AND AUTOTHROTTLES

If WAGS detects a windshear and the FD and autothrottle system are turned off, the windshear pitch guidance function is still available. Maximum thrust must manually set when the autothrottle system is turned off. If the engine EPR is above 95% of the go-around thrust rating, the FD will come into view and provide windshear guidance. If engine EPR is not above 95% of go-around thrust rating, the pilot is required to either push the TO/GA button or move throttles to above 95% of go-around rating to acquire FD guidance. The FD is biased out of view after reversion to takeoff, go-around or other pilot selected DFGC modes.

WINDSHEAR GUIDANCE

The most demanding windshear is an encounter with a strong microburst which typically has lateral, horizontal and vertical wind components often with rapid reversal of direction. It is difficult to comply with FD windshear guidance commands when the airplane still has a significant amount of surplus kinetic energy and much more difficult when flying at stick shaker angle of attack. Here PLI information is very useful. The information presented to the pilot is pitch margin to stick shaker angle of attack between the airplane symbol and the PLI. When the airplane symbol and the PLI coincide, the airplane is at stick shaker angle of attack and the stick shaker will activate. During a steady and/or rapid increase or decrease in airplane kinetic energy, pitch margin to PLI will be displayed accordingly and should be monitored while following FD pitch commands. When the airplane is at a low energy level flying at or near stick shaker angle of attack and has encountered the roll vortices of a microburst or gust front, rapid and strong reversal of lateral, vertical and horizontal wind components will require immediate response by the pilot to FD commands. Rapid PLI movements both above and below the airplane symbol will often occur. Observing a change in direction of PLI movement relative to the airplane symbol helps the pilot anticipate a change or reversal of control force in order to properly follow guidance commands which, in this regime of flight, will often require much greater and much more rapid control inputs than normal. These control inputs also often require greater or less force with attendant slower airplane response than is normally the case. Windshear dynamics may also cause airplane response to appear slower than normal.

For airplanes equipped with electro-mechanical attitude director indicators, there is no PLI. However, the fast/slow indicator will display airplane angle of attack information relative to stick shaker angle of attack during windshear only. During windshear guidance, the S mark indicates an angle of attack 5 degrees above stick shaker, the center mark indicates stick shaker angle of attack and the F mark indicates an angle of attack which has 10 degrees of pitch margin below stick shaker angle of attack.

Windshear guidance will not command the pilot to fly above stick shaker angle of attack. However, strong vertical wind components may cause the PFD to display this condition to the pilot. The FD command in this situation will be to pitch down and the rate may be rapid but not abrupt. The pilot should also be aware that commands will be attenuated when the system senses a reversal of wind direction. This helps prevent what might otherwise become a Pilot Induced Oscillation (PIO) maneuver with the pilot out of phase with the commands of the FD.

(Continued)

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FLIGHT CREW OPERATING MANUAL

WINDSHEAR ALERT AND GUIDANCE SYSTEM (WAGS) *Continued.*

DETECTION AND ESCAPE MANEUVER

When a pilot chooses to, or must attempt a takeoff or landing in questionable weather, he will normally be alert for signs of windshear. In this situation, it is very possible that he will recognize the onset of windshear before the windshear detection system functions. Even though WAGS cannot provide windshear encounter guidance unless detection has taken place, it is not recommended that the pilot delay initiation of an escape maneuver until detection occurs. Upon recognition of a windshear condition, the pilot should immediately apply full rated thrust and follow the recommendations for a manual escape maneuver; i.e., increase or decrease pitch as necessary towards 15 degree pitch at a normal rate and continue following the technique set forth for the manual maneuver. It is more than likely that detection by the system will occur in short order and programmed windshear encounter guidance will automatically follow with appropriate aural and visual annunciations.

THRUST

The windshear system will advance to and clamp the autothrottles (if engaged), at maximum rated thrust during windshear guidance. During takeoff, if ARTS is armed, ARTS will activate, thrust rating will be updated to maximum takeoff and the autothrottle system will remain clamped.

The amount of thrust will be sufficient for the MD-80 to survive windshear encounters. However, if airplane performance is such that the pilot judges that ground contact will occur, the throttles should be advanced to the stop, as previously recommended.

GPWS AND TCAS

The GPWS is inhibited during windshear guidance when FD commands are being followed within ± 5 degrees. The TCAS system functions are inhibited upon windshear detection.

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FLIGHT CREW OPERATING MANUAL

GPWS WARNING PROCEDURES

GENERAL

Under certain conditions of flight where immediate visual reference to the surrounding terrain is not available, prompt and decisive action is required for a GPWS warning.

CAUTION

Do not ignore short duration warnings. Take immediate and aggressive action.

ACTIVATION OF GPWS WARNING

Flight crews should become familiar with the following sequence of actions and use them immediately and aggressively upon activation of an aural or visual GPWS warning.

Thrust –

Disengage the autothrottles and aggressively apply necessary thrust to ensure adequate airplane performance. Avoid engine overboost unless necessary to avoid ground contact. When airplane safety is assured, adjust thrust to maintain engine parameters within normal limits.

NOTE

If engine emergency overboost is used, enter the engine parameters which exceeded the limits and the duration of the overboost in the airplane log.

Autopilot –

Disengage the autopilot.

Pitch –

Immediately rotate the airplane at a rate of 3° per second (similar to a normal takeoff rotation rate) to 20° pitch attitude.

Trade airspeed for climb performance. If necessary (to prevent ground contact), continue to increase pitch attitude until stick shaker actuates. In this situation, consider use of engine overboost by moving throttles to their mechanical limits.

