Do–L410–1214.2

AIRPLANE FLIGHT MANUAL

FOR THE

L 410 UVP - E20

BOOK 1 (SECTIONS 0 to 5)

THE AIRPLANE MEETS FOLLOWS AIRWORTHINESS REQUIREMENTS:

FAR 23, Amendment 34

Serial Number	**912533**
Registration Number	**D - CLED**
Type Certificate Number	**90 - 03**

This Airplane Flight Manual must be carried in the airplane at all times of airplane operation.
The airplane's crew must be acquainted with content of this Airplane Flight Manual.
This Airplane Flight Manual contains all information necessary for safe operation of the airplane. This manual is only valid with all approved Revisions included.

This Airplane Flight Manual is approved by the Civil Aviation Inspectorate of the Czech Republic.

Approved b

Date: 98-05-13

ÚŘAD PRO CIVILNÍ LETECTVÍ

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LET, a.s.
686 04 Kunovice
Czech Republic

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BOOK 2 (SECTIONS 0, 6 to 9)

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LIST OF EFFECTIVE PAGES

SECTION	PAGE	DATE
BOOK 1 & 2		
Title page		
Section 0		
	0–1	May 30/01
	0–2	May 30/01
	0–3	May 30/01
	0–4	May 1/96
	0–5	May 30/01
	0–6	Mar 1/96
	0–7	Mar 1/96
	0–8	Mar 1/96
	0–9	Mar 1/96
	0–10	Mar 1/96
BOOK 1		
General – I		
	1–i	Mar 1/96
	1–ii	Mar 1/96
	1–1	May 1/98
	1–2	May 30/01
	1–3	Mar 1/96
	1–4	Mar 1/96
	1–5	Mar 1/96
	1–6	Mar 1/96
	1–7	Apr 1/98
	1–8	Mar 1/96
	1–9	Mar 1/96
	1–10	Mar 1/96
	1–11	Mar 1/96
	1–12	Mar 1/96
	1–13	Apr 1/98
	1–14	Mar 1/96
	1–15	Mar 1/96
	1–16	Apr 1/98
	1–17	Apr 1/98
	1–18	Mar 1/96
	1–19	Mar 1/96
	1–20	Mar 1/96
	1–21	Mar 1/96
	1–22	Mar 1/96
	1–23	Mar 1/96
	1–24	Mar 1/96

SECTION	PAGE	DATE
Limitations – II		
CAI Approved	2–i	Apr 1/98
CAI Approved	2–ii	Apr 1/98
CAI Approved	2–1	May 1/98
CAI Approved	2–2	May 1/96
CAI Approved	2–3	Mar 1/96
CAI Approved	2–4	Mar 1/96
CAI Approved	2–5	Mar 1/96
CAI Approved	2–6	Mar 1/96
CAA Approved	2–7	May 30/01
CAI Approved	2–8	Mar 1/96
CAI Approved	2–9	Apr 1/98
CAI Approved	2–10	Mar 1/96
CAI Approved	2–11	Mar 1/96
CAI Approved	2–12	Mar 1/96
CAI Approved	2–13	Mar 1/96
CAI Approved	2–14	Apr 1/98
CAI Approved	2–15	Apr 1/98
CAI Approved	2–16	Mar 1/96
CAI Approved	2–17	Mar 1/96
CAI Approved	2–18	Mar 1/96
CAI Approved	2–19	May 1/98
CAI Approved	2–20	Apr 1/98
CAI Approved	2–21	Apr 1/98
CAI Approved	2–22	Apr 1/98
CAI Approved	2–23	May 1/98
CAI Approved	2–24	Apr 1/98
CAI Approved	2–25	Apr 1/98
CAI Approved	2–26	Mar 1/96
CAI Approved	2–27	Mar 1/96
CAI Approved	2–28	Mar 1/96
CAI Approved	2–29	May 1/98
CAI Approved	2–30	Mar 1/96
Emergency Procedures – III		
CAI Approved	3–i	Mar 1/96
CAI Approved	3–ii	Mar 1/96
CAI Approved	3–1	Apr 1/98
CAI Approved	3–2	Apr 1/98
CAI Approved	3–3	Apr 1/98
CAI Approved	3–4	Apr 1/98
CAI Approved	3–5	Mar 1/96

LIST OF EFFECTIVE PAGES

SECTION	PAGE	DATE
Emergency Procedures – III		
CAI Approved	3–6	Mar 1/96
CAI Approved	3–7	Mar 1/96
CAI Approved	3–8	Mar 1/96
CAI Approved	3–9	Apr 1/98
CAI Approved	3–10	Apr 1/98
CAI Approved	3–11	Apr 1/98
CAI Approved	3–12	Apr 1/98
CAI Approved	3–13	Apr 1/98
CAI Approved	3–14	Apr 1/98
CAI Approved	3–15	Mar 1/96
CAI Approved	3–16	Apr 1/98
CAI Approved	3–17	Apr 1/98
CAI Approved	3–18	Apr 1/98
CAI Approved	3–19	Apr 1/98
CAI Approved	3–20	Apr 1/98
Abnormal Procedures – IIIA		
CAA Approved	3A–i	May 30/01
CAI Approved	3A–ii	Apr 1/98
CAI Approved	3A–1	Apr 1/98
CAI Approved	3A–2	Apr 1/98
CAI Approved	3A–3	Mar 1/96
CAI Approved	3A–4	Apr 1/98
CAI Approved	3A–5	Apr 1/98
CAI Approved	3A–6	Apr 1/98
CAI Approved	3A–7	Apr 1/98
CAI Approved	3A–8	Mar 1/96
CAA Approved	3A–9	May 30/01
CAA Approved	3A–10	May 30/01
CAA Approved	3A–11	May 30/01
CAI Approved	3A–12	Apr 1/98
CAI Approved	3A–13	Apr 1/98
CAI Approved	3A–14	Apr 1/98
CAI Approved	3A–15	Apr 1/98
CAI Approved	3A–16	Mar 1/96
CAI Approved	3A–17	Apr 1/98
CAI Approved	3A–18	Apr 1/98
CAI Approved	3A–19	Apr 1/98
CAI Approved	3A–20	Apr 1/98

SECTION	PAGE	DATE
CAI Approved	3A–21	Apr 1/98
CAI Approved	3A–22	Mar 1/96
CAI Approved	3A–23	Apr 1/98
CAI Approved	3A–24	Apr 1/98
CAI Approved	3A–25	Apr 1/98
CAI Approved	3A–26	Apr 1/98
Normal Procedures – IV		
CAI Approved	4–i	Apr 1/98
CAI Approved	4–ii	Apr 1/98
CAI Approved	4–1	Apr 1/98
CAI Approved	4–2	Apr 1/98
CAI Approved	4–3	Apr 1/98
CAI Approved	4–4	Mar 1/96
CAI Approved	4–5	Apr 1/98
CAI Approved	4–6	Apr 1/98
CAI Approved	4–7	Apr 1/98
CAI Approved	4–8	Apr 1/98
CAI Approved	4–9	Apr 1/98
CAI Approved	4–10	Apr 1/98
CAI Approved	4–11	Apr 1/98
CAI Approved	4–12	Apr 1/98
CAI Approved	4–13	Apr 1/98
CAI Approved	4–14	Apr 1/98
CAI Approved	4–15	Apr 1/98
CAI Approved	4–16	Apr 1/98
CAI Approved	4–17	Apr 1/98
CAI Approved	4–18	Apr 1/98
CAI Approved	4–19	Apr 1/98
CAI Approved	4–20	Apr 1/98
CAI Approved	4–21	Apr 1/98
CAI Approved	4–22	Apr 1/98
CAI Approved	4–23	Apr 1/98
CAI Approved	4–24	Apr 1/98
CAI Approved	4–25	Apr 1/98
CAI Approved	4–26	Mar 1/96
CAI Approved	4–27	Apr 1/98
CAI Approved	4–28	Apr 1/98
CAI Approved	4–29	Apr 1/98
CAI Approved	4–30	Apr 1/98
CAI Approved	4–31	Apr 1/98
CAI Approved	4–32	Apr 1/98

LIST OF EFFECTIVE PAGES

SECTION	PAGE	DATE
Normal Procedures – IV		
CAI Approved	4–33	Apr 1/98
CAI Approved	4–34	Mar 1/96
CAI Approved	4–35	Apr 1/98
CAI Approved	4–36	Apr 1/98
CAA Approved	4–37	May 30/01
CAI Approved	4–38	Apr 1/98
CAI Approved	4–39	Apr 1/98
CAI Approved	4–40	Apr 1/98
CAI Approved	4–41	Apr 1/98
CAI Approved	4–42	Apr 1/98
CAI Approved	4–43	Apr 1/98
CAI Approved	4–44	May 1/98
CAI Approved	4–45	Apr 1/98
CAI Approved	4–46	Apr 1/98
CAI Approved	4–47	Apr 1/98
CAI Approved	4–48	Apr 1/98
Performance – V		
CAI Approved	5–i	Mar 1/96
CAI Approved	5–ii	Mar 1/96
CAI Approved	5–1	Apr 1/98
CAI Approved	5–2	Mar 1/96
CAI Approved	5–3	Mar 1/96
CAI Approved	5–4	May 1/96
CAI Approved	5–5	May 1/96
CAI Approved	5–6	Mar 1/96
CAI Approved	5–7	Mar 1/96
CAI Approved	5–8	Mar 1/96
CAI Approved	5–9	Mar 1/96
CAI Approved	5–10	Mar 1/96
CAI Approved	5–11	Apr 1/98
CAI Approved	5–12	Mar 1/96
CAI Approved	5–13	May 1/96
CAI Approved	5–14	Mar 1/96
CAI Approved	5–15	Mar 1/96
CAI Approved	5–16	May 1/96
CAI Approved	5–17	Mar 1/96

SECTION	PAGE	DATE
CAI Approved	5–18	Mar 1/96
CAI Approved	5–19	Mar 1/96
CAI Approved	5–20	Mar 1/96
CAI Approved	5–21	May 1/96
CAI Approved	5–22	Mar 1/96
CAI Approved	5–23	Mar 1/96
CAI Approved	5–24	Mar 1/96
CAI Approved	5–25	May 1/96
CAI Approved	5–26	Mar 1/96
CAI Approved	5–27	Mar 1/96
CAI Approved	5–28	Mar 1/96
CAI Approved	5–29	May 1/96
CAI Approved	5–30	Mar 1/96
CAI Approved	5–31	Mar 1/96
CAI Approved	5–32	May 1/96
CAI Approved	5–33	Mar 1/96
CAI Approved	5–34	Mar 1/96
CAI Approved	5–35	Mar 1/96
CAI Approved	5–36	Mar 1/96
CAI Approved	5–37	Mar 1/96
CAI Approved	5–38	Mar 1/96
CAI Approved	5–39	May 1/96
CAI Approved	5–40	May 1/96
CAI Approved	5–41	Mar 1/96
CAI Approved	5–42	Mar 1/96
CAI Approved	5–43	May 1/96
CAI Approved	5–44	May 1/96
CAI Approved	5–45	May 1/96
CAI Approved	5–46	May 1/96
CAI Approved	5–47	Mar 1/96
CAI Approved	5–48	Mar 1/96
CAI Approved	5–49	May 1/96
CAI Approved	5–50	May 1/96
CAI Approved	5–51	May 1/96
CAI Approved	5–52	May 1/96
CAI Approved	5–53	May 1/96
CAI Approved	5–54	Apr 1/98
CAI Approved	5–55	May 1/96
CAI Approved	5–56	May 1/96
CAI Approved	5–57	May 1/96
CAI Approved	5–58	Mar 1/96

LIST OF EFFECTIVE PAGES

SECTION	PAGE	DATE
Performance – V		
CAI Approved	5–59	Mar 1/96
CAI Approved	5–60	May 1/96
CAI Approved	5–61	Mar 1/96
CAI Approved	5–62	Mar 1/96
CAI Approved	5–63	May 1/96
CAI Approved	5–64	Mar 1/96
CAI Approved	5–65	Mar 1/96
CAI Approved	5–66	Mar 1/96
CAI Approved	5–67	May 1/96
CAI Approved	5–68	Mar 1/96
CAI Approved	5–69	Mar 1/96
CAI Approved	5–70	Mar 1/96
CAI Approved	5–71	May 1/96
CAI Approved	5–72	Mar 1/96
CAI Approved	5–73	May 1/96
CAI Approved	5–74	May 1/96
CAI Approved	5–75	Mar 1/96
CAI Approved	5–76	May 1/96
CAI Approved	5–77	Mar 1/96
CAI Approved	5–78	Mar 1/96
CAI Approved	5–79	Mar 1/96
CAI Approved	5–80	Mar 1/96
CAI Approved	5–81	May 1/96
CAI Approved	5–82	May 1/96
CAI Approved	5–83	Mar 1/96
CAI Approved	5–84	Mar 1/96
CAI Approved	5–85	May 1/96
CAI Approved	5–86	May 1/96
CAI Approved	5–87	May 1/96
CAI Approved	5–88	Mar 1/96
CAI Approved	5–89	May 1/96
CAI Approved	5–90	Mar 1/96
CAI Approved	5–91	May 1/96
CAI Approved	5–92	May 1/96
CAI Approved	5–93	May 1/96
CAI Approved	5–94	May 1/96
CAI Approved	5–95	Mar 1/96
CAI Approved	5–96	Mar 1/96
CAI Approved	5–97	Mar 1/96
CAI Approved	5–98	May 1/96

SECTION	PAGE	DATE
CAI Approved	5–99	May 1/96
CAI Approved	5–100	Mar 1/96
CAI Approved	5–101	May 1/96
CAI Approved	5–102	Mar 1/96
CAI Approved	5–103	May 1/96
CAI Approved	5–104	Mar 1/96
CAI Approved	5–105	May 1/96
CAI Approved	5–106	Mar 1/96
CAI Approved	5–107	Mar 1/96
CAI Approved	5–108	Mar 1/96
CAI Approved	5–109	Mar 1/96
CAI Approved	5–110	Mar 1/96
CAI Approved	5–111	May 1/96
CAI Approved	5–112	May 1/96
CAI Approved	5–113	Mar 1/96
CAI Approved	5–114	Mar 1/96
CAI Approved	5–115	Mar 1/96
CAI Approved	5–116	Mar 1/96
CAI Approved	5–117	Mar 1/96
CAI Approved	5–118	Mar 1/96
BOOK 2 Weight & Balance – VI		
	6–i	Mar 1/96
	6–ii	Mar 1/96
	6–1	May 1/96
	6–2	Mar 1/96
	6–3	May 1/96
	6–4	Mar 1/96
	6–5	Mar 1/96
	6–6	Mar 1/96
	6–7	Mar 1/96
	6–8	Mar 1/96
	6–9	Mar 1/96
	6–10	Mar 1/96
	6–11	Mar 1/96
	6–12	Mar 1/96
	6–13	Mar 1/96
	6–14	Mar 1/96
	6–15	Mar 1/96
	6–16	Mar 1/96

LIST OF EFFECTIVE PAGES

SECTION	PAGE	DATE
Weight & Balance – VI		
	6–17	Mar 1/96
	6–18	Mar 1/96
	6–19	Mar 1/96
	6–20	Mar 1/96
	6–21	Mar 1/96
	6–22	May 1/96
	6–23	May 1/96
	6–24	May 1/96
	6–25	Mar 1/96
	6–26	Mar 1/96
	6–27	Mar 1/96
	6–28	Mar 1/96
	6–29	Mar 1/96
	6–30	Mar 1/96
Systems of airplane – VII		
	7–i	Mar 1/96
	7–ii	Mar 1/96
	7–1	Mar 1/96
	7–2	Mar 1/96
	7–3	Mar 1/96
	7–4	Mar 1/96
	7–5	Apr 1/98
	7–6	Mar 1/96
	7–7	Mar 1/96
	7–8	Apr 1/98
	7–9	Mar 1/96
	7–10	Mar 1/96
	7–11	Apr 1/98
	7–12	Mar 1/96
	7–13	Mar 1/96
	7–14	Mar 1/96
	7–15	Mar 1/96
	7–16	Mar 1/96
	7–17	Mar 1/96
	7–18	Mar 1/96
	7–19	Mar 1/96
	7–20	Mar 1/96
	7–21	Mar 1/96
	7–22	Mar 1/96

SECTION	PAGE	DATE
	7–23	Mar 1/96
	7–24	Mar 1/96
	7–25	Mar 1/96
	7–26	Mar 1/96
	7–27	Mar 1/96
	7–28	Mar 1/96
	7–29	Apr 1/98
	7–30	Apr 1/98
	7–31	Apr 1/98
	7–32	Mar 1/96
	7–33	Mar 1/96
	7–34	Mar 1/96
	7–35	Mar 1/96
	7–36	Apr 1/98
	7–37	Mar 1/96
	7–38	Mar 1/96
	7–39	Mar 1/96
	7–40	Mar 1/96
	7–41	Mar 1/96
	7–42	Mar 1/96
	7–43	Mar 1/96
	7–44	Apr 1/98
	7–45	Apr 1/98
	7–46	Mar 1/96
	7–47	Mar 1/96
	7–48	Mar 1/96
	7–49	Mar 1/96
	7–50	Mar 1/96
	7–51	Mar 1/96
	7–52	Apr 1/98
	7–53	Mar 1/96
	7–54	Mar 1/96
	7–55	Mar 1/96
	7–56	Mar 1/96
	7–57	Apr 1/98
	7–58	Mar 1/96
	7–59	Mar 1/96
	7–60	Mar 1/96
	7–61	Mar 1/96
	7–62	Mar 1/96
	7–63	Mar 1/96
	7–64	Mar 1/96
	7–65	Mar 1/96

LIST OF EFFECTIVE PAGES

SECTION	PAGE	DATE
Systems of airplane – VII		
	7–66	Mar 1/96
	7–67	Mar 1/96
	7–68	May 30/01
	7–69	Mar 1/96
	7–70	Mar 1/96
	7–71	Mar 1/96
	7–72	Mar 1/96
	7–73	Mar 1/96
	7–74	Mar 1/96
	7–75	Mar 1/96
	7–76	Mar 1/96
	7–77	Mar 1/96
	7–78	Mar 1/96
	7–79	Mar 1/96
	7–80	Mar 1/96
	7–81	Mar 1/96
	7–82	Mar 1/96
	7–83	Mar 1/96
	7–84	Mar 1/96
	7–85	Mar 1/96
	7–86	Mar 1/96
	7–87	Mar 1/96
	7–88	Mar 1/96
	7–89	Mar 1/96
	7–90	Mar 1/96
	7–91	Mar 1/96
	7–92	Mar 1/96
	7–93	Mar 1/96
	7–94	Mar 1/96
	7–95	Mar 1/96
	7–96	Mar 1/96
	7–97	Mar 1/96
	7–98	Mar 1/96
	7–99	Mar 1/96
	7–100	Mar 1/96
	7–101	Mar 1/96
	7–102	Mar 1/96
	7–103	Mar 1/96
	7–104	Mar 1/96
	7–105	Mar 1/96
	7–106	Mar 1/96

SECTION	PAGE	DATE
	7–107	Mar 1/96
	7–108	Mar 1/96
	7–109	Mar 1/96
	7–110	Mar 1/96
	7–111	Mar 1/96
	7–112	Mar 1/96
	7–113	Mar 1/96
	7–114	Mar 1/96
	7–115	Mar 1/96
	7–116	Mar 1/96
	7–117	Mar 1/96
	7–118	Mar 1/96
	7–119	Mar 1/96
	7–120	Mar 1/96
Handling, Servicing & Maintenance – VIII		
	8–i	Mar 1/96
	8–ii	Mar 1/96
	8–1	Mar 1/96
	8–2	Mar 1/96
	8–3	Mar 1/96
	8–4	Mar 1/96
	8–5	Mar 1/96
	8–6	Mar 1/96
	8–7	Mar 1/96
	8–8	Mar 1/96
	8–9	Mar 1/96
	8–10	Mar 1/96
	8–11	Mar 1/96
	8–12	Mar 1/96
	8–13	Mar 1/96
	8–14	Mar 1/96
	8–15	Mar 1/96
	8–16	Mar 1/96
	8–17	Mar 1/96
	8–18	Mar 1/96
	8–19	Mar 1/96
	8–20	Mar 1/96
	8–21	Mar 1/96
	8–22	Mar 1/96

LIST OF EFFECTIVE PAGES

SECTION	PAGE	DATE
Supplements		
– IX	9-1	Mar 1/96
	9-2	Mar 1/96
	9-3	Mar 1/96
	9-4	Mar 1/96
	9-5	Mar 1/96
	9-6	Mar 1/96
No. 1a	1 of 12	Mar 28/97
No. 1c	1 of 10	Mar 28/97
No. 1d	1 of 8	Mar 28/97
No. 1f	1 of 6	Mar 28/97
No. 1g	1 of 8	Mar 28/97
No. 1i	1 of 6	Mar 28/97
No. 1k	1 of 28	Mar 28/97
No. 1m	1 of 26	Mar 28/97
No. 1n	1 of 32	Mar 28/97
No. 1p	1 of 6	Mar 28/97
No. 1r	1 of 6	Mar 28/97
No. 1s	1 of 12	Mar 12/98
No. 4	1 of 8	Apr. 10/97
No. 19a	1 of 10	Mar. 25/99
No. 20 i	1 of 6	Jun. 1/98
No. 34	1 of 12	Mar. 20/99

SECTION	PAGE	DATE

LIST OF EFFECTIVE PAGES

SECTION	PAGE	DATE

SECTION	PAGE	DATE

TABLE OF CONTENTS

BOOK 1

BOOK 2

Intentionally left blank

GENERAL

TABLE OF CONTENTS

Intentionally left blank

LOG OF REVISIONS

The list of current pages is indicated in the Log of Revisions.

When a revision to this Manual is issued, the holder will be provided new revised pages. The holder of this Manual is responsible for ensuring that this Manual is current. The revised pages will be marked with the number and the date of issue of the revision.

A marginal notation will be used to indicate those parts of the contents of a page that have been revised.

Revision Number	Revised pages	Description of Revision	CAA approved	Date
1	0-1, 2, 3, 4 1-1, 2-1, 2 3-1, 11, 12, 13, 14, 18, 19, 20 3A-2, 18 4-17, 44 5-4, 5, 13, 16, 21, 25, 29, 32, 5-39/40, 43/44, 45/46, 49/50, 5-51/52, 53, 55, 56, 57, 60, 5-63, 67, 71, 73, 74, 76, 5-81/82, 85/86, 87, 89, 91/92, 5-93, 94, 98, 99, 101, 103, 5-105, 111/112 6-1, 3, 22, 23, 24	According to Mandatory Bulletin No L410 UVP-E/067a	Approved in Czech language version	May 1/96
2	0-1 to 3, 5 1-1, 7, 13, 16, 17 2-i, ii, 1, 7, 9, 14, 15, 20 to 25 3-1 to 4, 9 to 14, 16 to 20 3A-i, ii, 1, 2, 4 to 7, 10 to 15, 3A-17 to 21, 23 to 26 4-i, ii, 1 to 3, 5 to 25, 27 to 33, 4-35 to 48 5-1, 11, 54 7-5, 8, 11, 29 to 31, 36, 44, 45, 7-52, 57, 68	According to Mandatory Bulletin No. L410 UVP-E/077a	ÚŘAD PRO CIVILNÍ LETECTVÍ 23 98-05-13	Apr 1/98
3	Title pages 0-1, 3 1-1 2-1, 19, 23, 29 4-44	According to Mandatory Bulletin No. L410 UVP-E/081a (valid for Model L 410 UVP-E20 according to LBA Germany Type Certificate)	ÚŘAD PRO CIVILNÍ LETECTVÍ 23 98-05-13	May 1/98

(cont.)

Revision Number	Revised pages	Description of Revision	CAA approved	Date
4	Not affected			
5	0−1 to 6 1−2, 2−7, 3A−i, 9, 10, 11, 4−37, 7−68	According to Mandatory Bulletin No. L410 UVP−E/096a (valid for airplanes L 410 UVP−E20 according to LBA Germany Type Certificate)		May 30/01

(cont.)

Revision Number	Revised pages	Description of Revision	CAI approved	Date

(cont.)

Revision Number	Revised pages	Description of Revision	CAI approved	Date

GENERAL DESCRIPTION

The L 410 UVP–E20 airplane is intended for the transport of passengers, mail and cargo and is able to take–off and land on paved as well as unpaved runways.
The L 410 UVP–E20 is all metal semimonocoque high design wing.

FUSELAGE

The fuselage is an all–metal structure consisting of 27 fuselage frames and bulkheads, longitudinal stiffeners, floor and ceiling longitudinal ribs, floors, outer skins and landing gear nacelles.
The front part of the fuselage begins with a nose cone, made of glassfibre–reinforced plastic, and ends at frame No 8. In this part of the fuselage are located: the front baggage compartment, the nose landing gear bay, electric and radio equipment bays, and the cockpit is arranged between bulkhead No 4 and frame No 7.
The fuselage center section, between frames No 8 and No 18, accommodates the passenger cabin. Four wing attachments are located at frame No 12 and No 14.
The rear section of the fuselage extends from frame No 18 to frame No 27 and terminates in a tail cone made of glassfibre–reinforced plastic. The baggage compartment is situated between frames No 19 and No 21. Behind the frame No 21 is located lavatory (version for 19 passengers). The tail attachment fittings are located at the reinforced frames No 25 and No 26.

WING

The wing is an all–metal structure and consists of two spars, cross ribs and skin with stringers. The wing is attached to the fuselage by means of four attachment lugs, located on the wing rib No 3. The four engine attachment fittings are located on ribs No 8 and No 10. Three wing tip tank attachment fittings are located on ribs No 31. Rubber fuel tanks are installed between the front and rear spars. The double–slotted wing flaps are split into an inner (ribs No 4 to No 10) and outer section (ribs No 10 to No 20). The ailerons are between ribs No 20 and No 31 .Ground spoilers are between ribs No 11 and No 20. Automatic bank control tabs are located between ribs No 27 and No 31. The ailerons are fabric–covered. The LH aileron is fitted with a trim tab.

TAIL UNIT

The tail unit consists of a horizontal tail, composed of a horizontal stabilizer and an elevator and a vertical tail with a fixed fin as vertical stabilizer and a rudder.

CONTROLS

The airplane is provided with dual controls.
The ailerons and the elevator are actuated by control columns through the system of tie rods.
The rudder is controlled by two interconnected pedal units through a system of tie rods and cables. The main landing gear brake valves are also controlled by the pedals.

(cont.)

The elevator trim tabs are controlled mechanically by means of a cable circuit.
The rudder trim tab and the left aileron trim tab are controlled electrically.

The ground spoilers, wing flaps and automatic bank control tabs are controlled electrohydraulically.
Nose wheel steering is performed by an electrohydraulic unit which is actuated either manually (by a lever located on the control column) or by pedals.

LANDING GEAR

The landing gear is of three–wheel design. It consists of the nose and main landing gear, a number of hydraulic, mechanical and electric systems with whose assistance the retracting and extending of landing gear, nose landing gear wheel steering and wheel braking is performed. The system is equipped with the emergency circuit for main landing gear extending and wheel braking for the case of the main hydraulic circuit failure.

ENGINE

The airplane is equipped with two WALTER M 601 E engines with the V 510 propellers. The engine is designed as a turboprop, two–shaft with engine reverse flow and with free turbine.

Shaft power:

– maximum take–off	750 SHP (560 kW)
– maximum continuous	657 SHP (490 kW)

Speeds:

– gas generator	36,660 RPM (=100 %)
– free turbine	31,023 RPM
– the way of starting	electric starter

PROPELLER

Basic technical parameters of V 510 propeller:

– propeller diameter	90.55 in (2.3 m)
– number of blades	5
– direction of rotation	clockwise (viewed from the rear in the direction of flight)
– propeller speed control range	1,700 – 2,080 RPM

GENERAL ARRANGEMENT DRAWING

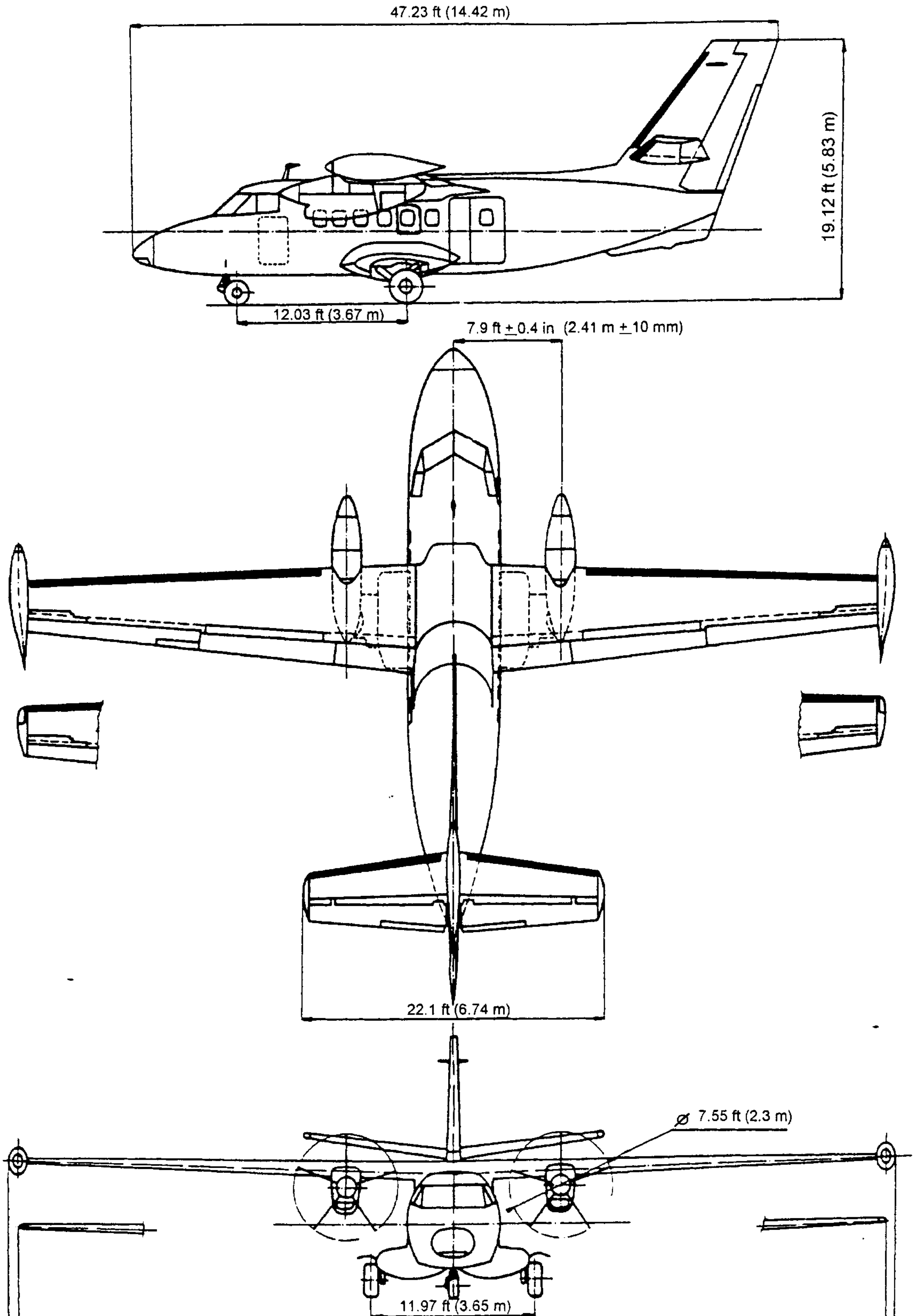

Fig. 1 - 1

MINIMUM RADIUS OF TURN ON THE GROUND

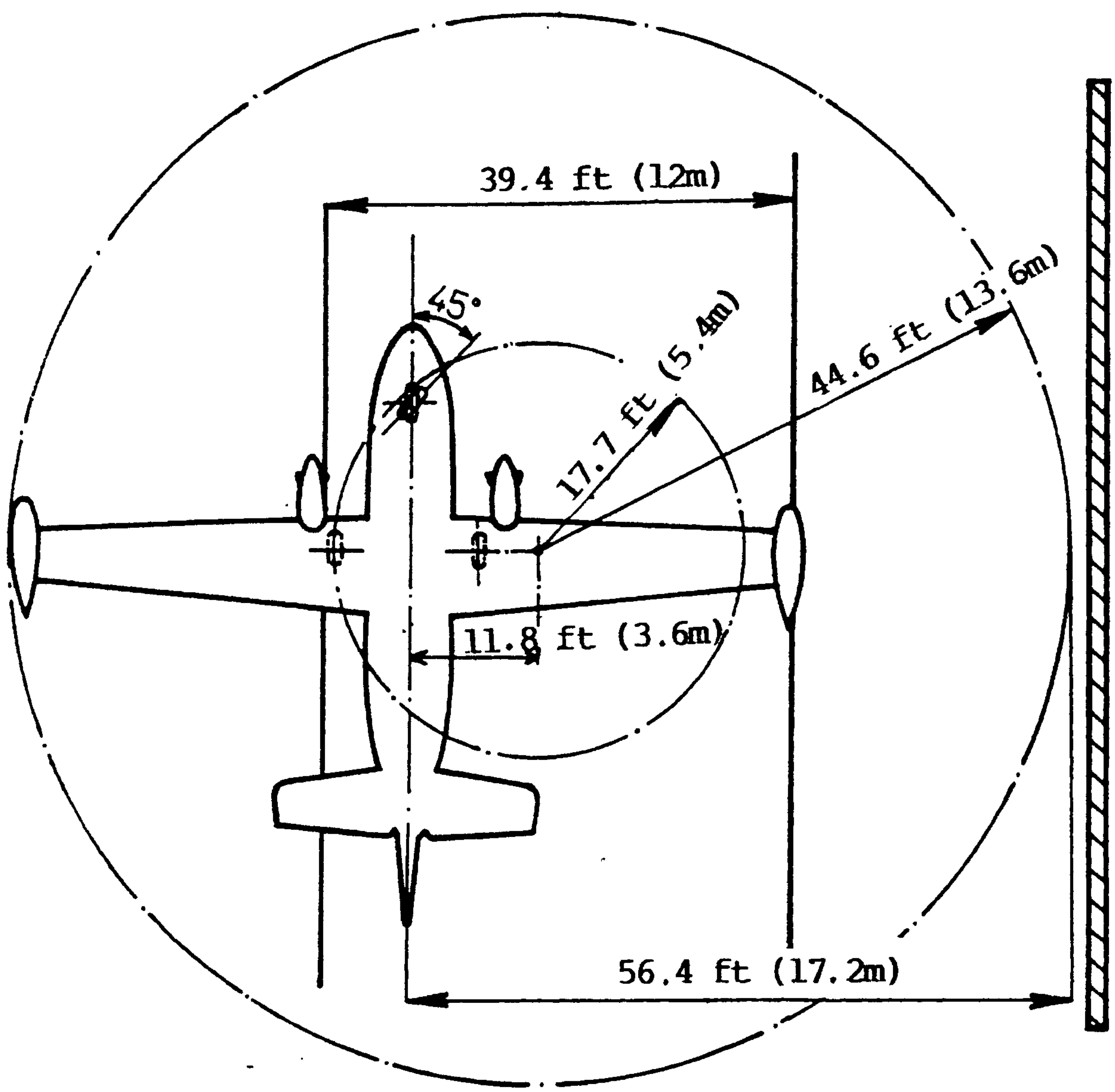

Fig. 1 - 2

OTHER DIMENSIONAL DATA

WING

Area (wing tips not included) .... 375.23 sq.ft (34.86 m^2)

Mean aerodynamic chord *) .... 6.29 ft (1,918 mm)

Aspect ratio 10.45

Quarter–chord sweepback .... 0°

Angle of incidence at root .... +2°

Dihedral .... 1°45'

Aerodynamic twist .... 0°

Geometric twist .... –2.8°

*) The incidence point of the mean aerodynamic chord is 7.19 ft (2,191 mm) behind the reference plane laid perpendicularly through leveling points No 2 on the fuselage. The distance between the reference plane and the fuselage nose is 8.95 ft (2,730 mm).

AILERONS

Length .... 2 x 12.54 ft (2 x 3,822 mm)

Area .... 2 x 15.6 sq.ft (2 x 1.45 m^2)

Deflection: up .... 27° ± 1°
down .... 14° ± 1°

Area of left hand aileron trim tab .... 2.15 sq.ft (0.20 m^2)

Deflection of trim tab: up .... 20° ± 2°
down .... 20° ± 2°

WING FLAPS

Length .... 2 x 15.84 ft (2 x 4,830 mm)

Area .... 2 x 31.86 sq.ft (2 x 2.96 m^2)

Deflection of outer wing flap: take–off .... 18° ± 1°
landing .... 42° ± 1°

GROUND SPOILERS

Length .... 2 x 8.84 ft (2 x 2,695 mm)

Area .... 2 x 4.73 sq.ft (2 x 0.44 m^2)

Deflection .... 72°30' ± 2°

(cont.)

AUTOMATIC BANK CONTROL TABS

Length .... 2 x 4.46 ft (2 x 1,360 mm)

Area .... 2 x 2.64 sq.ft (2 x 0.245 m^2)

Deflection .... $55^o \pm 2^o$

HORIZONTAL TAIL

Span .... 22.1 ft (6,736 mm)

Area (total) .... 102.9 sq.ft (9.56 m^2)

Quarter–chord sweepback .... 5^o

Dihedral .... 7^o

Aspect ratio 4.79

Mean aerodynamic chord .... 4.82 ft (1,469 mm)

Angle of incidence .... $+2^o$

ELEVATOR

Area .... 2 x 17 sq.ft (2 x 1.58 m^2)

Deflection: up .... $30^o \pm 1^o$
down .... $14^o \pm 1^o$

Trim tab area .... 2 x 2.05 sq.ft (2 x 0.19 m^2)

Trim tab deflection: up .... $10^o \pm 1^o$
down .... $16^o \pm 1^o$

VERTICAL TAIL

Height .... 10.86 ft (3,310 mm)

Area (total) .... 78.57 sq.ft (7.30 m^2)

Quarter–chord sweepback .... 35^o

Aspect ratio 1.5

Mean aerodynamic chord .... 7.49 ft (2,285 mm)

(cont.)

RUDDER

Area .... 30.24 sq.ft (2.81 m^2)

Deflection .... 17° – 30'

Trim tab area .... 4.63 sq.ft (0.43 m^2)

Trim deflection: to the left side .... 10° – 1°
to the right side .... 10° – 1° 30'

FUSELAGE

Dimensions of doors and heights of door frames above the ground.

ENTRY DOOR

Dimension .... 2.62 x 4.79 ft (800 x 1,460 mm)

Sill height above the ground .... 2.59 ft (792 mm)

CARGO DOOR

Dimension .... 4.10 x 4.79 ft (1,250 x 1,460 mm)

Sill height above the ground .... 2.59 ft (792 mm)

EMERGENCY EXIT DOOR (FRONT)

Dimension .... 2.18 x 3.18 ft (665 x 970 mm)

Sill height above the ground .... 2.86 ft (872 mm)

EMERGENCY EXIT DOOR (UNDER WING)

Dimension .... 1.67 x 2.39 ft (510 x 730 mm)

Sill height above the ground .... 4.53 ft (1,382 mm)

BASIC EMPTY WEIGHT

The basic empty weight of the airplane with standard equipment (navigation King Gold Crown without autoflight control system, GPS, vertical gyro):

– without wing tip tanks .... 8,730 lb (3,960 kg)
– with wing–tip tanks .... 8,862 lb (4,020 kg)

NOTE

Airplane actual weight is mentioned in chapter 6 – The L410 UVP–E20 Airplane Weighing Form.

DEFINITIONS AND SYMBOLS

WARNING

MEANS THAT THE NON – OBSERVATION OF THE CORRESPONDING PROCEDURE LEADS TO AN IMMEDIATE OR IMPORTANT DEGRADATION OF THE FLIGHT SAFETY.

CAUTION

MEANS THAT THE NON – OBSERVATION OF THE CORRESPONDING PROCEDURE LEADS TO A MINOR OR LESS LONG TERM DEGRADATION OF THE FLIGHT SAFETY.

NOTE

Draws the attention on any special item not directly related to safety but which is important or unusual.

A	ampere
ABC	automatic bank control system
AC	Alternating current
ADF	automatic direction finding
AGL	above ground level
ALT	altitude
Altitude	The altitude specified in this manual is pressure altitude which is the expression of atmospheric pressure in terms of altitude above mean sea level according to inter–relations of these factors in the International Standard Atmosphere. This altitude may be determined by setting the sub–scale of an accurate pressure type altimeter at 1.013 hPa (29.92 in. Hg).
AP	autopilot
ATC	air traffic control
ASDA	accelerate – stop distance available

(cont.)

°C	degrees Celsius
CAI	Civil Aviation Inspectorate of the Czech Republic
CAS	calibrated air speed
CDI	course deviation indicator
CG; cg	centre of gravity
cm	centimeter/centimeters (1cm = 0.394 inch)
COM or COMM	communication
CVR	cockpit voice recorder
CWD	central warning display
DA	decision altitude
DC	direct current
DH	decision height
DME	distance measuring equipment
EAS	equivalent airspeed
ELT	emergency locator transmitter
°F	degrees Fahrenheit
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FD	flight director
FDR	flight data recorder
ft	foot/feet (1ft = 0.3048 m)
ft/min or fpm	feet per minute (100 ft/min = 0.508 m/s)
F.S.	fuselage station – the distance from the fuselage datum (leveling point No 2.)
g	acceleration due to gravity (1g = 9.81m/s^2)
GPS	global positioning system
Gradient of climb	The gradient of climb is the ratio, in the same units, and expressed as a percentage, of:

$$\frac{\text{Change of Altitude}}{\text{Horizontal Distance Travelled}}$$

The gradients of climb shown in the graphs are true gradients, i. e. they are derived from true (not pressure) rates of climb.

(cont.)

Gross performance	Gross performance is such that the performance of any airplane of the type, measured at any time, is at least as likely to exceed the gross performance as not.
Hard runway	A runway with a concrete or tarmac surface.
Height	The vertical distance between the lowest part of the airplane and the ground (AGL).
HF	high frequency
HP	horse power (1HP = 735.499 W)
hPa	hektopascal
hr	hour/hours
Hz	Hertz
IAS	indicated airspeed
ICAO	International Civil Aviation Organization
IELU	integrated electronic limiter unit
IFR	instruments flight rules
ILS	instrument landing system
IMC	instrument meteorological conditions
in	inch/inches (1 inch = 0.0254 m)
ISA	International Standard Atmosphere – the air is a dry perfect gas – the temperature at sea level is 15 °C (59 °F) – the pressure at sea level is 1013.2 hPa (29.92 in. Hg)
ITT	interturbine temperature
kg	kilogram/kilograms (1 kg = 2.20462 lb)
kHz	kilohertz
KIAS	indicated airspeed in knots
km	kilometer/kilometers (1 km = 0.5399 Nm)
km/hr IAS	indicated airspeed in kilometers per hour
kp	kilopond/kiloponds (1 kp = 9.81 N)
kt	knot/knots (1 kt =1NM per hour)
kW	kilowatt (1 kW = 1.34 HP)
l	liter (1 liter = 0.26417 U.S. gallon)
lb	pound/pounds (1 lb = 0.453 kg)

(cont.)

LDA	landing distance available
LH	left hand side
m	meter/meters (1 m = 3.280 ft)
MAC	mean aerodynamic chord
max	maximum
MDA	minimum descent altitude
MDH	minimum descent height
MHz	megahertz
mm	millimeter/millimeters
min	minimum/minute
MKR	marker
MM	middle marker
MSG	message
N	Newton
n_G	gas generator speed
n_p	propeller speed
NAV	navigation
Net performance	The majority of data given in this Flight Manual is net performance which is the gross performance diminished by certain margins to allow for various contingencies which cannot be directly accounted for during expected operation (e. g. need to manoeuvre, unavoidable variations in piloting technique, temporary below average performance, etc.). It is unlikely that the net performance will not be achieved in operation, provided the airplane is flown in accordance with the recommended techniques.
NM	nautical miles (1 NM = 1.852 km)
OAT	outside air temperature
OM	outer marker
PA	public address
PCL	propeller control lever
PROP	propeller
psi	pounds per square inch
QFE	atmospheric pressure at aerodrome elevation
QNH	altimeter setting to obtain elevation when on the ground

(cont.)

QTY	quantity
RB	radio beacon
RH	right hand side
RMI	radio magnetic indicator
RPM	revolution per minute
S1A, S2B	emergency bus bars
sec	seconds
SHP	shaft horse power
SSR	transponder (see also XPDR)
STBY or SBY	standby
TAS	true airspeed
TBO	time between overhaul
TCL	throttle control lever
TEMP	temperature
TODA	take-off - distance available
TORA	take-off run available
T_Q	torque
V	speed or volt whichever applies
VFR	visual flight rules
VHF	very high frequency
VMC	visual meteorological conditions
V_A	design maneuvering speed
V_B	design speed for maximum gust intensity
V_{FE}	maximum flaps extended speed
V_{FO}	maximum flaps operating speed
V_{LE}	maximum landing gear extended speed
V_{LO}	maximum landing gear operating speed
V_{MCA}	minimum control speed for take-off
V_{MCG}	minimum control speed for take-off run
V_{MCL}	minimum control speed for landing

(cont.)

V_{MO}	maximum operating limit speed
V_{SO}	stalling speed in the landing configuration
V_{SPOIL}	maximum permissible spoiler extension speed
V_{S1}	stalling speed, with idle power, in a configuration other than landing
V_X	best angle of climb speed
V_Y	best rate of climb speed
V_1	take–off decision speed
V_2	take–off safety speed
V_R	rotation speed
WPT	waypoint
XPDR	transponder
YD	yaw damper

CONVERSION TABLES

1. CONVERSION OF MM TO INCH

1 mm = 0.03937 in

mm	in	mm	in	mm	in
1	0.03937	35	1.37795	69	2.71653
2	0.07874	36	1.41732	70	2.75590
3	0.11811	37	1.45669	71	2.79527
4	0.15748	38	1.49606	72	2.83464
5	0.19685	39	1.53543	73	2.87401
6	0.23622	40	1.57480	74	2.91338
7	0.27559	41	1.61417	75	2.95275
8	0.31496	42	1.65354	76	2.99212
9	0.35433	43	1.69291	77	3.03149
10	0.39370	44	1.73228	78	3.07086
11	0.43307	45	1.77165	79	3.11023
12	0.47244	46	1.81102	80	3.14960
13	0.51181	47	1.85039	81	3.18897
14	0.55118	48	1.88976	82	3.22834
15	0.59055	49	1.92913	83	3.26771
16	0.62992	50	1.96850	84	3.30708
17	0.66929	51	2.00787	85	3.34645
18	0.70866	52	2.04724	86	3.38582
19	0.74803	53	2.08661	87	3.42519
20	0.78740	54	2.12598	88	3.46456
21	0.82677	55	2.16535	89	3.50393
22	0.86614	56	2.20472	90	3.54330
23	0.90551	57	2.24409	91	3.58267
24	0.94488	58	2.28346	92	3.62204
25	0.98425	59	2.32283	93	3.66141
26	1.02362	60	2.36220	94	3.70078
27	1.06299	61	2.40157	95	3.74015
28	1.10236	62	2.44094	96	3.77952
29	1.14173	63	2.48031	97	3.81889
30	1.18110	64	2.51968	98	3.85826
31	1.22047	65	2.55905	99	3.89763
32	1.25984	66	2.59842	100	3.93700
33	1.29921	67	2.63779		
34	1.33858	68	2.67716		

2. CONVERSION OF INCH TO MM

1 in = 25.4 mm

in	mm	in	mm	in	mm
1	25.40000	35	889.00000	69	1752.60000
2	50.80000	36	914.40000	70	1778.00000
3	76.20000	37	939.80000	71	1803.40000
4	101.60000	38	965.20000	72	1828.80000
5	127.00000	39	990.60000	73	1854.20000
6	152.40000	40	1016.00000	74	1879.60000
7	177.80000	41	1041.40000	75	1905.00000
8	203.20000	42	1066.80000	76	1930.40000
9	228.60000	43	1092.20000	77	1955.80000
10	254.00000	44	1117.60000	78	1981.20000
11	279.40000	45	1143.00000	79	2006.60000
12	304.80000	46	1168.40000	80	2032.00000
13	330.20000	47	1193.80000	81	2057.40000
14	355.60000	48	1219.20000	82	2082.80000
15	381.00000	49	1244.60000	83	2108.20000
16	406.40000	50	1270.00000	84	2133.60000
17	431.80000	51	1295.40000	85	2159.00000
18	457.20000	52	1320.80000	86	2184.40000
19	482.60000	53	1346.20000	87	2209.80000
20	508.00000	54	1371.60000	88	2235.20000
21	533.40000	55	1397.00000	89	2260.60000
22	558.80000	56	1422.40000	90	2286.00000
23	584.20000	57	1447.80000	91	2311.40000
24	609.60000	58	1473.20000	92	2336.80000
25	635.00000	59	1498.60000	93	2362.20000
26	660.40000	60	1524.00000	94	2387.60000
27	685.80000	61	1549.40000	95	2413.00000
28	711.20000	62	1574.80000	96	2438.40000
29	736.60000	63	1600.20000	97	2463.80000
30	762.00000	64	1625.60000	98	2489.20000
31	787.40000	65	1651.00000	99	2514.60000
32	812.80000	66	1676.40000	100	2540.00000
33	838.20000	67	1701.80000		
34	863.60000	68	1727.20000		

3. CONVERSION OF M TO FOOT

1 m = 3.28084 ft

m	ft	m	ft	m	ft
1	3.280840	35	114.829400	69	226.377960
2	6.561680	36	118.110240	70	229.658800
3	9.842520	37	121.391080	71	232.939640
4	13.123360	38	124.671920	72	236.220480
5	16.404200	39	127.952760	73	239.501320
6	19.685040	40	131.233600	74	242.782160
7	22.965880	41	134.514440	75	246.063000
8	26.246720	42	137.795280	76	249.343840
9	29.527560	43	141.076120	77	252.624680
10	32.808400	44	144.356960	78	255.905520
11	36.089240	45	147.637800	79	259.186360
12	39.370080	46	150.918640	80	262.467200
13	42.650920	47	154.199480	81	265.748040
14	45.931760	48	157.480320	82	269.028880
15	49.212600	49	160.761160	83	272.309720
16	52.493440	50	164.042000	84	275.590560
17	55.774280	51	167.322840	85	278.871400
18	59.055120	52	170.603680	86	282.152240
19	62.335960	53	173.884520	87	285.433080
20	65.616800	54	177.165360	88	288.713920
21	68.897640	55	180.446200	89	291.994760
22	72.178480	56	183.727040	90	295.275600
23	75.459320	57	187.007880	91	298.556440
24	78.740160	58	190.288720	92	301.837280
25	82.021000	59	193.569560	93	305.118120
26	85.301840	60	196.850400	94	308.398960
27	88.582680	61	200.131240	95	311.679800
28	91.863520	62	203.412080	96	314.960640
29	95.144360	63	206.692920	97	318.241480
30	98.425200	64	209.973760	98	321.522320
31	101.706040	65	213.254600	99	324.803160
32	104.986880	66	216.535440	100	328.084000
33	108.267720	67	219.816280		
34	111.548560	68	223.097120		

4. CONVERSION OF FOOT TO M

1 ft = 0.3048 m

ft	m	ft	m	ft	m
1	0.304800	35	10.668000	69	21.031200
2	0.609600	36	10.972800	70	21.336000
3	0.914400	37	11.277600	71	21.640800
4	1.219200	38	11.582400	72	21.945600
5	1.524000	39	11.887200	73	22.250400
6	1.828800	40	12.192000	74	22.555200
7	2.133600	41	12.496800	75	22.860000
8	2.438400	42	12.801600	76	23.164800
9	2.743200	43	13.106400	77	23.469600
10	3.048000	44	13.411200	78	23.774400
11	3.352800	45	13.716000	79	24.079200
12	3.657600	46	14.020800	80	24.384000
13	3.962400	47	14.325600	81	24.688800
14	4.267200	48	14.630400	82	24.993600
15	4.572000	49	14.935200	83	25.298400
16	4.876800	50	15.240000	84	25.603200
17	5.181600	51	15.544800	85	25.908000
18	5.486400	52	15.849600	86	26.212800
19	5.791200	53	16.154400	87	26.517600
20	6.096000	54	16.459200	88	26.822400
21	6.400800	55	16.764000	89	27.127200
22	6.705600	56	17.068800	90	27.432000
23	7.010400	57	17.373600	91	27.736800
24	7.315200	58	17.678400	92	28.041600
25	7.620000	59	17.983200	93	28.346400
26	7.924800	60	18.288000	94	28.651200
27	8.229600	61	18.592800	95	28.956000
28	8.534400	62	18.897600	96	29.260800
29	8.839200	63	19.202400	97	29.565600
30	9.144000	64	19.507200	98	29.870400
31	9.448800	65	19.812000	99	30.175200
32	9.753600	66	20.116800	100	30.480000
33	10.058400	67	20.421600		
34	10.363200	68	20.726400		

5. CONVERSION OF KG TO POUND

1 kg = 2.2046223 lb

kg	lb	kg	lb	kg	lb
1	2.2046223	35	77.1617805	69	152.1189387
2	4.4092446	36	79.3664028	70	154.3235610
3	6.6138669	37	81.5710251	71	156.5281833
4	8.8184892	38	83.7756474	72	158.7328056
5	11.0231115	39	85.9802697	73	160.9374279
6	13.2277338	40	88.1848920	74	163.1420502
7	15.4323561	41	90.3895143	75	165.3466725
8	17.6369784	42	92.5941366	76	167.5512948
9	19.8416007	43	94.7987589	77	169.7559171
10	22.0462230	44	97.0033812	78	171.9605394
11	24.2508453	45	99.2080035	79	174.1651617
12	26.4554676	46	101.4126258	80	176.3697840
13	28.6600899	47	103.6172481	81	178.5744063
14	30.8647122	48	105.8218704	82	180.7790286
15	33.0693345	49	108.0264927	83	182.9836509
16	35.2739568	50	110.2311150	84	185.1882732
17	37.4785791	51	112.4357373	85	187.3928955
18	39.6832014	52	114.6403596	86	189.5975178
19	41.8878237	53	116.8449819	87	191.8021401
20	44.0924460	54	119.0496042	88	194.0067624
21	46.2970683	55	121.2542265	89	196.2113847
22	48.5016906	56	123.4588488	90	198.4160070
23	50.7063129	57	125.6634711	91	200.6206293
24	52.9109352	58	127.8680934	92	202.8252516
25	55.1155575	59	130.0727157	93	205.0298739
26	57.3201798	60	132.2773380	94	207.2344962
27	59.5248021	61	134.4819603	95	209.4391185
28	61.7294244	62	136.6865826	96	211.6437408
29	63.9340467	63	138.8912049	97	213.8483631
30	66.1386690	64	141.0958272	98	216.0529854
31	68.3432913	65	143.3004495	99	218.2576077
32	70.5479136	66	145.5050718	100	220.4622300
33	72.7525359	67	147.7096941		
34	74.9571582	68	149.9143164		

6. CONVERSION OF POUND TO KG

1 lb = 0.453592 kg

lb	kg	lb	kg	lb	kg
1	0.4535920	35	15.8757200	69	31.2978480
2	0.9071840	36	16.3293120	70	31.7514400
3	1.3607760	37	16.7829040	71	32.2050320
4	1.8143680	38	17.2364960	72	32.6586240
5	2.2679600	39	17.6900880	73	33.1122160
6	2.7215520	40	18.1436800	74	33.5658080
7	3.1751440	41	18.5972720	75	34.0194000
8	3.6287360	42	19.0508640	76	34.4729920
9	4.0823280	43	19.5044560	77	34.9265840
10	4.5359200	44	19.9580480	78	35.3801760
11	4.9895120	45	20.4116400	79	35.8337680
12	5.4431040	46	20.8652320	80	36.2873600
13	5.8966960	47	21.3188240	81	36.7409520
14	6.3502880	48	21.7724160	82	37.1945440
15	6.8038800	49	22.2260080	83	37.6481360
16	7.2574720	50	22.6796000	84	38.1017280
17	7.7110640	51	23.1331920	85	38.5553200
18	8.1646560	52	23.5867840	86	39.0089120
19	8.6182480	53	24.0403760	87	39.4625040
20	9.0718400	54	24.4939680	88	39.9160960
21	9.5254320	55	24.9475600	89	40.3696880
22	9.9790240	56	25.4011520	90	40.8232800
23	10.4326160	57	25.8547440	91	41.2768720
24	10.8862080	58	26.3083360	92	41.7304640
25	11.3398000	59	26.7619280	93	42.1840560
26	11.7933920	60	27.2155200	94	42.6376480
27	12.2469840	61	27.6691120	95	43.0912400
28	12.7005760	62	28.1227040	96	43.5448320
29	13.1541680	63	28.5762960	97	43.9984240
30	13.6077600	64	29.0298880	98	44.4520160
31	14.0613520	65	29.4834800	99	44.9056080
32	14.5149440	66	29.9370720	100	45.3592000
33	14.9685360	67	30.3906640		
34	15.4221280	68	30.8442560		

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LIMITATIONS

TABLE OF CONTENTS

(cont.)

CERTIFICATION STATUS

The airplane meets :

- FAR 23, Amendment 34 (with departures mentioned in Part 10 of the Type Certificate of Airworthiness 90-03 the airplane type L 410 UVP-E20)

NOISE CERTIFICATION

Max. take-off weight	Measurement method	Flaps position	Level of noise dB(A)
14,550 lb (6,600 kg)	ICAO - Annex 16, Chapter 10	0°	84.5
		18°	85.4
	FAR Part 36	0°	82.6
		18°	83.2

WEIGHTS

Maximum ramp weight is 14,594 lb (6,620 kg).

Maximum take-off weight is 14,550 lb (6,600 kg).

Maximum landing weight is 14,109 lb (6,400 kg).

Maximum zero fuel weight - without wing tip tanks is 13,227 lb (6,000 kg)
- with wing tip tanks is 13,360 lb (6,060 kg).

CAUTION

THE ACTUAL MAXIMUM PERMISSIBLE TAKE-OFF WEIGHT IS THE LOWEST ONE OF THE WEIGHTS DETERMINED BY FLIGHT MANUAL, PARA: TAKE-OFF WAT CURVES, TAKE-OFF FIELD LENGTHS AND NET TAKE-OFF FLIGHT PATH DATA, EN-ROUTE DATA. WITH THE LIMITATION GIVEN IN SECTION 2 IN MIND.

NOTE

In exceptional cases it is permitted to land with weight of 14,550 lb (6,600 kg), or with fuel in the wing tip tanks.
Each this case must be recorded in the Airplane Log Book

CENTRE OF GRAVITY (LANDING GEAR EXTENDED)

The centre of gravity limits must be always inside the envelope given by the curve shown in Fig. 2 – 1. The position of the Mean Aerodynamic Chord is shown in Fig. 2 – 1. The dimensions are given in mm (inches). The airplane will not tip over when being loaded if its centre of gravity is maintained within the envelope during loading.

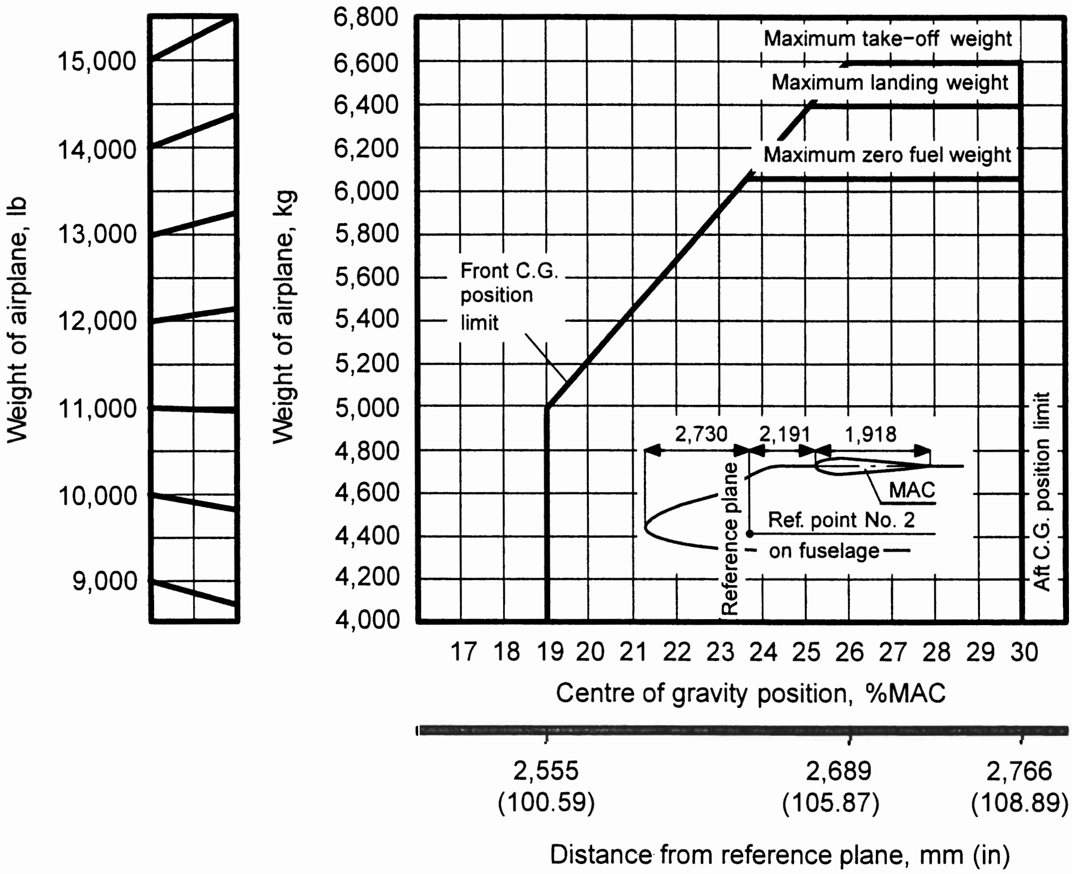

Fig. 2 – 1 CENTRE OF GRAVITY LIMITS AND MAC POSITIONS

FLOOR LOADING

LIMITATIONS FOR PASSENGER VERSION

Maximum load on baggage compartments:

- rear .... 330 lb (150 kg)
- front .... 220 lb (100 kg)

(cont.)

Maximum specific load on the floors of baggage compartments (front and rear) .... 82 lb/sq.ft (400 kg/m^2)

Maximum specific load on the floor of passenger cabin .... 82 lb/sq.ft (400 kg/m^2)

LIMITATIONS FOR CARGO VERSION

Maximum load in baggage compartments:

- rear .... 330 lb (150 kg)
- front .... 220 lb (100 kg)

Maximum weight of the cargo in the container .... 2,200 lb (1,000 kg)

Maximum weight of the cargo without the separator installed .... 1,100 lb (500 kg)

Maximum weight of the cargo in one section with the separator installed . 1,100 lb (500 kg)

Maximum specific floor loading of the container .... 82 lb/sq.ft (400 kg/m^2)

Maximum cargo dimensions:

(a) height .... 3.28 ft (1m)

(b) length and width:

- with the separator installed (two sections) .... 3.74 x 3.60 ft (1.14 x 1.1 m)
- without the separator installed .... 7.48 x 3.60 ft (2.28 x 1.1 m)

MAXIMUM PAYLOAD

Maximum payload .... 3,770 lb (1,710 kg)

MAXIMUM NUMBER OF OCCUPANTS

FOR 17 PASSENGERS VERSION

The maximum permissible number of occupants including the crew is 19.

The maximum permissible number of occupants including the crew for cargo version is 3.

FOR 19 PASSENGERS VERSION

The maximum permissible number of occupants including the crew is 21.

The maximum permissible number of occupants including the crew for cargo version is 5.

PERFORMANCE LIMITATIONS

MAXIMUM ALTITUDE

The maximum permissible operating altitude is 14,000 ft (4,250 m).

The maximum permissible operating altitude with fuel pumps inoperative is 13,120 ft (4,000 m)

The maximum permissible pressure airport altitude for take–off and landing is 13,120 (4,000 m).

AIR TEMPERATURE LIMITATION

The airplane is admitted for operation at ambient temperatures ranging from –50°C to +40°C (–58°F to 104°F).

CAUTION

IF THE AIRPLANE IS TO BE OPERATED AT AMBIENT TEMPERATURES BELOW –5°C (23°F) AND ABOVE +30°C (86°F), IT IS NECESSARY TO CARRY OUT MODIFICATIONS OF THE ENGINE COOLING SYSTEM IN ACCORDANCE WITH THE MAINTENANCE SCHEDULE, SECTION 6.

NOTE

At low ground temperatures below –20°C (–4°F), it is necessary to heat up the cabin before engine starting.

WIND SPEED AND DIRECTION LIMITATIONS (DEMONSTRATED VALUES)

(a) Maximum demonstrated component of cross wind:

- from unpaved grass strips as well as from dry and wet take–off and landing runways with pavement .... 19.4 kts (10 m/s)
- from unpaved strips with compacted snow layer incl. a layer of fresh snow .... 13.5 kts (7 m/s)
- from paved take–off and landing runways with a layer of water, watery or wet snow .... 9.5 kts (5 m/s)
- from unpaved take–off and landing runways with a slushy upper layer or a layer of watery or wet snow .... .9.5 kts (5 m/s)

(cont.)

- from paved take–off and landing runways with a friction coefficient less than 0.5, or covered with a layer of dry snow see Table below

Friction coefficient	Braking effect	Degree	Maximum permissible component of cross wind	
			kts	m/s
0.50 and more	good	5	19.5	10.0
0.49 – 0.43	medium/good	4	17.5	9.0
0.42 – 0.37	medium	3	13.5	7.0
0.36 – 0.30	medium/poor	2	10.5	5.5
0.29 – 0.20	poor	1	5.0	2.5

(b) Maximum demonstrated component of tail wind
(in the direction of the axis of the take–off and landing runway)

- from unpaved strip as well as from paved dry and wet take–off and landing runways .... 9.5 kts (5 m/s)
- from paved take–off and landing runways with a layer of water ... 0 kts (0 m/s)

RUNWAY CONDITIONS (DEMONSTRATED VALUES)

The take–off and the landing are demonstrated from and on paved and unpaved runways which comply with the following requirements:

(a) Paved take–off and landing runways:

- the friction coefficient of the take–off and landing runway is at least 0.2;
- the layer of water does not exceed 0.4 in (10 mm);
- the layer of watery or wet snow does not exceed 0.5 in (12 mm);
- the layer of dry snow does not exceed 2 in (50 mm);

(b) Unpaved take–off and landing runways:

- the runway subsoil strength shall be at least 85.3 psi (6.0 kg/cm^2)
- the strength of the compacted snow layer on the take–off and landing runway shall be:
  - if thickness of the snow layer ranges from 2.4 to 3.1 in (6 to 8 cm) .... at least 92.4 psi (6.5 kg/cm^2)
  - if the thickness of the snow layer ranges from 3.5 to 7.9 in (9 to 20 cm) .... at least 106.6 psi (7.5 kg/cm^2)

(cont.)

- if the thickness of the snow layer ranges from 8.3 to 15.7 in (21 to 40 cm) .... at least 113.7 psi (8.0 kg/cm^2)
- if the thickness of the snow layer is over 15.7 in (40 cm) .... at least 120.9 psi (8.5 kg/cm^2)
- the thickness of the layer of dry snow does not exceed 2 in (50 mm);
- the thickness of the layer of wet snow does not exceed 0.5 in (12 mm);
- the thickness of the muddy upper soil layer does not exceed 2 in (50 mm).

POWERPLANT

GENERAL

All engine power ratings indicated in the present AFM apply to the airplane powered by two WALTER M 601 E turboprop engines of maximum take–off power of 750 SHP (560 kW) each with AVIA V 510 five–blade propellers of a 90.55 in dia. (2.3 m).

FUEL

The airplane engines may be supplied with the following fuels only:

T–1 .... according to ST SEV 5024–85 or GOST 10227–86

TS–1 .... according to ST SEV 5024–85 or GOST 10227–86 or CSN 656520

PL–6 .... according to PND 25005–76

PL–7 .... according to PND 25005–92

PSM 2 .... according to PN–86/C–96026

RT .... according to ST SEV 5024–85 or GOST 10227–86 or CSN 656520

JET A .... according to ASTM D 1655–89

JET A1 .... according to ASTM D 1655–89 or DERD 2494

The mixing of the above fuels is permitted.

USABLE FUEL

	Wing tanks lb (kg)		Wing tip tanks lb (kg)	
	LH	RH	LH	RH
Total fuel tank capacity	1,102 (500)	1,102 (500)	346 (156.9)	346 (156.9)
Unusable fuel	10 (4.5)	10 (4.5)	4 (1.9)	4 (1.9)
Total usable fuel	1,092 (495.5)	1,092 (495.5)	342 (155)	342 (155)

FUEL UNBALANCE

Differences in fuel quantity between the LH and RH group of tanks must not exceed 132 lb (60 kg) before take−off and during flight.

OIL

The following oils only may be used for engine lubrication:

(a) AERO SHELL TURBINE OIL 500 .... according to MIL−L 23699C (USA)
AERO SHELL TURBINE OIL 555
AERO SHELL TURBINE OIL 560

(b) MOBILE JET OIL II .... according to MIL−L 23699C (USA)
EXXON TURBO OIL 2380
CASTROL 599

(c) B−3V .... according to TU−38−101 295−72 (Russia)

WARNING

THE MUTUAL MIXING OF THE OILS GROUPS LISTED IN ABOVE MENTIONED ITEMS IS NOT PERMITTED.

The total oil capacity in each engine (including cooler, tank, gear box, oil filter, piping) is 2.91 US gallons (11 litres).
The minimum permissible quantity of oil in one tank is 1.45 US gallons (5.5 litres).
The maximum permissible quantity of oil in one tank is 1.85 US gallons (7 litres).

ENGINE STARTING

Maximum inter–turbine temperature at the time of the starting:

- from external power supply .... 700°C (1,292°F)
- from airplane batteries .... 730°C (1,346°F)

Maximum pressure altitude for starting the engine .... 13,120 ft (4,000 m)

Maximum number of subsequent startings
(and/or engine motoring) in intervals of 2 minutes each 5

NOTE

Cool the starter–generator for one hour before further engine starting.

Minimum voltage of external power suply (unloaded)
at the time of starting 20V

Minimum permissible value to which battery voltage
may drop at the beginning of starting cycle (for 4 s as a maximum) 14V

OIL SYSTEM

Minimum oil temperature for engine starting .... –20°C (–4°F)

Minimum oil temperature for acceleration .... 20°C (68°F)

Maximum working oil temperature .... 85°C (185°F) (see Note)

NOTE

When Intermediate Contingency Power is used, the maximum oil temperature may be increased to 95°C (203°F).

Minimum constant oil pressure value .... 1.2 kp/cm^2 (17.1 psi)

Maximum working oil pressure value .... 2.7 kp/cm^2 (38.4 psi) (see Note)

NOTE

If the engine is started at temperatures below 0°C (32°F), an increase of oil pressure to 3.5 kp/cm^2 (49.8 psi) is permitted.

WATER INJECTION

It is possible to use only:

Distilled water .... according to CSN 68 4063,
IS 1070–1960 (international),
BN–71 6191 (Poland),
B.S. 3978;1966 (UK),
GOST 6709–72 (Russia)

or

distilled water, provided the following requirements are met:

1. Visual appearance:
   Transparent, colorless, free of visible mechanic particles.
2. Contents of solid particles:
   Water may contain only non-visible solid particles of maximum size 10 mm.
3. Specific electric conductivity:
   Max. 15 mS cm^{-1} at the temperature 25° ± 5° C (77° ± 9°F).
4. pH factor within the range 5.0 - 7.5
5. Evaporation residue
   Maximum 10 mg/l after evaporation of 1 litre of water.

Minimum ambient air temperature allowed for
the use of water injection at 0 ft (0 m) ISA .... +23 °C (74°F)

NOTE

The airplane performance indicated in Section 5 of this AFM at take- off airport air temperature of + 23°C (73.4°F) or higher, or at atmospheric pressure and air temperature as shown in Fig. 4- 3, page 4- 34, are only guaranteed when using the appropriate degree of water injection.

AUTO FEATHERING

Maximum pressure flight altitude of the airplane with
the automatic feathering system switched on 10,000 ft (3,050 m)

HEATING USE

Air bleed for heating must not be used when maximum take-off power, maximum contingency power or intermediate contingency power is required. With the engines operating at these power ratings, air bleed may only be used in icing conditions for airframe deicing.

CAUTION

IF AIR BLEED FOR THE HEATING IS SWITCHED ON, THE ALLOWABLE ITT TEMPERATURE INCREASE IS 30°C.

REVERSE USE

Reverse power rating must not be used:

- during flight;
- when the emergency fuel control circuit is used.

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POWER RATINGS LIMITATIONS

The values given in this table are maximum permissible values of engine parametres (if not indicated otherwise).

Power rating	Inter–turbine temperat. (°C)	Torque (%)	Gas generator speed (%)	Propeller speed (RPM)	Oil Pressure (kp/cm^2) [psi]	Oil Temperature (°C) [°F]	Maximum running time	Refer.
Maximum contingency	–	106.5	–	2,080	1.8 to 2.7 $\boxed{3}$ [25.6 to 38.4]	+20 to +85 ★ [68 to 185]	6 minutes	$\boxed{1}$
Intermediate contingency	735	100	100				1 hour	$\boxed{2}$
	750						1 hr/TBO	$\boxed{5}$
Maximum take–off	735	100 $\boxed{4}$	100	2,080	1.8 to 2.7 $\boxed{3}$ [25.6 to 38.4]	+20 to +85 [68 to 185]	5 minutes	–
Take–off with water injection							1 minute	$\boxed{6}$
Maximum continuous	690	100	97	1,900			unlimited	–
0.8 max. continuous			94	1,700				
Idle	550	–	60 + 3	–	min.1.2 [17.1]	–20 to +85 [68 to 185]	unlimited	–
Starting – from ground sources – from on–board sources	 700 730	–	min.18	–	at temp. below 0°C [32°F] max. 3.5 [50]	min.–20 [–4]	45 sec.	–
Acceleration: – at altitudes 0 to 13,000 ft – above altitude 13,000 ft	 735 735	Max. overshoot 106 106	Max. overshoot 101 101	Max. overshoot 2,140 $\boxed{9}$ 2,140	1.8 to 2.7 $\boxed{3}$ [25.6 to 38.4]	+20 to +85 [68 to 185]	 5 sec. 6 sec.	 $\boxed{7}$ $\boxed{8}$
Max. reverse	710	–	97	1,900			1 minute	●
"Emergency circuit" (operation with automatic regulation off)	710	100	99	2,080			1 hour	$\boxed{10}$

REFERENCES

1 After maximum contingency power it is permitted to use intermediate contingency power for 30 minutes.

2 Only when second engine is failed.

3 For oil temperature range from 20°C to 55°C (68°F to 130°F) an increase of oil pressure of 0.3 kp/cm^2 (4.27 psi) is permitted.

4 At take–off it is possible to raise torque to 106% for short time.

5 Only when second engine is failed and atmospheric temperature is above +30 °C.

6 For atmospheric temperature above +23 °C (73.4°F). Water injection according to Fig. 4–3.

Water injection is permitted on the mountain airports:

- for height from 2,600 to 4,200 ft (from 800 to 1,300 m) for atmospheric temperature above + 15°C (58°F)
- for height above 4,200 ft (1,300 m) for atmospheric temperature above +10 °C (50°F)

7 Move TCL during 1 s. Maximum 3 overshoots are allowed at acceleration. Acceleration is performed from an initial regime for acceleration which is given by generator speed n_G = 70% for altitudes up to 3,280 ft (1,000 m) ISA and n_G = 75% for altitudes above 3,280 ft (above 1,000 m) ISA. Acceleration time is determined by reaching 95% take–off power under given atmospheric condition.

8 Move TCL during min. 6 s. Maximum 3 overshoots n_G are allowed to stabilize. Initial regime for acceleration see 7.

9 Maximum overshoot of the propeller speed after acceleration in case of missed approach is 2,200 RPM. Time to stabilization is max. 6 s.

10 Fuel condition lever move during min. 6 s for acceleration.

● If conditions not correspond ISA 0 ft (0 m), V = 0 kt (0 km/hr) the generator speed is changed and power is changed according to constant fuel flow condition.

★ Increase of oil temperature to max. +95 °C (203°F) is permitted for intermediate contingency power.

AIRSPEEDS

MAXIMUM OPERATING LIMIT SPEED, V_{MO} 181 KIAS (335 km/hr IAS)

This operating limitation must not be deliberately exceeded in any regime of flight (climb, level flight, descent).

DESIGN MANOEUVERING SPEED, V_A 143 KIAS (265 km/hr IAS)

Do not make full or abrupt control movements above this airspeed.

DESIGN SPEED FOR MAXIMUM GUST INTENSITY, V_B 143 KIAS (265 km/hr IAS)

Maximum airspeed in the turbulence

MAXIMUM LANDING GEAR OPERATING SPEED, V_{LO} 135 KIAS (250 km/hr IAS)

MAXIMUM LANDING GEAR EXTENDED SPEED, V_{LE} IS SAME AS V_{LO}.

MAXIMUM FLAPS EXTENDED SPEED, V_{FE}

- flaps in take-off position (18°) 135 KIAS (250 km/hr IAS)
- flaps in landing position (42°) 119 KIAS (220 km/hr IAS)

Automatic interlocking prevents the wing flaps from moving to landing position at the airspeeds above 111 KIAS (205 km/hr IAS).

MAXIMUM FLAPS OPERATING SPEED, V_{FO} IS SAME AS V_{FE}

MAXIMUM PERMISSIBLE SPOILER EXTENSION SPEED, V_{SPOIL} 102 KIAS (190 km/hr IAS)

MINIMUM CONTROL SPEED

- **for take-off run, V_{MCG}** 70 KIAS (130 km/hr IAS)
- **for take-off, V_{MCA}** 73 KIAS (135 km/hr IAS)
- **for landing, V_{MCL}** 73 KIAS (135 km/hr IAS)

MINIMUM TAKE-OFF SAFETY SPEED V_2

- **flaps in 0° position** 94 KIAS (175 km/hr IAS)
- **flaps in 18° position** 84 KIAS (155 km/hr IAS)

MARKINGS OF THE AIRSPEED INDICATOR

Airspeed indicator	RANGE	RED LINE (MIN.)	GREEN ARC	WHITE ARC	YELLOW ARC	RED LINE (MAX.)	BLUE RADIAL
KIAS	0 to 300	73 [1]	73 to 181	55 to 135 [2]	-	181 [3]	108
km/hr IAS	0 to 600	135 [1]	135 to 335	102 to 250 [2]	-	335 [3]	200

[1] V_{MCA} Minimum control speed for take-off.

[2] V_{FE} Maximum permissible flaps extended speed:
- thick arc for flaps in landing position 42° (max. 119 KIAS [220 km/hr IAS]),
- thick and thin arc for flaps in take-off position 18° (max. 135 KIAS [250 km/hr IAS]).

[3] V_{MO} Maximum operating speed.

BLUE LINE - airspeed with one engine inoperative

WHITEARC - airspeed range for wing-flaps using

KINDS OF OPERATION

The airplane is approved for flight day and night according to IFR and VFR and in the full range of icing conditions according to FAR 25, Appendix C, if airplane is equipped according to operating rules of the relevant state.

WARNING

THE AIRPLANE IS NOT APPROVED FOR FLIGHT INTO FREEZING DRIZZLE OR FREEZING RAIN, WHICH ARE OUTSIDE OF THE CERTIFICATION ENVELOPE. IN CASE OF INADVERTENT ENCOUNTER PERFORM PROCEDURE "INADVERTENT FLIGHT INTO FREEZING RAIN OR FREEZING DRIZZLE" - SEE SECTION IV.

KINDS OF OPERATIONS EQUIPMENT LIST

The system and items of equipment listed must be installed and operable for the particular kind of operation indicated.

NOTE

Additional functional equipment may be required by the relevant national operating rules.
Further information is listed in approved Master Minimum Equipment List (MMEL).
The following system and equipment list does not include components obviously required for the airplane to be airworthy such as wings, tail units, engines, etc.

SYSTEM or COMPONENT	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	ICING CONDITIONS
ELECTRICAL POWER					
1. Battery	2	2	2	2	2
2. DC Generator	2	2	2	2	2
3. AC Generator	1	1	1	1	2
4. Inverter 115 V AC	1	2	2	2	2
5. Inverter 36 V AC	2	2	2	2	2
6. Voltampermetr	2	2	2	2	2
7. Voltmeter 36 V AC	1	1	1	1	1
8. Voltmeter 115 V AC	1	1	1	1	1
EQUIPMENT / FURNISHINGS					
1. Safety belt for Each Seat	1	1	1	1	1
2. Safety belt and Shoulder harness for Each Pilot	1	1	1	1	1
FIRE PROTECTION					
1. Engine Fire Warning Annunciator (Horn and Light)	2	2	2	2	2
2. Front Baggage Compartment Fire Warning Light	1	1	1	1	1
3. Rear Baggage Compartment Fire Warning Light (if installed Rear Baggage Compartment accessible from outside)	1	1	1	1	1
4. Engine Fire Extinguishing System	2	2	2	2	2
5. Front Baggage Compartment Fire Extinguishing System	1	1	1	1	1
6. Rear Baggage Compartment Fire Extinguishing System (if installed Rear Baggage Compartment accessible from outside)	1	1	1	1	1
FLIGHT CONTROLS					
1. Stall Warning Horn	1	1	1	1	1
2. Aileron Trim System with Position Indicator	1	1	1	1	1
3. Elevator Trim System	1	1	1	1	1

(cont.)

SYSTEM or COMPONENT	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	ICING CONDITIONS
4. Rudder Trim System with Position Indicator	1	1	1	1	1
5. Flap System with Position Indicator	1	1	1	1	1
FUEL SYSTEM					
1. Fuel Pump	2	2	2	2	2
2. Fuel Fire Cock	2	2	2	2	2
3. Crossfeed Solenoid Valve	1	1	1	1	1
4. Fuel Flow Indicator	2	2	2	2	2
5. Fuel Quantity Warning Light	2	2	2	2	2
6. Fuel Quantity Indicator	2	2	2	2	2
7. Fuel Pressure Indicator	2	2	2	2	2
8. Minimum Fuel Pressure Warning Light	2	2	2	2	2
9. Fuel Quantity Indicator in Wing Tip Tanks	2	2	2	2	2
ICE AND RAIN PROTECTION					
1. Wings and Tail Unit Deicing System	0	0	0	0	1
2. Engine Air Intake Deicing System	2	2	2	2	2
3. Propeller Deicing System	0	0	0	0	2
4. Heated Windshield (Left)	0	0	0	0	1
5. Windshield Wiper (Left)	1	1	1	1	1
6. Pitot Tube Heater	1	1	2	2	2
7. Static Pressure Head Heater	1	1	2	2	2
8. Ram Pressure Head Heater	1	1	1	1	1
LANDING GEAR					
1. Landing Gear Position Indicator Lights	3	3	3	3	3
2. Extended Landing Gear Warning Horn	1	1	1	1	1
3. Nose Wheel Steering System	1	1	1	1	1
4. Emergency Hydraulic Hand Pump	1	1	1	1	1
5. Brake System	1	1	1	1	1

(cont.)