Although there are no pitch limitations in emergency conditions, caution must be exercised to keep from maintaining pitch attitudes that result in continuous actuation of stick shaker.

Speed Brakes –

Retract speed brakes (if extended).

(Continued)

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FLIGHT CREW OPERATING MANUAL

GPWS WARNING PROCEDURES (Continued)

Flight Director –

Turn off flight director or disregard commands.

Level wings to assure maximum airplane performance.

Do not change gear or flap configuration until terrain separation is assured.

Monitor radio altimeter for sustained or increasing terrain separation.

After GPWS warning ceases, continue climb to published minimum safe altitude.

[END]

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FLIGHT CREW OPERATING MANUAL

VOLCANIC ASH PROCEDURES

GENERAL

These procedures should be used in the event of inadvertent flight into a volcanic ash cloud and during ground operations in volcanic ash or dust conditions. They are intended to maximize engine surge protection and to decrease engine EGT. The lower EGT will minimize accumulation of volcanic material on the turbine vanes.

Initial engine indications will be a decrease of N1, N2, EPR, and fuel flow and an increase in EGT. Engine surges, torching from tailpipe and flameout may also occur.

Physical indications of volcanic ash may appear as smoke or dust in the cockpit or an acrid odor similar to electrical smoke. At night, heavy static discharges (St. Elmo's Fire) may be visible around the windshields. The landing lights will cast sharp, distinct shadows.

Do not rely on weather radar to detect and display the presence of volcanic ash and dust. Airborne weather radar systems, on commercial airplanes, are not capable of detecting very small ash and dust particles.

Volcanic ash and dust may not be visible at night or in Instrument Meteorological Conditions (IMC).

Fly on the upwind side of the ash cloud. If an ash cloud is inadvertently entered, exit immediately via the shortest route at the least practicable thrust setting.

During prolonged exposure to ash laden air, use the crew oxygen system (100 percent) when there is evidence of a sulfur odor from the air conditioning system, or volcanic dust in the cockpit. Manual deployment of passenger oxygen masks is not recommended if cabin pressure is normal. The passenger oxygen will be diluted with cabin air contaminated with volcanic dust.

Communications difficulties may be experienced due to electrostatic conditions. This may be more prevalent in terminal areas.

DURING FLIGHT

If volcanic ash cloud is inadvertently encountered during flight, perform the following actions as rapidly as possible.

- Turn Ignition on (select the position normally used for inflight start).
- Disengage the autothrottle system to preclude increasing engine thrust and simultaneously (terrain permitting), retard throttles to idle or as low as practical. This will provide additional engine surge margin and decrease EGT.

NOTE

Decreasing EGT will reduce debris buildup on the turbine blades and hot section, and significantly reduce damage to the compressor section and blade tips due to erosion.

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FLIGHT CREW OPERATING MANUAL

VOLCANIC ASH PROCEDURES (Continued)

- Turn on all available airbleed systems, wing and engine anti-ice, air conditioning, and pneumatic systems.
- Depart the area by the shortest route possible. The quickest route out of the volcanic ash cloud may be an immediate descending 180 degree turn.
- Consider starting the APU, if certified and available. The APU can be used to power the electrical system in the event of multiple engine loss.
- Monitor the EGT. Should EGT approach or exceed the limit, or if an engine flames out, perform an engine shut down. Refer to Section 1, EMERGENCY PROCEDURES - ENGINE FAILURE/INFLIGHT ENGINE SHUTDOWN procedures.
- Monitor airspeed and pitch attitude. Airspeed indications may be erratic and unreliable, or a complete loss of airspeed indication may occur. If volcanic ash blocks the pitot system or damages the Air Data Computer, refer to Section 3, INSTRUMENTATION AND NAVIGATION - OPERATION WITHOUT NOSE RADOME OR AIRSPEED INDICATION for pitch guidance information.
- Restart the engines using the published restart procedures.

NOTES

If an engine fails to start, repeated attempts should be made immediately. A successful start may not be possible until clear of the volcanic ash cloud and airspeed and altitude are within the relight envelope.

Engines are slow to accelerate at high altitudes. This should not be interpreted as failure to start.

- When clear of the volcanic ash cloud, and if engines have been restarted, avoid rapid thrust lever movement, if possible.

NOTE

If compressor and/or turbine blades have been eroded, an increase in fuel flow and EGT may be noticed.

- As soon as practical after discovering volcanic activity, make a pilot report. Transmit all available information concerning location, altitude and drift direction of the ash cloud to ATC. Transmit to ATC the information requested in Sections 1 through 8 of the ICAO Volcanic Activity Report. Log the information on the form. Complete Sections 9 through 16 as crew duties permit. Submit the completed form to airline operations at the next landing.
- Land at the nearest suitable airport.

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FLIGHT CREW OPERATING MANUAL

VOLCANIC ASH PROCEDURES (Continued)

NOTES

A precautionary landing should be made if damage has occurred to the airplane or abnormal engine operation was observed while operating in the dust cloud.

The abrasive effects of volcanic ash on windshields and landing lights may markedly decrease visibility for approach and landing.

GROUND OPERATIONS

During ground operation in volcanic ash or dust conditions, complete the following actions:

- Discontinue bleed air use when reverser operation is imminent.
- Limit the use of reverse thrust to prevent ingestion of volcanic ash into the engines and to prevent further reduction of visibility.
- Maintain a greater than normal separation from other airplanes while taxiing. Use caution when taxiing -- limit thrust operation to the minimum required to taxi.
- Use all engines during taxi. Taxi at low speed. Whenever possible, avoid operating the engines above idle.
- Limit braking. The presence of volcanic ash or dust will increase brake wear. A light layer of ash or dust on the taxiway or runway may reduce tire adhesion.
- Volcanic ash or dust covered taxiways or runways, especially if wet, will reduce braking efficiency.
- Avoid the use of air conditioning while on the ground. If dust is visible and air conditioning use is necessary, operate the air conditioning at full cold setting.

CAUTION

Use of windshield wipers for ash or dust removal will result in minute scratches on the windshield. These will show up as a blossoming effect at night and could make landing approach difficult.

- Ash or dust deposits should be hosed off with water. Any ash or dust residue should be removed with a clean cloth.
- Verify that the pitot and static ports are free of ash or dust.
- Inspect all ventilation scoops and inlets, and ensure that they are clear of ash or dust accumulations.
- Check engine inlets for acoustic panel dust coating.

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FLIGHT CREW OPERATING MANUAL

VOLCANIC ASH PROCEDURES (Continued)

If at all possible, delay takeoff in an area of an ash cloud.

Limit the use of the APU to engine start.

Prior to takeoff, allow the ash and dust to settle.

A rolling takeoff should be used. Whenever possible, avoid setting high thrust at low speed. Do not takeoff with the packs on.

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FLIGHT CREW OPERATING MANUAL

COLD WEATHER PROCEDURES

GENERAL

Cold weather operations, particularly those associated with icing conditions, freezing rain, and slush or snow-covered runways, present flight crews with potentially hazardous conditions. The following information is intended to supplement or amplify the normal operating procedures and should be applied appropriately. Since weather conditions will vary, the following procedures may not fit all situations. For that reason, it remains the responsibility of the operator to evaluate the existing conditions and take the necessary action to ensure safe operation. Refer to current Douglas Aircraft Company All Operator Letters (AOL's) and the DAC MD-80 Maintenance Manual for operational performance guidelines and the methods and material for de-icing and servicing airplanes in cold weather.

Winter weather is often characterized with rapidly changing and widespread adverse conditions. It is the responsibility of those operating in winter weather areas to have a thorough knowledge of existing and forecast weather conditions, exercise extreme caution, and adhere to standard operating procedures. Due to the basic nature of winter flight operations, flight crews should allow additional time to accomplish what would normally be routine tasks to ensure proper planning, briefing, and airplane preparation.

PREFLIGHT CHECK

A careful check of the fuselage, wings, tail, control surfaces, surface actuators, engine nacelle inlets, landing gear, and gear doors must be made, and all ice, frost, or snow must be removed from these areas prior to takeoff.

A light coating of powdery snow that is determined not to be adhering to critical surfaces, and can be expected to blow off during the early stages of the takeoff roll, may be acceptable at the determination of the pilot in command. In this case, consideration should be given to the potential of melting and refreezing, or the possibility of ice or frost beneath such a layer. If in doubt, de-ice.

The area around pitot tubes, static ports, vanes, etc., should be carefully checked and verified to be clean, even though these items are electrically heated. Any ice or snow formations on inlets, cabin outflow valves, cabin pressure relief valves, and windshields should be completely removed. Be alert for any signs of water leakage in the water and lavatory service panel areas to preclude subsequent accumulation and freezing which could result in foreign object damage.

Check tires and struts for proper inflation and ensure that the tires are not frozen to the ground or to the chocks.

Pay particular attention to the underside of the flaps and the open areas of the flaps and slats as a previous descent through icing conditions with flaps and slats extended may have caused considerable ice to accumulate in these areas. Similarly, landing and taxiing through slush or snow may also have caused accumulation on struts, gear doors and flaps.

The removal of snow from the fuselage should be accomplished before prolonged heating of the interior, since after melting, refreezing of water on the fuselage may occur. Similarly, the hanging of

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FLIGHT CREW OPERATING MANUAL

COLD WEATHER PROCEDURES (Continued)

airplane or application of external heat for snow removal should be carefully monitored. Unless precautions are taken, the resultant water may refreeze on some other, perhaps more critical, portion of the airplane. If heat is used, it should be applied for a period sufficient to allow the airplane to dry completely.

Frosting on the underside of the wings below the fuel tanks will occur when the fuel temperature is low, the outside air temperature is above freezing and humidity is high. This type of frost may re-form after the removal on the ground. Takeoff with frost on the fuel tank underwing surfaces is permitted, provided it is not excessive. A coating of frost thicker than 1/8 inch (3.2 mm) should be removed before departure. Operation with frost adhering on areas of the wing other than the lower surface fuel tank region is not permitted.

CAUTION

Ice shedding from the wing upper surface during takeoff can cause severe damage to one or both engines, leading to surge, vibration, and complete thrust loss.

Ice can form on wing surfaces during exposure of the airplane to normal icing conditions. Clear ice can also form on the wing upper surface when cold-soaked fuel is in the main wing fuel tanks and the airplane is exposed to conditions of high humidity, rain, drizzle, or fog at ambient temperatures well above freezing. Even though the bottom surface of the wing is free of frost and ice, upper wing surface clear ice can form if suitable conditions exist. An accumulation of clear ice is difficult to detect visually.

The wing upper surface must be physically checked for ice when the airplane has been exposed to conditions conducive to ice formation (i.e., ambient temperature less than 10°C/50°F and high humidity or visible moisture such as rain, drizzle, sleet, snow, fog, etc., is present; frost or ice is present on the lower surface of either wing). Takeoff may not be initiated unless the flight crew verifies that a visual check and a physical (hands-on) check of the wing upper surface has been accomplished and the wing is clear of ice accumulation. If tufts and triangular decals are installed, the physical check may be made by assuring that all installed tufts move freely.