SYSTEM or COMPONENT	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	ICING CONDITIONS
LIGHTS					
1. Anti-Collision Beacon	2	2	2	2	2
2. Position Lights	0	3	0	3	0
3. Landing Lights	0	3	0	3	0
4. Cockpit Lighting	0	1	0	1	0
5. Instrument Panel Lighting System	0	1	0	1	0
6. Passenger Cabin Lighting (1/3)	0	1	0	1	0
7. Emergency Lighting System	1	1	1	1	1
8. Static Ice Detector Lighting	0	1	0	1	1
NAVIGATION					
1. Gyro Horizon	0	0	1	1	1
2. Altimeter	1	1	1	1	1
3. Airspeed Indicator (Left Side)	1	1	1	1	1
4. Speed Warning Device (V_{MO})	1	1	1	1	1
5. Magnetic Compass	1	1	1	1	1
6. Outside Air Temperature Indicator	1	1	1	1	1
7. Gyromagnetic Commpass Indicator	0	0	1	1	1
8. Turn and Bank Indicator	0	0	1	1	1
9. Vertical Speed Indicator	0	0	1	1	1
10. Clock	0	0	1	1	1
11. Sensitive Altimeter	0	0	1	1	1
12. Navigation System *)	0	0	1	1	1
13. VHF Transceiver	0	0	1	1	1
DOOR					
1. Door Warning Light	1	1	1	1	1
PROPELLER					
1. Propeller Control System	2	2	2	2	2
2. Beta Range Warning Light	2	2	2	2	2
ENGINE INDICATING					
1. ITT Indicator	2	2	2	2	2
2. Gas Generator Speed Indicator	2	2	2	2	2
3. Propeller RPM Indicator	2	2	2	2	2

(cont.)

SYSTEM or COMPONENT	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	ICING CONDITIONS
4. Torque Indicator	2	2	2	2	2
5. IELU	2	2	2	2	2
ENGINE OIL					
1. Oil Pressure Indicator	2	2	2	2	2
2. Oil Temperature Indicator	2	2	2	2	2
3. Chips Warning Light	2	2	2	2	2
4. Minimum Oil Pressure Warning Light	2	2	2	2	2

*) Navigation system compatible with appropriate ground navigation equipment.

MANOEUVRES

Aerobatic manoeuvers are prohibited.

The limit maneuver load factors are following:

- positive:

  wing flaps extended 2.0

  wing flaps retracted 3.1

- negative: .... −1.24

It is recommended not exceed banks ±30° for enroute flight.

MINIMUM CREW

The minimum crew : 2 pilots.

SYSTEMS AND EQUIPMENT LIMITATIONS

BRAKE OPERATIONS

Max. pressure in the parking brake .... 25 + 5 kp/cm^2 (355 + 71 psi)

Max. pressure during emergency braking .... 45 + 3 kp/cm^2 (640 + 43 psi)

Max. pressure during engine test .... 50 ± 5 kp/cm^2 (711 ± 71 psi)

Antiblocking device can be used for speed range 11 – 85 kts (20 – 157 km/hr).

WARNING

THERE MUST BE NO PRESSURE IN THE BRAKE SYSTEM BEFORE LANDING.

CAUTION

TAKE-OFF WITH INOPERATIVE BRAKES IS BANNED.

ZERO PRESSURE MUST BE IN THE PARKING BRAKES BEFORE TAXIING.

WHEN NORMAL OR EMERGENCY BRAKING IS USED, MAIN WHEELS MUST BE ON THE GROUND, LANDING GEAR MUST BE LOADED.

SPEEDS FOR BRAKE APPLICATION

1. For typical landing with wing flaps in the landing position (42°), the demostrated speed for brake application is V = 85 KIAS (157 km/hr IAS).
2. For emergency landing with wing flaps in the cruise position (0°) or aborted take- off with wing flaps in the take- off position (18°), the demonstrated speed for brake application is V = 89 KIAS (165 km/hr IAS).

NOTE

After emergency landing with wing flaps in the cruise position (0°) or aborted take-off with wing flaps in the take-off position (18°) perform check of brakes – refer to Maintenance Manual, Chapter 32.

SPOILER OPERATIONS

The spoilers can be controlled only by left pilot.

Maximum height for spoilers using .... 1.6 ft (0.5 m)

ELECTRICAL SYSTEM LIMITATIONS

Maximum ground load on one generator
(for 30 minutes as a maximum) .... 100 A

Maximum in–flight load on one generator .... 200 A

Maximum permissible in–flight load on one generator (for 30 minutes as a maximum)
at ambient temperature below +5 °C (41°F) .... 250 A

HYDRAULIC SYSTEM LIMITATIONS

It is possible to use these hydraulic fluids only:

AEROSHELLFLUID 4 .... according to MIL – H 6085A

AEROSHELLFLUID 41 .... according to MIL – H 6085A

AMG – 10 .... according to GOST 6794 – 75

AIR CONDITIONING USE

Maximum permissible temperature
in the ducts of the heating system .... 80°C (176°F)

ICE PROTECTION SYSTEM LIMITATIONS

Minimum heating time of front windshield in
I. position before switching to position II. .... 7 minutes

The operation of the Pitot–static system heads and the stall probe heating when the airplane is on the ground is limited as follows:

- at ambient temperatures above 0°C (32°F) .... 1 minute maximum
- at ambient temperatures below 0°C (32°F) .... 3 minutes maximum

(cont.)

The max. operation time of the Pitot-static system heads, the stall probe and windshield heating when the airplane is on the ground after landing .... 2 minutes

Minimum ambient temperature for switching on the pneumatic airframe deicing system .... −30 °C (−22 °F)

Minimum pressure when the pneumatic deicing system is out of operating cycle .... 1.2 kp/cm^2 (17.1 psi)

MAGNETIC COMPASS USE

If the magnetic compass is used, then the WINDSHIELDHEATING must be in position I., and the fan and windshield wiper must be off. The fan must be turned to the right and tilted up.

MISCELLANEOUS LIMITATIONS

TAXIING SPEED

Taxiing speed on unpaved strips must be lower than 27 kts (50 km/hr).

CAUTION

USE AS LOW SPEED AS POSSIBLE WHEN RUNNING OVER A ROUGH SURFACE WITH WING TIPS TANK FILLED WITH FUEL.

VALID FOR SYSTEMS

Maximum permissible operating time of the landing lights during landing is 5 minutes.

Logo light situated on the horizontal stabilizer (if installed) can only be switched on when DC generators are switched on and the engines are running.

Before take-off the elevator trim tab handwheel must be set in such a way that the mechanical indicator is in green area.

NOTE

Further limitations for the navigation equipment and optional equipment are mentioned in the Section IX - Supplements of this AFM.

FLIGHT DATA RECORDER (BUR-1-2G)

Minimum time for reach operating temperature (starting time) .... 3 minutes (at amb. temperature bellow −40 °C (−40 °F) time increased to 15 minutes)

INSTRUMENT MARKINGS

INSTRUMENT	RANGE	RED LINE (MIN.)	GREEN ARC	YELLOW ARC	RED LINE (MAX.)	NOTE
Inter Turbine Temperature (°C)	0 to 900	-	430 to 690	690 to 735	735	-
Torquemeter (% Torque)	0 to 120	-	0 to 100	100 to 106.5	106.5	-
Generator Speed (%)	0 to 110	60	60 to 97	97 to 100	100	-
Propeller speed (RPM)	0 to 2,500	-	800 to 2,080	-	2,080	-
Fuel pressure (kp/cm^2)	0 to 16	-	0.5 to 12	-	12	-
Oil pressure (kp/cm^2)	0 to 4	1.2	1.8 to 2.7	1.2 to 1.8 2.7 to 3.5	3,5	-
Oil temperature (°C)	-30 to +120	-	+20 to +95	-20 to +20	+95	-
Hydraulic pressure (kp/cm^2)	0 to 240	100	137 to 165	100 to 137	165	-
Brake accumulator pressure (kp/cm^2)	0 to 240	137	137 to 165	165 to 180	180	-
Brake pressure (kp/cm^2)	0 to 60	5	5 to 50	-	50	-
Parking brake pressure (kp/cm^2)	0 to 100	25	25 to 30	30 to 55	55	-
Ice protection pressure (kp/cm^2)	0 to 3	-	1.2 to 1.5	-	-	-
Cabin temperature (°C)	0 to 40	-	18 to 30	-	30	-
Air ducts temperature (°C)	20 to 120	-	20 to 80	-	80	-
Battery temp. indicator (°F) (if installed)	90 to 190	-	90 to120	120 to 150	150 to 190	-
Fuel gauge indicator (kg)	0 to 525	-	-	10 to 110	-	-
DC Voltmeter (V)	0 to 45	-	34 to 39	-	-	-
Volt-ampere meter (LH) (V)	0 to 40		23.5 to 30			
(A)	-50 to250					

(pokr.)

INSTRUMENT	RANGE	RED LINE (MIN.)	GREEN ARC	YELLOW ARC	RED LINE (MAX.)	NOTE
Volt-ampere meter (RH) (V)	0 to 40		25 to 30			
(A)	-50 to250					
AC Voltmeter (V)	0 to 150	-	111 to 123	-	-	-
Pressure gauge of front baggage extinguisher (kp/cm^2)	0 to 16	4	4 to 15.5	-	15.5	-

COLOR MARKINGS USED ON THE INSTRUMENTS

RED RADIAL LINE - maximum and/or minimum permissible value of the measured parameter

GREEN ARC - normal operating range

YELLOW ARC - permissible for short duration (caution range)

PLACARDS

The following limitations are emphasized by means of placards in the cockpit:

Airspeed indicator in km/h

V_{MO}	335
V_A	265
V_{LO} V_{FE18^o}	250
V_{FE42^o}	220
V_{SPOIL}	190

Airspeed indicator in KNOTS

V_{MO}	181
V_A	143
V_{LO} V_{FE18^o}	135
V_{FE42^o}	119
V_{SPOIL}	102

Located on the RH and LH instrument panel.

AEROBATIC MANOEUVRES PROHIBITED

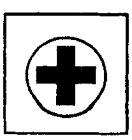
Located on central instrument panel.

IF BOTH GENERATORS INOPERATIVE USE DATA ON REVERSE SIDE OF COMPASS DEVIATION CHART

Located on LH side next to overhead panel.

DEVIATION ESTABLISHED WITH RADIO EQUIPMENT ON

Located on RH and LH side next to overhead panel.

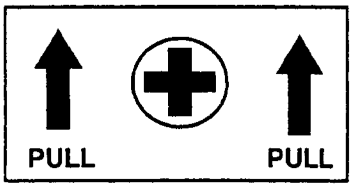


Located on RH and LH side next to overhead panel.

THIS AIRPLANE MUST BE OPERATED AS A COMMUTER CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN FORM OF PLACARDS MARKINGS AND MANUALS. THIS AIRPLANE APPROVED FOR VFR IFR DAY & NIGHT OPERATION & IN ICING CONDITIONS.	Located on overhead panel.

Following placards are located in the passenger's compartment:

TOP SECTION LIMIT LOAD 60 kg BOTTOM SECTION LIMIT LOAD 90 kg	Located in the rear baggage compartnent.
LIFE-VEST UNDER YOUR SEAT	Located on 7th frame on control cover and on LH, RH side before the first seat row and on the back side of rest of each passenger seat which has a servicing table.
ELT LOCATED HERE	Located on the ceiling opposite the rear baggage compartment.
PUSH TO CALL CREW	Located on the RH and LH side above passenger's seats.
FASTEN SEAT BELTS	Located on 7th frame of controls cover.
FIRE EXTINGUISHER	Located on RH side next to the entry door. (if the buffet after last single seat is installed, then placard is located on the wall of 18th frame)
	Located on 7th frame on controls cover.
NO SMOKING	Located at the toilet.



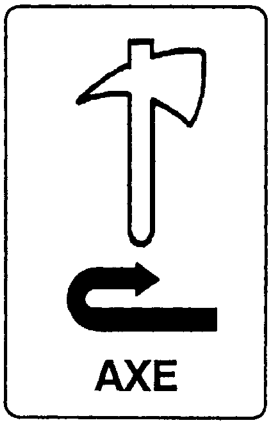
Located above the entry door.

DANGER PROPELLER

Located next to the front emergency exit.

OXYGEN

Located on 18th frame.

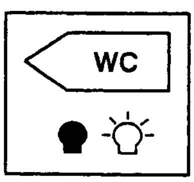


Located on 7th frame on controls cover.

AIRSTEPS

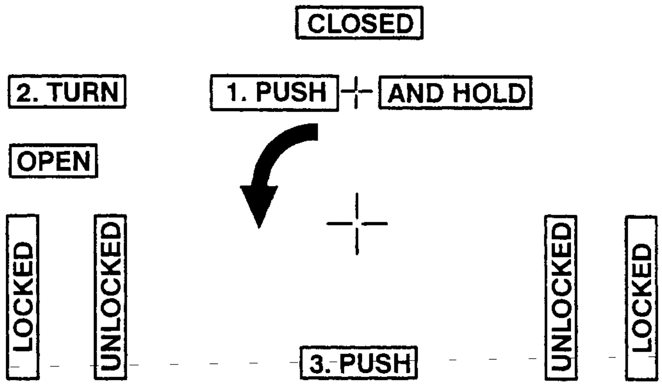
Located on cover of airsteps (18th frame).

Located on 7th frame on control covers and next to the side emergency exits.

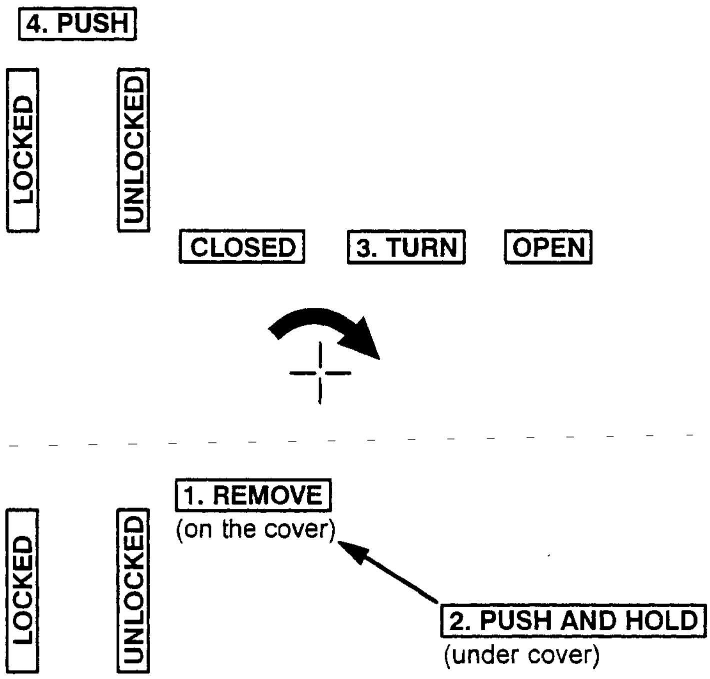


Located on the 21th frame.

Placards on the entry door:

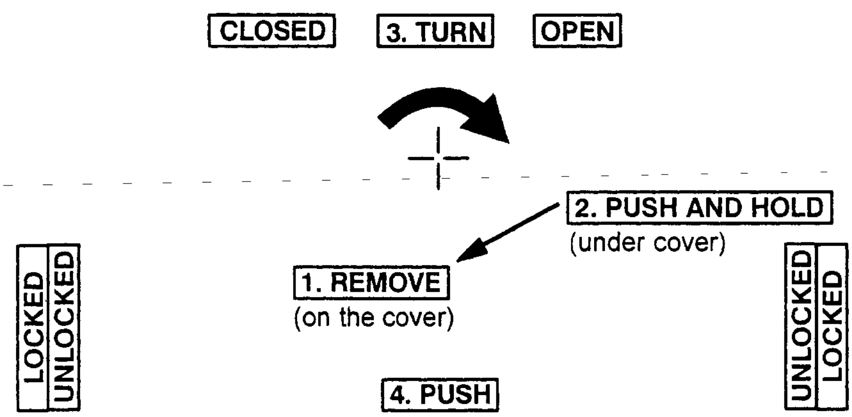


Placards on the front emergency exit:

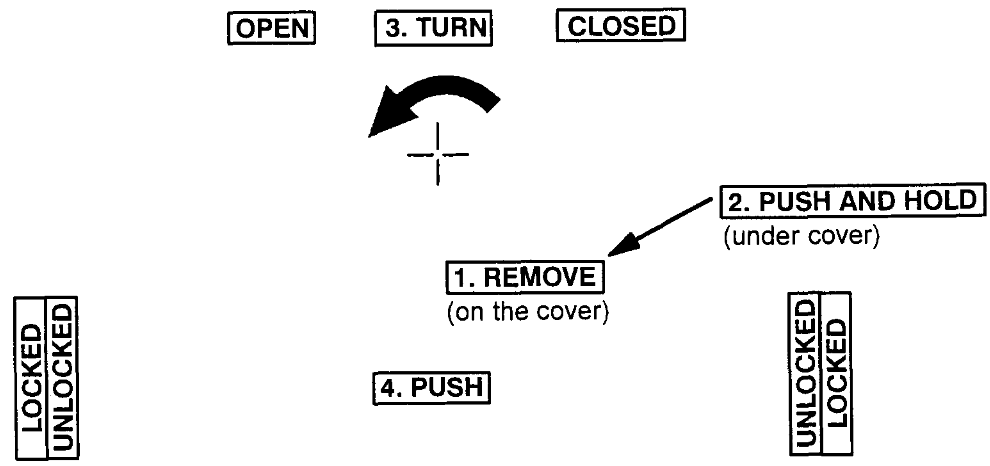


Placards on the side emergency exits:

RH EMERGENCYEXIT



LH EMERGENCYEXIT



EXIT	Located above the entry door and emergency exits.
EMERGENCY EXIT	Located on the emergency exits.
ONLY SOFT ARTICLES MAX. LOAD 10 kg	Located on the rack next to entry door.
SEAT NOT TO BE OCCUPIED DURING TAKE OFF AND LANDING	Located in the toilet.

NOTE

All placards for the passengers have to be provided in the local language in addition.

The following placards are installed in the front baggage compartment:

MAX. LOAD 100 kg MAXIMUM SPECIFIC LOAD 400 kg/m^2	Located on the 5th frame.

EXTERIOR PLACARDS AND MARKINGS

CUT HERE TO BRAK IN	Located on the right side next to the entry door.
DO NOT STEP HERE	Located on the wing and on the horizontal tail.

	Located above the entry door.
DO NOT PRESS HERE	Located on the engine nacelles.
PRESS FIRE EXTINGUISHER BY GROUND MEANS	Located on the outer side of the engine nacelles.
E.L.T.	Located above the entry door, next to ELT antenna.
FUEL 628 l MAX. PRESS. 0.39 MPa AVIATION KEROSENE	Located on the upper side of the wing next to the filling neck.
AVIATION KEROSENE FUEL 200 l MAX. PRESS. 0.39 MPa	Located on the wing tip fuel tank.
OIL 11 l	Located on the outer side of the engine nacelles.
HYDRAULIC FLUID	Located on the upper side of the wing above the engine nacelles.
DISTILLED WATER MAX. 10 l	Located on the RH landing gear nacelle.
AIR 0.49 MPa	Located on the RH landing gear nacelle.
NITROGEN 1.47 MPa NITROGEN 4.9 MPa	Located on the LH landing gear nacelle.
GROUND HYDR. SOURCE 14.7 MPa COMPRESSED AIR GROUND SOURCE 0.54 MPa	Located in the back of the outer side of the LH engine nacelle.
GROUND POWER 28 V FC 500 A	Located on the LH side of the front part of fuselage.

EMERGENCY PROCEDURES

TABLE OF CONTENTS

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AIRSPEEDS FOR SAFE OPERATION

3. Minimum safe take–off airspeed	
with wing flaps in 18° position	V_2 = 84 KIAS (155 km/hr IAS)
with wing flaps in 0° position	V_2 = 97 KIAS (180 km/hr IAS)
4. One engine inoperative best angle of climb airspeed (Wing flaps 0°)	V_X = 100 KIAS (185 km/hr IAS)
5. One engine inoperative best rate of climb airspeed (Wing flaps 0°)	V_Y = 108 KIAS (200 km/hr IAS)
6. One engine inoperative minimum airspeed for climbing on route (Wing flaps 0°)	108 KIAS (200 km/hr IAS)

ENGINE FIRE

* 1. Engine	DETERMINE
The following items are valid for engine on fire:	
* 2. Fuel fire cock	SHUT
* 3. HEATING lever	SHUT (DOWN)
* 4. EXTINGUISH.– PRIM. push–button	PUSH
5. TCL	IDLE
6. MANUAL FEATHER push–button	PUSH
7. PCL	FEATHER
8. DC GENERATOR and AC GENERATOR switches	OFF
If fire continues:	
9. EXTINGUISH.– SEC. push–button	PUSH
10. Fuel stop cock/Emergency throttle lever	SHUT
11. ENGINE STARTING, IELU, FUEL PUMP circuit breakers	OFF
12. Land on the nearest suitable airport.	

(cont.)

WARNING

NEVER RE–START AN ENGINE AFTER IT HAS BEEN ON FIRE.

NOTE

Steps marked with an asterisk (∗) are the most vital and urgent actions – "memory items". These steps are recommended for keep them in mind.

1. When a FIREcell on the central warning display (CWD)come on, first make sure this is not a false alarm. If signs such as smoke, flames, smell of burning, or changes in the behaviour of the engine confirms a real fire, proceed with the ENGINE FIRE emergency procedure.

2. If the secondary extinguisher button is pushed, the extinguisher nozzles in the burning engine are fed from the extinguisher bottle of the other engine. No more further means remain for extinguishing an engine fire.

3. The heating system may be re–engaged 5 minutes after the fire has been extinguished.

4. After the engine has stopped, note down the maximum ITT and the length of time this max. temperature was maintained.

COCKPIT OR CABIN FIRE

The following procedure applies both to cockpit and passenger cabin fire.

1. If smoke appears, put on the oxygen masks and, if necessary, the protective goggles.
2. Switch on the FASTEN SEAT BELTS circuit breaker.
3. Start the descent as required to a flight level that is safe with respect to the weather and terrain profile.
4. Determine the source of the fire:
   – If the fire has been initiated by a faulty electrical device (appliance) switch off this its control element.

(cont.)

CAUTION

DO NOT SWITCH OFF CIRCUIT BREAKERS MARKED WITH YELLOW STRIP, AS LONG AS CAPTAIN DECIDED DIFFERENTLY. IN CASE FAILURE OF THE MAIN BUSES IT IS POWER FOR CIRCUIT BREAKERS MARKED WITH YELLOW STRIP AUTOMATICALLY SWITCH TO EMERGENCY BUSES.

5. Extinguish fire by means of the portable fire extinguisher.
6. If necessary open one or both cockpit windows.

<u>If you have not succeeded in extinguishing the fire:</u>

7. Perform either landing on the nearest airport or forced landing.

USING THE PORTABLE FIRE EXTINGUISHER

Pull the extinguisher from the holder, located behind the copilot's seat or located on the RH side next to the entry door.

<u>It is valid only for the portable fire extinguisher with manometer:</u>
Hold the extinguisher with the valve at the top, throw out locking pin from grip of the extinguisher, and press down both parts of the grip to release the closing valve.

<u>It is valid only for the portable fire extinguisher without manometer:</u>
Hold the extinguisher with the valve at the top, remove locking pin from extinguisher handle. Release safety catch, squeeze lever and sweep base of flame.

FRONT BAGGAGE COMPARTMENT FIRE

* 1. Pull out the BAGGAGE COMPARTMENT EXTINGUISHING handle on the right-hand control panel and hold it until the pressure gauge on the instrument panel reads zero.
2. Switch on the FASTEN SEAT BELTS circuit breaker.
3. Start descent quickly to a flight level that is safe with respect to the weather and the terrain profile.
4. If necessary open one or both cockpit windows.

NOTE

When the BAG. COMP. FIRE cell on CWD comes on, first make sure that this is not a false alarm. If signs such as smoke or an abnormally warm rear wall of the baggage compartment confirm that there is a fire, proceed with the FRONT BAGGAGE COMPARTMENT FIRE emergency procedure.

BOTH GENERATORS INOPERATIVE

When both LH DC GENERATOR and RH DC GENERATOR cells on CWD come on:

1. LH GENERATOR and RH GENERATOR switches on the overhead panel — Check SWITCHING-ON and attempt to re-engage the generators only once.

If the generator default signals remain on:

2. Switch off all circuit breakers and switches which are not marked with a yellow strip. In case failure of the main buses, the power for circuit breakers marked with yellow strip is automatically switched to emergency buses.
   Captain determine which circuit breakers and switches marked with yellow strip keep on according conditions of the flight.

NOTE

In icing conditions keep on corresponding circuit breakers of the deicing systems or abandon icing conditions area.

3. Check the battery discharging current, and use the graph in Fig. 3-1 to estimate how long the batteries will supply the energy before their voltage drops to the residual 20 V which is the emergency minimum.

NOTE

To check the discharging current, set the volt/ammeter switch on the right-hand control panel to the BATTERY I VA, II VA positions, and read the discharging current on the right-hand volt/ammeter.

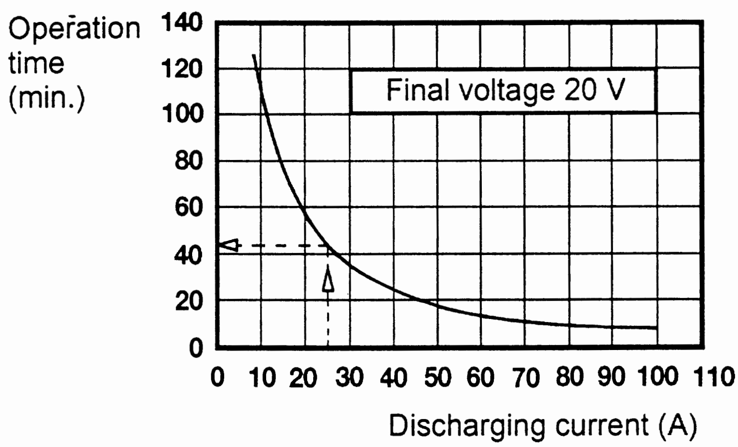


Fig. 3 - 1

4. Take a decision on the place to land.

EMERGENCY DESCENT

1. SSR	SET 7700, INFORM ATC
2. TCL	DECREASE POWER AS REQUIRED
3. FASTEN SEAT BELTS circuit breaker	SWITCH ON
4. Quick descent	START
5. Airspeed	DO NOT EXCEED V_{MO} = 181 KIAS (335 km/hr IAS)

FORCED LANDINGS

1. Choose the place for landing
2. Approach at the minimum safety airspeed
3. At night, make approach with the emergency external light switched on, and after descending to 350 to 500 ft (100 to 150 m) switch on the SEARCHLIGHTS LANDING.

NOTE

1. It is recommended that for all emergency landings on land, the wing flaps should be extended to 42° and the landing gear extended, except for landings on very uneven surfaces in which case the landing gear should preferably be retracted.

2. ELT and further radionavigation equipment emergency operation is described in AFM, Section 9.

LANDINGS WITH FAULTY LANDING GEAR

CAUTION

IF POSSIBLE DO NOT LAND ON A HARD–SURFACED RUNWAY.

PILOTING TECHNIQUE

The piloting technique for approach and landing with a faulty landing gear is generally similar to that described above under FORCED LANDINGS, except for the following recommendations:

- before landing, transfer fuel from the wing tip tank to the main wing tanks;
- immediately after landing, while still in the cockpit, consecutively switch off power source (DC GENERATOR RH, LH; AC GENERATOR RH, LH; BATTERY I,II), check the extent of damage, especially near the fuel tanks and engines, and make sure that no fire has broken out. If you detect a fire, then proceed according to ENGINE FIRE.

NOSE WHEEL LANDINGS (WITH MAIN WHEELS RETRACTED)

If it is possible to retract the nose wheel, retract it and perform the wheels–up landing.

If it is impossible to retract the nose wheel, touch down so that the first contact with the ground will occur with the rear part of the fuselage.

MAIN WHEELS LANDINGS (WITH THE NOSE WHEEL RETRACTED)

After touchdown, while rolling to a stop, use the elevator to keep the nose of the airplane off the ground as long as possible.

WARNING

DO NOT USE THE BRAKES.

LANDING ON NOSE WHEEL AND ONE MAIN WHEEL

Before touchdown, bank the airplane toward the extended main wheel, and keep the bank for as long as possible by means of the ailerons and pedal–operated steering.

(cont.)

CAUTION

TO SHORTEN THE LANDING RUN, THE EXTENDED MAIN WHEEL MAY BE BRAKED VERY GENTLY.

WHEELS–UP LANDINGS

1. Select a suitable spot free of obstacles and preferably with a soft surface, such as a meadow or a sloughed field, etc.
2. The airplane must touch down at its minimum landing airspeed, without any surplus kinetic energy, to prevent uncontrollable rebound from the ground.
3. Touch down, so that the first contact with the ground will occur with the rear part of the fuselage. Never touch down on the whole bottom surface of the fuselage.

LANDING ON WATER

NOTE

Same as landing with wheels–up.

1. Always land on water with landing gear UP and wing flaps extended to 42^{o}.
2. Burn off as much fuel as possible before landing to reduce the airplane weight.
3. Always try to land as close to seashore or a ship as possible. In a storm try to land where the waves are smallest.
4. If the sea is rough, carry out the landing along the wave ridges making use as much as possible of the head wind component.
5. Inform passengers, prepare life–vest for using.

EMERGENCY EVACUATION

The emergency evacuation is accomplished at pilot's command using the appropriate emergency exits.

Opening the individual doors:

1. Entry door
   - push and hold the button above the the control lever
   - turn the control lever in arrow direction
   - release the button above the control lever
   - open the door outward the airplane
2. Emergency exit doors (under wing)
   - remove the cover located close to the control lever
   - push and hold the button
   - turn the control lever in arrow direction
   - release the button
   - push the door outward the airplane
3. Emergency exit doors (front)
   - remove the cover located close to the control lever
   - push and hold the button
   - turn the control lever in arrow direction
   - release the button
   - open the door outward the airplane

CAUTION

DURING EVACUATION THROUGH THE FRONT EMERGENCY EXIT, FIRST MAKE SURE THAT THE PROPELLER OF RH ENGINE DOES NOT ROTATE.

FLIGHT WITH TWO ENGINES INOPERATIVE

1. FASTEN SEAT BELTS circuit breaker — SWITCH ON
2. Feathering both propellers — CHECK

If propellers aren't feathered:

- MANUAL FEATHER push–button — PUSH
- PCL — FEATHER position

3. Fuel stop cock/Emergency throttle lever — SHUT
4. Switch off all unnecessary equipment. The circuit breakers SSR and RECORDERmust remain switched on.

PILOTING TECHNIQUE

1. Maintain optimal gliding airspeed.
2. It is recommended to glide down to 1,000 ft (300 m) above the emergency landing place with retracted wing flaps. Carry out emergency flaps extension as per Section 3A, to 18° position. Extend the flaps to 42° position only it sufficient time remains. Flare the airplane as during a normal power on landing. Flare should be carried out quickly.
3. Check the pressure in the brake accumulator before landing with landing gear extended. If the pressure is below 40 kp/cm^2 (568.9 psi) apply emergency braking.
4. When making the approach at night switch on EMERGENCYLIGHTING, SEARCHLIGHTSLANDING.
5. Switch off BATTERYI and II switches beforê touched down – in the night as required (lighting the emergency landing place).

If both engines become inoperative during the flight it is necessary to maintain the following speeds for a given airplane configuration to make full use of the height available.

The data in the table are effective for the airplane weight of 13,668 lb (6,200 kg) and feathered propellers. The influence of wing tip tanks is negligible.

Landing gear position	retracted			extended		
Wing flaps position	0°	18°	42°	0°	18°	42°
Optimal gliding airspeed – KIAS (km/hr IAS)	102.5 (190)	102.5 (190)	91.5 (170)	97 (180)	94.5 (175)	89 (165)
Maximum glide number – ft : NM (m : m)	100:0.224 (1:14)	100:0.192 (1:12)	100:0.128 (1:8)	100:0.176 (1:11)	100:0.160 (1:10)	100:0.112 (1:7)
Descent rate – fpm (m/s)	790 to 890 (4.0 to 4.5)	890 to 980 (4.5 to 5.0)	1180 to 1280 (6.0 to 6.5)	890 to 980 (4.5 to 5.0)	980 to 1080 (5.0 to 5.5)	1280 to 1380 (6.5 to 7.0)

(cont.)

To have a surplus of kinetic energy or last moment touch down corrections it is recommended to carry out the final approach with a gliding airspeed higher by 5 to 10% than the optimal gliding airspeed for the selected configuration.

ABORTED TAKE–OFF

* 1.	TCL	REVERSEAS REQUIRED
* 2.	Ground spoilers	EXTEND
* 3.	Brakes	AS REQUIRED

Use pedal nose wheel steering and brakes to maintain direction and push control column forward to load the nose wheel simultaneously.

ENGINE FAILURE DURING TAKE–OFF (WING FLAPS 18^{O})

Below V_1 — ABORT THE TAKE–OFF

If engine fails above V_1 airspeed:

* 1. TCL of both engines — MAXIMUM TAKE–OFF POWER, lift–off at V_R=81 KIAS (150 km/hr IAS)
* 2. Failed engine — DETERMINE

Immediately eliminate the sideslip by full rudder deflection and by ailerons as required. The recommended angle of bank after lift–off is 5° to the side of operating engine. The force on the rudder pedal does not exceed 690 N (68 kg) at airspeed of 81 KIAS (150 km/hr IAS).

After take–off:

* 3. Landing gear — UP
* 4. Check the propeller feathering (by means of the propeller RPM indicator n_P)

(d) If the automatic feathering cycle has not been accomplished:

– MANUAL FEATHER. push button of the inoperative engine — PUSH

– IELU (LH + RH) circuit breakers — OFF

(e) If the inoperative engine propeller has not been feathered even after above measures had been taken then :

– PCL of the inoperative engine — FEATHER

(cont.)

5. Maintain take–off safety airspeed — min. V_2= 84 KIAS (155 km/hr IAS)

6. At height of 35 ft (10.7 m) set — MAXIMUM CONTINGENCY POWER

WARNING

DO NOT ALLOW THE AIRSPEED TO DROP BELOW 84 KIAS (155 KM/HR IAS).

7. At height of 200 ft (61 m) above runway AUT. BANK CONTROL switch on the central control panel — OFF

8. At height of 6 minutes point for use of max. contingency power increase the airspeed to 97 KIAS (180 km/hr IAS).

   Retract the wing flaps into the cruise position and without losing height accelerate the airplane to V_X = 100 KIAS (185 km/hr IAS). Maintain this airspeed up to 1,500 ft (457 m) above runway.

CAUTION

MAXIMUM PERMISSIBLE DURATION OF MAXIMUM CONTINGENCY ENGINE POWER SETTING IS 6 MINUTES ONLY.

9. Check the parameters of the inoperative engine.

   (a) If the engine is fully stopped

   The following items are valid for inoperative engine:

   - TCL — IDLE
   - Fuel stop cock/Emergency throttle lever — SHUT
   - DC GENERATOR, AC GENERATOR switches — OFF
   - ENGINE STARTING, IELU, FUEL PUMP circuit breakers — OFF

   If you decide to continue the flight to destination or alternate airport then at height of 1,500 ft (450 m) above runway accelerate the airplane to airspeed V_Y = 108 KIAS (200 km/hr IAS) up to the cruise level.

(cont.)

(b) If the engine operates at idle and other parameters correspond to idle power then:

- Propeller — UNFEATHER
- USE of emergency fuel control circuit

ENGINE FAILURE DURING TAKE–OFF (WING FLAPS 0^{o})

Below V_1 — ABORT THE TAKE–OFF

If engine fails above V_1 airspeed:

* 1. TCL of both engines — MAXIMUM TAKE–OFF POWER, lift–off at V_R= 97 KIAS (180 km/hr IAS)

* 2. Failed engine — DETERMINE

Immediately eliminate the sideslip by full rudder deflection and by ailerons as required. The recommended angle of bank after lift–off is 5° to the side of operating engine. The force on the rudder pedal does not exceed 690 N (68 kg) at airspeed of 97 KIAS (180 km/hr IAS).

After take–off:

* 3. Landing gear — UP

* 4. Check the propeller feathering (by means of the propeller RPM indicator n_P)

(a) If the automatic feathering cycle has not been accomplished:

- MANUAL FEATHER. push button of the inoperative engine — PUSH
- IELU (LH + RH) circuit breakers — OFF

(b) If the inoperative engine propeller has not been feathered even after above measures had been taken then :

- PCL of the inoperative engine — FEATHER

5. Maintain take–off safety airspeed — min. V_2= 97 KIAS (180 km/hr IAS)

6. At height of 35 ft (10.7 m) set — MAXIMUM CONTINGENCY POWER

(cont.)

WARNING

DO NOT ALLOW THE AIRSPEED TO DROP BELOW 97 KIAS (180 KM/HR IAS).

7. At height of 200 ft (61 m) above runway
   AUT. BANK CONTROL switch
   on the central control panel — OFF

8. At height of 6 minutes point for use of max. contingency power increase the airspeed to 100 KIAS (185 km/hr IAS). Maintain this airspeed up to 1,500 ft (457 m) above runway.

CAUTION

MAXIMUM PERMISSIBLE DURATION OF MAXIMUM CONTINGENCY ENGINE POWER SETTING IS 6 MINUTES ONLY.

9. Check the parameters of the inoperative engine.

   (a) If the engine is fully stopped

   The following items are valid for inoperative engine:

   - TCL — IDLE
   - Fuel stop cock/Emergency throttle lever — SHUT
   - DC GENERATOR, AC GENERATOR switches — OFF
   - ENGINE STARTING, IELU, FUEL PUMP circuit breakers — OFF

   If you decide to continue the flight to destination or alternate airport then at height of 1,500 ft (450 m) above runway accelerate the airplane to airspeed V_Y = 108 KIAS (200 km/hr IAS) up to the cruise level.

   (b) If the engine operates at idle and other parameters correspond to idle power then:

   - Propeller — UNFEATHER
   - USE of emergency fuel control circuit

ENGINE FAILURE DURING MISSED APPROACH

*	1. TCL of both engines	MAXIMUM CONTINGENCY POWER or INTERMEDIATE CONTINGENCY POWER (see NOTE)

Immediately eliminate the side slip by full rudder deflection and by ailerons as required. The recommended angle of bank is 5° to the side of the operating engine. The force on the rudder pedal does not exceed 690 N (68 kg) at airspeed of 81 KIAS (150 km/hr IAS).

*	2. Airspeed	min. 84 KIAS (155 km/hr IAS)
*	3. Wing flaps	18°
*	4. Landing gear	UP

* 5. Check the propeller feathering (by means of propeller RPM indicator n_P):

(a) If the automatic feathering cycle has not been accomplished:

– MANUAL FEATHERING push–button of the inoperative engine	PUSH
– IELU (LH + RH) circuit breakers	OFF

(b) If the inoperative engine propeller has not been feathered even after above measures had been taken then:

– propeller control lever of the inoperative engine	FEATHER
6. Maintain take–off safety airspeed	min. V_2=84 KIAS (155 km/hr IAS)

WARNING

DO NOT ALLOW THE AIRSPEED TO DROP BELOW 84 KIAS (155 km/hr IAS).

7. At height of 200 ft (61 m) above runways AUT. BANK CONTROL switch on the central control panel	OFF

8. At height of 400 ft (122 m) above runway increase the airspeed up to 97 KIAS (180 km/hr IAS). Retract the wing flaps into the cruise position and without losing altitude accelerate the airplane to 100 KIAS (185 km/hr IAS). Maintain this airspeed up to height of 1,500 ft (457 m) above runway.

(cont.)

CAUTION

MAXIMUM PERMISSIBLE DURATION OF MAXIMUM CONTINGENCY ENGINE POWERSETTING IS 6 MINUTES ONLY.

9. Accomplish the following procedures for inoperative engine:

– TCL	IDLE
– Fuel stop cock/Emergency throttle lever	SHUT
– DC GENERATOR, AC GENERATOR switches	OFF
– ENGINE STARTING, IELU, FUEL PUMP circuit breakers	OFF

NOTE

Maximum contingency power can be used only when the engine failure was not occurred during take-off.

AUTOPILOT (IF INSTALED)

Maximum Altitude losses due to autopilot malfunction:

Configuration	Alt Loss
Cruise, Climb, Descent	400 ft (122 m)
APR (Approach)	90 ft (28 m)
SE APR (Single engine approach)	90 ft (28 m)

CHECK LISTS OF EMERGENCY PROCEDURES

USING OF CHECK LISTS OF EMERGENCY PROCEDURES

1. The Check Lists of Emergency Procedures contain the abbreviated names of necessary procedures and reference to the corresponding part of Flight Manual with detailed explanation. The sequence of procedures is mandatory for both crew members.
2. The crew activity in emergency situation is directed by instructions of pilot–in–command. Items marked (∗) are of top importance and, in emergency case must be executed at the prescribed sequence without waste of time. If there is enough time, the pilot–in–command shall instruct the copilot to read corresponding Check List to recheck the procedures executed.