Be knowledgeable of the ground de-icing and anti-icing procedures being used on your airplane whether the service is being performed by your own company or a contracted service. Do not allow de-icing or anti-icing until you are familiar with the de-icing/anti-icing practices and quality control procedures of the service organization. Use only authorized methods, products and support equipment.

By definition, de-icing is the removal of accumulated snow, ice, etc., from the airplane surfaces by application of heated water followed by undiluted glycol-based fluid or the application of a heated water/glycol solution. Anti-icing is the treatment with undiluted glycol-based fluid to prevent snow, ice or frost from adhering to airplane surfaces. Holdover time is the estimated time anti-icing fluid will prevent the formation or accumulation of rime, ice, or snow on the protected surfaces of an airplane under average weather conditions outlined in the guideline to holdover time in the MD-80 Maintenance Manual.

Cold weather protection and servicing of the airplane, including de-icing, should be carried out in accordance with the procedures outlined in the MD-80 Maintenance Manual.

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FLIGHT CREW OPERATING MANUAL

COLD WEATHER PROCEDURES (Continued)

De-icing fluid, if allowed to enter the engine or APU inlet ducts, will cause white acrid smoke to enter the airplane via the air conditioning system if these pneumatic sources are operating. When de-icing around the engines and APU inlet and exhaust areas, use de-icing fluid sparingly to avoid subsequent ingestion. During de-icing, operational and safety considerations may require leaving the APU running. In this case, the air conditioning packs should be shut down and care should be exercised to avoid fluid spray in the vicinity of the APU inlet and exhaust.

After de-icing is completed, the airplane should be checked by trained and qualified ground personnel or the flight crew to ensure the proper results. Operate the flight controls, trim tabs, and flaps (where practical) through full travel. If precipitation continues, the de-icing fluid already on the airplane could be diluted, or if takeoff is delayed, consider the possibility of subsequent refreezing on the airplane surfaces which could require additional de-icing. The requirement for further de-icing (holdover time) depends upon the type and concentration of de-icing fluid used, rate and type of precipitation, outside air temperature, temperature of the fuel and airplane surface exposed to the elements and airplane exhaust. Because of the influence of these many variables, it is difficult to accurately determine the time of effectiveness of a de-icing or anti-icing treatment. Be knowledgeable of these variables and their general effects on holdover time. Assure that de-icing or anti-icing treatment is performed at the last possible time prior to taxi to the takeoff position.

If any doubt exists as to the condition of critical surface areas, they should be checked again by the flight crew or trained and qualified personnel prior to taxi or takeoff. Even a small amount of surface roughness caused by ice or snow adhering to the wing surface can greatly increase the stall speed. This can only be detected by a close check.

Refer to the appropriate FAA approved Airplane Flight Manual (AFM) for operational limitations including minimum takeoff, enroute and landing temperatures.

ENGINE START

When parked on a slippery area, make sure that chocks are applied both in front and behind the nose and main wheels prior to starting the engines. Chocks may not hold on slippery areas unless they are sanded. If chocks are not available for start, use sand or similar material and clear the airplane for potential movement.

Cold components such as gyros, gauges, actuators, etc., may function slower than normal until reaching operating temperatures. Instrument flags may take longer than normal to retract.

Before starting engines, ensure engine cowl inlet and exhaust areas are clear of any excess de-icing fluid and/or ice accumulations. Use of de-icing solutions for removal of engine inlet ice should be kept to the minimum required.

Apply normal procedures for engine start. Preheating is normally not necessary; however, if engine will not start, or a hung start is experienced, ground heating may be necessary to warm the engine components.

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FLIGHT CREW OPERATING MANUAL

COLD WEATHER PROCEDURES (Continued)

Ensure N_1 rotation prior to moving fuel control lever to on. A cold engine may exhibit abnormal oil pressure and temperature indications during start. Observe appropriate engine limitations in accordance with the FCOM Operating Procedures section and do not increase thrust above idle until all engine parameters are in the normal range. The illumination of the L (or R) OIL STRAINER CLOGGING (or CLOG) annunciator light may occur during a cold engine start. Refer to the FCOM Volume I Abnormal Procedures section for appropriate action.

After engine start, engine anti-ice should be turned on if outside air temperature is less than 6°C (42°F) and visible moisture is present or dewpoint and outside air temperature (RAT or SAT) are within 3°C (5°F) of each other. When icing conditions exist in the immediate vicinity of the departure airport, airfoil anti-ice may also be turned on at this time.

When using airfoil anti-ice for takeoff, refer to ENGINE AND AIRFRAME ICE PROTECTION TAKEOFF WEIGHT CORRECTIONS table, appropriate TAKEOFF DECISION SPEED chart table, and appropriate SECOND SEGMENT CLIMB GRADIENTS chart in the TAKEOFF section of the FCOM Performance volume.

TAXI

Reverse taxi (powerback) is not authorized when ice, snow, or slush is on the ramp, or during periods of heavy rain. Single engine taxi is not recommended on ice, snow, or slush-covered surfaces. When on slippery surfaces, make sure the parking brakes are released prior to commencing taxi. When power is applied, the airplane may slide forward even though the brakes are set.

Exercise caution when commencing taxi as ramp areas may be especially slippery due to airplane servicing, de-icing, etc. Avoid high thrust settings when taxiing, especially when leaving the ramp area. If airplane response to throttle movement is slow while on snow or slush, allow a few seconds for the airplane to respond before applying more throttle. Advance power only as necessary to start the airplane moving, then retard the throttles smoothly to idle or to the minimum thrust necessary to maintain appropriate taxi speed.

Extend flaps/slats to the takeoff setting when commencing taxi as in normal established procedures. Spray and debris deflectors combined with prudent taxi speeds on contaminated taxi areas provide sufficient protection from contamination of exposed flap/slat surface areas.

Taxi speed should be as slow as practical on slippery surfaces and should be especially slow when approaching turns or stopping areas. Lead turns by as much as possible considering taxiway width. Nosewheel steering and braking action may both be affected by lack of traction on slick and frozen surfaces; the slower the speed, the better the traction. Avoid excessive nose gear steering deflection. Surface conditions may vary between taxiways and parking areas due to sanding and de-icing. Expect taxiways on bridges or other elevated areas to be more susceptible to ice formation than adjacent areas. An icy surface may be covered by a layer of snow. Melting ice or snow may cause rapid changes in traction. It is essential that the taxi speed be kept low enough that the airplane can be stopped in the space available. Reverse thrust may be used if necessary to assist in stopping.

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FLIGHT CREW OPERATING MANUAL

COLD WEATHER PROCEDURES (Continued)

Taxi slowly on contaminated taxiways to prevent snow and slush from impinging on wheel wells, flaps, and engines. Do not taxi through areas of deep snow or deep slush. A crowned, slippery taxiway or a slick crosswind taxiway may cause sideways slipping or weathervaning into the wind. Taxi as close as possible on the centerline and avoid large nose steering inputs. Be aware of snowbanks as extended flaps are particularly susceptible to damage from such hazards. Be alert for obscured runway, taxiway, or ramp markings and lights.

When de-icing spraying is required and airplane is cleared to the de-icing facility,

APU AIR and MASTER Switches OFF

Just prior to reaching spray area,

AIR CONDITIONING SUPPLY Switches OFF

FLAP/SLAT Handle UP/RET

NOTE

Preferred configuration is flaps up, slats retracted, unless specific problems are present such as snow or slush in the flaps or slats area, which may require additional spraying.

Parking Brakes AS REQUIRED

Ground Crew Communications ESTABLISH

WARNING

Once the deicing operation begins, any airplane movement or changes in configuration must be coordinated with the ground crew.

CAUTION

During spraying operations, ensure ground crew does not spray into engines, ram air inlet, outflow valve opening, and onto brakes.

When clear of de-icing facility.

AIR CONDITIONING SUPPLY Switches AUTO

Flaps/Slats CYCLE FULL DOWN/SET FOR TAKEOFF

Flight Controls CHECK

Complete normal checklists as required.

In the event of extended ground idle operations during taxi or a delay in takeoff in severe icing conditions, conduct periodic engine run-ups with the engine anti-icing system on, to as high a thrust setting as practical (70 percent N_1 for a minimum of 15 seconds is desired) to minimize the possibility of ice buildup. Such run-ups need not be made more frequently than at 10 minute intervals. Be aware that blasted snow or ice can cause damage at considerable distances. Maintain increased separation behind other airplanes. Expect they may also require an engine run-up to counteract ice formation.

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FLIGHT CREW OPERATING MANUAL

COLD WEATHER PROCEDURES (Continued)

Fuel heat should be used during ground operations when the indicated fuel temperature is 0°C or below. When required, fuel heat should be employed for one cycle (1 minute duration). Both fuel heat switches and the L and R FUEL HEAT ON lights must be off for takeoff.

Prior to takeoff, recheck flight controls and trim for freedom of movement. Use caution when taxiing onto the runway for takeoff. The approach end of the runway may be more slippery than other areas due to melting and refreezing of snow or ice following previous takeoffs. In addition, painted surfaces and normal accumulation of fuel, oil, and rubber are made more slippery when coated with moisture (i.e., water or slush).

TAKEOFF

Check latest field conditions prior to takeoff. Slush and snow conditions change rapidly. A reduced thrust takeoff is not permitted when the runway is wet or contaminated by water, ice, slush or snow. Maximum depth of wet snow/slush/water is 1/2 inch (12.7 mm) and maximum depth of dry snow is 4 inches (10 cm). Refer to the CONTAMINATED RUNWAY TAKEOFF WEIGHT CORRECTIONS table in the TAKEOFF section of the FCOM Performance volume.

Dry snow is snow with limited water content. It normally forms a cloud when disturbed and dissipates rapidly. The outside temperature is generally below -2°C (28°F). Dry snow can become wet if exposed to bright sunlight.

Wet snow has sufficient moisture content so that it packs easily and will compact when pushed. It packs down when compressed but has no tendency to splash. If there is a tendency to splash, it must be considered slush. Wet snow quickly becomes slush under certain conditions. If in doubt, consider it as slush.

Slush is partially melted snow with high water content. It will splash when a vehicle is run through it or otherwise compressed.

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FLIGHT CREW OPERATING MANUAL

COLD WEATHER PROCEDURES (Continued)

The operator should establish minimum values for takeoff based on runway conditions, including existing weather and winds.

If the takeoff is being made on a contaminated runway, the ignition should be in OVRD and the APU kept running with the L and R APU bus switches on.

For contaminated runways, consider the use of higher takeoff flap settings as permitted by takeoff performance considerations to reduce takeoff roll.

Align the airplane with the runway centerline and ensure that the nosewheel is straight before applying power for takeoff. Under severe icing conditions, takeoff should be preceded by a static run-up to as high a thrust level as practical with observation of EPR and EGT to assure normal engine operation. On slippery surfaces, ensure the parking brakes are released prior to setting takeoff power to preclude a takeoff with the parking brakes set.