ENGINE FIRE

∗	1. Engine	DETERMINE
	The following items are valid for inoperative engine:	
∗	2. Fuel fire cock	SHUT
∗	3. Heating	SHUT (DOWN)
∗	4. EXTINGUISHING– PRIMARY	PUSH
	5. TCL	IDLE
	6. MANUAL FEATHER push–button	PUSH
	7. PCL	FEATHER
	8. DC GENERATOR and AC GENERATOR	OFF
	If fire continues:	
	9. EXTINGUISH.– SEC. push–button	PUSH
	10. Fuel stop cock/Emergency throttle lever	SHUT
	11. ENGINE STARTING, IELU, FUEL PUMP circuit breakers	OFF

COCKPIT OR CABIN FIRE

1.	Oxygen masks(goggles protecting against smoke)	PUT ON
2.	FASTEN SEAT BELTS	ON
3.	Descent	INITIATED AS REQUIRED
4.	Source of fire	DETERMINE
5.	Portable extinguishers	USE
6.	Cockpit windows	OPEN

FIRE IN FRONT BAGGAGE COMPARTMENT

* 1.	Fire extinguisher baggage compartment	SWITCH ON
2.	FASTEN SEAT BELTS	ON
3.	Descent	INITIATED AS REQUIRED
4.	Cockpit windows	OPEN

BOTH GENERATORS INOPERATIVE

1.	DC GENERATOR LH, RH	CHECK SWITCHING-ON
2.	Equipment not marked by yellow strip	SWITCH OFF
3.	Discharging current of batteries	FIND OUT AMPERES
4.	Time to battery discharging	GIVEN IN Fig. 3-1, page 3-4
5.	Place for landing	DETERMINE

ENGINE FAILURE DURING TAKE-OFF (AT AIRSPEED > V_1, WING FLAPS 18°)

* 1.	TCL of both engines	MAXIMUM TAKE-OFF POWER
* 2.	Failed engine	DETERMINE
* 3.	Landing gear	UP

(cont.)

*	4. Feathering propeller of inoperative engine	CHECK
	(a) If the automatic feathering cycle has not been accomplished:	
	– MANUAL FEATHERING push-button of the inoperative engine	PUSH
	– IELU LH + RH circuit breakers	OFF
	(b) If the inoperative engine propeller has not been feathered even after above measures had been taken then:	
	– PCL of the inoperative engine	FEATHER
	5. Airspeed	min. V_2 = 84 KIAS (155 km/hr IAS)
	6. At height of 35 ft (10.7 m) set	MAXIMUM CONTINGENCY POWER
	7. AUT. BANK CONTROL	OFF
	8. Airspeed at height of 6 minutes point for use of max. contingency power	97 KIAS (180 km/hr IAS)
	9. Flaps at height of 6 minutes point for use of max. contingency power	RETRACTED
	10. Airspeed	100 KIAS (185 km/hr IAS)
	11. Inoperative engine	FIND OUT PARAMETERS
	The following items are valid for inoperative engine:	
	12. TCL	IDLE
	13. Fuel stop cock/Emergency throttle lever	SHUT
	14. DC GENERATOR, AC GENERATOR switches	OFF
	15. ENGINE STARTING, IELU, FUEL PUMP circuit breakers	OFF

ENGINE FAILURE DURING TAKE–OFF
(AT AIRSPEED > V_1, WING FLAPS 0^{O})

*	1. TCL of both engines	MAXIMUM TAKE–OFF POWER
*	2. Failed engine	DETERMINE
*	3. Landing gear	UP

(cont.)

*	4. Feathering propeller of inoperative engine	CHECK
	(a) If the automatic feathering cycle has not been accomplished:	
	– MANUAL FEATHERING push–button of the inoperative engine	PUSH
	– IELU LH + RH circuit breakers	OFF
	(b) If the inoperative engine propeller has not been feathered even after above measures had been taken then:	
	– PCL of the inoperative engine	FEATHER
	5. Airspeed	min. V_2 = 97 KIAS (180 km/hr IAS)
	6. At height of 35 ft (10.7 m) set	MAXIMUM CONTINGENCY POWER
	7. AUT. BANK CONTROL	OFF
	8. Airspeed at height of 6 minutes point for use of max. contingency power	100 KIAS (185 km/hr IAS)
	9. Inoperative engine	FIND OUT PARAMETERS
	The following items are valid for inoperative engine:	
	10. TCL	IDLE
	11. Fuel stop cock/Emergency throttle lever	SHUT
	12. DC GENERATOR, AC GENERATOR switches	OFF
	13. ENGINE STARTING, IELU, FUEL PUMP circuit breakers	OFF

ENGINE FAILURE DURING MISSED APPROACH

*	1. TCL of both engines	MAXIMUM CONTINGENCY POWER OR INTERMEDIATE CONTINGENCY POWER
*	2. Airspeed	min. 84 KIAS (155 km/hr IAS)
*	3. Wing flaps	18°
*	4. Landing gear	UP

(cont.)

*	5. Feathering propeller of inoperative engine	CHECK
	(a) If the automatic feathering cycle has not been accomplished:	
	– MANUAL FEATHERING push–button of the inoperative engine	PUSH
	– IELU LH + RH circuit breakers	OFF
	(b) If the inoperative engine propeller has not been feathered even after above measures had been taken then:	
	– PCL of the inoperative engine	FEATHER
	6. Airspeed	min. V_2 = 84 KIAS (155 km/hr IAS)
	7. AUT. BANK CONTROL	OFF
	8. Airspeed at height of 400 ft (122 m) above runway	97 KIAS (180 km/hr IAS)
	9. Wing flaps at height of 400 ft (122 m) above runway	RETRACTED
	10. Airspeed	100 KIAS (185 km/hr IAS)
	11. Failed engine	FIND OUT PARAMETERS
	The following items are valid for inoperative engine:	
	12. TCL	IDLE
	13. Fuel stop cock/Emergency throttle lever	SHUT
	14. DC GENERATOR, AC GENERATOR switches	OFF
	15. ENGINE STARTING, IELU, FUEL PUMP circuit breakers	OFF

ABNORMAL PROCEDURES

TABLE OF CONTENTS

(cont.)

ENGINE

ENGINE FAILURE IN FLIGHT

Engine failure can be identified by a drop in the main operating parameters (ITT, T_Q, and n_G) and the following signal lights coming on: red MINIMUM OIL PRESSURE cell in the Engine section of the CWD (signal light IELU INTERVENTcell is not coming on), possibly accomplished by the amber DC GENERATOR LH (RH),
AC GENERATOR LH (RH) in the Electro section of the CWD.
In this case follow the procedure "Engine shutdown in flight".

ENGINE SHUTDOWN IN THE FLIGHT

Operating engine .... INTERMEDIATE CONTINGENCY POWER or lower, as required

Counteraction, on the controls of the engine to be shutdown:

TCL .... IDLE

MANUAL FEATHERING push-button
(unless automatic feathering has already taken place) .... PUSH

Fuel stop cock/Emergency throttle lever .... SHUT

DC GENERATOR and AC GENERATOR switches .... OFF

After the gas generator has stopped:

FUEL PUMP and WING TIP TANKS circuit breakers .... OFF

STARTING ENGINE, IELU circuit breakers .... OFF

PCL .... FEATHER

CAUTION

IF THE AUTOMATIC FEATHERING SYSTEM HAS FAILED, EVEN THE APPLICATION OF FULL RUDDER WILL NOT COMPENSATE THE RESIDUAL ASYMMETRIC THRUST, THIS HAS TO BE COMPENSATED OUT BY A 5-DEGREE BANK TOWARDS THE ENGINE THAT IS STILL WORKING.

WHEN TURNING WITH A FEATHERED PROPELLER, LIMIT BANKING TO 15 DEGREES AT THE MOST, AND MAKE SURE THAT THE BALL OF THE BANK AND TURN INDICATOR REMAINS IN ITS NEUTRAL POSITION THROUGHOUT THE TURN.

MISSED APPROACH WITH ONE ENGINE INOPERATIVE

Operating engine .... MAXIMUM CONTINGENCY POWER or INTERMEDIATE CONTINGENCY POWER (see NOTE)

Propeller of inoperative engine .... FEATHER

Perform transition to climb at airspeed .... 84 KIAS (155 km/hr IAS)

Flaps .... 18°

Landing gear .... UP

Search lights .... OFF

At height of 400 ft (122 m) above the runway:

Airspeed .... 97 KIAS (180 km/hr IAS)

Flaps .... RETRACTED

Airspeed .... 100 KIAS (185 km/hr IAS)

NOTE

More information see SECTION 5.

IN FLIGHT ENGINE STARTING

The sequence is the same as in ground starting. During the starting cycle, switch off all except the most essential electrical equipment.
Maximum altitude for in flight engine starting is 13,000 ft (4,000 m).
Recommended airspeed is between 108 to 119 KIAS (200 and 220 km/hr), maximum airspeed is 162 KIAS (300 km/hr IAS).
If flying at an ambient temperature of +5 °C (41 °F) or lower, without any anti–icing additives in the fuel it is recommended to re–start the engine not later than 2 minutes after it has stopped.

COMPRESSOR SURGING

A compressor may start surge during rapid acceleration or deceleration of the engine, and exceptionally also under its steady running condition too. This will cause unusual noises, fluctuation of the instrument readings, and a rapid rise of the ITT.

If this occurs, immediately take following actions:

TCL .... IDLE

(cont.)

If the ITT rise continues:

Fuel stop cock/Emergency throttle lever .... SHUT

After the engine has stopped, take the actions specified in Engine shutdown in flight – page 3A–1.

SPONTANEOUS IELU INTERVENTION

(a) At altitudes up to 2,300 ft (700 m) AGL (level I)

IELU intervention can be recognized by a drop in the main engine parameters (the torque to approximately 70%, the other parameters in proportion to the torque) and by the IELU INTERVENTcell, when no automatic feathering has taken place.

TCL .... match with the TCL position of the correctly working engine

IELU circuit breaker of the corresponding engine .... OFF

NOTE

Since all limiting devices are switched off, check the engine instruments regularly and frequently to make sure that none of the parameters are exceeding their limits. Moreover the gas generator speed must be checked against the ambient air temperature – see Fig. 3A–1.

TCL .... if necessary adjust engine power

(b) At altitudes above 2,300 ft (700 m) AGL (level II)

IELU intervention can be recognized by a drop in the main engine parameters (n_G drop to 60% and the other parameters diminish in proportion to n_G), by the IELU INTERVENTcell and automatic feathering.

TCL .... IDLE

IELU circuit breaker of the corresponding engine .... OFF

AUTO FEATHERING switch
(on the central control panel) .... OFF

As soon as the propeller starts to unfeather:

TCL .... move slowly forward to set the desired engine power

(cont.)

NOTE

1. Since all limiting devices are switched off, check the engine instruments regularly and frequently to make sure that none of the parameters are exceeding their limits. Moreover the gas generator speed must be checked against the ambient air temperature – see Fig. 3A–1.

2. The automatic feathering system may be re–engaged when it is obvious that the engine is functioning normally

LIMITATION OF MAXIMUM PERMISSIBLE n_G AS A FUNCTION OF AMBIENT AIR TEMPERATURE

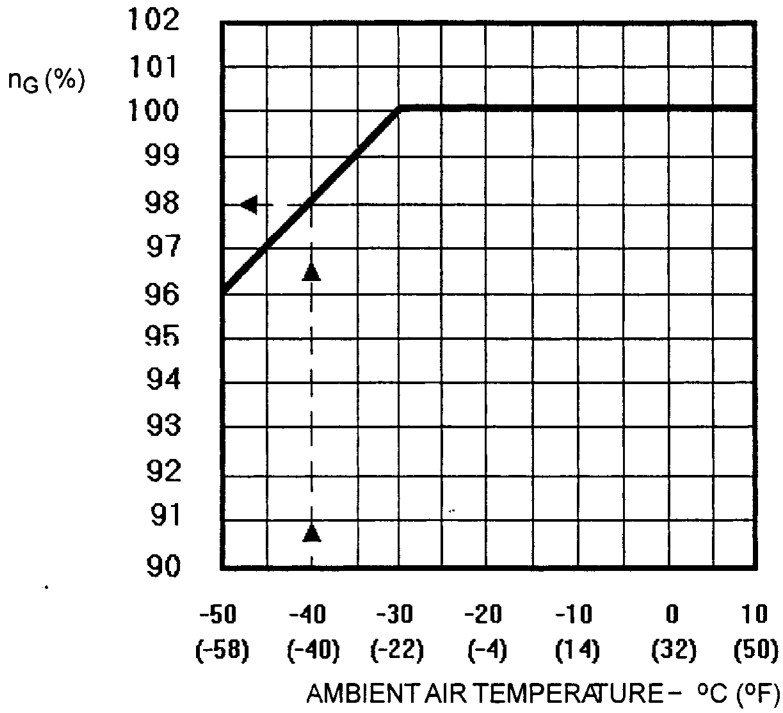


Fig. 3A – 1

The–example plotted in the graph indicates that at an ambient air temperature of –40 °C (–40 °F), the speed of the n_G must be kept below 98%.

MINIMUM OIL PRESSURE

When the amber MINIMUM OIL PRESSURE cell in the Engine section of the CWD comes on:

- Check immediately that the pressure is within operating range on the 3-pointer indicator.

If the oil pressure is not within the operating range, carry out the actions specified in Engine shutdown in flight – page 3A–1.

METAL CHIPS IN THE OIL

When the amber CHIPS cell in the Engine section of the CWD comes on:

(a) In flight with both engines running:

Check immediately all parameters of affected engine.

Continue the flight while paying particular attention to the parameters of affected engine.

If the oil temperature is above the maximum limit:

- Reduce the power of the affected engine and continue the flight.
- If the parameters of the affected engine continue to fluctuate, carry out actions specified in Engine shutdown in flight - page 3A-1.

CAUTION

DO NOT STOP THE ENGINE DURING TAKE-OFF.

(b) Under unfavourable flight conditions such as icing conditions, thunderstorms, mountains, etc., or when flying on one engine:

Set the power of affected engine to a level at which the main parameters of the engine will remain within the permissible limits.

If it proves impossible to set the power to such a level:

- If flying on both engines, stop the malfunctioning engine and land at the nearest airport.
- If flying on one engine only, do not stop the engine but carry out a forced landing - see procedure Forced landings - Section 3, page 3-5.

PROPELLER

AUTOMATIC FEATHERING

When the automatic feathering system is switched on (note the limitations stated in Section 2), and the TCL is in its forward position, which implies a n_G of at least 88 ± 1% (or 92 ± 1%, depending on the adjustment), shutting an engine down causes automatic feathering of its propeller, while an automatic interlock prevents feathering of the propeller on the other engine.

The system intervention causes the green AUTO FEATHER cell in the Engine section of the CWD to go off, and the amber FEATHER PUMP cell in the Engine section of the CWD signal to come on for 12 to 15 seconds. The actual feathering of the propeller blades takes 5 seconds at the most.
After automatic feathering, it is recommended to move the PCL of the inoperative engine to FEATHER position.

CAUTION

THE EMERGENCY FUEL CONTROL CIRCUIT IS ENGAGED AFTER USING AUTOMATIC FEATHERING. THIS IS INDICATED BY COMING ON THE "ISOLATION VALVE" CELL ON CWD.

MANUAL FEATHERING

Manual feathering is used in case of the engine failure:

- while the automatic feathering system is switched off, or
- if the automatic feathering system fails,
- in case of engine failure while the TCL is set to less than 88 ± 1% n_G (or less than 92 ± 1% n_G, depending on the adjustment),
- in other cases as necessary.

The propeller of the stopped engine is feathered by pushing of the MANUAL FEATHERING push-button of the inoperative engine.
The actual feathering of the propeller blades takes 5 seconds at the most, but the feathering pump is engaged for 12 to 15 seconds, and its running is indicated by coming on of the amber FEATHER PUMP cell in the Engine section of the CWD throughout this period.

CAUTION

THE EMERGENCY FUEL CONTROL CIRCUIT IS ENGAGED AFTER USING MANUAL FEATHERING. THIS IS INDICATED BY COMING ON THE "ISOLATION VALVE" CELL ON CWD.

NOTE

During straight and level flight a feathered propeller may turn at not more than 50 RPM in the direction of engine shaft rotation, and not more than 20 RPM in the opposite direction.

EMERGENCY FEATHERING

If the propeller blades are not feathered 5 seconds after the MANUAL FEATHERING button has been pushed, move the PCL of the stopped engine back to its rearmost, "Feathered", position. The blades will in this case take max. 20 seconds to reach feathered position.

UNFEATHERING PROPELLER

TCL .... IDLE position

PCL .... initial FEATHER position

PROP FEATHERING/AUT. BANK CONTROL
circuit breaker .... OFF and ON again

PCL .... FIN PITCH

NOTE

If the propeller unfeathering does not occur and n_P stabilizes at approximately 350 RPM, slowly increase n_G until n_P starts rising, but to 80% at the most.

FUEL

USE OF EMERGENCY FUEL CONTROL CIRCUIT

The emergency fuel control circuit controls the engine in case of a normal fuel control system failure which is indicated by n_G hang-up, or a spontaneous increase in n_G, or a spontaneous drop of engine power (signal cell IELU INTERVENTis not coming on). The engine will not respond to movements of the TCL, or responds abnormally.

WARNING

BETA CONTROL AND REVERSE PITCH MUST NOT BE ENGAGED WHEN THE EMERGENCY CIRCUIT IS IN USE.

CAUTION

THE EMERGENCY CIRCUIT CAN BE USED ONLY WHEN THE FUEL PUMP OF THE AFFECTEDENGINE IS FUNCTIONINGNORMALLY.

NOTE

1. Before switching-on the emergency fuel control circuit switch-off the automatic feathering.

2. Engagement of the emergency fuel control circuit automatically disconnects the system which controls the fuel supply regulator, as well as the automatic engine starting cycle, the minimum fuel consumption valve which safeguards idling speed at higher altitudes, and all limiting devices. Therefore, when this circuit is engaged, a check must be kept (especially during altitude changes) on the key parameters of the engine (n_G, ITT and T_Q) to ensure that none of them exceeds the permissible maximum limits (for service limitations, see Section 2). At the same time, the n_G must not be allowed to fall below 60% at altitudes lower than 6,500 ft (2,000 m), or below 75% at altitudes above 6,500 ft (2,000 m).

3. At altitudes below 6,500 ft (2,000 m) the gas generator may fail to reach its maximum speed (99%) even when the Fuel stop cock/Emergency throttle lever is set to its foremost position. (see Fig. 3A-1, page 3A-4)

(cont.)

(a) Engaging the emergency fuel control circuit

TCL .... IDLE

ISOL. VALVE circuit breaker .... ON

ISOLATION VALVE amber cell on the CWD
of the affected engine .... Check ON

Fuel stop cock/Emergency throttle lever .... Move slowly forward from OPEN position to emergency circuit area

(b) Stopping an engine with the emergency circuit engaged

The sequence of steps is the same as in the normal engine stopping procedure – see Section 4 – page 4–26.

FUEL CROSSFEED – ONE ENGINE INOPERATIVE

Engine feeding from the opposite group of fuel tanks:

FUEL PUMP circuit breaker for
that side from which fuel
is to be transferred .... CHECK ON

FUEL TRANSFER circuit breaker .... ON

FUEL PUMP circuit breaker
for fuel tanks not in use .... OFF

FAILURE OF AUTOMATIC SWITCHING–ON FUEL TRANSFER FROM WING–TIP TANKS

This failure is indicated by amber ACTUATE TRANSFER cell (RH or LH) in the Airframe section of the CWD.

WING TIP TANK switch for the affected side
on the right instrument panel .... ON

Green FUEL TRANSFER cell
in the Airframe section of the CWD .... CHECK ON

FAILURE OF FUEL TRANSFER FROM ONE WING–TIP TANK

NOTE

If fuel transfer from one wing–tip tank fails it is possible to use the fuel from the other wing–tip tank.

(cont.)

CAUTION

DURING THE FUEL TRANSFER FROM THE OTHER WING–TIP TANK AND THE FUEL CROSSFEED SWITCH OFF THE AUTOPILOT (IF INSTALLED)

During the transfer of the fuel from the other wing–tip tank to the wing tanks balance the airplane with aileron trim.

Leave the fuel unbalance regardless of FUEL UNBALANCE (see Section II – LIMITATIONS) unless the amber signal cell MINIMUM FUEL illuminates.

If the amber signal cell MINIMUM FUEL illuminates use the procedure FUEL CROSSFEED (see Section IV – NORMAL PROCEDURES) until the fuel quantities in both wing tanks are the same.

NOTE

1. Fuel unbalance caused by the failure of fuel transfer from one wing–tip tank can be fully balanced with aileron trim.
   Nevertheless, also aileron control is sufficient to maintain flight without bank in all configurations and required control wheel deflection to the empty wing–tip tank side does not exceed the half of available range.
   It is recomended not to exceed banks $\pm$ 20°.

2. Consider that remaining fuel in the wing tip tank is not usable.

3. Consider the limitation of maximum crosswind during landing.

MINIMUM FUEL PRESSURE

This is indicated by amber FUEL PRESSURE cell in the Engine section of the CWD.

NOTE

The reason for the fuel pressure drop is either failure of the fuel pump or full utilization of fuel in the group of tanks in use.

- Check that the FUEL PUMP LH (RH) circuit breaker on the overhead panel is switched–on.
- Check the MINIMUM FUEL signal.
- Check the fuel quantity in the group of tank in use. If necessary use crossfeed.

(cont.)

– Check the fuel pressure on the three–pointer indicator. The pointer must indicate in the green sector (0.5 to 12 kp/cm^2).

If previous instructions have been executed and the engine works normally then continue the flight and pay closely attention to the main parameters of the engine.

If the engine operates irregularly:

TCL of the faulty engine .... IDLE

Engine shutdown in flight (see page 3A–1) .... CARRY–OUT

FUEL LEAKAGE IN FLIGHT

Fuel leakage from a fuel tank filler cap which is not closed properly can be detected by the fuel mist that forms behind the trailing edge of the wing, and by fuel content in affected tanks changes faster than the contents of the other tanks. The fuel mist is visible only from the rear windows of the passenger cabin.

(a) If fuel leakage is observed soon after take–off:

– Return to airport of departure. Do not utilize fuel transfer system.

(b) If leakage is observed on route:

– Check how much fuel is left in tanks.

Depending on the fuel reserve, decide whether to continue to the nearest airport or whether to carry out an emergency landing.

Feed both engines with fuel from the tanks on the leaking side, by the procedure fuel crossfeed – see section 4.

Continue using fuel only from the leaking side, after the MINIMUM FUEL cell has come on, switch over to fuel crossfeed from the opposite group of fuel tanks.

ELECTRICAL SYSTEM

FAILURE OF ONE DC GENERATOR

This failure is indicated by amber DC GENERATOR (LH or RH) cell in the Electro section of the CWD.

Check the switches on the overhead panel to confirm that this is not a false alarm.

DC GENERATOR switch of failed unit .... OFF and then back ON again

If DC GENERATOR is fault:

DC GENERATOR switch of failed unit .... OFF

VA METER selector switch on the INVERTER SELECTION panel .... Set first to BATTERY I VA and then to BATTERY II VA position

Check the charging rate on the right volt/ammeter.

FAILURE OF ONE AC GENERATOR

This failure is indicated by amber AC GENERATOR (LH or RH) cell in the Electro section of the CWD.

Check the switches on the overhead panel to confirm that this is not a false alarm.

AC GENERATOR switch of failed unit .... OFF and then back ON again

If AC GENERATOR is fault:

AC GENERATOR switch of failed unit .... OFF

NOTE

The load on the failed AC generator is automatically transferred to the other AC generator.

FAILURE OF ONE 36 V AC INVERTER

This failure is indicated by amber INVERTER36 V AC (I or II) cell in the Electro section of the CWD.

INVERTER36V AC (I or II) switches on the overhead panel ...... CHECK ON

INVERTER36V AC (I or II) switches on the overhead panel ...... OFF and then back ON again

If 36 V AC INVERTERis fault:

Failed inverter switch .... OFF

NOTE

1. All circuits previously fed by the failed inverter are automatically switched over to the other inverter.

2. The amber INVERTER36V AC (I or II) cell will not go off after the faulty inverter has been switched off.

FAILURE OF THE 115 V AC/400 HZ INVERTER I

This failure is indicated by amber INVERTERI 115V AC cell in the Electro section of the CWD.

INVERTERI 115V AC switch on the overhead panel .... CHECK ON

INVERTERI 115V AC switch on the overhead panel .... OFF and then back ON again

If 115 V AC INVERTERis fault:

AC INVERTERI 115 V switch .... OFF

NOTE

1. The failure automatically activates 115 V AC inverter II, which then feeds all the 115 V AC circuits. The amber INVERTERI 115 V AC cell will not go off after the faulty inverter has been switched off.

2. If the automatic change-over does not take place, set the INVERTER SELECTION 115 V change-over switch on the right-hand control console to the position II.

FAILURE OF BATTERY CIRCUIT

This failure is indicated by amber BATTERY cell in the Electro section of the CWD.

BATTERY switches on the overhead panel .... CHECK ON

VA METER selector switch on the inverter selection panel .... Set successively to BATTERY I VA and II VA

Charging of both batteries .... CHECK

BATTERY switch for the battery which is not charged .... SWITCH OFF

CAUTION

THE BATTERY SIGNAL CELL WILL NOT GO OFF AFTER THE FAULTY BATTERY HAS BEEN SWITCHED OFF.

BATTERY OVERHEATING

NOTE

When 120 °F (49 °C) temperature is reached an amber caution light comes on; in case of battery overheating a red warning light comes on. The caution and warning lights are located on the dual battery temperature indicator on the instrument panel.

If the amber caution light comes on:

Continue the flight paying increased attention to the battery temperature.

If the red warning light comes on:

BATTERY I (II) switch .... OFF

NOTE

If the BATTERY I,II switches are in OFF position, you can continue the flight.
After landing report the failure to the ground staff.

VOLTAGE FAILURE ON THE S1A BUS–BAR

No voltage on the S1A bus–bar is indicated by the following instruments being out of service:

(a) ADF I

(b) Transponder I

(c) RH artificial horizon

(d) RH turn–and–bank indicator

(e) Internal instrument illumination

(f) 36 V AC inverter I

(g) Feathering pump left and right

(h) Landing gear control - basic circuit

(i) Nose wheel steering systems

(j) Landing gear position indicator

(k) Wing flaps position indicator

(l) LH ENGINE AND AIRFRAME panel of CWD

(m) Instrument panel lighting, circuit II

(n) LH engine oil temperature indicator

(o) Center landing and taxiing searchlight

(p) LH Tip tank fuel indicator

(q) LH fuel gauge

(r) Windshield deicing indication

(s) Rudder trim and aileron trim tab controls

(t) Indication of the air temperature in the heating duct and in the cabin

(u) RH AC GENERATOR

INSTRUMENT PANEL/STBY CIRCUIT circuit breaker (at night) .... ON

I–S SR–II change–over switch (if installed) .... position II

(cont.)

NOTE

1. Extend landing gear by means of the emergency system.

2. Check the extension by the mechanical indicators on the landing gear nacelles and on the central control panel in the cockpit.

3. Keep directional control during landing by alternate braking, if necessary also by means of alternate reverse power.

4. If transponder II is not installed, inform ATC about transponder failure

VOLTAGE FAILURE ON THE S2B BUS-BAR

No voltage on the S2B bus-bar is indicated by the following instruments being out of service:

(a) NAV I

(b) VHF I

(c) Gyro compass I

(d) Intercom I

(e) LH artificial horizon

(f) Standby artificial horizon

(g) LH turn-and-bank indicator

(h) RH engine oil temperature indicator

(i) 115 V AC inverter I

(j) Standby lighting of the instrument panels

(k) Passengers cabin lighting 1/3

(l) FASTEN SEAT BELTS sign.

(m) PITOT PRESSURE I and STATIC PRESSURE I heating

(n) ELECTRO and R.H. ENGINE panels on the CWD

(o) Signalization of engine fire

(p) Automatic and manual feathering (LH and RH)/ Automatic bank control (LH and RH)

(q) RH fuel gauge

(cont.)

(r) RH tip tank fuel indicator

(s) Front baggage compartment fire sign.

(t) LH AC GENERATOR

PITOT PRESSURE II heating push-button
on the RH control panel .... Check whether switched on and check proper function of heating element

PITOT PRESSURE cock on the LH control panel .... Position II

CAUTION

IN CASE THE 115 V AC INVERTER II HAS NOT BEEN AUTOMATICALLY ENGAGED (INDICATED BY APPEARANCE OF THE WARNING FLAG ON THE RH ARTIFICIAL HORIZON AND BY APPEARANCE OF THE WARNING FLAG ON THE RH PNI) SWITCH OVER THE INV. SELECT. 115 V CHANGE-OVER SWITCH ON THE RH CONTROL PANEL TO POSITION II.

NOTE

Instruct the passengers to fasten seat belts using the passenger address system.

HYDRAULIC SYSTEM

HYDRAULIC OVERHEATING

If the amber HYDRAUL. cell (temperature of the hydraulic fluid is higher then 85 °C) in the Engine section of the CWD comes on:

- continue the flight,
- check pressure in the hydraulic system

After landing report the failure to the ground personnel.

CONTROLS

EMERGENCY EXTENSION OF WING FLAPS 18°

WING FLAPS control lever	18°
WING FLAPS EMERGENCY EXTENSION lever	DOWN (OPEN)
Emergency hydraulic pump	Pump until appropriate indication on wing flaps position indicator comes on

CAUTION

1. IF WING FLAPS EXTENSION SYSTEM FAILS, LAND WITH THE WING FLAPS EXTENDED TO 18° ONLY. MAINTAIN THE AIRSPEED OF 97 KIAS (180 KM/HR IAS) UNTIL YOU PASS OVER THE RUNWAY THRESHOLD AND REACH THE HEIGHT OF 50 FT (15 M) ABOVE THE RUNWAY.

2. IF IT IS NECESSARY TO EMERGENCY EXTEND THE FLAPS AND LANDING GEAR THEN EXTEND LANDING GEAR FIRST

NOTE

1. The wing flaps emergency extension lever is safety wired. Moving it down to extend the wing flaps, breaks the wire.

2. Emergency extension of the flaps to the 18 degree position requires about 8 manual pumping strokes.

WING FLAPS RETRACTING FAILURE

The failure is indicated by constant signalization of flap position 18° even if the flap position selector has been moved to the position 0° after take-off.

Real position of the flaps .... CHECK

If the flaps has remained in the take-off position (18°):

Maintain climb with airspeed .... 124 KIAS (230 km/hr IAS)

After climbing maintain the airspeed not exceeding 135 KIAS (250 km/hr IAS). Recommended value of airspeed is 108 KIAS (200 km/hr IAS).

According to your decision .... Continue in the flight

NOTE

The fuel consumption at the airspeed of 108 KIAS (200 km/hr IAS) at the altitude of 10,000 ft (3,000 m) is 230 kg/hr (507 lb/hr).

SPONTANEOUS EXTENSION OF ONE ABC TAB DURING TAKE-OFF

Extension of a tab tends to bank the airplane.

The airplane .... Level by means of the ailerons

AUT. BANK CONTROL switch
on the central control panel .... OFF

If the ABC tab retracts:

Further flight .... Continue

If the ABC tab does not retract, trim the airplane using the aileron trim and do not exceed 111 KIAS (205 km/hr IAS). Decide whether to continue the flight or to land on the airport of departure. The fuel consumption at 108 KIAS (200 km/hr IAS) at the altitude of 10,000 ft (3,000 m) is 230 kg/hr (507 lb/hr).

LANDING GEAR

EMERGENCY EXTENSION OF LANDING GEAR

LANDING GEAR lever .... DOWN position

LANDING GEAR EMERGENCY EXTENSION lever .... down

(cont.)

Emergency hydraulic pump .... Pump until the 3 green lights on landing gear position indicator come on and until resistance on pump handle increases.

NOTE

1. The landing gear emergency extension lever is safety wired. Moving it down to extend the landing gear, breaks the wire.

2. Emergency extension of the landing gear requires about 45 manual pumping strokes. Time to landing gear extension is about 60 seconds.

<u>If after the use of emergency hydraulic system some of the landing gear legs are stuck in the intermediate position (red light on the landing gear position indicator stays on) perform the following procedure:</u>

Increase the airplane airspeed in horizontal flight to .... 135 KIAS (250 km/hr IAS)

Climb .... to safe altitude

Wait .... 60 seconds

Sideslip .... Perform

Smoothly push the rudder to the side of the stuck landing gear leg while maintaining the flight direction with ailerons. Keep increasing the rudder deflection until securing the landing gear leg in its locked down position and/or until reaching the maximum rudder deflection with a maximum pedal force 690 N (68 kg [150 lb]). Bank angle during this manoeuvre must not exceed 20°. Keep the maximum rudder deflection for a period of 10 seconds.

<u>If locking of the landing gear leg does not take place:</u>

Sideslip .... Repeat 3 times

<u>After repeating the sideslip 3 times without result:</u>

Airplane swinging with bank of 30° to 45° .... Perform

Use the full control wheel deflection for airplane swinging. Perform this manoeuvre max. 8 times.

NOTE

The LANDING GEAR EMERGENCY EXTENSION lever must be left in its DOWN position until the cause of the failure of the normal extension system has been found and rectified.

EMERGENCY BRAKING

PARKING BRAKE lever .... STOP position

Emergency hydraulic pump .... Pump to build up necessary braking pressure (max. pressure 45 + 3 kp/cm^2 (640 + 43 psi))

CAUTION

THE ABS SYSTEM DOES NOT OPERATE WHEN EMERGENCY BRAKING IS USED.

NOTE

When the parking brake is used for slowing down, both main wheels are braked simultaneously there is no possibility of braking one wheel at the time. Therefore keep a constant check on the direction of the airplane and on the brake pressure. Maintain direction by means of rudder pedal control and, if necessary, by alternate use of either RH or LH engine reverse power.

FAILURE OF THE LANDING GEAR TO RETRACT AFTER TAKE-OFF

If the landing gear fails to retract either all green lights or all red lights do not go off after the LANDING GEAR lever has been moved into UP position.

<u>If all green lights or all red lights have not gone off:</u>

LAND. GEAR lever .... DOWN and then UP again

<u>If the green or red signal light has not gone off:</u>

LAND. GEAR lever .... DOWN

Extension of the landing gear according to both light and mechanical indication .... CHECK

Do not exceed the airspeed .... 135 KIAS (250 km/hr IAS)

Make decision about landing on the nearest airport or continuing the flight.

(cont.)

NOTE

1. After landing report the failure to the ground personnel.

2. The fuel consumption will be min. 25% higher than that given in Flight Manual - Section 5.

DEFLATED TIRE ON ONE WHEEL

It is indicated by nose pitching down if the nose wheel tire burst and by banking and yawing if a main wheel tire burst.

(a) <u>If the tire failure indication occurs during the take-off:</u>

At an airspeed less or equal to V_1 interrupt the take-off. Relieve the load on the wheel with faulty tire and use reverse power as required.

At an airspeed higher than V_1 continue the take-off. Do not retract the landing gear, retract the flaps at altitude of 400 ft (122 m) and accelerate to 135 KIAS (250 km/hr IAS). Do not exceed this airspeed during further climb or cruise.

Make decision whether you land on the departure airport or the other airport. Take into account that flight with landing gear extended increases the fuel consumption min. 25% by compared to consumption given in Flight Manual - Section 5, Fuel consumption in horizontal flight.

Carry out the landing preferably on unpaved runway. Relieve load on the wheel with faulty tire and use reverse power as required.

(b) <u>If the tire failure indication occurs during the landing:</u>

Relieve load on the wheel with faulty tire and use reverse power as required.

NOTE

1. Maintain the straight direction by means of the breakers.

2. Relief load on wheel with faulty tire in the following way:
   a) Nose wheel:
      - pull the control column back
      - brake by reverse power setting largely
   b) Main wheel:
      - bank the airplane 3° to 5° to the side of good tire
      - after touch-down and during roll-out roll the aileron to the side of the good tire
      - do not brake the wheel with deflated tire
      - brake by reverse power setting largely.

DEICING SYSTEM

CAUTION

LEAVE THE ICING AREA IF DEICING SYSTEM IS FAILED.

NOTE

Function of the deicing wing sections may be checked visually during the flight.

ONE SECTION OF PNEUMATIC AIRFRAME DEICING FAILURE

Failure is signaled by a decrease of the pressure indicated on the pressure gauge on the pneumatic deicing control panel, when the faulty section – A, B or C – is engaged.

- Check whether engagement of the faulty section is accompanied by a rise of the ITT, either above the permissible maximum ITT or by more than 30 °C above the previous value. If yes, switch-over the function selector to MANUAL and do not use the faulty section any more.

TOTAL FAILURE OF PNEUMATIC AIRFRAME DEICING

The failure causes the pointer of the pressure gauge on the deicing system control panel to move out of the green sector (the pressure may either be too high or too low) and light A, B and C do not flash cyclic.

Pneumatic deicing system switch
on the deicing control panel .... OFF

CAUTION

WHEN THE DEICING SYSTEM IS INOPERATIVE AND THERE IS NO CERTAINTY THAT THE WINGS ARE FREE OF ICE, APPROACH FOR LANDING AT AIRSPEED OF 105 KIAS (195 KM/HR IAS) WITH WING FLAPS IN TAKE-OFF POSITION (18^{O}). AVOID MOVING THE CONTROL SURFACES ABRUPTLY OR THROUGH LARGE ANGLES.

(cont.)

NOTE

In view of the higher landing airspeed, the landing distance will be 35% longer than normal.

PNEUMATIC DEICING TIMER RELAY FAILURE

This failure is signaled by going off of some or all of the light A, B and C on the control panel for the pneumatic deicing system.

TEST A, B, C push-button .... PUSH

If only one of the lights does not come on when it is tested, this means a burnt out bulb filament. Replace the bulb.

If failure is not due to a bulb:

Function selector of pneumatic deicing .... MANUAL

Selector switch next to lights .... Set to A, then B, then to C

Switching of this selector must come on the light for that section to which the selector is set. The manual holding time in each position and the total duration of the cycle must be adapted to the rate of ice accretion.

ELECTRIC WINDSHIELD HEATING FAILURE

If the outer panes of the windshield crack, or if sparking is observed in the heater element or the heater element bus bar:

WINDSHIELD HEATING LH or RH circuit breaker .... OFF

PROPELLER DEICING FAILURE

Simultaneous coming on of both amber PROPELLER DEICING cells in the Engine section of the CWD means main circuit failure of propeller deicing cycling switch.

PROP DEICING switch
on the right instrument panel .... STDBY I or STDBY II

Coming on of one of the amber PROPELLER DEICING cell or the alternate flashing of the amber PROPELLER DEICING cells on the LH and RH sides of the CWD means blades heating failure.

If engine vibrations become noticeable:

- Reduce engine power output, or stop the engine.

PITOT–STATIC SYSTEM

STATIC PRESSURE HEAD FAILURE

If the static pressure head failure is occured, the vertical speed indicator and the altimeter do not respond to altitude changes.

STATIC PRESSURE I and II heater push buttons .... Check switching on

The green lights in these push–buttons must stay on.

(a) If the left hand instruments are affected:

EMERGENCY STATIC PRESSURE red cock .... OPEN

CAUTION

AFTER SWITCHING OVER TO EMERGENCY STATIC PRESSURE, ADD 5.5 KIAS (10 KM/HR IAS) TO ALL CRITICAL OR SPECIFIED AIR-SPEEDS.

(b) If the right hand instruments are affected:

AUTOPILOT (if installed) .... DISCONNECT

- Continue the flight without any special measures.

WARNING

1. **WHEN THE STATIC PRESSURE SYSTEM FOR THE RIGHT HAND SIDE INSTRUMENTS IS BLOCKED, THE “EXTEND LAND. GEAR” SIGNAL IS INOPERATIVE DURING THE DESCENT AND APPROACH BECAUSE IT IS ACTIVATED BY THE AIRSPEED AND ENGINE POWER SETTING.**

2. **“MAXIMUM AIRSPEED” SIGNAL IS INOPERATIVE DURING THE FLIGHT.**

CAUTION

DISREGARD READINGS OF THE VERTICAL SPEED INDICATOR, ALTIMETER AND AIRSPEED INDICATOR ON THE RIGHT INSTRUMENT PANEL.

NORMAL PROCEDURES

TABLE OF CONTENTS

ITEM **PAGE**

(cont.)

4.1.CHECK LISTS OF NORMAL PROCEDURES

PRE–FLIGHT INSPECTION

EXTERNAL INSPECTION

The inspection is performed from the airplane nose towards the right side of the fuselage, the right engine, the right landing gear, the right wing, to tail unit and similarly on the left side of the airplane, ending at the airplane nose.

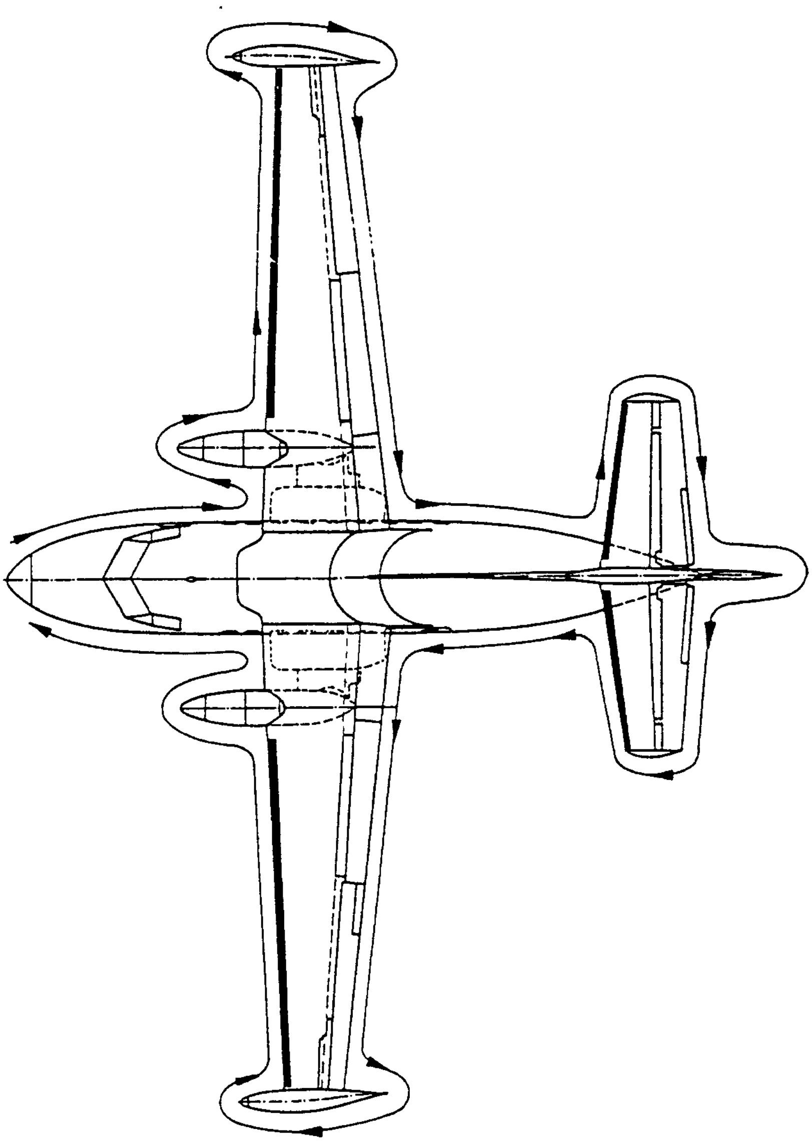


Fig. 4 – 1 External inspection

(cont.)