With a contaminated runway, a static takeoff should be performed. Advance throttles to 1.4 EPR or 80% N₂ and check that EPR's are approximately matched. If the airplane starts to move due to poor braking conditions, release the brakes and proceed with a rolling takeoff. Check all engine instruments for proper indications during the early part of this step, including the MINIMUM N₁ FOR TAKEOFF EPR ERROR CHECK as contained in the TAKEOFF section of the FCOM Performance volume.

Asymmetrical thrust can adversely affect directional control on slippery runways. Throttle alignment at partial power may not assure alignment at takeoff power as engine pairs may have different spool-up rates.

On slippery runways, apply some nose down elevator to improve nosewheel traction and directional control until rudder control becomes effective for steering the airplane. Excessive forward control column pressure should be avoided and, as speed increases, the forward pressure on the control column should be reduced to lessen the possibility of nosewheel spray being ingested into the engines when operating on wet, or slush and snow-covered runways.

To maintain the heading during takeoff roll, recognize initial heading deflections early and correct by small rudder pedal steering pedal steering inputs. Do not use differential thrust.

With the increased stopping distances encountered under contaminated runway conditions, consideration should be given to limiting the decision to abort at speeds between V₁ -20 and V₁ to engine failure, or conditions where the airplane is considered unflyable.

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FLIGHT CREW OPERATING MANUAL

COLD WEATHER PROCEDURES (Continued)

Difficulty with directional control may be encountered after a takeoff rejection, especially under crosswind conditions. When rejecting, ensure spoiler deployment, apply moderate forward pressure on the control column and maintain directional control with rudder pedal steering, simultaneously applying maximum braking. Both nose wheel steering and differential braking effectiveness are reduced during wet/slippery runway operation. Do not apply excessive forward control column pressure as this will reduce the weight on the main wheels resulting in reduced braking friction. While the use of reverse thrust on wet runways is recommended to reduce the stopping distance, its prolonged use further reduces the total directional control capability (rudder blanking) as the airplane slows. Consequently, reverse thrust should be applied gradually and symmetrically (both engines operating) commensurate with the ability to maintain directional control under the existing conditions. Should directional control become a problem while in reverse thrust, reduce reverse thrust to reverse idle (or forward idle thrust, if required), regain directional control and reapply reverse thrust as necessary. Do not attempt to maintain directional control by using asymmetric reverse thrust.

After takeoff in slush or wet snow and when clear of obstacles, extending and retracting landing gear may reduce ice accumulation and possibility of gear door freeze-up.

If pitch-up or roll-off is encountered after lift-off, use aileron, rudder, and elevator as required to maintain the desired flight path. Do not allow further increases in pitch attitude until full lateral control has been regained. Use smooth continuous control inputs to avoid over-controlling. If during flap or slat retraction, pitch-up, roll-off or buffeting is encountered (due to undetected ice, frost, or snow accumulations), reselect the flaps/slats to the original configuration. Activate the airfoil ice protection prior to any further configuration changes.

INFLIGHT

The flight crew and operational personnel must be aware at all times of the adverse and rapidly changing nature of winter weather and be alert for potential requirements for flight plan changes and possible diversions. Icing, strong winds, turbulence, and windshear are common occurrences in the wintertime.

Engine and airfoil anti-ice should be on whenever icing conditions exist or are expected. Engine anti-ice should be used, and airfoil icing conditions can exist, when the RAM air temperature is less than 6°C (42°F) and there is visible moisture in the air. In addition to temperatures below 6°C (42°F), be alert for ice build-up on windshield wipers or edges of the windshields as indications of airfoil icing conditions.

The higher the temperature, the higher the cloud liquid water content. This will result in more severe icing conditions. At temperatures below -20°C (-4°F), icing conditions should be less severe. However, heavy icing has, on occasion, been reported at temperatures as low as -60°C (-76°F).

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FLIGHT CREW OPERATING MANUAL

COLD WEATHER PROCEDURES (Continued)

One of the first indications of engine ice formation can be an erratic EPR indication due to icing of the PT2 probe. Ice formation can produce a thrust loss as indicated by a drop of all engine thrust parameters, or induce surging or flameout if allowed to become sufficiently severe. If icing conditions become severe, consideration should be given to altering the flight plan to avoid the area of icing conditions. The flight crew should be familiar with the SEVERE RAIN/ICE/TURBULENCE procedures in the ICE AND RAIN PROTECTION section in the FCOM.

When encountering engine inlet icing conditions and before engine anti-icing system is turned on, turn engine ignition on (CONTIN, GRD START & CONTIN or SYS A/SYS B). Move engine anti-ice switches to ON one at a time. Wait until the engine is stabilized before turning on the opposite engine anti-ice. Following engine stabilization, if in light or minimal icing conditions, engine ignition (A/B system) may be turned off to conserve ignition operational time.

When engine anti-ice is no longer required, ensure engine ignition is on, then move engine anti-ice switches to OFF one at a time, allowing each engine to stabilize. Move engine ignition to OFF. Engine thrust will increase when engine anti-ice switches are moved to OFF. It may be necessary to adjust throttles to avoid exceeding engine limits or to maintain desired thrust setting.

When airfoil anti-ice is required, airfoil anti-ice switches should be turned on subsequent to the application of engine anti-ice and, when no longer required, should be selected off prior to the termination of engine anti-icing to maintain normal bleed configuration input to the thrust rating indicator. In addition to the requirement to operate the tail de-ice system each 20 minutes (15 minute cycle for automatic tail de-ice) during icing conditions, tail de-ice cycle should be selected on again (nonautomatic system) prior to terminating airfoil anti-icing, when icing conditions no longer exist.

When extended periods of using the engine and airfoil anti-ice systems are anticipated or encountered, consideration should be given to the increased fuel burned criteria as indicated on the CRUISE CONTROL TABLE in the CRUISE section of the FCOM Performance volume.