FRONT FUSELAGE PART	INSPECTION
Nose cover locks	Check if closed
Skin, searchlights glazing	Check for damage
Rotary ice detector	Check for damage
Air ventilation intake	No foreign objects
Holes of static pressure heads covers	Check if removed
Holes of static pressure heads, LH, RH	Check for soiling
Cockpit window	Check for damage and soiling
Windshield vipers	Check for damage
Rubber strip on the fuselage	Check for damage or unsticking
Emergency exit	Check if closed
Antenna on the lower part of the fuselage	Check for damage

NOSE LANDING GEAR	INSPECTION
Servo control tie rods	Check for damage
Tire	Check for damage, deformation or underinflation

RIGHT PITOT PRESSURE HEAD (RH)	INSPECTION
Pitot pressure head cover	Check if removed
Inlet and drainage holes of pitot pressure head	Check for damage or foreign objects

RIGHT MAIN LANDING GEAR	INSPECTION
Tie rods	Check for damage
Tire	Check for damage, deformation or underinflation
Water pump	Check if the proper quantity supply is adjusted
Water tank	Check for water quantity

(cont.)

RIGHT POWER UNIT	INSPECTION
Covers	Check for proper closing
Propeller blades cover and blocking	Check if removed
Propeller blades	Check for damage
Propeller hub	Check for oil leakage
Engine inlet cover	Check if removed
Air inlet	Check for foreign objects
Separator vane	Check if closed
Drainage fuel sample (if performed by pilot see AFM, page 8-17, 8-18)	Check for water

RIGHT WING	INSPECTION
Wing deicing system	Check for damage
Wingtip (if installed)	Check for damage
Wingtip tank	Check for damage, deformation and fuel leakage and filler neck closed
Navigation lights	Check for damage
Aileron trailing edge and flaps	Check for damage
Static wicks, aileron, wing tip tank	Check for damage, one static wick may be missing.
Aileron control tie rods	Check for damage
Flaps controls tie rods	Check for damage
ABC tabs, spoiler	Check if closed
Control locks (see AFM, Section 8)	Check if removed
Fuel tank filling neck	Check if closed

(cont.)

RH SIDE OF FUSELAGE	INSPECTION
Emergency exit	Check if closed
Emergency lights	Check for damage
Lavatory door (if installed)	Check if closed

TAIL UNIT	INSPECTION
Tail deicing system	Check for damage
Elevator and rudder trailing edges	Check for damage
Elevator and rudder control tie rods	Check for damage
Control locks (see AFM, Section 8)	Check if removed
Static wicks	Check for damage, one may be missing on the elevator
Beacon	Check for damage
Antenna	Check for damage

REAR PART OF THE FUSELAGE	INSPECTION
Static wick	Check for damage, it may be missing
Lower fin	Check for damage

LEFT LANDING GEAR	INSPECTION
Tie rods	Check for damage
Tire	Check for damage, deformation or underinflation

LEFT POWER UNIT

Same inspection as right power unit

LEFT WING

Same inspection as right wing

(cont.)

LEFT SIDE OF THE FUSELAGE	**INSPECTION**
Emergency exit	Check if closed
Emergency lights	Check for damage
Rubber strip on the fuselage	Check for damage or unsticking
Static ice detector and light	Check for damage

LEFT PITOT PRESSURE HEAD (LH)

Same inspection as right pitot pressure head

FRONT PART OF THE FUSELAGE	**INSPECTION**
Baggage compartment doors (after loading the baggage)	Check if closed

INTERNAL INSPECTION

1. Check ceiling panels, carpets, upholstery passenger's seats and fastening items for intactness and cleanness, check the first-aid box. Check the location of life jackets (if installed). The number of life jackets shall correspond with number of persons on the airplane.
2. Check load distribution and fastening, fastening of the protective net in the rear baggage compartment.
3. Check the pressure in oxygen bottles (for passengers) and the total number of masks.
4. Check state of the passenger cabin lights.
5. Close the door.
6. Check if the moveable pins are in position LOCKED.
7. Remove the lock pins of all emergency exits and insert them into bag on the back side of the pilot's seat.
8. Check by moving if the emergency door's control handle is locked in the position CLOSED and check the emergency door sealing.
9. Set the pilot seats to the required position.

(cont.)

PILOT'S COMPARTMENT PREPARATION – CO–PILOT

Pressure in oxygen bottle and mask with microphone .... CHECK

Parking brake .... STOP, pressure 40 + 5 kp/cm^2

Landing gear .... DOWN, Lever Locked

TCL .... IDLE

PCL .... FEATHER

Fuel fire cocks .... OPEN

Fuel stop cock/Emergency throttle levers .... CLOSE

Circuit breakers under the cover
(except LOGO – if installed and WATER INJECTION
– if you don't decide to use water injection) .... ON

BATTERY I, II .... ON

INVERTER 36 V I .... ON

PILOT'S COMPARTMENT PREPARATION – PILOT IN COMMAND

Pressure in oxygen bottle and mask with microphone	CHECK
Free motion of controls	CHECK
Heating	CLOSED
Signalling	CHECK
Fire signalling system	CHECK

PRELIMINARY PROCEDURES

External inspection	PERFORMED
Internal inspection	PERFORMED
Operational, technical and personal documents	CHECKED, on board
Passengers	............, on board
Centre of gravity position	............%
Altimeters	SET

BEFORE ENGINE STARTING

VHF I	OFF
PRU on the Flight recorder	OFF
RECORDER	ON

REC FAIL light on the Flight recorder control box comes on.

FIRE EXTIN. push–button cover on central control panel	CHECK SEALING
ENGINE STARTING LH, RH	ON
IELU LH, RH	ON
FUEL PUMP LH, RH	ON
FUEL PRESSURE signal cells	OFF
Area around propellers and removing of the blocking	FREE/CHECKED

(cont.)

Decrease hydraulic fluid pressure in main hydraulic circuit (to 100 kp/cm^2) by retracting and extending wing flaps after hydraulic system check.

PRU on the Flight recorder .... ON (after the warning up time has expired – see Section 2)

REC FAIL light on the Flight recorder control box must go off.

ANTICOLL BEACON, VOICE RECORDER(if installed)
circuit breaker .... ON

On the voice recorder control box:
TEST push–button .... PUSH
Indicator pointer on the control box must be positioned in green area.

Engine starting .... READY

ENGINE STARTING

Fuel stop cock/Emergency throttle lever .... OPEN

ENGINE STARTING push–button .... PUSH

STOP WATCH .... START (for starting period)

Engine starting process automatically cuts out after 20 seconds, and the engine without any further actions stabilizes at its idling speed.

NOTE

If the fuel does not ignite within 12 seconds after the ENGINE STARTING button is pushed, (no rise in the ITT is indicated) – interrupt engine starting.

During the starting cycle, check:

ITT;
n_G;
the oil pressure;
the ENGINE STARTING cell goes off after 20 seconds;
pressure rise in hydraulic system.

(cont.)

CAUTION

1. IF THE ENGINE STARTING CELL DOES NOT GO OFF WITHIN 20 SECONDS AFTER THE ENGINE STARTING BUTTON IS PUSHED, MEANING THAT THE STARTING CIRCUIT IS STILL ENGAGED, OR IN OTHER EMERGENCIES, INTERRUPT THE STARTING CYCLE BY SWITCHING OFF THE APPROPRIATE (LH OR RH) ENGINE STARTING CIRCUIT BREAKER.

2. IF DURING THE STARTING CYCLE THE GAS GENERATOR ACCELERATES SLOWLY OR INTERMITTENTLY, ADD MORE FUEL BY SLOWLY MOVING THE POWER CONTROL LEVER FORWARD UNTIL THE SPEED OF THE GAS GENERATOR BEGINS TO INCREASE CONTINUOUSLY, THEN RETURN THE POWER CONTROL LEVER TO ITS IDLING POSITION. CHECK THE ITT, WHICH MUST NOT EXCEED THE MAXIMUM LIMIT SPECIFIED FOR ENGINE STARTING.

When the engines have stabilized at their idling speed:

DC GENERATOR and AC GENERATOR switches .... ON

Ground power source .... DISCONNECT

EXT POWER SUPPLY cell .... OFF

Engine parameters .... CHECK

In case of starting engines without ground power supply:

Before starting up the second engine:

DC GENERATOR of running engine .... ON

n_G .... 65% (max. 70%)

Hydraulic pressure .... CHECK

(cont.)

NOTE

1. At low ambient air temperatures the FEATHER PUMP cell (on the left-hand or right-hand engine CWD) may come on even when there is nothing wrong. These cells will go off again when the engine has warmed up.

2. While starting by means of the on-board batteries, keep check on the system voltage shown on the right-hand volt/ammeter (the VA METER switch must be in its BATTERY I VA or II VA setting). When the ENGINE STARTING button is pushed, the indicated voltage may drop to not less than 14 V for not more than 4 seconds.

3. When starting up the first engine, keep check on the hydraulic system pressure. If the hydraulic pump does not build up pressure within 25 seconds, stop the engine and inform the ground staff of the failure.

FAILED STARTING ATTEMPT

Fuel stop cock/Emergency throttle lever .... SHUT

ENGINE STARTING circuit breaker .... OFF

The starting procedure must be interrupted by switching off the ENGINE STARTING circuit breaker immediately:

- if the ITT rises fast which could result in exceeding the maximum temperature limit;
- if the fuel does not ignite within 12 seconds after the ENGINE STARTING button is pushed, (no rise in the ITT is indicated);
- if the oil pressure does not build up;
- if there are flames coming out of the exhaust pipes;
- if there are any abnormal noises during starting.

After unsuccessful ground starting:

Dry motoring prior to next start .... CARRY OUT

CAUTION

DO NOT ATTEMPT TO START ENGINE AGAIN BEFORE THE CAUSE OF THE FAILURE HAS BEEN RECTIFIED

WARMING UP THE ENGINES AFTER STARTING

After starting, the engines must be warmed up. This warming up, and the initial engines and instrument checks, are performed at idling speed and at the initial setting for acceleration. The warming up time depends on the ambient temperature but should not be less than 2 minutes. At low ambient temperatures the warming up time can be reduced by increasing the gas generator speed to between 75 and 78% as soon as the oil temperature has reached +10 °C (50 °F). The temperature in the end of warning up the engine should be greater then minimum value for acceleration + 20 °C (68 °F).

BEFORE TAXING

POWER SUPPLY	ON
RADIONAVIGATION	ON
PROP. FEATHERING/AUT. BANK CONTROL circuit breaker	ON
VHF I, II, HF (if installed)	ON
FASTEN SEAT BELTS	ON
ROTARY ICE DETECTOR	ON
PA, RADAR (if installed)	ON
SPEC. EQUIPMENT	ON
AUTOPILOT, ELECTRIC TRIM (if installed)	ON
Radar screen (if installed)	STBY
GPS (if installed)	ON
Graphic unit (if installed)	STBY
NAV 1/NAV 2 change-over switch (if installed)	CHECK position NAV 1
Brakes	DEPRESS and check accum. pressure
RH horizon and turn indicator	ON
LH horizon and turn indicator	ON
SPOILERS switch	ON
AUT. BANK CONTROL switch	ON
AUTOFEATHER switch	ON
Nose wheel steering	MANUAL

(cont.)

Brake antiskid	ON
Central warning display FLAPS 18°, MANUAL STEERINGand green AUT. BANK CONTROL	ON
Gyromagnetic compasses	CHECK
GPS (if installed)	SET MODE
DME change-over switch	NAV I (II)
Radio-altimeter	CHECK, set to DH (MDH) .... ft (m)
Electric system	CHECK
Electric trim function	CHECK
Elevator trim	set according to centre of gravity
Aileron trim	Neutral position
Rudder trim	One division to the right
Navigation systems	CHECK, frequencies ....
Transponder(s)	CHECK, standby I, II
Autopilot (if installed)	TEST, CHECK
PCL	FINE PITCH
Reverse thrust latch	REMOVED
For taxiing	READY
SEARCHLIGHTSTAXIING I, II	ON
Parking brake	RELEASED

TAXIING

1. It is possible to perform taxiing with the using of nose landing wheel steering only from the left pilot's seat.

NOTE

Steer the airplane by gentle and gradual movements of the control lever, because rapid movements result in disproportionate increase in forces on the control lever.

2. Fuel consumption during taxiing is 4.4 lb (2 kg) per 1 minute.
3. Brakes .... CHECK

NOTE

If braking at either brake is not effective, park the airplane on the acceptable area and brake with an operative brake (determined as per the pressure gauge). Repair the defect.

4. During taxiing vent the propellers hydraulic system by feathering of the left and right propeller by PCL. When the propeller speed drops to 350 to 400 RPM, return the PCL.

NOTE

1. It is recommended both propellers can be feathered simultaneously. This may be done for as long as is necessary to reduce the taxiing speed.
2. During taxiing check the possibility of reverse power setting and BETA RANGE cell coming on when TCL is moved from idle power to reverse power position. PCL is set to fine pitch.

5. During taxing check turn and bank indicator function.
6. To improve outlook during taxiing it is possible to open cockpit window.

BEFORE LINE UP

Cockpit windows	SHUT
Horizons	UNCAGE AND CHECK
Engine parameters	OK, IN OPERATION RANGE
Windshield heating, PROP. DEICING	ON, stage I
Heating	CLOSED
Flaps	18° or 0°
I SSR II change–over switch (if installed)	SET I
SSR	CODE.........., STBY
Controls	FREE

CAUTION

DURING TAKE–OFF WITH WING FLAPS IN POSITION 0° THE AMBER CELL "FLAPS 18°" ON THE CWD WILL BE TURNED ON UNTIL THE AIRPLANE LIFTS UP.

BEFORE TAKE–OFF

Nose wheel steering change–over switch	PEDAL, PEDAL STEERING cell comes on
Instruments	OK, IN OPERATION RANGE
Gyromagnetic compasses	CHECK runway heading
Graphic unit (if installed)	AS REQUIRED

AFTER CLEARANCE FOR TAKE–OFF RECEIVED

SSR	ON
Pitot heating	ON
Stop watch	START

TAKE–OFF (WING FLAPS 18°)

TAKE–OFF AIRSPEEDS

Decision airspeed .... V_1 – variable, will be determine from graphs on the Fig. 5–10 and 5–12

Rotation airspeed .... V_R = 81 KIAS (150 km/hr IAS)

Take–off safety airspeed .... V_2 = 84 KIAS (155 km/hr IAS)

Both engines best angle of climb airspeed
(Wing flaps 0°) .... V_X = 108 KIAS (200 km/hr IAS)

Both engines best rate of climb airspeed
(Wing flaps 0°) .... V_Y = 135 KIAS (250 km/hr IAS)

This airspeeds do not vary with weight and centre of gravity position.

(a) Normal take–off

Brakes .... SET

TCL .... Increase power to value for which the airplane does not move

Brakes .... RELEASE

TCL .... MAXIMUM TAKE–OFF POWER

Airspeed .... V_R = 81 KIAS (150 km/hr IAS)

Rotate the airplane to a take–off attitude of max. 10° and lift up the airplane.

Brake at a height of 10 – 16 ft (3 – 5 m) above runway .... SET

Landing gear lever lock .... REMOVE

Landing gear .... UP

Airspeed .... V_2 = 84 KIAS (155 km/hr IAS)

From the height of 400 ft (122 m) above runway:

Climb recommended vertical speed .... 600 fpm (3 m/s)

Accelerate to airspeed .... 94 KIAS (175 km/hr IAS)

Flaps .... 0°

Airspeed .... 108 KIAS (200 km/hr IAS)

TCL .... Maximum continuous power

(cont.)

Taxi lights .... OFF

At a height of 1,500 ft (457 m):

SPOILERS, AUT. BANK CONTROL,
AUTOFEATHER switches .... OFF

Airspeed .... 135 KIAS (250 km/hr IAS)

CAUTION

REDUCE POWER TO MAX. CONTINUOUS BY REDUCING THE T_Q TO 90% AS A MAXIMUM BY MEANS OF TCL. ONLY THEN, SET THE PROPELLER CONTROL LEVERS TO 1,900 RPM.

(b) Take-off with water injection

At T_Q = min. 60%, the co-pilot shall switch the water injection on.

NOTE

1. The airplane performance indicated in Section 5 of this Flight Manual at take-off airport air temperature of +23 °C (73.4 °F) or higher, or at atmospheric pressure and air temperature as shown in Fig. 4-3, page 4-34, are only guaranteed when using the appropriate degree of water injection.

2. Refer to page 4-33 – Use of water injection for detailed information on the preparation of the airplane for take-off with water injection.

3. The piloting technique with water injection is the same as that of normal take-off.

4. Normal operation of the water injection system is characterized by a steady lighting of the WATER INJECTION cell on the CWD and a drop of ITT by 20-30 °C at the moment of switching the system on.

TAKE-OFF (WING FLAPS 0°)

TAKE-OFF AIRSPEEDS

Decision airspeed	V_1 – variable, will be determine from graphs on the Fig. 5-10a and 5-12a
Rotation airspeed	V_R = 97 KIAS (180 km/hr IAS)
Take-off safety airspeed	V_2 = 97 KIAS (180 km/hr IAS)
Both engines best angle of climb airspeed (Wing flaps 0°)	V_X = 108 KIAS (200 km/hr IAS)
Both engines best rate of climb airspeed (Wing flaps 0°)	V_Y = 135 KIAS (250 km/hr IAS)

This airspeeds do not vary with weight and centre of gravity position.

(a) Normal take-off

Brakes	SET
TCL	Increase power to value for which the airplane does not move
Brakes	RELEASE
TCL	MAXIMUM TAKE-OFF POWER
Airspeed	V_R = 97 KIAS (180 km/hr IAS)

Rotate the airplane to a take-off attitude of max. 10° and lift up the airplane.

Brake at a height of 10 – 16 ft (3 – 5 m) above runway	SET
Landing gear lever lock	REMOVE
Landing gear	UP
Airspeed	V_2 = 97 KIAS (180 km/hr IAS)

From the height of 400 ft (122 m) above runway:

Climb recommended vertical speed	600 fpm (3 m/s)
Accelerate to airspeed	108 KIAS (200 km/hr IAS)
TCL	Maximum continuous power
Taxi lights	OFF

(cont.)

At a height of 1,500 ft (457 m):

SPOILERS, AUT. BANK CONTROL,
AUTOFEATHER switch . . . . OFF

Airspeed . . . . 135 KIAS (250 km/hr IAS)

CAUTION

REDUCE POWER TO MAX. CONTINUOUS BY REDUCING THE T_Q TO 90% AS A MAXIMUM BY MEANS OF TCL. ONLY THEN, SET THE PROPELLER CONTROL LEVERS TO 1,900 RPM.

(b) Take-off with water injection

At $T_Q =$ min. 60%, the co-pilot shall switch the water injection on.

NOTE

1. The airplane performance indicated in Section 5 of this Flight Manual at take-off airport air temperature of +23 °C (73.4 °F) or higher, or at atmospheric pressure and air temperature as shown in Fig. 4-3, page 4-34, are only guaranteed when using the appropriate degree of water injection.

2. Refer to page 4-33 – Use of water injection for detailed information on the preparation of the airplane for take-off with water injection.

3. The piloting technique with water injection is the same as that of normal take-off.

4. Normal operation of the water injection system is characterized by a steady lighting of the WATER INJECTION cell on the CWD and a drop of ITT by 20-30 °C at the moment of switching the system on.

CLIMB

1. TCL .... MAXIMUM CONTINUOUS POWER
2. PCL .... 1,900 RPM
3. Two engine climbing airspeed .... min.135 KIAS (250 km/hr IAS)
4. At trans. altitude altimeters .... set STANDARD
5. Recommended vertical speed (with passengers) .... max.600 fpm (3 m/s)
6. FASTEN SAFETYBELTS circuit breaker .... AS REQUIRED

CRUISE

1. TCL .... from IDLE POWER to MAX. CONTINUOUS POWER
2. PCL .... 1,700 RPM

NOTE

At max. continuous power it is permitted to use full air bleeding from the compressors provided ITT will not exceed 690 °C.

3. After climbing to the cruising flight level (if fuel is in the wing tip tank):

   – WING TIP TANK LH, RH circuit breaker .... ON

   If the fuel is exhausted from wing tip tanks:

   – WING TIP TANK LH, RH circuit breaker .... OFF

FLIGHT IN SEVERE TURBULENCE

1. Airspeed .... max. 143 KIAS (265 km/hr IAS)
2. FASTEN SEAT BELTS circuit breaker .... SWITCH ON

FLIGHT UNDER ICING CONDITIONS

In case of icing conditions (at ambient temperatures of +5 °C (41 °F) or less in clouds, fog, snowfall, rainfall or drizzle):

ROTARY ICE DETECTOR .... CHECK ON

WINDSHIELD HEATING change-over switch II

(cont.)

PROP DEICING change-over switch .... MAIN I or II (depending on rate of ice accretion)

SEPARATOR VANE LH and RH switches
on the overhead panel .... AS REQUIRED

The SEPARATOR VANE cells on the CWD will start flashing. With the separator vanes in fully opened position the cell must be stay on.

ON/OFF switch of pneumatic deicing system .... AS REQUIRED

The internal illumination of the control panel must come on after switching on pneumatic deicing system.

ICE DETECTORLIGHTING push-button .... PUSH (AS REQUIRED)

NOTE

The deicing action is most efficient if the pneumatic deicing system is switched on when the ice layer is 0.3 to 0.4 in (8 to 10 mm) thick. The thickness of the ice layer is seen on the ice static detector or on the wing.

Function selector of pneumatic deicing .... AUTOMAT.

Cycle rate selector switch .... FAST or SLOW, depending on rate of ice accretion

Check the correct inflation sequence and timing of the individual sections by the coming on of light A, B and C on the control panel. Check also the inflation pressure which must be within the operating range. One cycle duration must correspond to the position of the cycle rate selector switch (1 minute if set to FAST or 3 minutes if set to SLOW).

INADVERTENT FLIGHT INTO FREEZING RAIN OR FREEZING DRIZZLE

If the airplane is flying in freezing rain or freezing drizzle then this is distinguished by following:

- ice covers all surface of the deicing boots on upper side of the wing
- ice covers unheated part of the forward side windows of the cockpit
- slight buffeting occurs on the control wheel above speed 135 KIAS (250 km/h IAS)

PROCEDURES:

- disconnect the autopilot (if installed) and fly manually until the airframe is clear of ice
- decrease speed bellow 150 KIAS (278 km/h IAS)
- change altitude or heading to leave these meteorological conditions
- do not retract the wing flaps until the airframe is clear of ice
- increase the minimum airspeed for appropriate wing flaps position about 5 KIAS (9 km/h IAS)
- do not make abrupt changes of flight attitude (maximum load factor 1.3; maximum angular velocity in roll 10 °/s
- maximum angle of bank ± 30°

AFTER LEAVING THE POSSIBLE ICING AREA

WINDSHIELD HEATING change-over switch I

PROP DEICING change-over switch .... 0 (OFF)

ICE DETECTOR/STATIC circuit breaker .... ON for period necessary for clearing away off all ice, then OFF

SEPARATOR VANE LH and RH switches on the overhead panel .... OFF

The SEPARATOR VANE cells on the CWD will start flashing and they must go off when the separator vanes reach the retracted position.

ON/OFF switch of pneumatic deicing system .... OFF

BEFORE DESCENT

Approach information .... RECEIVED

FASTEN SEAT BELTS circuit breaker .... ON

DESCENT

To descent it is possible to use engine power rating from max. continuous power to flight idle power setting.

Recommended airspeed is 167 KIAS (310 km/hr IAS).

It is recommended for descent (with passengers) do not exceed the vertical speed 600 fpm (3 m/s).

PASSING TRANSITION LEVEL

Altimeters .... Set to QNH .... compare altitude

Brakes .... Check the brake accumulator pressure

AUTOFEATHER, AUT. BANK CONTROL, SPOILERS switches .... ON

Radio altimeter .... set DH.........ft

ON FINAL APPROACH

Airspeed .... max. 135 KIAS (250 km/hr IAS)

Landing gear .... DOWN and LOCKED

Flaps .... 18°

PEDAL CONTROL cell .... ON

LANDING LIGHTS .... ON

Radar (if installed) .... STBY

Airspeed .... min. 89 KIAS (165 km/hr IAS)

Heating .... SHUT

100 ft (30 m) above DH (MDA):

Airspeed .... min. 89 KIAS (165 km/hr IAS)

PCL .... Fine pitch

Autopilot (if installed) .... OFF or
GO- AROUND at DH

At decision height (if decide to land):

Flaps .... 42°

Airspeed .... 84 KIAS (155 km/hr IAS)

MISSED APPROACH WITH BOTH ENGINES OPERATING

(a) ABOVE DH (MDH)

TCL .... MAXIMUM TAKE-OFF POWER

Climbing .... INITIATE

Landing gear .... UP

Airspeed .... 84 KIAS (155 km/hr IAS)

Landing lights .... OFF

After reaching a height of 400 ft (122 m):

Airspeed .... 94 KIAS (175 km/hr IAS)

Flaps .... 0°

Airspeed .... 108 KIAS (200 km/hr IAS)

(cont.)

(b) BELOW DH (MDH)

TCL .... MAXIMUM TAKE-OFF POWER

Climbing at an airspeed of
84 KIAS (155 km/hr IAS) .... INITIATE

Landing gear .... UP

Flaps .... 18°

Landing lights .... OFF

After reaching a height of 400 ft (122 m):

Airspeed .... 94 KIAS (175 km/hr IAS)

Flaps .... 0°

Airspeed .... 108 KIAS (200 km/hr IAS)

After reaching a height of 1500 ft (457 m):

Airspeed .... 135 KIAS (250 km/hr IAS)

NOTE

More information see SECTION 5.

LANDING

APPROACH AIRSPEED

Conditions:

(a) Flaps in landing position (42°)

- Landing gear .... DOWN
- Both engines .... idling or one engine inoperative and the other idling
- Airspeed .... 84 KIAS (155 km/hr IAS)

(cont.)

(b) Flaps in take–off position (18°)

- Landing gear .... DOWN
- Both engines .... idling or one engine inoperative and the other idling
- Airspeed 89 KIAS (165 km/hr IAS)

These speeds do not vary with landing weight and centre of gravity position.

LANDING PROCEDURES

(a) With both engines operating

At a height of 50 ft (15 m) above runway:

TCL .... IDLE

At the height of 10 ft (3 m) above runway:

Airplane .... FLARE

Vertical speed .... 200 to 100 fpm (1 to 0.5 m/s)

Immediately after touch–down according to conditions:

Push–button of spoilers .... PUSH as required

TCL .... REVERSEPOWERas required

After nose–wheel touch down

Brakes .... AS REQUIRED

CAUTION

ACTUAL LANDING DISTANCE ON THE RUNWAY WITH LOW FRICTION MAY BE 60% LONGER COMPARED WITH THE ACTUAL LANDING DISTANCE UNDER NORMAL CONDITIONS.

NOTE

Spoilers can be controlled only by left pilot.

(b) With one engine inoperative

At a height of 50 ft (15 m) above runway:

TCL .... IDLE

At the height of 10 ft (3 m) above runway:

Airplane .... FLARE

(cont.)

Vertical speed .... 200 to 100 fpm (1 to 0.5 m/s)

Immediately after touch–down according to conditions:

Push–button of spoilers .... PUSH as required

TCL of operating engine .... REVERSEPOWERas required

After nose–wheel touch down:

Brakes .... AS REQUIRED

NOTE

1. Eliminate the tendency to turn when reverse power is selected by nose wheel pedal steering, brakes and full push on the control column.

2. Actual landing distance with one engine operating is 20% longer than actual landing distance with both engines operating (see section 5 – Landing field lengths).

3. During landing on unpaved runway with either one or both engines operating relieve the nose wheel of load after touch–down and selection of reverse power by pulling the control column back.

AFTER LANDING

Taxi lights .... ON

Transponder(s) .... STBY

Graphic unit (if installed) .... OFF

Nose wheel steering .... MANUAL

(cont.)

Flaps .... RETRACED

AUTOFEATHER, AUT. BANK CONTROL,
SPOILERS switches .... OFF

Heating of air pressure probes .... OFF

Deicing (windshield, propeller) .... OFF

Horizons, Turn and bank indicators .... OFF and LOCK

GPS (if installed) .... OFF

Radar screen (if installed) .... OFF

SPEC. EQUIPMENT .... OFF

Autopilot, elect. trim (if installed) .... OFF

PA, RADAR (if installed) .... OFF

SEPARATOR VANE .... OFF

Ice detectors .... OFF

HF (if installed) .... OFF

PROP. FEATHERING/AUT. BANK CONTROL
circuit breakers .... OFF

ADF, NAV, DME .... OFF

GYRO COMPASS .... OFF

STBY GYRO HORIZON .... OFF

INVERTERS except No I 36 V .... OFF

Stop watch .... STOP

After stopping airplane:

FASTEN SEAT BELTS circuit breaker .... OFF

Parking brake .... pressure 25 + 5 kp/cm^2

SHUTTING DOWN THE ENGINE ON GROUND

TCL .... IDLE

PCL .... FEATHER

Taxi lights .... OFF

(cont.)

VHF, INTERCOM .... OFF

After 3 minutes, needed for the engine cooling:

NOTE

The engine cooling time may include taxiing time; during this taxiing the gas generator speed may rise to max. 70% for a period not exceeding 15 seconds.

AC, DC GENERATORS switches .... OFF

Fuel stop cock/Emergency throttle lever .... SHUT

Stop watch .... START
(to check run out of gas generator speed – not less than 18 seconds)

WARNING

IF SIGNS OF FIRE IN THE ENGINE ARE DETECTED AFTER THE ENGINE HAS BEEN SHUT DOWN IMMEDIATELY TAKE ACTION SPECIFIED IN SECTION DRY MOTORING.

After gas generator has stopped:

ANTICOL BEACON, VOICE RECORDER (if installed) .... OFF

IELU, ENGINE STARTING .... OFF

FUEL PUMP .... OFF

INVERTER 36-V I .... OFF

All circuit breaker under cover .... OFF

BATTERY I, II .... OFF

For long term parking:

PCL .... Move out of Feathered position and let it close to this position

4.2. SYSTEM CHECKS AND OPERATION – EXPANDED PART 4.1.

ENGINES AND PROPELLERS

ENGINE PERFORMANCE CHECK BEFORE TAKE-OFF

1. Both engines .... IDLING
2. Engine instruments .... CHECK:

   n_G .... 60 to 63%

   ITT .... max. 550 °C

   T_Q .... min. 8%

   Oil temperature .... min. +20 °C (68 °F)

   Oil pressure .... min. 1.8 kp/cm^2 (25.6 psi)

   Propeller speed .... 920 ±60 RPM
   (difference between the left and right propeller speed must not exceed 40 RPM)

SETTING THE MAXIMUM TAKE-OFF POWER

The PCL is to be put to a position corresponding to maximum propeller speed.

The TCL is to be put to a position corresponding to torque T_Q = 100% or maximum permitted ITT 735 °C or n_G = 100%.

In order to prevent exceeding limited values of measured parameters (see Section 2 – POWERRATINGS LIMITATIONS, page 2-12) it is recommended to check their values during the course of airspeed increasing. If the value of some measured parameter exceeds the permitted limit, decrease immediately the engine power by the TCL.

CAUTION

WHEN THE ENGINE OPERATES AT THE MAXIMUM TAKE-OFF POWER THE AIR BLEED MUST BE CLOSED.

(cont.)

SETTING THE MAXIMUM TAKE-OFF POWER WITH WATER INJECTION

Maximum take-off power with water injection is used in case of atmospheric conditions do not guarantee sufficient engine power.
It is used at atmospheric temperature +23 °C (73 °F) and higher or according to conditions see Fig. 4-3, page 4-34.

According to the atmospheric conditions - temperature and pressure - the necessary water injection stage is to be determined using the graph (see Section 4 - USE OF WATER INJECTION, page 4-33).

NOTE

During take-off, an IELU intervention is possible because the 100% T_Q rating has been exceeded without throttling back the engines. However, check that the IELU intervention really was caused by excessive T_Q and not by exceeding other limits (n_G or n_P or ITT).

SETTING MAXIMUM CONTINUOUS POWER

Set the gas generator speed determined from the graph in Fig. 4-2, page 4-30 (max. n_G = 97%).

Check the other limiting parameters (ITT = max. 690 °C; T_Q = max. 100%; n_P = max. 1,900 RPM), and if necessary decrease the engine power by TCL.

Any difference between the T_Q of the left and of the right engine at same propeller speeds can be eliminated, if the pilot considers this necessary, by TCL.

At max. continuous power, all the bleed air required for the airplane's systems may be used with respect to engine operation limitations.

(cont.)

GRAPH FOR DETERMININGOF MAX. CONTINUOUS POWER
AS A FUNCTION OF ALTITUDE AND TEMPERATURE (V = 119 kts (220 km/hr) TAS; T_Q = 100%)

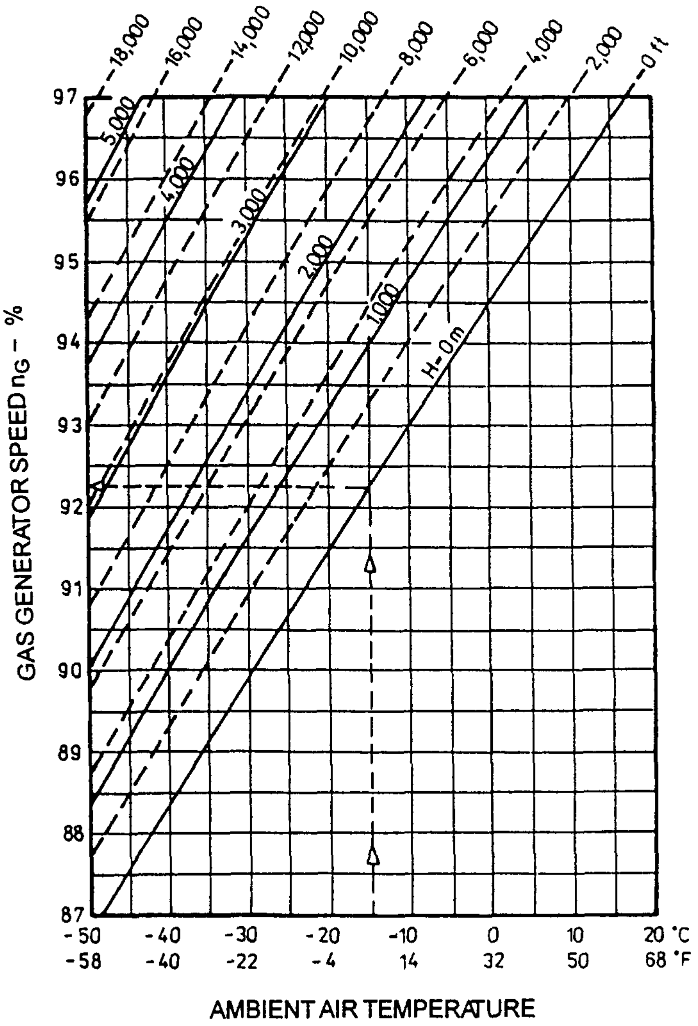


Fig. 4 - 2

SETTING MAXIMUM CONTINGENCY POWER

This setting is used typically when one engine becomes inoperative at take-off and missed approach.

Push the catch on the TCL to lift the locking pin in the groove of the guide, overcome the resistance of the spring-loaded stop, and shift the TCL to its farthest front position.

As soon as the TCL is beyond the spring-loaded stop, the extra resistance is cancelled, and the lever can be moved freely throughout the entire range from its idling to its max. contingency power.

In this mode, make sure the torque limit 106.5% is not exceeded (regardless of all the other engine operating parameters).

(cont.)

NOTE

1. The time for which an engine has run in this mode, max. n_G and max. ITT must be entered in the Engine Logbook.

2. After using Maximum Contingency power, the engine manufacturer must decide about the further operation of the engine.

3. The IELU must be switched off at this power setting and do not use the cockpit or cabin heating system.

SETTING INTERMEDIATE CONTINGENCY POWER

This setting is used when one engine becomes inoperative.

The setting is limited by that parameter T_Q = 100%, n_G = 100%, ITT = max. 735 °C. At an ambient temperature of +30 °C (86 °F), the ITT limit may be exceeded up to 750 °C.

The time for which an engine has run in this mode must be entered in the Engine Logbook.

NOTE

The IELU must be switched off at this power setting and do not use the cockpit or cabin heating system.

SETTING REVERSE POWER

WARNING

1. **FOR PITCH REVERSING THE PCL MUST BE IN FINE PITCH POSITIONS.**

2. **USING REVERSE POWER IN FLIGHT IS PROHIBITED.**

Pulling the TCL back behind the idle stop sets the propeller blades to negative pitch while increasing the engine output. When the TCL are in their rearmost positions, the blades are at their maximum negative pitch.

Reverse pitch operation is signalled by the BETA RANGE cell of the appropriate engine.

Reverse power setting procedure:

After lifting off the red stop, move both TCL back until their increased resistance indicates that they are at the reverse interlock coupling stop. Check that the BETA RANGE cells of both engines come on, and then smoothly move both TCL to the desired engine reverse power.

(cont.)

The rate at which the TCL can be moved is governed by the displacement rate of the reverse coupling ring. Do not use abnormal force to move the TCL in this range!

To keep the reverse thrust symmetrical, if this is necessary, the TCLs may be set at different angles.

If the BETA RANGE cell does not come on:

Return both TCL to the idling position.

Apply the wheel brakes intensively (if necessary).

ENGINE ACCELERATION

In normal operation, both on the ground and in the air, increase the engine speed by smooth and gradual shifting of the TCL from their idling to their maximum take-off power position.

This movement of the TCL should take not less than 3 seconds.

WARNING

POWER RATINGS GREATER THAN IDLE CAN BE SET FROM IDLE RATING ONLY IF THE CELLS "BETA RANGE" ARE STAYED OFF, OTHERWISE PROPELLER OVERSPEED MAY OCCUR.

CAUTION

ENGINE ACCELERATION WITHIN 5 SECONDS IS ENSURED ONLY IF THE ENGINE WAS PREVIOUSLY IN ITS INITIAL CONDITIONS FOR ACCELERATION, AS SPECIFIED IN SECTION 2, PAGE 2-12.

NOTE

At altitudes up to 13,120 ft (4,000 m), the engines can be speeded up in an emergency, from their initial setting for acceleration, by shifting the TCL in one second. At altitudes above 13,120 ft (4,000 m) the motion of the TCL for acceleration must take at least 6 seconds.

DRY MOTORING

To remove remainders of fuel or fuel vapours, and also if signs of a fire within the engine are detected after the engine has been stopped:

TCL .... IDLE

PCL .... FEATHERED

Fuel fire cocks .... OPEN

(cont.)

Fuel stop cock/Emergency throttle lever .... SHUT

BATTERY I,II; INVERTER 36 V I, II;
ENGINE STARTING and FUEL PUMP
switches and circuit breakers .... ON

DRY MOTORING RUN push-button .... PUSH

Dry motoring process cuts out automatically after 20 sec.

NOTE

The dry motoring can, if necessary, be discontinued by switching off the ENGINE STARTING circuit breaker.

After the gas generator has stopped:

FUEL PUMP circuit breaker .... OFF

USE OF WATER INJECTION

NOTE

The airplane performance mentioned in Section 5 of this Flight Manual at take-off airport air temperature of +23 °C (73 °F) or higher, or at atmospheric pressure and air temperature as shown in Fig. 4-3, page 4-34, are only guaranteed when using the appropriate degree of water injection.

BEFORE ENGINE STARTING

(a) Use the graph in Fig. 4-3 to select the injection degree and amount of water needed at the given atmospheric pressure and ambient temperature.
At atmospheric pressures lower than those listed in the graph, use injection degree III.

(cont.)

GRAPH FOR SELECTING THE WATER INJECTION DEGREE

Injection degree	Amount of water [US gallons (litres)]
I.	0.87 (3.3)
II.	1.74 (6.6)
III.	2.64 (10.0)

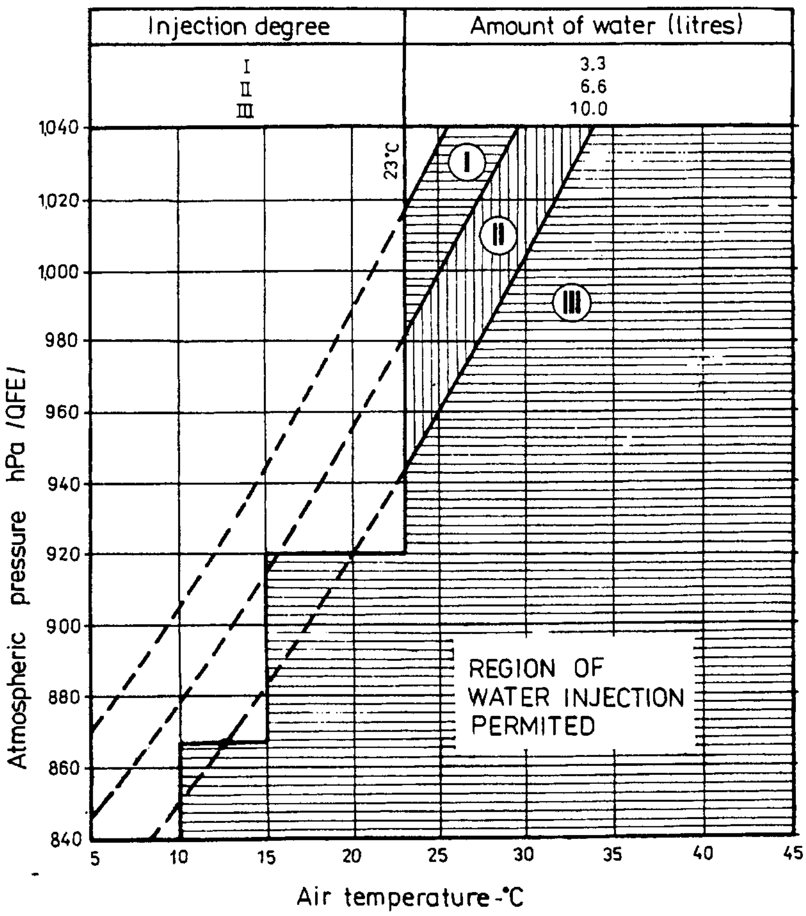


Fig. 4 - 3

(cont.)