When icing is anticipated during descent, commence use of the engine and airfoil anti-ice systems well before reaching the expected icing level. If the engines are at low power, it may be necessary to increase power to a minimum of 1.2 EPR to maintain a minimum of 20 psi pneumatic pressure for the ice protection systems. Increased drag, such as use of speedbrakes, may be necessary to maintain an adequate rate of descent. Vertical speeds should be kept as high as practical to reduce the exposure and ice accretion time. For approach maneuvering, 11 degrees flaps may be used as an intermediate flap setting as slats extended to the mid-position will be less subject to ice accumulation.

Holding is normally flown in the minimum fuel consumption cruise configuration with slats and flaps retracted. Engine bleed air adequate to maintain anti-icing may require a higher drag configuration, much the same as descent, consequently causing a higher fuel consumption. When forced to hold in icing conditions, there is a concern for ice buildup on the underside of the flaps and the flap/slat extension mechanisms. If necessary, the landing gear may be extended to increase drag as the effects of ice accumulation on the landing gear would be less than on the flaps, slats and speedbrakes.

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FLIGHT CREW OPERATING MANUAL

COLD WEATHER PROCEDURES (Continued)

If airfoil anti-ice is required for approach, tail de-ice should be initiated approximately 1 minute prior to extension of landing flaps, normally just prior to landing gear extension. Fuel heat should be turned on for 1 minute prior to final approach whenever the fuel temperature is 0°C (32°F) or below. Fuel heat switches should be off for final approach and go-around. If a landing is to be made on a runway contaminated with slush, standing water, or during heavy rain, the APU should be started and the left and right APU bus switches on prior to final approach. This will serve as a backup electrical power source in case the engine driven generators are lost due to slush or water ingestion by the engines and subsequent loss of engine RPM.

LANDING

The flight crew must be aware of the condition of the runway with respect to snow, ice, slush, or precipitation. The most favorable runway in relation to surface condition, wind, and weather should be used. A landing on, or dispatch to, a runway with a braking action of poor is undesirable and should not be planned unless other factors make this imperative. In very general terms, landing on a wet runway increases the stopping distance approximately 1000 feet over a dry runway, and landing on an icy runway increases the stopping distance by more than 3000 feet. The appropriate landing distance should be obtained from the applicable charts and tables in the FCOM Performance volume, to include the ESTIMATED EFFECT OF RUNWAY SURFACE CONDITIONS AND REVERSE THRUST ON LANDING DISTANCE and the ESTIMATED ICE COVERED RUNWAY LANDING DISTANCE tables. Use maximum landing flap configuration when landing on a contaminated runway. As winter weather is often characterized by strong winds and crosswinds, the guidelines for V_{REF} additives outlined in the APPROACH AND LANDING section of the FCOM Performance volume should be observed.

If a landing is planned on a runway contaminated with snow, slush, standing water, or during heavy rain, the following factors must be considered: available runway length; visibility of runway markers and lights; snowbanks and drifts along the runway; wind direction and velocity; crosswind effect on directional control; braking action; possibility of effect on the airplane from slush and water spray (engine ingestion, damage to flaps, gear doors, etc.); and the probability of hydroplaning and its effect on stopping distances.

A common form of hydroplaning is dynamic hydroplaning. It occurs when there is standing water on the runway surface. Water with a depth of about one-tenth of an inch acts to lift the tire off the runway surface. This condition can progress to where the tires no longer contribute to directional control and braking action is nil.

The minimum dynamic hydroplaning speed of a tire has been determined to be 8.6 times the square root of the tire pressure in pounds per square inch. With a main wheel tire pressure of 180 psi, the calculated hydroplaning speed is approximately 115 knots. With a nosewheel tire pressure of 155 psi, the calculated hydroplaning speed of the nosewheel tire is approximately 107 knots. Nosewheel tire hydroplaning might be encountered while executing a high speed turnoff. The calculated hydroplaning speed referred to is for the start of dynamic hydroplaning. Once hydroplaning has started, it may persist to a significantly slower speed.

Braking action can become inhibited following the application of chemical de-icers on an icy runway. When first applied, the chemicals provide a watery film over snow and ice that results in an extremely low coefficient of friction. When in doubt about the type of runway de-icing, ask the tower specifically if chemical de-icers were used.

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FLIGHT CREW OPERATING MANUAL

COLD WEATHER PROCEDURES (Continued)

Blowing or drifting snow can create optical illusions or depth perception problems during landing or taxi-in. In crosswind conditions, they may create a false impression of airplane movement over the ground. It is possible to have an impression of no drift when in fact a considerable drift may exist. When landing under these conditions, runway markers or runway lights can help supply the necessary visual references.

When it has been established that a safe landing can be made, the airplane must be flown with the objective of minimizing the landing distance. The approach must be stabilized early. Precise control over drift and approach speeds is mandatory. Execute a missed approach if zero-drift condition cannot be established prior to touchdown. When making the transition to visual reference for landing, continue to utilize the glideslope and VASI information to control the glidepath as wet windshields and snow-covered surfaces may distort depth perception. The airplane should be flown firmly onto the runway at the aiming point. Avoid holding off. Be prepared to manually deploy the spoilers if automatic deployment does not occur as wheel spin up may be delayed.