(b) Check that the water injection tank contains the specified amount of water, and that the correct pump delivery rate is set on the water injection pump casing (degree I, II or III).

DURING TAKE-OFF

WATER INJECTION circuit breaker .... ON

TCL .... T_Q = min. 60%

WATER INJECTION/ON push-button .... Push and hold till amber WATER INJECTION signal comes on (on the front control panel)

If the water injection degree has been correctly selected and set, injection will not last longer than the permissible injection time. When exhaustion of the water supply causes the injection system pressure to drop, the injection pump is shut down automatically, and the WATER INJECTION signal on the front control panel goes off.

CAUTION

ITT RISES WHEN WATER INJECTION IS TERMINATED. THEREFORE THROTTLE BACK THE ENGINES TO AVOID EXCEEDING THE MAXIMUM PERMISSIBLE LIMIT OF ITT.

Water injection is automatically stopped when the engine is throttled back from maximum take-off to a lower power setting (that is, when the TCL is moved back beyond the 88% n_G or 92% n_G position). Water injection can also be discontinued by pushing the WATER INJECTION/OFF button on the front control panel.

AFTER COMPLETING THE TAKE-OFF:

WATER DRAIN switch .... ON

CAUTION

1. ABORT TAKE-OFF IF THE WATER INJECTION SIGNAL DOES NOT COME ON WITHIN 5 SECONDS AFTER THE WATER INJECTION BUTTON HAS BEEN PUSHED. THIS INDICATES A DEFECT IN SOME PART OF THE WATER INJECTION SYSTEM.
2. ABORT TAKE-OFF IF ONE OR BOTH OF THE ENGINES FAILS AFTER WATER INJECTION IS USED. THIS INDICATES A FLAME-OUT CAUSED BY A TOO LOW n_G.
3. CONTINUE IN TAKE-OFF IF THE WATER INJECTION SIGNAL LIGHT GOES OFF AFTER THE AIRPLANE HAS LIFTED OFF. THIS INDICATES FAILURE OF SOME PART OF THE WATER INJECTION SYSTEM. CO-PILOT MUST ADJUST THE ITT AS NECESSARY.

FUEL SYSTEM

PREPARATION FOR ENGINE STARTING

Fuel fire cocks .... OPEN

Fuel stop cock/Emergency throttle lever .... SHUT

The FUEL PRESSURE cells on the central warning displays must come on.

FUEL FEED FROM THE WING TANKS

FUEL PUMP (LH, RH) circuit breakers .... Check ON

The FUEL PRESSURE cells on the central warning displays must stay off.

CAUTION

IF THE FUEL QUANTITY INDICATOR READS ZERO IT IS NOT POSSIBLE TO SUPPLY ANY FUEL FROM THE CORRESPONDING FUEL TANK SAFELY.

NOTE

Under normal conditions in flight fuel for the left engine is supplied from the left collector fuel tank and for the right engine from the right collector tank.

FUEL FEED FROM THE WING–TIP TANKS

After reaching the cruising flight level:

WING TIP TANK LH and RH circuit breakers .... ON

If ACTUATE TRANSFER amber cell comes on:

WING TIP FUEL TRANSFER switches
on the right instrument panel .... ON

(cont.)

After the transfer completing:

WING TIP FUEL TRANSFER switches
on the right instrument panel .... OFF

NOTE

Transfer of the fuel from wing tip tanks is signalled by green signal cells FUEL TRANSFER on the CWD. After exhaust of the fuel the signal cells go off.

FUEL CROSSFEED

Feeding both engines from one group of tanks:

FUEL TRANSFER circuit breaker .... ON

FUEL PUMP circuit breaker
for fuel tanks not in use .... OFF

FIRE EXTINGUISHING SYSTEM

CHECK OF FIRE SIGNALLING SYSTEM OF THE ENGINE AND FRONT BAGGAGE COMPARTMENT

Before starting the engines:

CENTRAL WARNING DISPLAY (CWD),
ENGINE FIRE SIGN., BAG. COMP. FRONT,
BATTERY I, II circuit breakers and switches .... CHECK ON

(cont.)

ENG. FIRE SIGN. I, II, III buttons
on the test panel .... PUSH GRADUALLY

Every time one of these buttons is pushed, the red FIRE cells of both the LH ENGINE and RH ENGINE blocks on the CWD must come on, and the alarm bell must ring.

FIRE EXT. change–over switch
on test panel .... Set gradually to LH I and II and to RH I and II positions

In every change–over switch position except for the neutral position, the green light (located left from this change–over switch) must come on.

FIRE DET. CHECK push–button
on the left control panel .... PUSH

The red BAG. COMP. FIRE cell on the CWD must come on.

ELECTRICAL SYSTEM

CONNECTION AN EXTERNAL POWER SOURCE

BATTERY I,II switches .... ON

The BATTERY cell on the CWD must come on.

VA METER selector switch
on the INVERTER SELECTION panel .... Set to the EMERG. BUS–BAR I V or II V position

The right volt/ammeter must indicate 27 to 29 V.

NOTE

Connecting up an external power source automatically disconnects the electric power sources on board, and the red EXT. POWER SUPPLY cell on the CWD comes on. The VHF I is automatically connected to the battery on board the airplane.

SWITCHING ON THE ELECTRICAL SYSTEM BEFORE ENGINE STARTING

All circuit breaker switches
in the CIRCUIT BREAKERS row under the cover .... ON

BATTERY I, II, INVERTER 36 V I, II switches .... ON

Circuit breakers:

INTERCOM I, II .... ON

ENGINE STARTING LH and RH .... ON

IELU LH and RH .... ON

FUEL PUMP LH and RH .... ON

ANTICOLL. BEACON, VOICE RECORDER (if installed) .... ON

INV. SELECT 115V change-over switch .... AUT.

THE REST OF THE ELECTRICAL SYSTEM ACTIVATION AFTER THE ENGINES HAVE BEEN STARTED

Circuit breakers and switches:

INVERTER 36 V AC II .... ON

INVERTERS 115 V AC I, II .... ON

STANDBY GYRO HORIZON .... ON

VHF I, II .... ON

ADF .... ON

GYRO COMPASS .... ON

HF (if installed) .... ON

ELECTRICAL MAIN BUS BAR CHECK AFTER ENGINE STARTING

(a) Voltage check

Check the electric measuring instruments on the right instrument panel:

- The LH and RH volt-ampere meters must indicate 27 to 29 V;
- The LH voltmeter must indicate 34 to 36 V;
- The RH voltmeter must indicate 115 to 119 V.

(cont.)

Check if all cells in the ELECTRO panel on the CWD stay off.

(b) Battery charging check (After the engines have been started by airplane's batteries)

VA METER selector switch
on the INVERTER SELECTION panel .... Set first to BATTERY I VA and then to BATTERY II VA

Check the charging rate on the right volt-ampere meter.

VA METER selector switch .... Return to RH DC GEN. position

HYDRAULIC SYSTEM

SETTING BRAKES BEFORE ENGINE STARTING

PARKING BRAKE lever .... Move to STOP position

Emergency hydraulic pump .... Increase pressure to 40 + 5 kp/cm^2 (569 + 71 psi)

HYDRAULIC PUMPS CHECK

(a) Before engine starting:

WING FLAPS lever .... Move from 18° to 0° and repeat it if necessary (until the mains pressure drops to 100 kp/cm^2 [1,423 psi])

(b) During starting of the first engine:

Check that the hydraulic system pressure increases and reach normal pressure within 60 seconds at most.

NOTE

The checks should be performed during the flight day with the engine starting-up sequence LEFT-RIGHT and RIGHT-LEFT respectively.

(c) After engine starting:

Check hydraulic system pressure.

Pressure must be within normal operating range.

SETTING PARKING BRAKES

PARKING BRAKE lever .... Move to STOP position

Emergency hydraulic pump .... Increase pressure to at least 25 +5 kp/cm^2 (356 +71 psi)

Latch of LANDING GEAR control lever .... Checked locked with red locking device

DEICING SYSTEMS

CHECK BEFORE TAXIING

(a) Regardless of the atmospheric conditions:

ICE DETECTORROTARY circuit breaker .... ON

(b) Check before flight in an area where icing conditions are reported:

Main switch of pneumatic deicing system .... ON

Three white lights on the pneumatic deicing panel .... COME ON

Function selector of pneumatic deicing .... MANUAL

Change–over switches close the white lights on the panel of the pneumatic deicing system .... Set to A, then B and then C, hold for 1–2 seconds in each position

The corresponding white light must come on.

Main switch of pneumatic deicing system .... OFF

WINDSHIELD HEATING change–over switch on right instrument panel .... SET TO I

WINDSHIELD HEATING CHECK LH and RH change–over switches on left control panel .... See the notes

(cont.)

NOTE

1. If the green signal lamp WINDSHILDHEAT. (left hand or right hand) stays on, set the left or right change-over switch to the HEATING ON position. Then the lamp must go off.

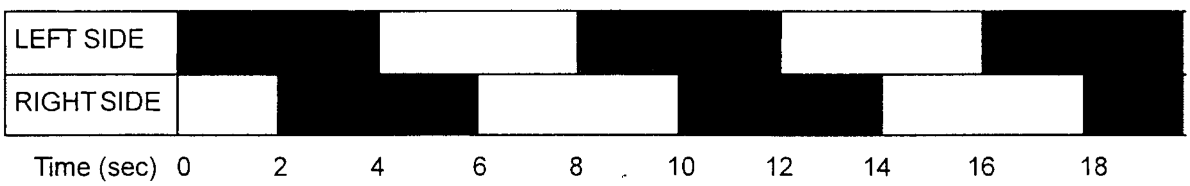
2. If the green signal lamp WINDSHILDHEAT. (left hand or right hand) stays off, set the left or right change-over switch to the HEATING OFF position. Then the lamp must come on.

3. The WINDSHIELD HEATING change-over switch may be left in the position I after the check.

PROP DEICING change-over switch
on the right instrument panel .... MAIN I

TIMER (PROP DEICING CHECK) push-button
on left control panel .... PUSH

When the cycle controls are working correctly, the PROPELLER DEICING cells on the CWD must come on for 4 seconds every eighth second, with a two-second overlap between the LH and RH sides, as shown below; another timing indicates a system defect.



BLADES (PROP DEICING CHECK) push-button .... PUSH

If the blade heating circuits are correct, the PROPELLER DEICING cells must not come on. If they do, that means a fault.

PROP DEICING change-over switch
on the right instrument panel .... 0 (OFF)

BEFORE TAXIING ONTO RUNWAY

Regardless of the atmospheric conditions:

WINDSHIELD HEATING change-over switch
on the right instrument panel .... I (Stage I heating)

BEFORE TAKE-OFF

Not more than 1 minute before take-off when the ambient air temperature is above 0 °C (32 °F) and not more than 3 minutes before take-off when this temperature is below 0 °C (32 °F) and not later than 3 minutes before take-off if visible moisture is present at an ambient temperature of+5 °C (41 °F) or less:

STALL PROBE, STATIC PRESSURE I and II,
and PITOT PRESSURE I and II heating buttons
on the right control panel .... PUSH

Under possible icing conditions, also:

WINDSHIELD HEATING change-over switch
on the right instrument panel .... SET TO II

PROP DEICING change-over switch
on the right instrument panel .... MAIN I

AFTER LANDING

Not later than 2 minutes after touchdown:

STALL PROBE, STATIC PRESSURE I and II,
and PITOT PRESSURE I and II push-buttons .... OFF

WINDSHIELD HEATING change-over switch .... 0 (OFF)

ICE DETECTOR ROTARY circuit breaker .... OFF

SEPARATOR VANE LH, RH circuit breakers .... OFF

NAVIGATION SYSTEMS

RADIONAVIGATION AND COMMUNICATION EQUIPMENT AND GYROMAGNETIC COMPASSES

See Section No. 9.

MAGNETIC COMPASS

The magnetic compass readings are valid only with the windshield wiper off and the ventilator fan off. The ventilator must be turned to the right and tilted up.

The compass illumination is switched on by means of the INSTRUMENT PANEL/CIRCUIT I circuit breaker in the LIGHTING sector of the overhead control panel.

CONTROLS

CHECK BEFORE ENGINE STARTING

Elevator, aileron and rudder controls, including controls of elevator trim tabs .... Check all the controls move freely to extreme positions

ACTION BEFORE TAXIING

Elevator trim tab handwheel (NOSE-HEAVY - TAIL-HEAVY) .... Set in dependence on weight and on c.g. position - see Table below. Mechanical indicator must be in the green area.

Electric trim .... Check function

The table is valid for V_2 = 84 KIAS (155 km/hr IAS) - wing flaps 18°
V_2 = 97 KIAS (180 km/hr IAS) - wing flaps 0°

Centre of gravity position (% MAC)	Weight (lb)	(kg)	Indexes TAIL-HEAVY (white sector)	
			wing flaps 18°	wing flaps 0°
19	up to 11,023	up to 5,000	8	11
20	11,023	5,000	8	11
25	14,109	6,400	7	10
28	14,550	6,600	4	7
30	14,550	6,600	2.5	6

Rudder trim:

TURN change-over switch .... Set according to indicator 1 scale mark to the right

Aileron trim:

BANK change-over switch .... Set to the neutral position (set BANK change-over switch to LEFT or RIGHT position until signalling lamp blinks once)

NOSE WHEEL STEERING MODE SELECTION

(a) Taxiing mode (Used for taxiing before take–off and after landing)

NOSE WHEEL STEERING selector .... MANUAL

Check that the MANUAL STEERING cell on the CWD comes on

ANTISKID switch .... ON

(b) Take – off and landing mode

Steering pedals .... Set to neutral position

NOSE WHEEL STEERING selector .... PEDAL

Check that the PEDAL STEERING cell on the CWD comes on.

ARMING AND DISARMING THE AUTOMATIC BANK CONTROL SYSTEM (ABC SYSTEM)

The automatic bank control tabs are actuated by an electro–hydraulic system, where the electric circuits are fed via the PROP. FEATHERING/AUT. BANK CONTROL circuit breaker on the overhead control panel and the AUT. BANK CONTROL switch on the central control panel.

When the circuit breaker and switch are on, and simultaneously, TCL of both engines are in position corresponding to n_G min. 88% ± 1% (for OAT –50 °C to +20 °C) or min. 92% ± 1% (for OAT –20 °C to +50 °C) then the ABC system is in stand–by , ready to intervene, and this is indicated by the green AUT. BANK CONTROL cell on the CWD.

If during take–off the torque of either engine drops to about 22%, the green AUT. BANK CONTROL cell on the CWD goes off. The ABC tab on the side of the malfunctioning engine is blocked in its retracted position and the ABC tab on the side of the normally working engine is extended; simultaneously, the amber AUT. BANK CONTROL cell on the CWD comes on.

During the approach, when the ABC system is not in stand–by conditions in consequence of the position of TCLs, the automatic bank control tabs are extended not in response to diminishing torque, but in response to a reduction of the air pressure downstream of the compressor to less than 0.05 MPa (7.25 psi).

If the ABC system has not intervened, the ABC system is automatically disarmed when the airspeed reaches 111 KIAS (205 km/hr IAS), and the green AUT. BANK CONTROL cell on the CWD goes off. When the airspeed declines to less than 111 KIAS (205 km/hr IAS), the ABC system is automatically rearmed.

If the ABC system has intervened, the extended ABC tab retracts at 111 KIAS (205 km/hr IAS), and the amber AUT. BANK CONTROL cell on the CWD goes off. When the airspeed declines to less than 111 KIAS (205 km/hr IAS), the ABC tab does not extend again and ABC is not in stand–by .

(cont.)

CAUTION

IF THE ABC SYSTEM HAS INTERVENED, IT CAN ONLY BE REARMED IF THE MALFUNCTIONING ENGINE HAS BEEN SUCCESSFULLY STARTED UP IN FLIGHT. BEFORE STARTING THE ENGINE SWITCH OFF AND THEN BACK ON THE PROP. FEATHERING / AUT. BANK CONTROL CIRCUIT BREAKERS ON THE OVERHEAD CONTROL PANEL.

SWITCHING-ON AND OFF THE SPOILERS SYSTEM

The spoiler control circuits are fed via the SPOILERS circuit breaker on the overhead control panel and the SPOILERS switch on the central control panel. Spoilers system is ready after switching on the switch and circuit breaker.

The spoiler system stand-by regime must be cancelled after the take-off, and rearmed before the approach, by means of the SPOILERS switch on the central control panel.

Spoiler extension:

SPOILERS push-button on the left
steering wheel .... PUSH AND HOLD for necessary period

Spoiler retraction:

SPOILERS push-button on the left
steering wheel .... RELEASE

HEATING AND VENTILATION

ACTION BEFORE ENGINE STARTING

All levers of heating and ventilation system .... DOWN (OFF)

CONTROL OF HEATING AND VENTILATION IN FLIGHT

HEATING, VENTILATION and
COCKPIT AIR CONTROL levers .... MOVE UP (as required)

Levers controlling air to the lower
portion of cockpit under instrument panel
(left and right) .... MOVE TO MAX.- MIN. (as required)

PITOT – STATIC SYSTEM

PRE – FLIGHT CHECK

On the left-hand control panel check settings:

EMERGENCY STATIC PRESSURE cock .... SHUT

PITOT PRESSURE cock I

NOTE

After switching-on the AIRFRAME (CENTRAL WARNING DISPLAY) circuit breaker on the overhead panel, the amber lamp PITOT HEATING, placed right from CWD, will light up.
It remains on, until the circuit breakers PITOT-STATIC I,II; STALL PROBE (DEICING) and the all push-buttons HEATING (STALL PROBE, STATIC HEADS I, II; PITOT HEADS I, II) on the right control panel are switched on.

FLIGHT DATA RECORDER BUR-1-2G

DATA INPUT

The following initial data must be entered:

- Time – 6 decimal digits (hours, minutes, seconds)
- Take-off date – 6 decimal digit (day, month, year)
- Flight number – 4 decimal digits
- Centre of gravity position – 3 decimal digits (%)
- Take-off weight – 3 decimal digits

Data are entered by a decimal coding system by means of the controls on the front panel of the recorder control box.

The time is entered by only 4 decimal digits (the hours and minutes). When the entered time is checked, by turning the code selector switch to its "0" position and pushing the INPUT CHECK push-button, the display shows the astronomical time in six figures, acting in effect as a clock with a four-second switching interval.

(cont.)

Any input data can be checked on the display by switching the code selector to the appropriate code number (as listed below) and then pushing the INPUT CHECK push-button.

The last 4 digits of the serial number of the airplane is entered into the flight recorder when this instrument is being installed on board, and can be recalled to the display by setting the selector to code "5" and pushing the INPUT CHECK button.

Data entering procedure:

- Set the selector to the first digit of the number to be entered.
- Push the SHIFT push-button. The entered number will then appear at the right-hand window of the display.
- Set the selector to the second digit of the number to be entered.
- Push the SHIFT push-button. The newly entered digit will appear at the right-hand edge of the display and the previously entered digit will move one place to the left on the display.
- Repeat the above sequence until the whole number is entered, then check on the display that it has been entered correctly. If there is an input error, push the CLEAR button and start again.
- Set the selector to the code number denoting the type of data being entered, as shown on the front panel of the recorder control box:

  TIME 0

  DATE 1

  FLT (Flight number) 2

  CG (Centre of gravity position) 3

  TOW (Take-off weight) 4
- Push the INPUT button.
- Use the same procedure for setting the astronomical time

PITOT PRESSURE HEAD FAILURE

If the pitot pressure head failure is occured, the airspeed indicator does not respond to airspeed changes in level flight.

(a) <u>If the left hand instruments are affected:</u>

PITOT PRESSURE red cock .... Position II

(b) <u>If the right hand instruments are affected:</u>

AUTOPILOT (if installed) .... DISCONNECT

- Continue in flight without any special measures.

WARNING

1. **WHEN THE PITOT PRESSURE SYSTEM FOR THE RIGHT HAND SIDE INSTRUMENTS IS BLOCKED, THE "EXTEND LAND. GEAR" SIGNAL IS INOPERATIVE DURING THE DESCENT AND APPROACH BECAUSE IT IS ACTIVATED BY THE AIRSPEED AND ENGINE POWER SETTING.**

2. **"MAXIMUM AIRSPEED" SIGNAL IS INOPERATIVE DURING THE FLIGHT.**

CAUTION

DISREGARD READINGS OF THE AIRSPEED INDICATOR ON THE RIGHT INSTRUMENT PANEL.

PERFORMANCE

TABLE OF CONTENTS

ITEM **PAGE**

(cont.)

GENERAL

CRITICAL ENGINE

Failure of the LH power unit has more adverse effect on handling and performance of the airplane than failure of RH power unit.

NOTE

All the data about performance and flight characteristics of the airplane with one engine inoperative are valid for failure of the LH engine.

AIRSPEED INDICATOR ERROR CORRECTION

(ASSUMES ZERO INSTRUMENTERROR)

The graph in Fig. 5-1 illustrates airspeed indicator error correction curves as a function of indicated airspeed and the position of the flaps. The value of the correction shall be added to the indicated airspeed (IAS) to get the respective calibrated airspeed (CAS).

The equivalent airspeed (EAS) for this airplane is approximately equal to calibrated airspeed (EAS=CAS). The influence of the landing gear position on airspeed indicator error correction is practically negligible. The graph applies to maximum airplane weight of 14,109 lb (6,400 kg).

Reduce airspeed indicator error correction with 0.8 kt (1.5 km/hr) for each 1,000 lb (500 kg) decreases in weight.

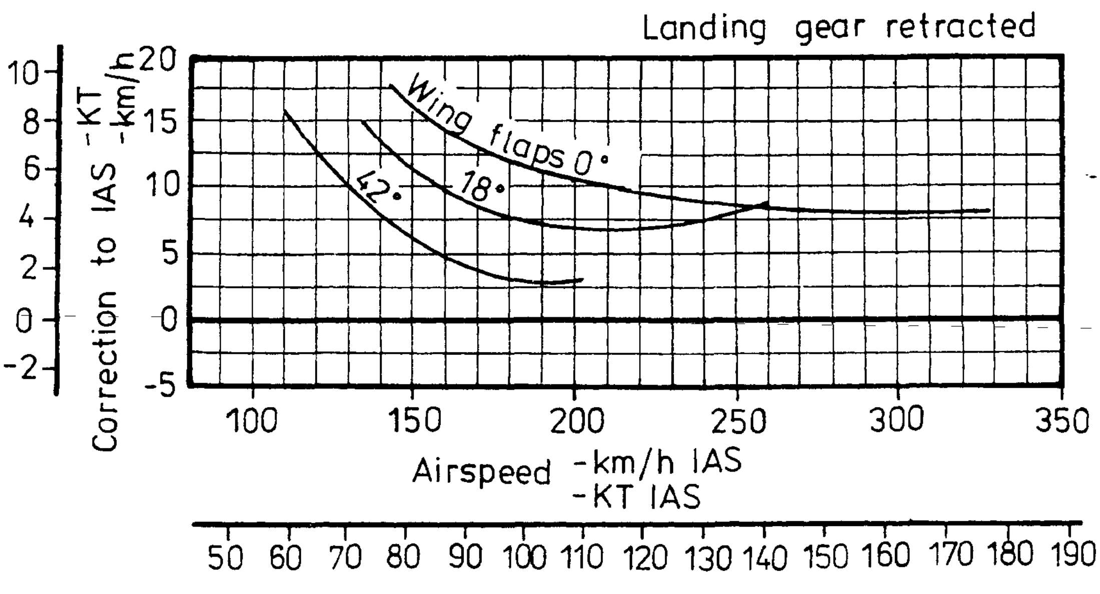


Fig. 5 - 1

ALTIMETER ERROR CORRECTION

(ASSUMES ZERO INSTRUMENTERROR)

The graphs in Fig. 5-2 and 5-3 illustrate a presentation of altimeter error correction curves as a function of indicated airspeed, pressure altitude and position of flaps. The value of the correction shall be added to the indicated altitude to get the corrected flight altitude. The influence of landing gear position on altimeter error correction is practically negligible.

The graphs apply to the weight of 14,109 lb (6,400 kg). Reduce the correction 3 ft (1 m) for each 1,000 lb (500 kg) reduction in weight.

The Fig. 5-2 applies to static pressure from probes placed on both sides of the forward part of the fuselage (EMERG. STATIC PRESS. cock SHUT).

The Fig. 5-3 applies to emergency static pressure (EMERG. STATIC PRESS. cock OPEN).

EMERG. STATIC PRESS. cock in position SHUT:

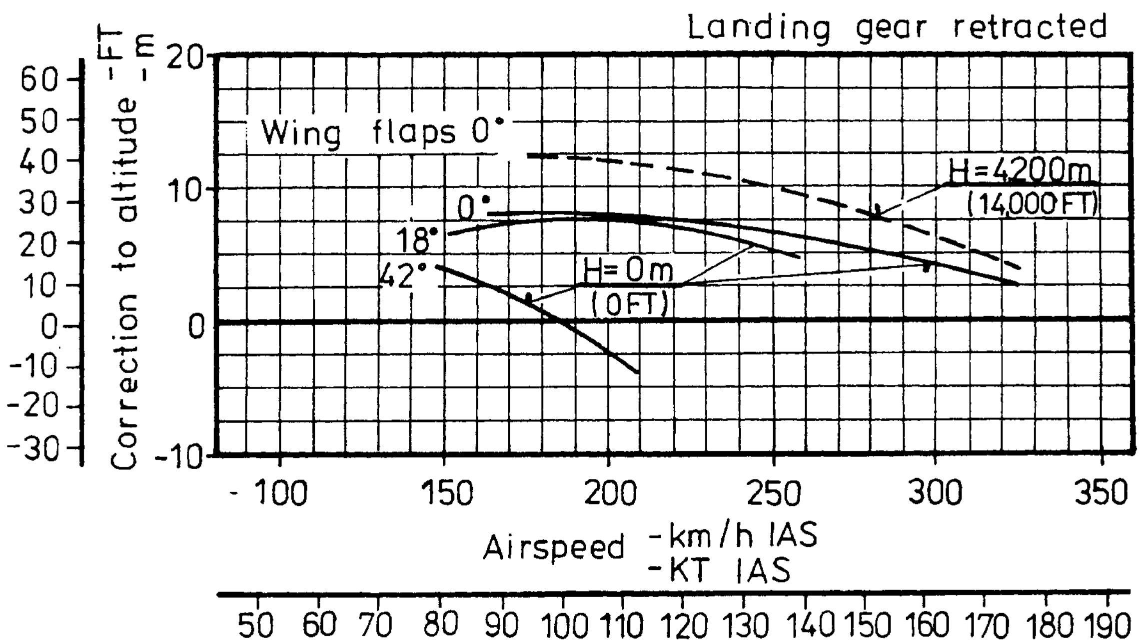


Fig. 5 - 2

EMERGENCY STATIC PRESS. cock in position OPEN.

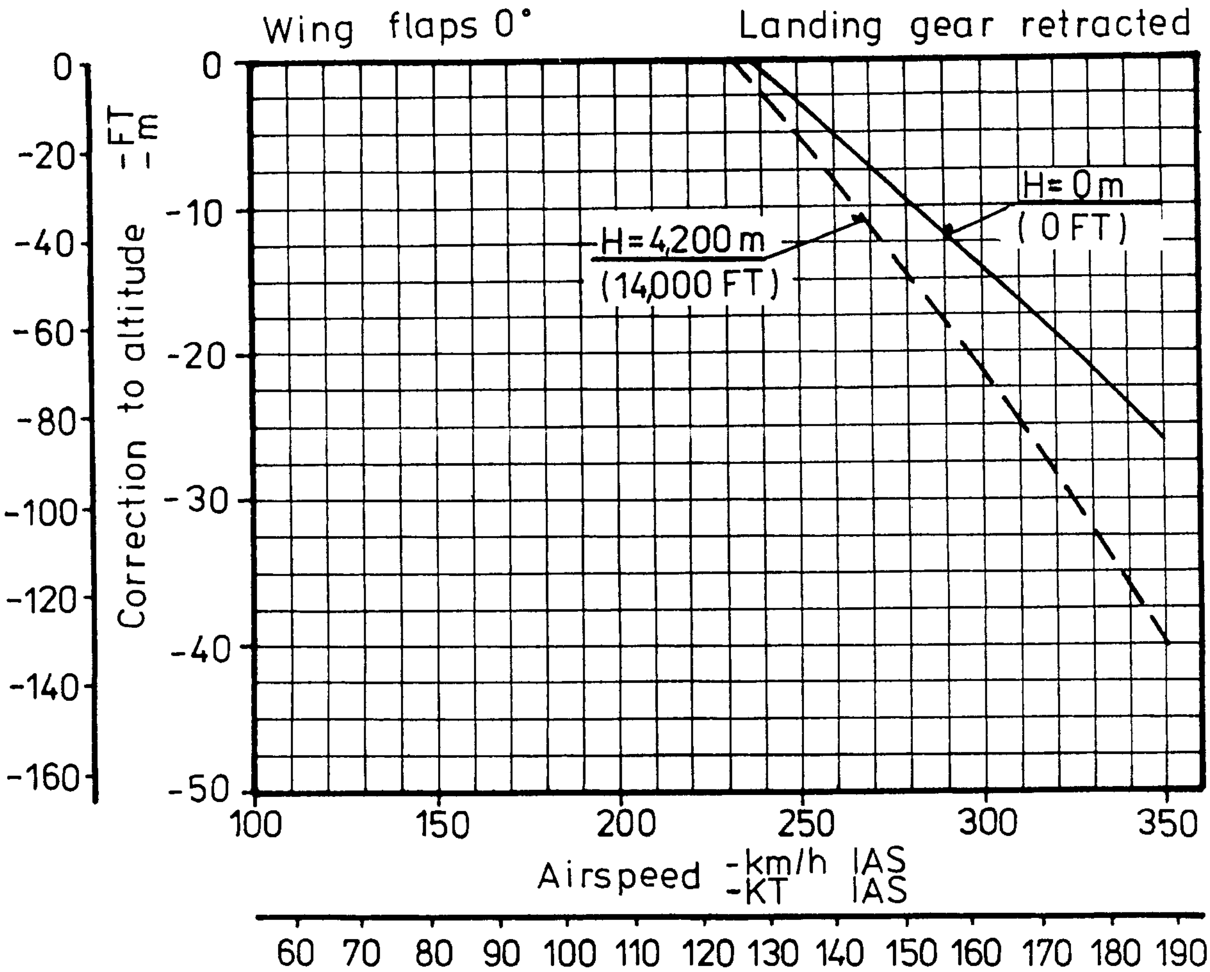


Fig. 5 – 3

POWER–OFF STALLING AIRSPEEDS – EAS

Stall airspeed for forward c.g. position.

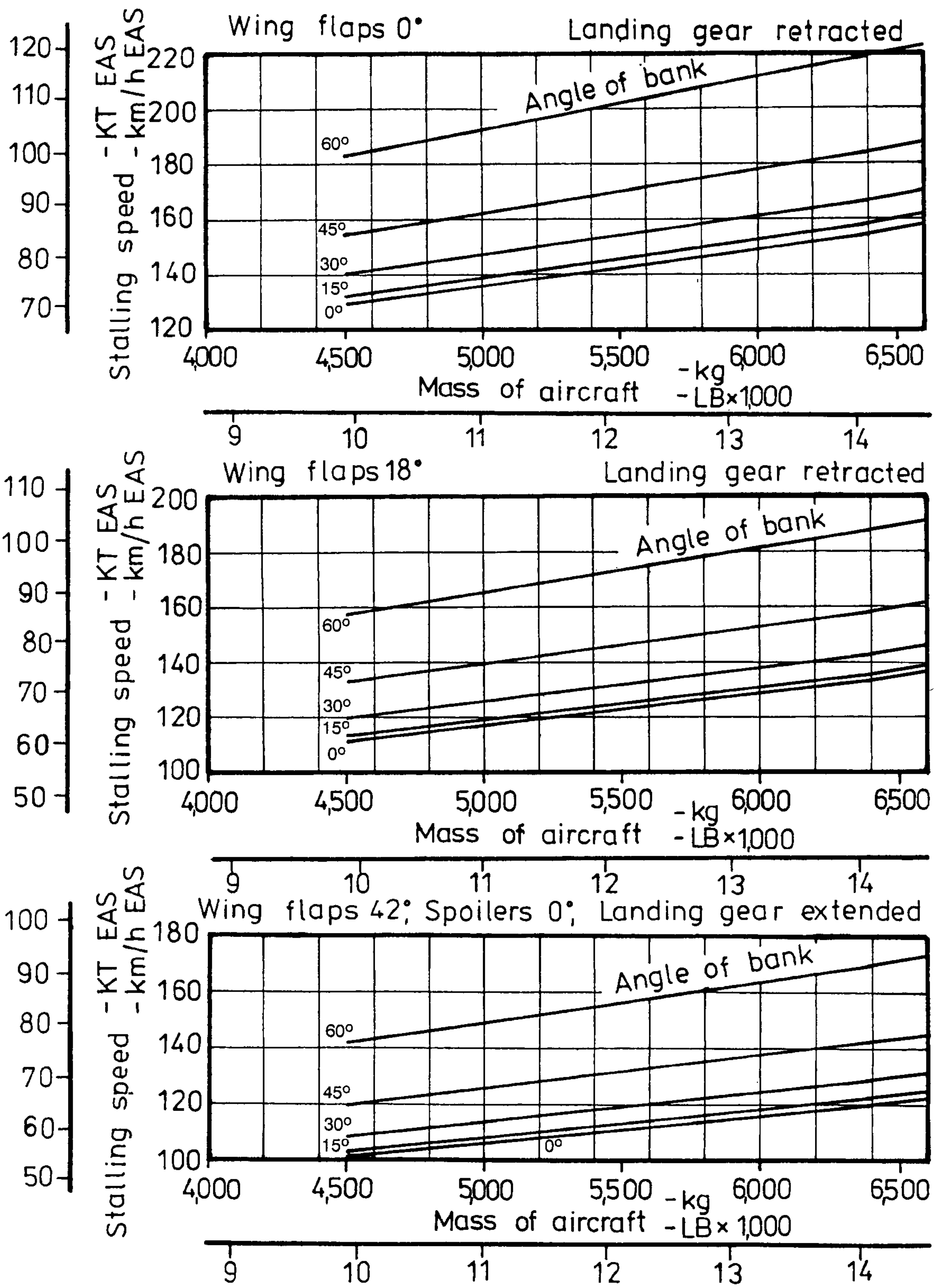


Fig. 5 – 4

POWER–OFF STALLING AIRSPEEDS – IAS

Stall airspeed for forward c.g. position.