On touchdown, take positive action to lower the nose gear to the runway and maintain moderate forward pressure on the control column to assist in directional control. Avoid excessive forward control column pressure in order to retain maximum braking effectiveness and to reduce the possibility of nose wheel spray. Maintain centerline tracking, ensure spoiler deployment, and simultaneously apply brakes smoothly and symmetrically, as appropriate to the braking action and runway length available to ensure a safe stop. On contaminated surfaces, full braking should be used to realize optimum anti-skid operation. Autobrakes, if available, should be used in the maximum setting. The normal braking technique on slippery runways is that immediately after nose gear touchdown, apply brake pressure smoothly and symmetrically with maximum pedal pressure and hold until a safe stop is assured.

Apply reverse thrust to the idle reverse detent. After reverse thrust is verified, gradually increase reverse thrust as required. If necessary, reverse thrust should be applied smoothly and symmetrically to maximum allowable as soon as possible since the reverse thrust effectiveness is greatest at higher speeds. If difficulty in maintaining directional control is experienced during reverse thrust operation, reduce thrust as required. Do not attempt to maintain directional control by using asymmetric reverse thrust as this will further aggravate the effects of weathervaning. Under emergency conditions, maximum reverse thrust may be used to a complete stop. The use of reverse thrust may cause a visibility problem from blowing snow forward as ground speed decreases and can melt dry snow which can impinge and freeze on cold surfaces. Take action as appropriate the braking effectiveness and runway length available. Avoid rapid return to forward thrust when engine RPM is high. The resultant forward thrust may be high enough to cause the airplane to accelerate.

Maintain directional control primarily with rudder pedals. Use differential braking as needed. Be alert for drift toward downwind side of the runway. The rudder required in strong crosswinds may cause the nose gear to turn to an angle which could induce skidding. Therefore, it may be necessary to hold the nose gear steering wheel centered while controlling steering with rudder and brakes to maintain tracking.

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FLIGHT CREW OPERATING MANUAL

COLD WEATHER PROCEDURES (Continued)

If a skid develops, especially in crosswind conditions, reverse thrust will increase the sideward movement of the airplane. In this case, release brake pressure and reduce reverse thrust to reverse idle, and if necessary, forward idle. Apply rudder as necessary to realign the airplane with the runway and reapply braking and reversing to complete the landing roll. Use as much runway as necessary to slow the airplane. Do not attempt to turn off a slippery runway until speed is reduced sufficiently to turn without skidding. Consider that braking effectiveness in the last 2,000 feet of the runway may be further reduced by painted surfaces and accumulation of fuel, oil, and rubber.

TAXI-IN

If the approach was made in icing conditions or if the runway was covered by slush or snow, retract the flaps and slats to 15/T.O. EXT. Damage to the flaps and slats could occur if residual ice is present and the flaps and slats are fully retracted. Slush in puddles or runway low spots may be deeper than the maximum allowed for operation and cause damage to flaps or other parts. A check after parking should be made for any damage or the necessity to de-ice the flaps and slats area. After a satisfactory check, flaps and slats should be moved to UP/RET.

Apply the same precautions for taxi-in as for taxi-out. Maintaining a safe taxi speed during taxi after landing may be even more difficult. As the airplane will have a lower gross weight, it will have a tendency to taxi faster with the same thrust. If icing conditions exist during taxi-in, engine anti-ice should be left on until parked at gate and ready for engine shutdown. If extended taxi-in delays are encountered, apply the same engine anti-ice run-up procedures as for taxi-out.

Use caution when entering ramp areas. Be alert for obscured taxi and parking lines and surface conditions that may not be conducive to good steering and stopping. Other airplanes may not be parked in proper positions and may not afford sufficient clearance due to contaminated parking areas. If in doubt, request assistance for proper parking and clearance from other airplanes and obstacles.

PARKING

The area in which an airplane is to be parked should be cleared of snow and slush. If this is impractical, the area around the main and nose gear wheels should be cleared to reduce the possibility of tires freezing to the ground.

Avoid a parking position during or immediately after completion of a turn. It is best to allow nose wheels to be centered and the airplane to roll forward a few feet to eliminate all side loads on main and nose gear struts.

Both main and nose gear should be properly chocked. Parking brakes should be released to eliminate possibility of brakes freezing. If concerned about chocks holding on an icy ramp, parking brakes may be left on.

If parking for an extended period and extreme cold temperatures are expected, consider parking on sand or similar material to prevent freeze down.

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FLIGHT CREW OPERATING MANUAL

COLD WEATHER PROCEDURES (Continued)

In blowing snow, engine covers may be required, depending on length of stop. After engine shutdown, check engines air inlets for presence of water and/or ice. Remove any accumulations before installing engine inlet plugs and covers. If remaining overnight, ensure all cabin doors, cargo compartment doors, access doors, sliding windows and outflow valves are closed. If the airplane is to remain inactive and the temperature is expected to go below freezing, drain all water and water waste systems and service the airplane in accordance with the MD-80 Maintenance Manual.

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FLIGHT CREW OPERATING MANUAL

FOD PREVENTION PROCEDURES

General

These procedures should be used during all ground operations in order to minimize foreign object ingestion into engine.

During all pre/post flight activity be aware of FOD in vicinity of airplane. Either pick it up or report it.

Ensure engine covers are installed during catering operations and overnight stays.

Be aware of NOTAMS that advise of potential FOD existing at various airports.

Taxi

- Recommended maximum taxi speed is 20 knots.

Select flaps to takeoff position when clear of ground equipment.

Landing Roll

Limit ground reverse thrust to 1.6 EPR dry (1.3 EPR wet) (maximum continuous thrust may be used in an emergency).

At 80 knots or higher, begin reducing thrust to achieve idle reverse by 60 knots.

Below 60 knots, do not use more than reverse idle.

After landing and taxi in,

Move flap/slat handle to 15° T.O. EXT.

Recommended maximum taxi speed is 20 knots.

[END]