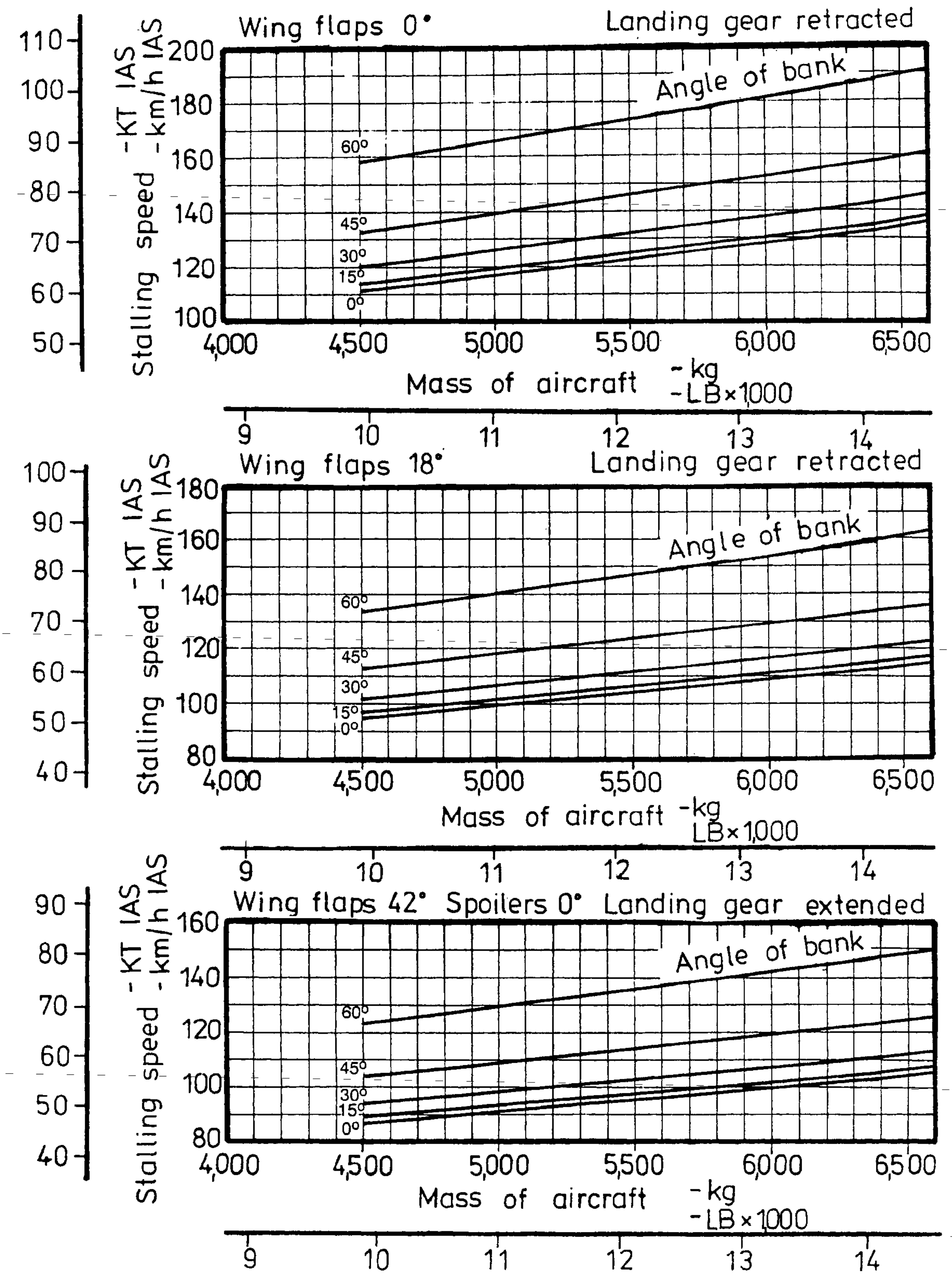


Fig. 5 – 5

CONVERSION TABLES AND GRAPHS

INTER–RELATIONSHIP OF AIR TEMPERATURE AND ALTITUDE IN ICAO STANDARD ATMOSPHERE

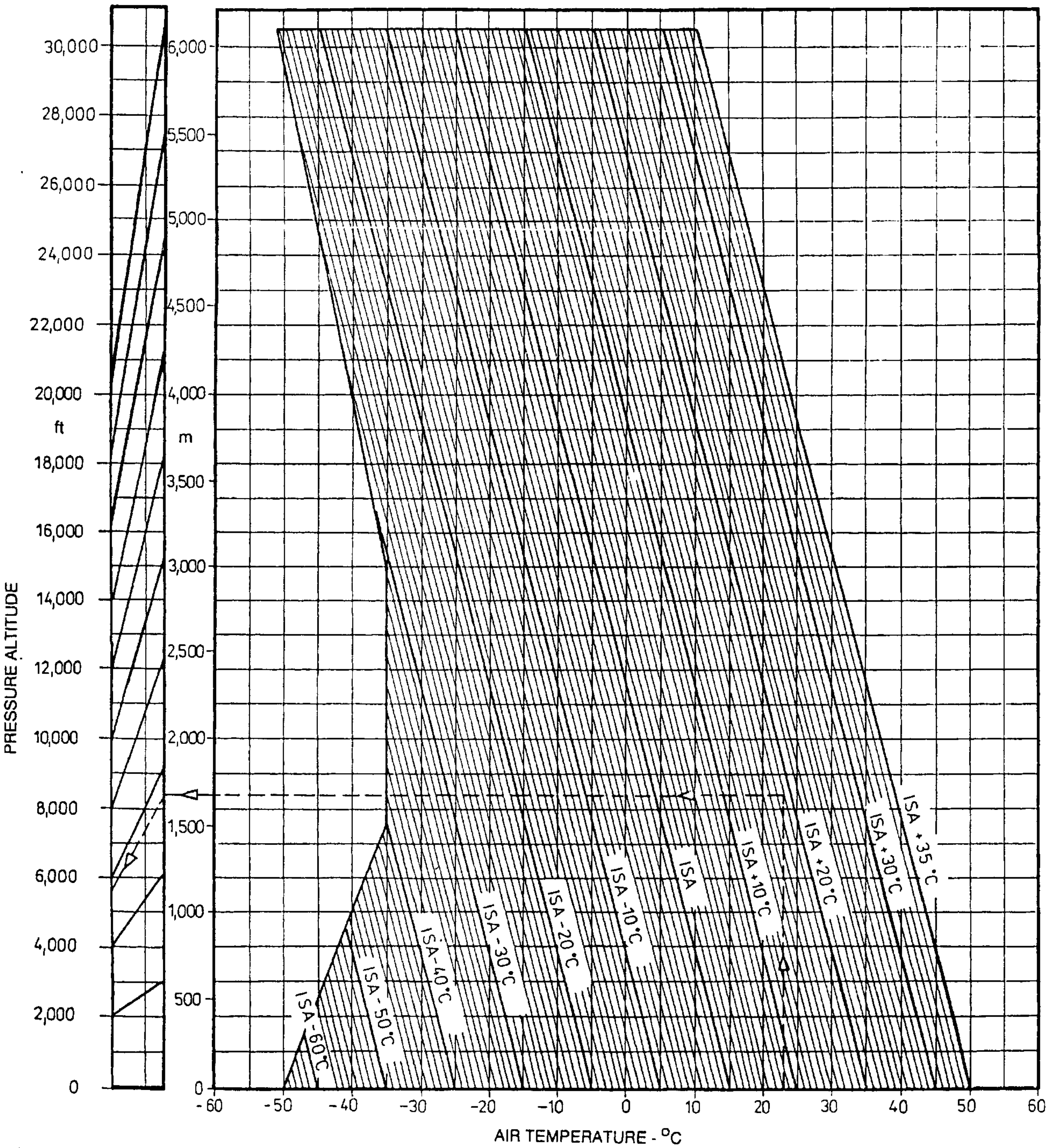


Fig. 5 – 6

CONVERSION OF ATMOSPHERIC PRESSURE INTO AIRPORT ALTITUDE

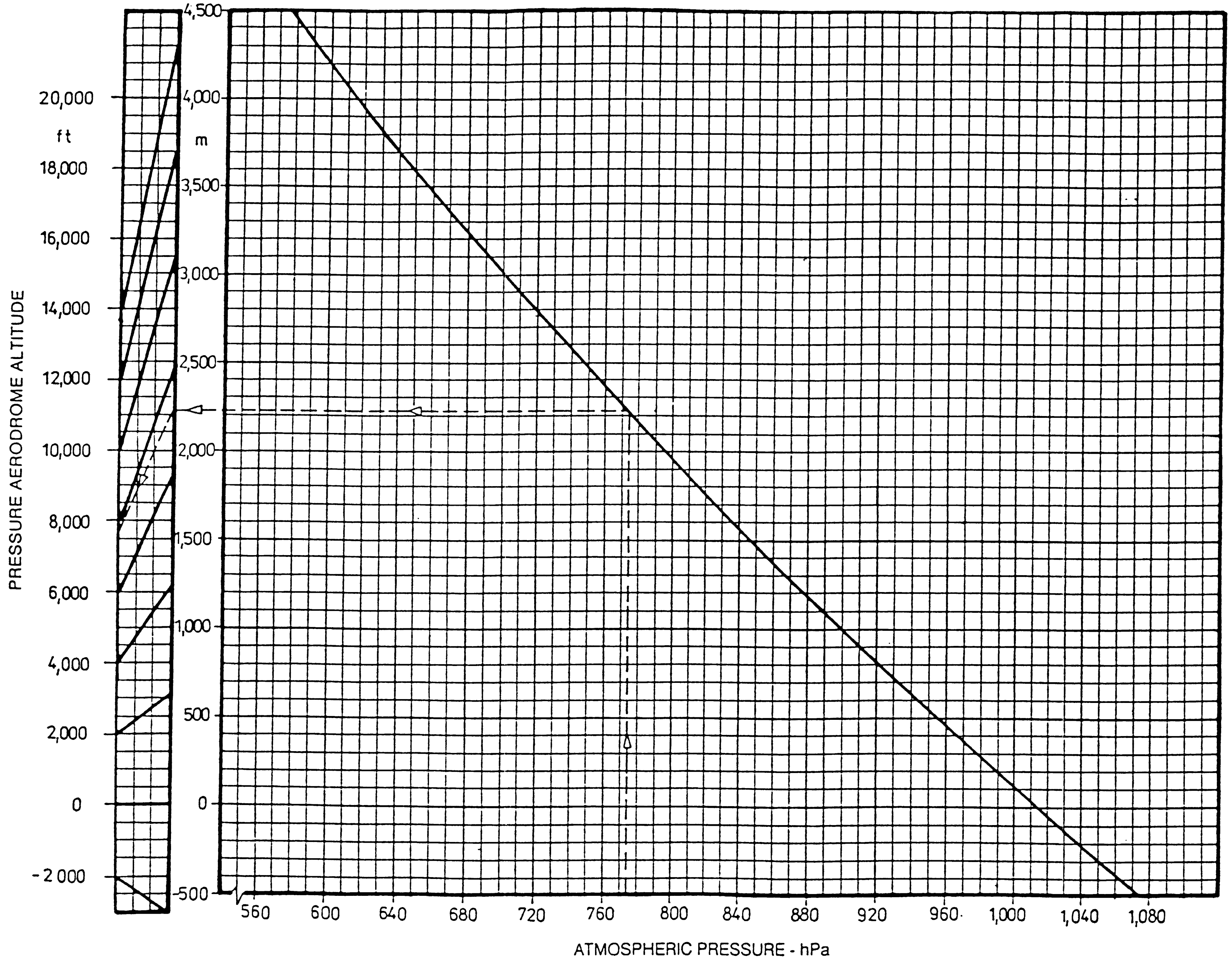


Fig. 5 – 7

TEMPERATURE CONVERSION FROM CELSIUS TO FAHRENHEIT

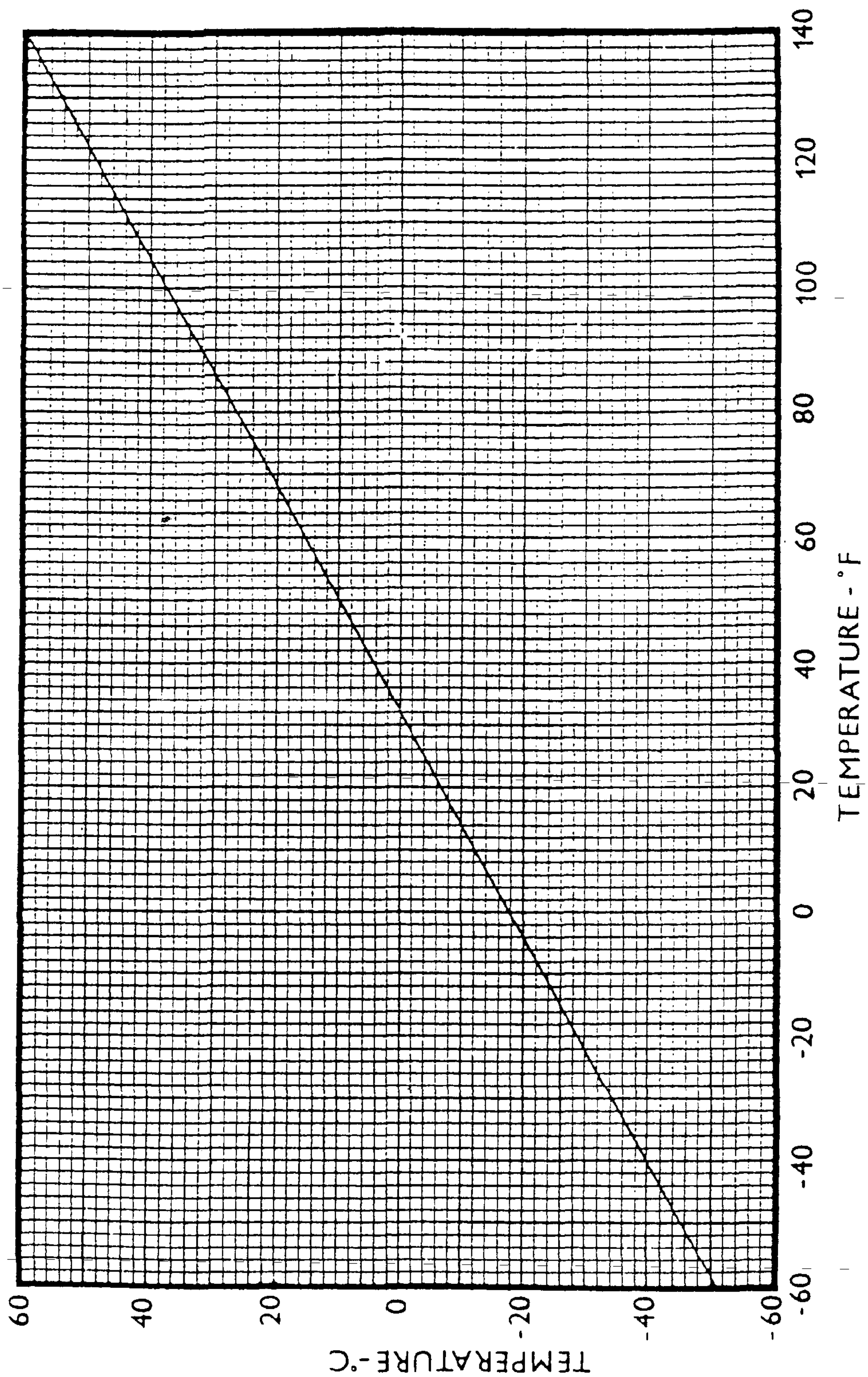


Fig. 5 – 8

TAKE–OFF PROCEDURES AND AIRSPEEDS

(WING FLAPS 18°)

TAKE–OFF AIRSPEEDS

Decision airspeed – V_1 – variable – to be determined according to graphs shown in Figs. 5–10 and 5–12.

Rotation airspeed .... V_R = 81 KIAS (150 km/hr IAS)

Take–off safety airspeed .... V_2 = 84 KIAS (155 km/hr IAS)

This airspeeds do not vary with weight and centre of gravity position.

TAKE–OFF PROCEDURES

The take–off performances information given in this Section are based on the following piloting technique:

(a) Normal take–off

With the wheel brakes applied and the NOSE WHEEL STEERING switch in the PEDAL mode position move the TCL smoothly forward to a position enabling the airplane to be held safely at rest by wheel brakes under the given runway surface conditions.

Increase power to max. take–off with simultaneous release of brakes. Applying primary controls to keep the airplane on all wheels until V_R = 81 KIAS (150 km/hr IAS) is attained. At airspeed of 81 KIAS (150 km/hr IAS), rotate the airplane to a take–off attitude of max. 10°.

After lift off at a height of 10 – 16 ft (3 – 5 m) apply wheel brakes and retract the landing gear. Start the climb at a airspeed of V_2 = 84 KIAS (155 km/hr IAS) from a height of 35 ft (10.7 m) to 400 ft (122 m).

From the height 400 ft (122 m) during mild climb at rate of climb 600 fpm (3 m/s) accelerate airplane to airspeed 94 KIAS (175 km/hr IAS), retract wing flaps and increase the airspeed to 108 KIAS (200 km/hr IAS). Throttle back the engines to maximum continuous power and continue the climb at this airspeed.

CAUTION

START THE REDUCTION OF POWER BY REDUCING THE TORQUE TO 90% AS A MAXIMUM. ONLY THEN, SET THE PROPELLER CONTROL LEVERS TO 1,900 RPM.

At a height of 1,500 ft (457 m) above the runway accelerate the airplane to a airspeed of 135 KIAS (250 km/hr IAS) and cancel stand–by regime of the automatic bank control system and spoilers.

(cont.)

(b) Take-off with water injection

NOTE

1. The airplane performance indicated in this section of Flight Manual at take-off airport air temperature of +23 °C (73 °F) or higher, or at atmospheric pressure and air temperature as shown in Fig. 4-3, page 4-34, are only guaranteed when using the appropriate degree of water injection.

2. Refer to SECTION 4, page 4-33 - Use of water injection for detailed information on the preparation of the airplane for take-off with water injection.

3. The piloting technique with water injection is the same as that of normal take-off - see the paragraph (a).

At a torque min. 60%, the co-pilot shall switch the water injection on.

NOTE

Normal operation of the water injection system is characterized by a steady lighting of the WATER INJECTION cell and a drop of ITT by 20 to 30 °C at the moment of switching the system on.

At a height of 1,500 ft (457 m) above the runway drain remaining water in the system.

TAKE – OFF WAT CURVES

(WING FLAPS 18°)

The graph in Fig. 5–9 illustrates the curves of maximum permissible take–off weight for pressure airport altitude and air temperature.

Use the graph shown in Fig. 5–7 to convert atmospheric pressure into airport altitude.

Associated conditions:

Engines	one engine inoperative, the other engine operating at maximum contingency power
Propellers	2,080 RPM
Wing flaps	18°
Landing gear	UP
Heating	OFF
Airframe deicing system	OFF
Airspeed	V_2 = 84 KIAS (155 km/hr IAS)

Example:

Input data:

Pressure airport altitude	2,459 ft (750 m)
Ambient air temperature	30 °C (86 °F)

Result:

Maximum permissible take–off weight	13,580 lb (6,160 kg)

CAUTION

THE ACTUAL MAXIMUM PERMISSIBLE TAKE–OFF WEIGHT IS THE LOWEST ONE OF THE WEIGHTS DETERMINED BY FLIGHT MANUAL SECTION 5, PARA TAKE–OFF WAT CURVES, TAKE–OFF FIELD LENGTHS, NET TAKE–OFF FLIGHT PATH DATA AND EN–ROUTE DATA WITH THE LIMITATION GIVEN IN SECTION 2 IN MIND.

MAXIMUM PERMISSIBLE TAKE-OFF WEIGHT FOR PRESSURE ALTITUDE AND TEMPERATURE

(Wing flaps 18°)

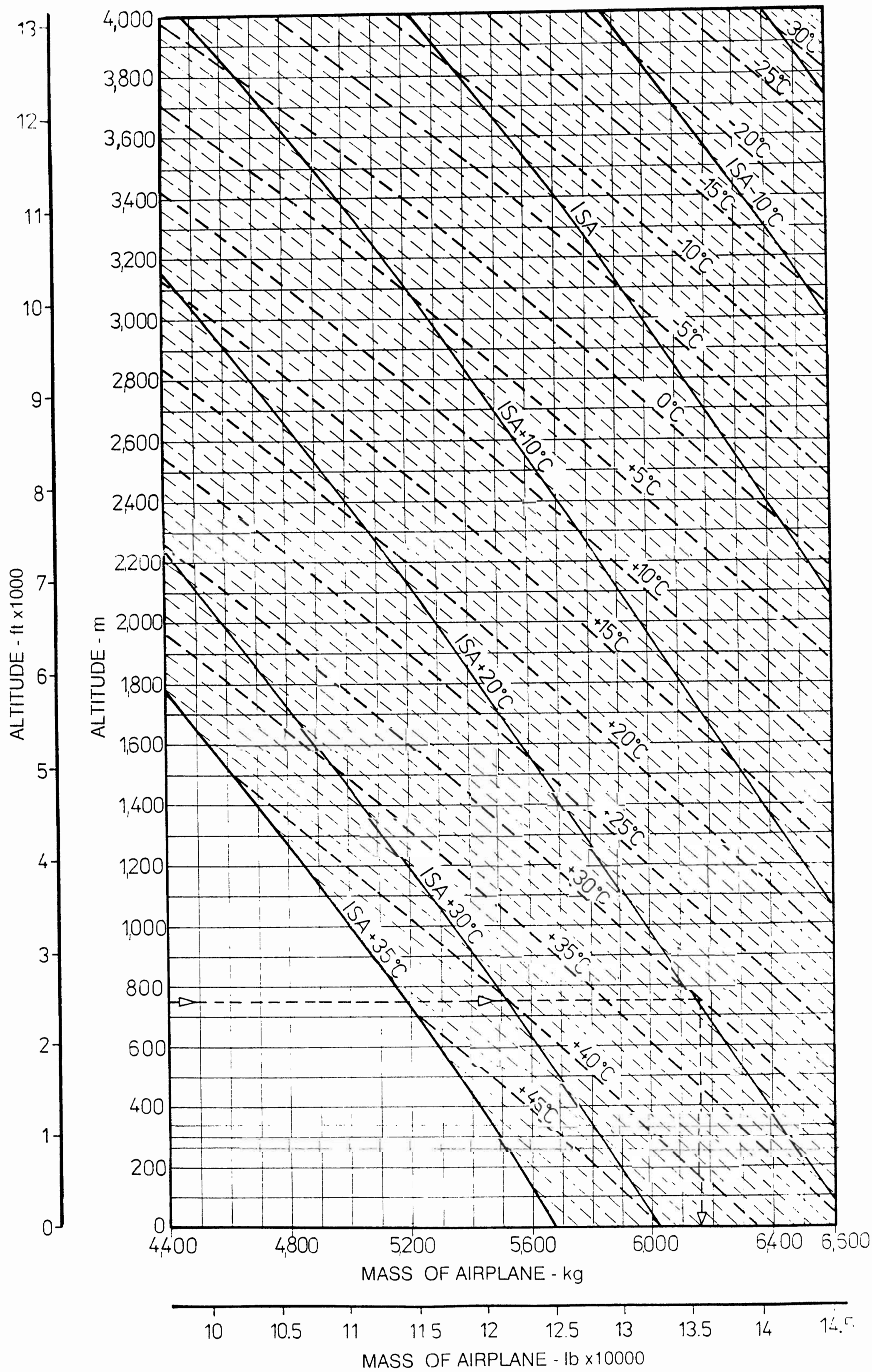


Fig. 5 – 9

TAKE–OFF CLIMB GRADIENTS

(WING FLAPS 18°)

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TAKE-OFF FIELD LENGTHS

(WING FLAPS 18°)

(a) Using the graph in Fig. 5-10 determine the "D" value and the decision airspeed V_1 for take-off (TODA) and accelerate-stop (ASDA) distance available, runway slope and head (tail) wind component.

If the horizontal line drawn in the middle of the graph "D", intersect the vertical line beyond the grid (i.e. the V_1 is greater than 84 KIAS (155 km/h IAS)), the value of "D" shall be read at the intersection of the horizontal line with the line denoting the decision airspeed V_1 = 84 KIAS (155 km/h IAS).

If the horizontal line drawn in the middle of the graph "D", intersect the perpendicular line before the grid (i.e. the V_1 is less than 73 KIAS (135 km/h IAS)), the value of "D" shall be read at the intersection of the vertical line with the line denoting the decision airspeed V_1 = 73 KIAS (135 km/h IAS).

(b) Using the graph in Fig. 5-11 determine the maximum permissible take-off weight for ambient air temperature, airport altitude and the value of "D".

(c) Using the graph in Fig. 5-12 determine the "R" value and the decision airspeed V_1 for take-off run (TORA) and accelerate-stop (ASDA) distance available, runway slope and head (tail) wind component.

If the horizontal line drawn in the middle of the graph "R", intersect the vertical line beyond the grid (i.e. the V_1 is greater than 84 KIAS (155 km/h IAS)), the value of "R" shall be read at the intersection of the horizontal line with the line denoting the decision airspeed V_1 = 84 KIAS (150 km/h IAS).

If the horizontal line drawn in the middle of the graph "R", intersect the vertical line before the grid (i.e. the V_1 is less than 73 KIAS (135 km/h IAS)), the value of "R" shall be read at the intersection of the vertical line with the line denoting the decision airspeed V_1 = 73 KIAS (135 km/h IAS).

NOTE

Correction curves for the effect of wind in the graphs Fig. 5-10, 5-12 are determined for 50% for the head wind speed value reported and 150% value of tail wind speed reported. If is wind speed greater then 38.8 kts (20 m/s) use value 38.8 kts (20 m/s) in the graph.

(d) Using the graphs in Fig. 5-13, determine the maximum permissible take-off weight for ambient air temperature, airport altitude and the value of "R".

(e) For decision airspeed V_1, use the weight obtained from "D" and "R", whichever is lower. If the maximum permissible take-off weight obtained from "R" and "D" are the same and equal to the maximum take-off weight 14,550 lb (6,600 kg), use the greater V_1 (if they are different)

(cont.)

(f) The values determined according to (a) and (c) apply to a hard, dry runway. The influence of other conditions of the runway surface shall be determined by dividing the available distances before using the graphs in Fig. 5–10 and 5–12 by a coefficient corresponding to the type and the condition of the runway surface – see the tables 5/I and 5/II.

(g) Use the lower of the weights obtained according to (b) and (d) for the determination of the maximum permissible take–off weight based on the take–off field lengths.

CAUTION

THE ACTUAL MAXIMUM PERMISSIBLE TAKE–OFF WEIGHT IS THE LOWEST ONE OF THE WEIGHTS DETERMINED BY FLIGHT MANUAL SECTION 5, PARA TAKE–OFF WAT CURVES, TAKE–OFF FIELD LENGTHS, NET TAKE–OFF FLIGHT PATH DATA AND EN–ROUTE DATA WITH THE LIMITATION GIVEN IN SECTION 2 IN MIND.

(h) Determine the value "D" – balanced take–off distance, i.e. the required take–off distance and required accelerate–stop distance, from graph in Fig. 5–11 as a function of ambient air temperature, airport altitude and airplane take–off weight.

(i) Determine the value "R" – balanced take–off run, i.e. the required take–off run and required accelerate–stop distance, from graph in Fig. 5–13 as a function of ambient air temperature, airport altitude and airplane take–off weight.

COEFFICIENTS FOR RUNWAY SURFACE CONDITIONS FOR ADJUSTING TAKE-OFF RUN AND THE TAKE-OFF DISTANCE

Tab.5/I

Type and condition of the runway surface	Coefficient
Paved runway with a layer of slush or wet snow not exceeding 0.5 in (12 mm)	1.21
Paved runway with a layer of water not exceeding 0.4 in (10 mm)	1.21
Paved and unpaved runway with a layer of dry snow not exceeding 2 in (50 mm)	1.17
Unpaved runway with a layer of compacted snow	1.25
Unpaved soft sandy runway	1.05
Unpaved runway with a strength of 85.3 psi (6 kg/cm^2)	1.55
Unpaved muddy runway	1.47

COEFFICIENTS FOR RUNWAY CONDITIONS FOR ADJUSTING ACCELERATE–STOP DISTANCE

Tab. 5/II

Type and condition of the runway	Coefficient
Paved runway with friction coefficient ranging from 0.5 to 0.45	1.06
Paved runway with friction coefficient ranging from 0.45 to 0.4	1.12
Paved runway with friction coefficient ranging from 0.4 to 0.35	1.19
Paved runway with friction coefficient ranging from 0.35 to 0.3	1.26
Paved runway with friction coefficient ranging from 0.3 to 0.25	1.34
Paved runway with friction coefficient ranging from 0.25 to 0.2	1.43
Paved runway with a layer of slush or wet snow up to 0.5 in (12 mm)	1.30
Paved runway with a layer of water up to 0.4 in (10 mm)	1.30
Paved and unpaved runway with a layer of dry snow up to 2 in (50 mm)	1.20
Unpaved runway with a layer of compacted snow	1.30
Unpaved runway with the strength of 85.3 psi (6 kg/cm^2)	1.35
Unpaved soft sandy runway	1.05
Unpaved muddy runway	1.03

EXAMPLES GIVEN IN GRAPHS IN FIG. 5–10, 5–11, 5–12, 5–13

(Wing flaps 18°)

1. Determination of maximum take–off weight and airspeed V_1

Input data:

Example	A	C
Ambient temperature	–15 °C (5 °F)	30 °C (86 °F)
Pressure airport altitude	2,461 ft (750 m)	2,461 ft (750 m)
Take–off run available (TORA)	2,953 ft (900 m)	4,101 ft (1,250 m)
Accelerate–stop distance available (ASDA)	3,281 ft (1,000 m)	4,429 ft (1,350 m)
Take–off distance available (TODA)	3,603 ft (1,100 m)	5,085 ft (1,550 m)
Slope of runway	0%	1% uphill
Wind	tail wind 8 kts (4 m/s)	head wind 19.5 kts (10 m/s)
Water injection	no	yes

Results (Wing flaps 18°):

Example	A	C
Value of "D" (see Fig. 5−10)	2,556 ft (779 m)	4,567 ft (1,392 m)
Airspeed V_1 according to "D" (see Fig. 5−10)	79.5 KIAS (147 km/h IAS)	84 KIAS (155 km/h IAS)
Maximum permissible take−off weight according to "D" (see Fig. 5−11)	12,081 lb (5,480 kg)	14,550 lb (6,600 kg)
Value of "R" (see Fig. 5−12)	2,336 ft (712 m)	4,265 ft (1,300 m)
Airspeed V_1 according to "R" (see Fig. 5−12)	75.5 KIAS (145 km/h IAS)	84 KIAS (155 km/h IAS)
Maximum permissible take−off weight according to "R" (see Fig. 5−13)	12,346 lb (5,600 kg)	14,550 lb (6,600 kg)

NOTE

Heavy line denotes values obtained according to conditions set in paragraphs (g) and (e).

2. Determination of required take−off distance (TOD), take−off run and accelerate−stop distance (example D)

Input data:

Ambient air temperature	+15 °C (59 °F)
Pressure airport altitude	1,640 ft (500 m)
Water injection	not used
Airplane weight	13,779 lb (6,250 kg)

Results:

Required take−off distance (see Fig. 5−11)	3,247 ft (990 m)

(cont.)

Required take–off run (see Fig. 5–13)	2,903 ft (885 m)
Required accelerate–stop distance	
– see Fig. 5–11	3,247 ft (990 m) *
– see Fig. 5–13	2,903 ft (885 m) *

* – greater value is considered

VALUE OF "D" AND DECISION AIRSPEED FOR TAKE-OFF DISTANCE AVAILABLE (TODA) AND ACCELERATE-STOP DISTANCE AVAILABLE (ASDA) (Wing flap 18°)

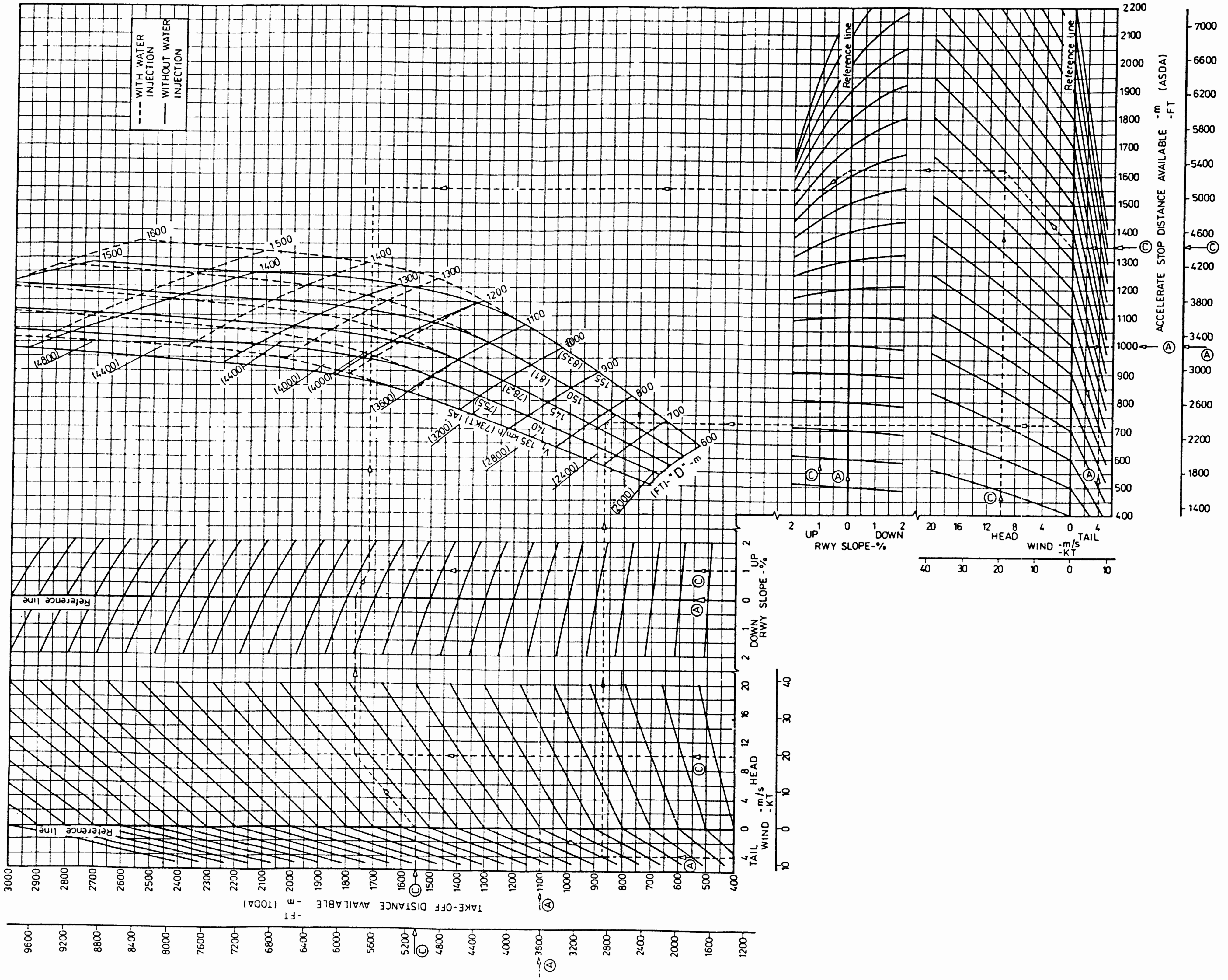

Fig. 5 - 10

MAXIMUM PERMISSIBLE TAKE-OFF WEIGHT FOR TAKE-OFF DISTANCE AVAILABLE (TODA) AND ACCELERATE-STOP DISTANCE AVAILABLE (ASDA) (Wing flaps 18°)

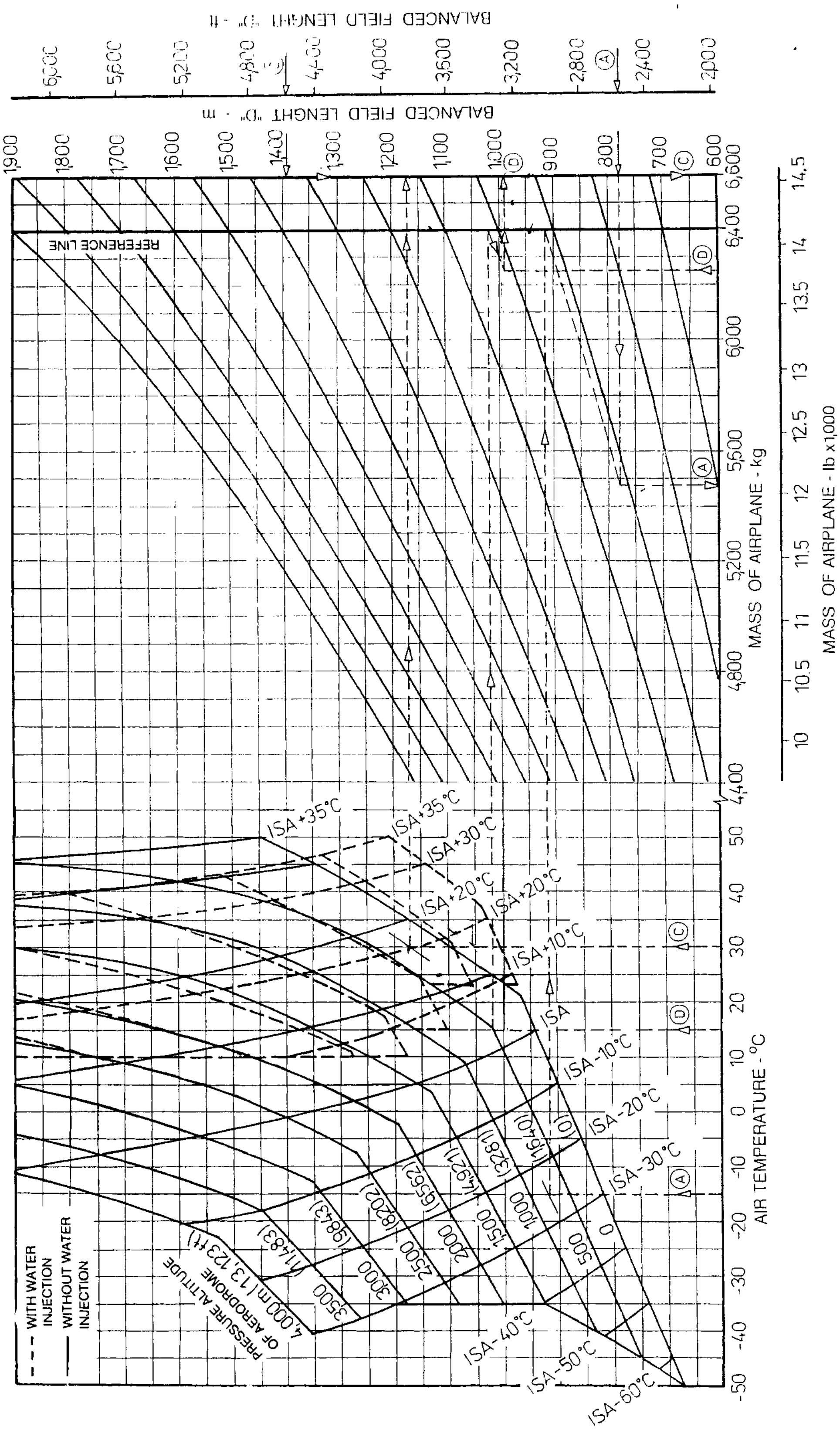

Fig. 5 – 11

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VALUE OF "R" AND DECISION AIRSPEED FOR TAKE-OFF RUN AVAILABLE (TORA) AND ACCELERATE-STOP DISTANCE AVAILABLE (ASDA) (Wing flaps 18°)

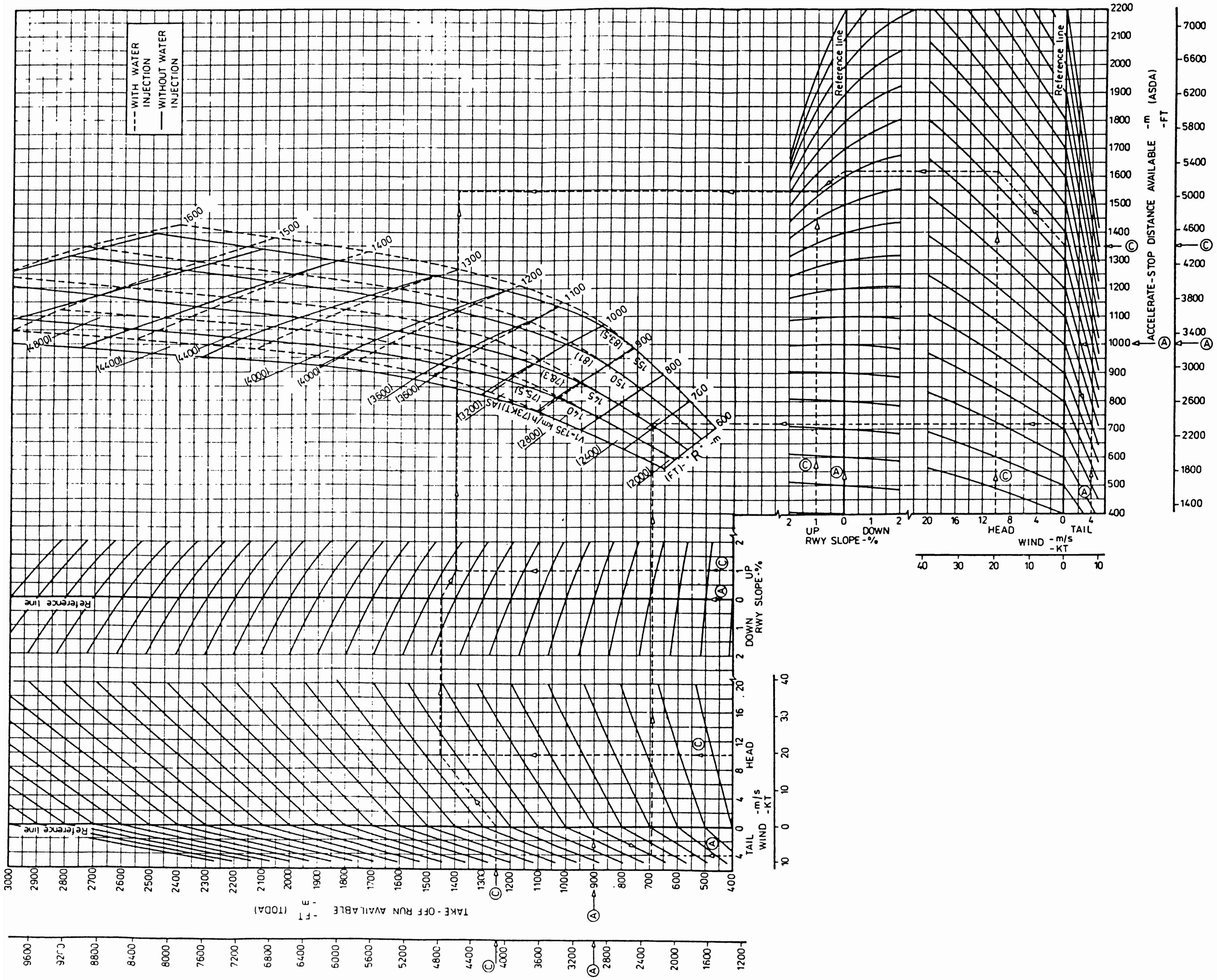

Fig. 5 – 12

MAXIMUM PERMISSIBLE TAKE-OFF WEIGHT FOR TAKE-OFF RUN AVAILABLE (TORA) AND ACCELERATE-STOP DISTANCE AVAILABLE (ASDA) (Wing flaps 18°)

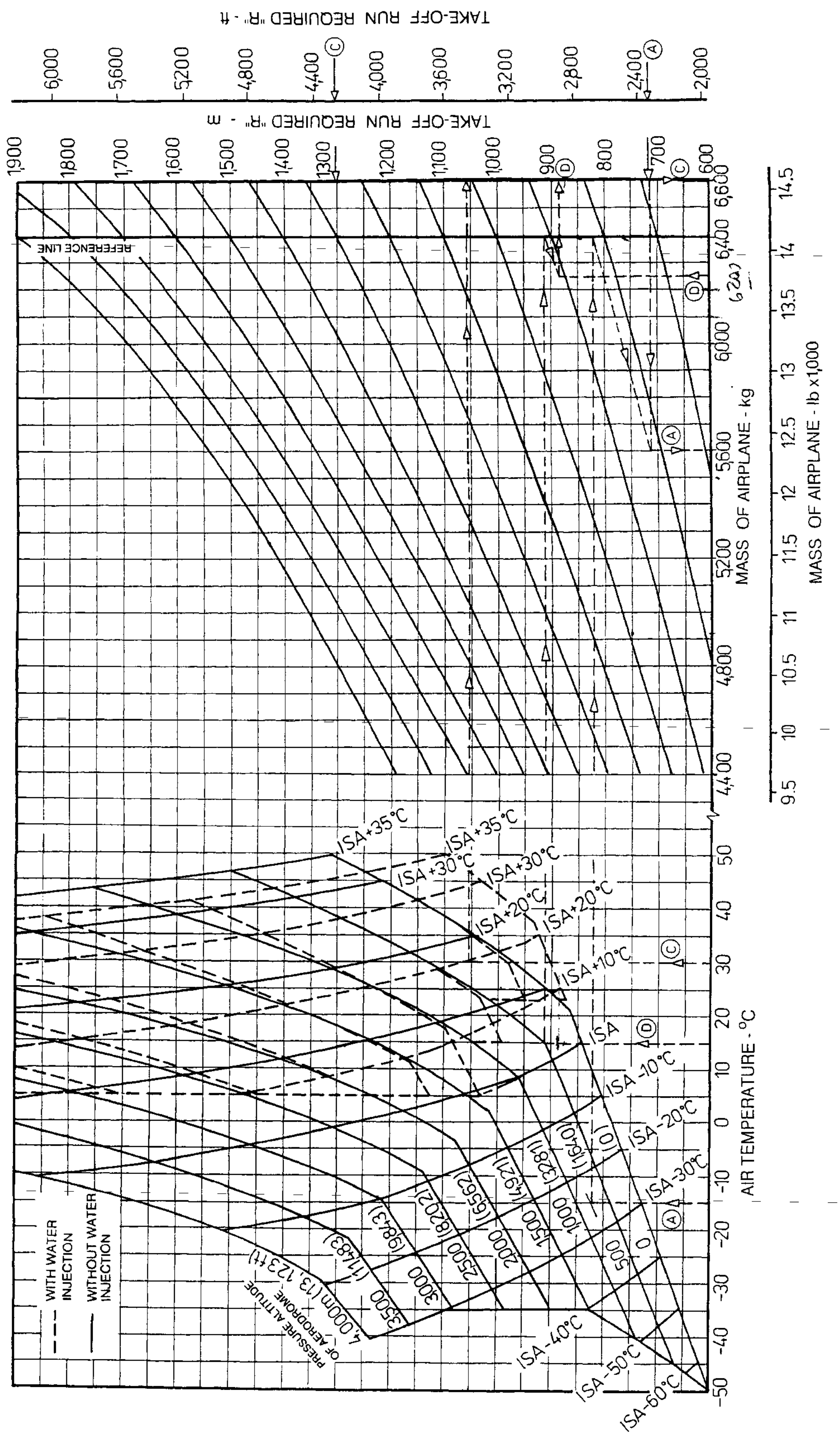

Fig. 5 – 13

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NET TAKE–OFF FLIGHT PATH DATA

(WING FLAPS 18°)

(a) Conditions:

On determining the net take–off flight path with one engine inoperative it is presumed that:

- the engine will fail prior to reaching the take–off safety airspeed V_2
- the propeller of the failed engine is in feathered position
- the heating is switched off
- the separator vanes are up (retracted)
- at the end of clearway the airplane will reach the height of 35 ft (10.7 m)
- changes in the heading of airplane during the climb are less than 15°
- the airplane weight in all segments equals the take–off weight (the lowest of weights determined by Flight Manual Section 5 para Take–off WAT curves, Take–off field lengths and Enroute data are used)
- the ambient air temperature in all segments corresponds with the value reported at the beginning of take–off
- operating engine:

  1st and 2nd segment – Maximum contingency power

  3rd segment – Intermediate contingency power

(b) Definition

Net take–off flight part consists of:

Reference zero

It is the beginning of the coordinate system in which individual points of net take–off flight path are defined.
The vertical axis of this coordinate system intersects the point of flight at a height of 35 ft (10.7 m) above runway at the end of the take–off distance available (TODA). The horizontal axis is 35 ft (10.7 m) below this point.

First segment

This segment of climb begins at reference zero at the height of 35 ft (10.7 m) above runway elevation and ends at the height where the landing gear is fully retracted. The wing flaps are in take–off position (18°), airspeed V_2 = 84 KIAS (155 km/hr IAS).

(cont.)

Second segment

This segment of climb begins at the end of first segment and ends at the height of 6 minutes point for use of max. contingency power above the runvay. The wing flaps are in take–off position (18°), airspeed V_2 = 84 KIAS (155 km/h IAS).

Third segment

This segment has been divided into two parts:

– segment 3a:

Acceleration of the airplane in horizontal flight at the height of 6 minutes point for use of max. contingency power above the runway from airspeed V_2=84 KIAS (155 km/hr IAS) to 97 KIAS (180 km/hr IAS), wing flaps selected up at this airspeed with subsequent acceleration to 100 KIAS (185 km/hr IAS).

– segment 3b:

Climbing from the height of 6 minutes point for use of max. contingency power to the height 1,500 ft (457 m) above runway. Wing flaps fully retracted and airspeed 100 KIAS (185 km/h IAS).

(c) Construction of net take–off flight path

The graphs needed for drawing net take–off flight path are shown in Figs. 5–15 to 5–21.

The correction curves for the influence of wind in these graphs are determined for 50% of the head wind speed value and 150% of tail wind speed value reported.
If the calculated trajectory does not pass above the obstacles with a reserve of 35 ft (10.7 m) at least, a new drawing of the net take–off flight path should be done for a reduced weight.

CAUTION

THE ACTUAL MAXIMUM PERMISSIBLE TAKE–OFF WEIGHT IS THE LOWEST ONE OF THE WEIGHTS DETERMINED BY FLIGHT MANUAL SECTION 5, PARA TAKE–OFF WAT CURVES, TAKE–OFF FIELD LENGTHS, NET TAKE–OFF FLIGHT PATH DATA AND EN–ROUTE DATA WITH THE LIMITATION GIVEN IN SECTION 2 IN MIND.

NOTE

If is wind speed greater then 38.8 kts (20 m/s) use value 38.8 kts (20 m/s) in the graph.

(cont.)

(d) Example:

Input data:

Pressure airport altitude	2,461 ft (750 m)
Ambient air temperature at the level of runway	+30 °C (86 °F)
Head wind	19.4 kts (10 m/s)
Take–off weight	13,312 lb (6,070 kg)

Calculation:

the 1st segment (landing gear retraction during climbing)

- see Fig. 5–15 net climb gradient γ_1 = 1.55 %
- see Fig. 5–16 increase of horizontal distance Δl_1 = 1,024 ft (312 m)
- increase of height above the runway

$$\Delta h_1 = \frac{\Delta l_1 \times \gamma_1}{100} = \frac{1,024 \times 1.55}{100} = 16 \text{ ft}$$

$$(\Delta h_1 = \frac{312 \times 1.55}{100} = 4.8 \text{ m})$$

- height above the runway at the end of the segment:

$h_1 = h_0 + \Delta h_1 = 35 + 16 = 51$ ft

($h_1 = 10.7 + 4.8 = 15.5$ m)

- horizontal distance covered at the end of the segment with respect to reference zero:

$l_1 = l_0 + \Delta l_1 = 0 + 1,024 = 1,024$ ft = 0.168 Nm

($l_1 = 0 + 312 = 312$ m = 0.312 km)

the 2nd segment (climbing to height of 6 minutes point for use of max. contingency power above the runway)

- see Fig. 5–17: net climb gradient: γ_2 = 2,65%
- time for climb at the 2nd segment with max. contingency power t_2:

from Fig. 5–18: t_1 = 14.2 sec at climbing to 35 ft (10.7 m)
h_1 = 50 ft (15.2 m)

t_{max} = 6 minutes = 360 sec

$t_2 = t_{max} - t_1$ =360 – 14.2 = 345.8 sec = 5.7633 min

(cont.)

- approximately half height of the 6 minutes point above runway is 755 ft (230 m) when pressure altitude of airport is 2,461 ft (750 m) then altitude for reading from Fig. 5–19 equals:

  2,461 + 755 = 3,216 ft

  (750 + 230 = 980 m)

  ambient air temperature is +30 °C (86 °F)

  from Fig. 5–19 value $1/\sqrt{\Delta} = 1.086$

  airspeed at the 2nd segment:

  V_2 = 84 KIAS = 90 kts CAS (from Fig. 5–1)
  V_2 = 155 km/hr IAS = 166 km/hr CAS

- rate of climb at the 2nd segment:

$$V_{y2} = \frac{\gamma_2}{100} \times \frac{1}{\sqrt{\Delta}} \times \frac{V_2}{3.6} = \frac{2.65}{100} \times 1.086 \times \frac{166}{3.6} = 1.327 \text{ m/s} = 261.2 \text{ ft/min}$$

- increase of height at the 2nd segment:

  $\Delta h_2 = V_{y2} \times t_2 = 261.2 \times 5.7633 = 1{,}505.5$ ft
  ($\Delta h_2 = V_{y2} \times t_2 = 1.327 \times 345.8 = 458.9$ m)

- height above the runway at the end of the 2nd segment:

  $h_2 = h_1 + \Delta h_2 = 50 + 1505.5 = 1{,}555.5$ ft
  ($h_2 = h_1 + \Delta h_2 = 15.2 + 458.9 = 474.1$ m)

  The height above the runway at the end of the 2nd segment is higher than 1,500 ft (457 m) then:

- correction height above the runway at the end of the 2nd segment:

  h_{2cor} = 1,500 ft (457 m)

- correction increase of height at the 2nd segment:

  $\Delta h_{2cor} = 1{,}500 - h_1 = 1{,}500 - 50 = 1{,}450$ ft
  ($\Delta h_{2cor} = 457 - h_1 = 457 - 15.2 = 441.8$ m)

- increase of horizontal distance:

$$\Delta l_2 = \frac{\Delta h_{2cor}}{\gamma_2} \times 100 = \frac{1{,}450}{2.65} \times 100 = 57{,}717 \text{ ft} = 9.000 \text{ Nm}$$

$$\left(\Delta l_2 = \frac{\Delta h_{2cor}}{\gamma_2} \times 100 = \frac{441.8}{2.65} \times 100 = 16{,}672 \text{ m} = 16.672 \text{ km}\right)$$

- total horizontal distance covered at the end of the segment with respect to reference zero

  $l_2 = l_1 + \Delta l_2 = 0.168 + 9.000 = 9.168$ Nm
  ($l_2 = l_1 + \Delta l_2 = 312 + 16{,}672 = 16{,}984$ m = 16.984 km)

(cont.)

3rd segment (when h_2 is less than 1,500 ft (457 m) – for this example the height h_2 is higher than 1,500 ft (457 m) therefore calculation is not carried out)

(a) segment 3a (acceleration at the height of 6 minutes point)

- from Fig. 5–20: increase of horizontal distance:

  Δl_{3a}

- total horizontal distance covered at the end of the segment with respect to reference zero:

  $l_{3a} = l_2 + \Delta l_{3a}$

(b) segment 3b (climb to 1,500 ft (457 m))

- height above the runway at the end of segment:1,500 ft (457 m)
- increase of height above the runway:

  $\Delta h_{3b} = h_{3b} - h_2$

- from Fig. 5–21: net climb gradient: $\gamma_{3b} = 1.1$ %
- increase of horizontal distance:

$$\Delta l_{3b} = \frac{\Delta h_{3b}}{\gamma_{3b}} \times 100$$

- total horizontal distance covered at the end of the segment with respect to reference zero:

  $l_{3b} = l_3 = l_{3a} + \Delta l_{3b}$

Brief review of calculation is in Table 5/III – next page.

Graphic presentation of the example is shown in Fig. 5–14

Tab. 5/III (Wing flaps 18°)

Take–off segment	Height above the runway at start of the segment	Increase of height above the runway at the segment	Height above the runway at the end of the segment	Net climb gradient at the segment	Horizontal distance covered from reference zero to the start of the segment	Increase of the horizontal distance at the segment	Total horizontal distance covered at the end of the segment with respect to reference zero
	[ft (m)]	Δh [ft (m)]	[ft (m)]	γ [%]	[Nm (km)]	Δl [Nm (km)]	[km (Nm)]
1	35 (10.7)	16 (4.8)	51 (15.5)	1.55	0	0.168 (0.312)	0.168 (0.312)
2	51 (15.5)	1,450 441.8	1,500 (457)	2.65	0.168 (0.312)	9.000 (16.672)	9.168 (16.984)
3a	1,500 (457)	–	1,500 (457)	–	9.168 (16.984)	0	9.168 (16.984)
3b	1,500 (457)	0	1,500 (457)	1.1	9.168 (16.984)	0	9.168 (16.984)

$$\Delta h = \frac{\Delta l \times \gamma}{100} \qquad \Delta l = \frac{\Delta h}{\gamma} \times 100$$

NET TAKE – OFF FLIGHT PATH (graph illustrating the example)

(Wing flaps 18°)

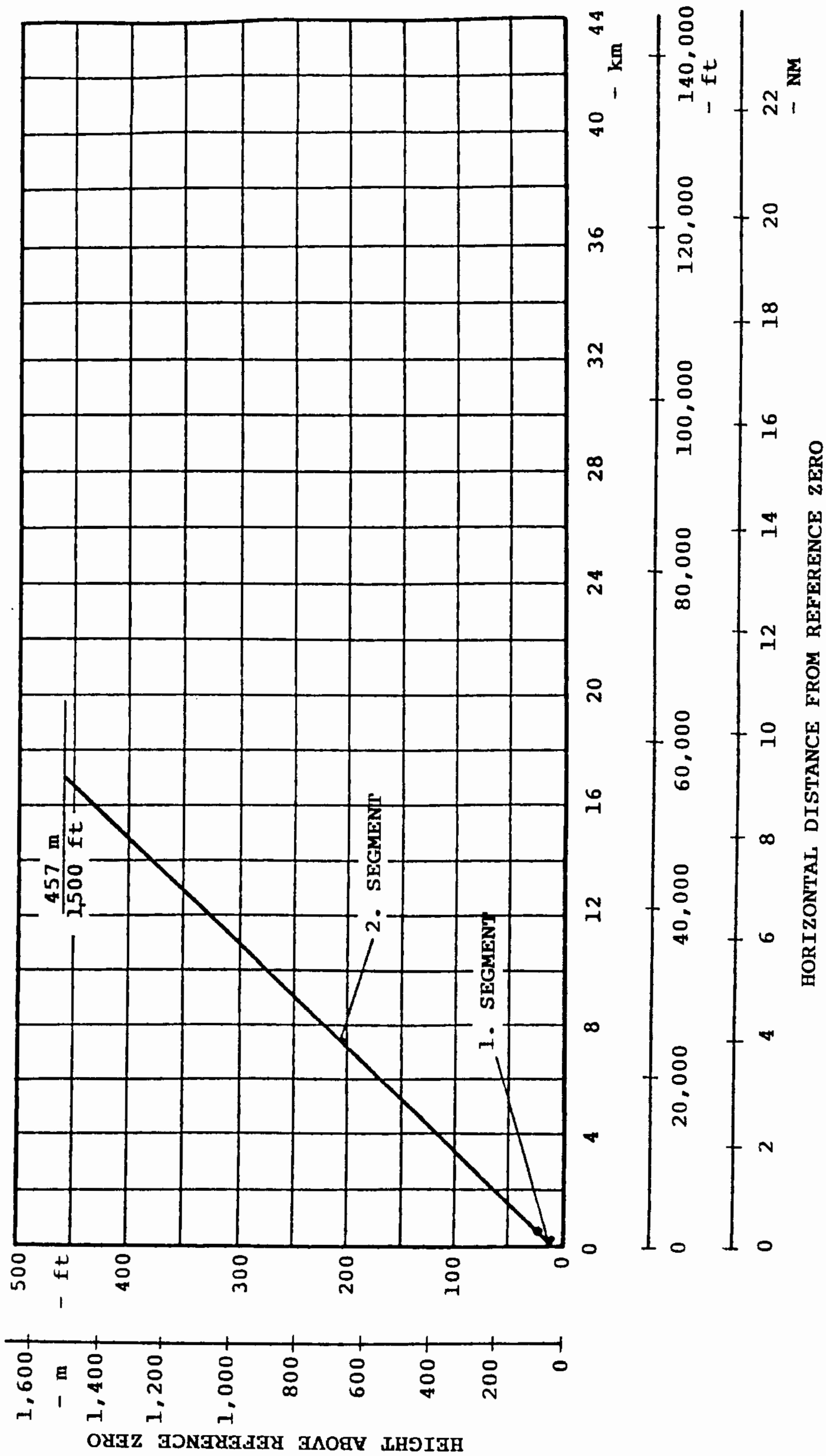

Fig. 5 – 14

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NET CLIMB GRADIENT IN THE 1ST SEGMENT OF THE TAKE-OFF

(Wing flaps 18°)

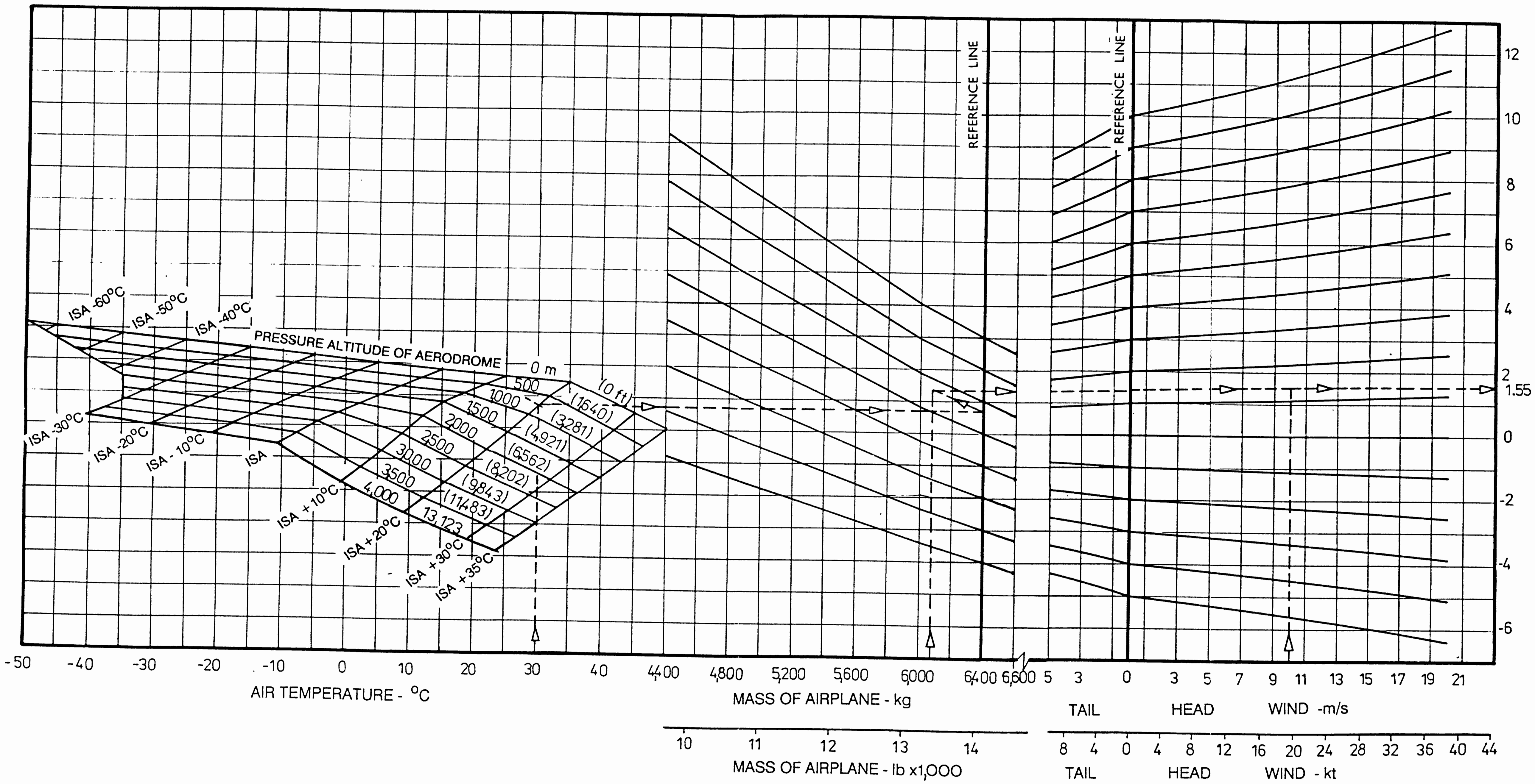

Fig. 5 – 15

INCREASE OF THE HORIZONTAL DISTANCE IN THE 1ST SEGMENT OF THE TAKE-OFF

(Wing flaps 18°)

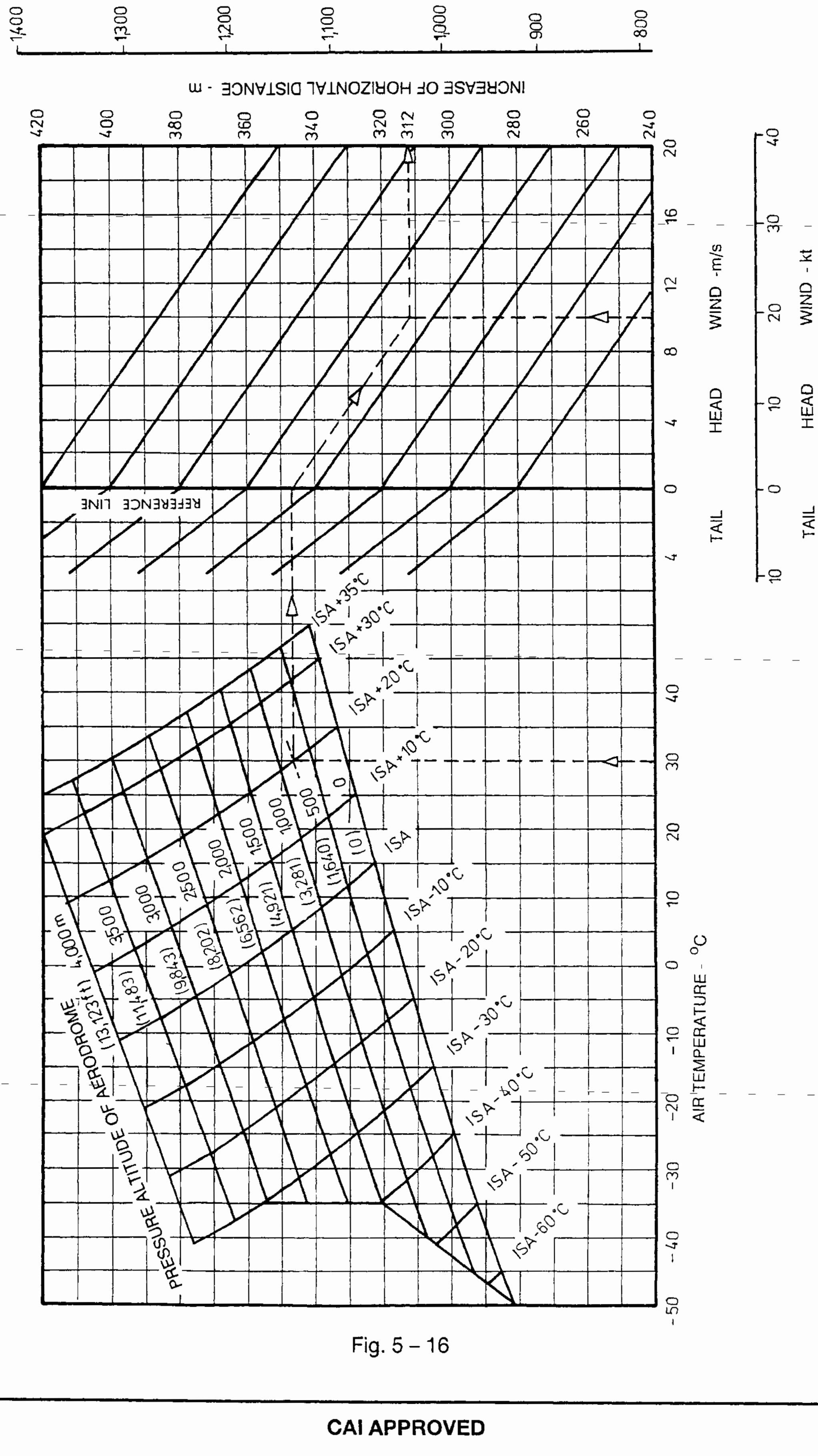

Fig. 5 – 16

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NET CLIMB GRADIENT IN THE 2ND SEGMENT OF THE TAKE-OFF

(Wing flaps 18°)

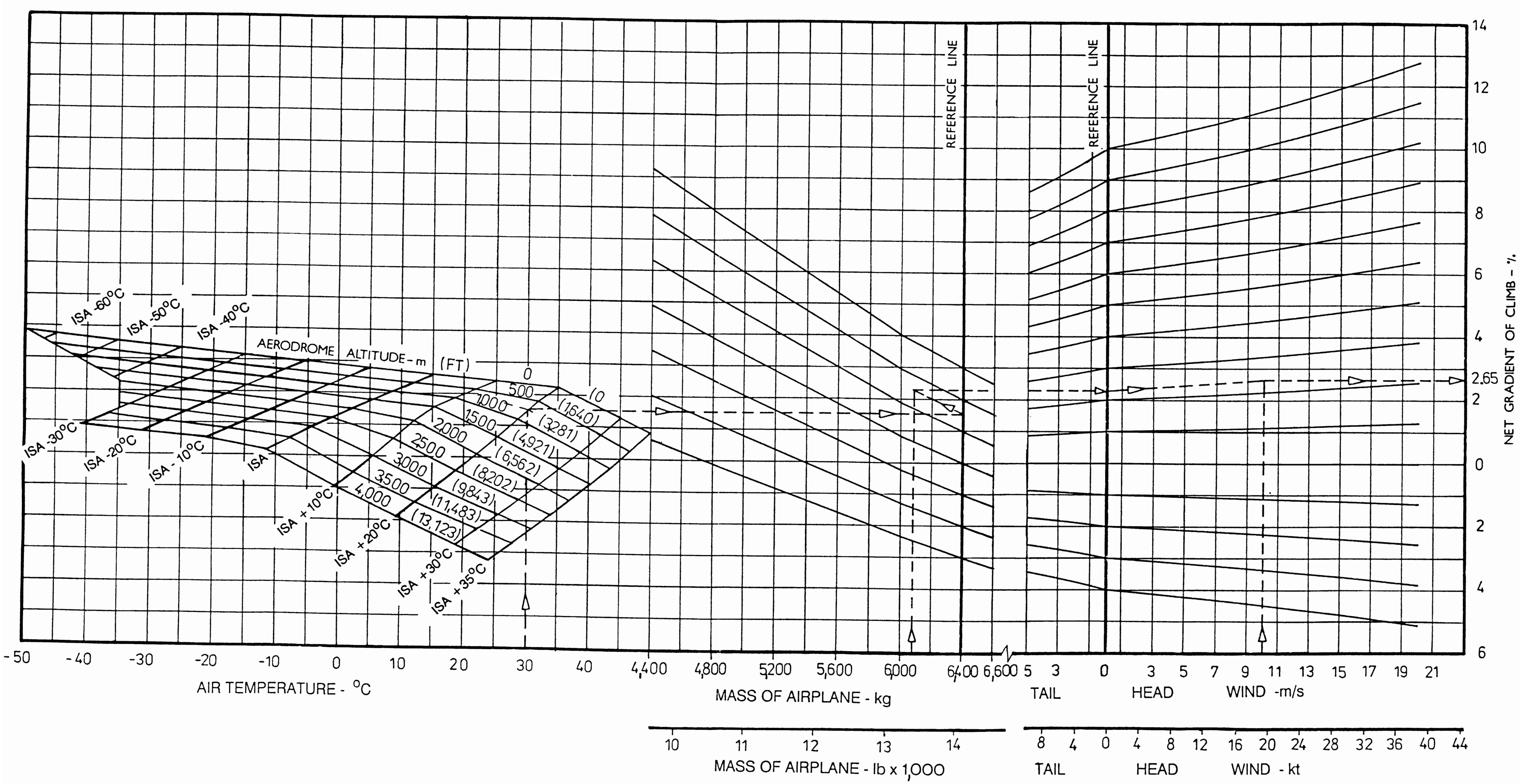

Fig. 5 – 17

DURATION OF THE MAX. CONTINGENCY POWER AT THE TAKE-OFF

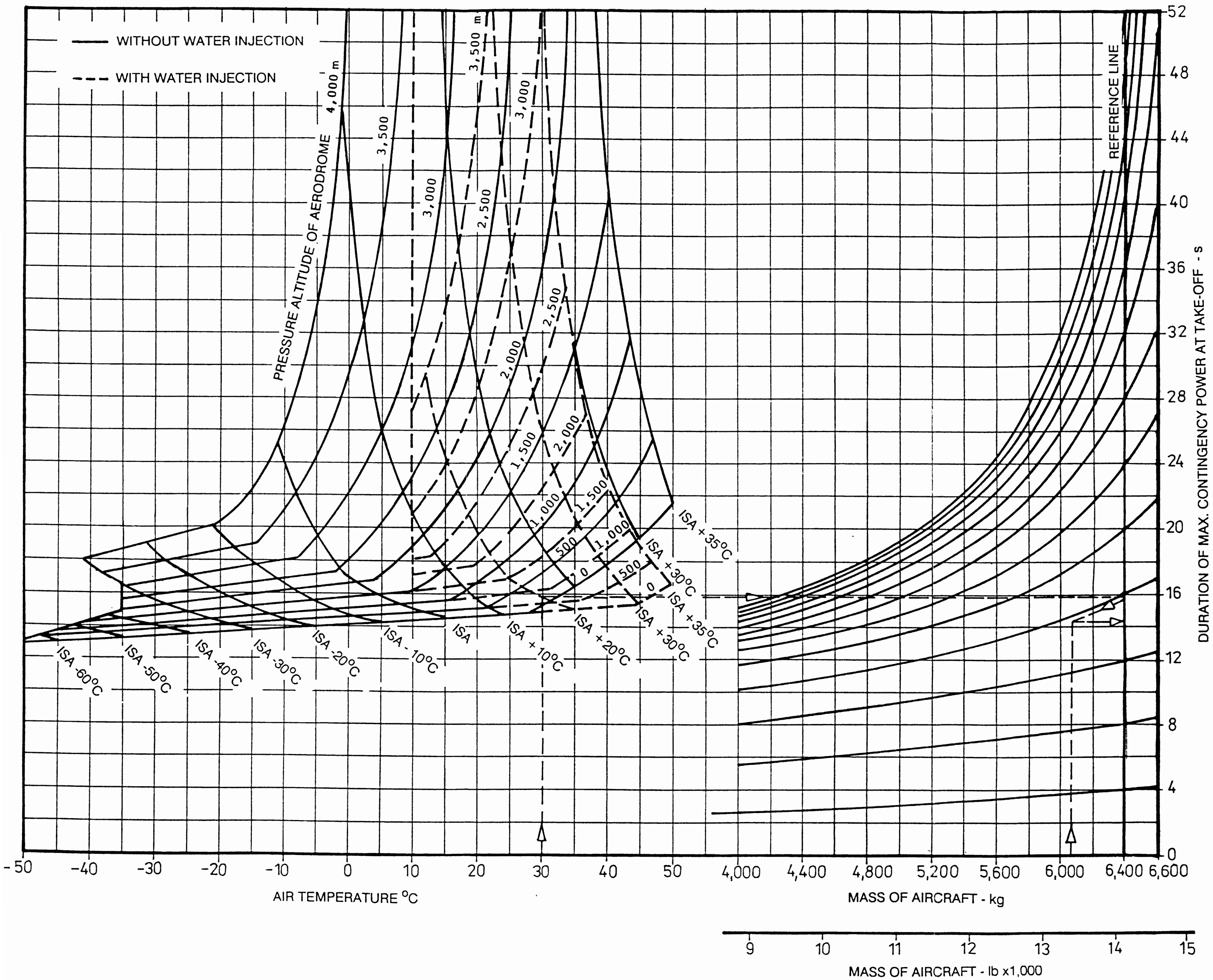

Fig. 5 – 18

DETERMINATION OF THE VALUE $1/\sqrt{\Delta}$

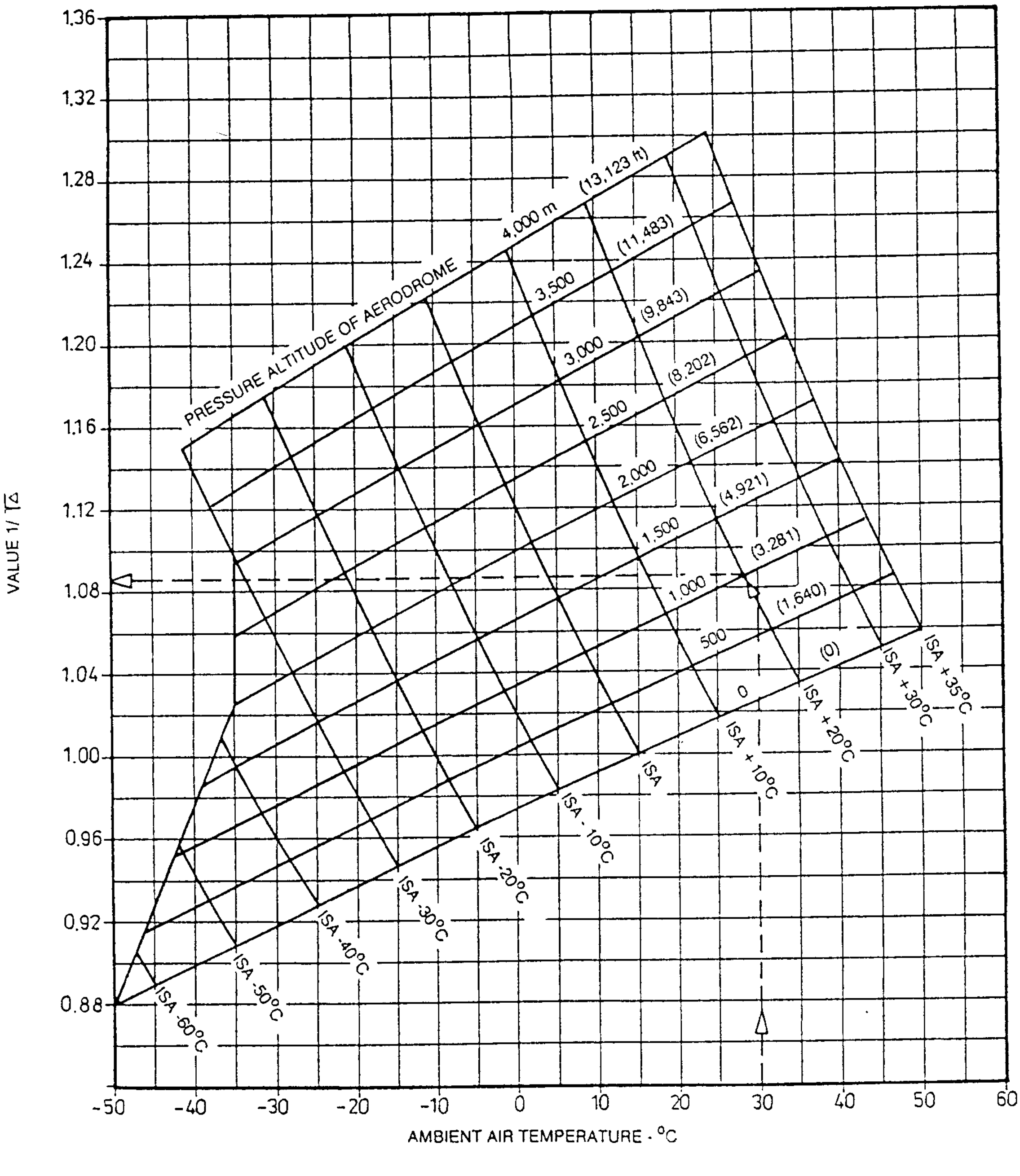

Fig. 5 – 19

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INCREASE OF THE HORIZONTAL DISTANCE IN THE SEGMENT 3a OF THE TAKE-OFF

(Wing flaps 18°)

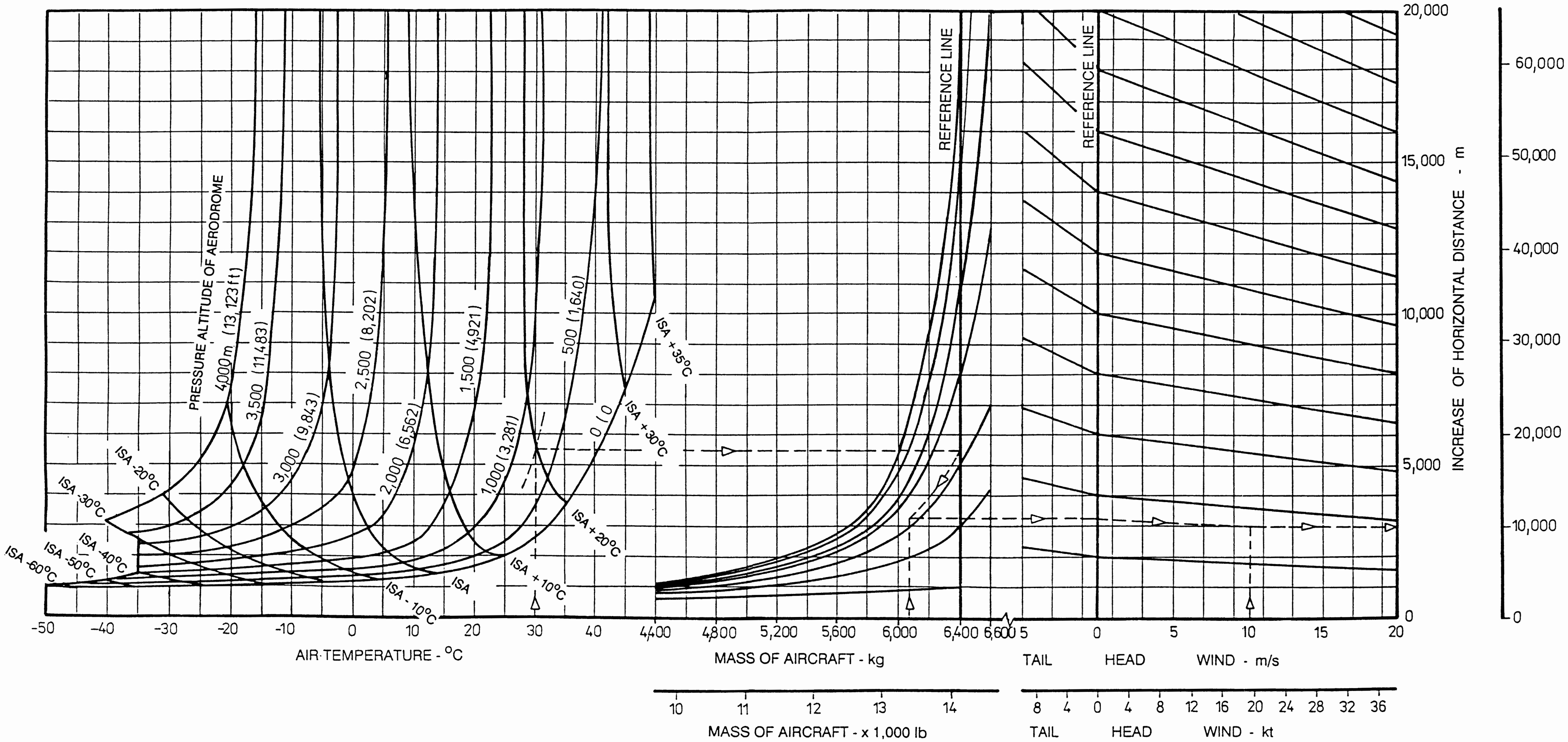

Fig. 5 – 20

NET CLIMB GRADIENT IN THE SEGMENT 3b OF THE TAKE-OFF

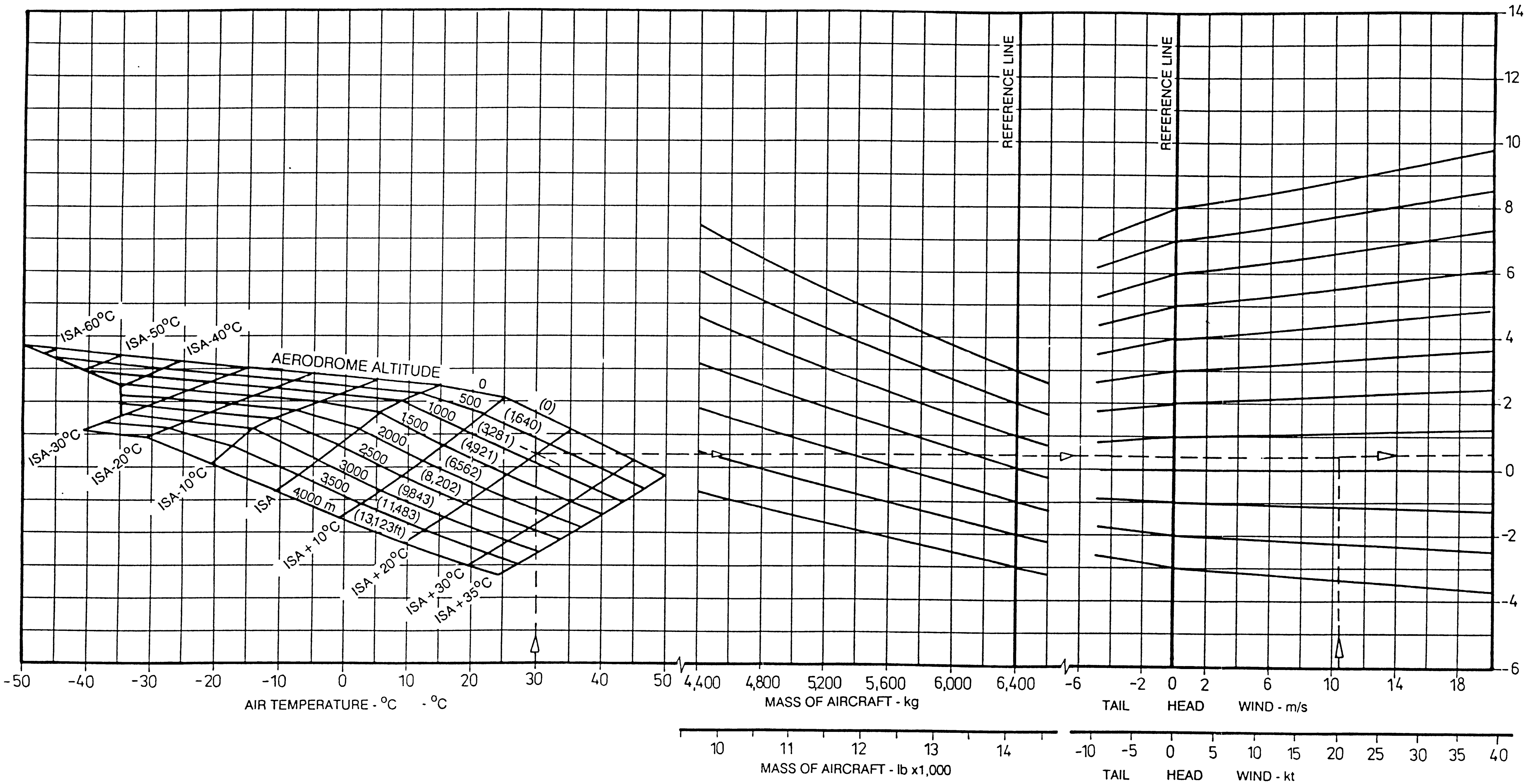

Fig. 5 – 21

TAKE-OFF PROCEDURES AND AIRSPEEDS

(WING FLAPS 0°)

TAKE-OFF AIRSPEEDS

Decision airspeed - V_1 - variable - to be determined according to graphs shown in Figs. 5-10a and 5-12a.

Rotation airspeed .... V_R = 97 KIAS (180 km/hr IAS)

Take-off safety airspeed .... V_2 = 97 KIAS (180 km/hr IAS)

This airspeeds do not vary with weight and centre of gravity position.

TAKE-OFF PROCEDURES

The take-off performances information given in this Section are based on the following piloting technique:

(a) Normal take-off

With the wheel brakes applied and the NOSE WHEEL STEERING switch in the PEDAL mode position move the TCL smoothly forward to a position enabling the airplane to be held safely at rest by wheel brakes under the given runway surface conditions.

Increase power to max. take-off with simultaneous release of brakes. Applying primary controls to keep the airplane on all wheels until V_R = 97 KIAS (180 km/hr IAS) is attained. At airspeed of 97 KIAS (180 km/hr IAS), rotate the airplane to a take-off attitude of max. 10°.

After lift off at a height of 10 - 16 ft (3 - 5 m) apply wheel brakes and retract the landing gear. Start the climb at a airspeed of V_2 = 97 KIAS (180 km/hr IAS) from a height of 35 ft (10.7 m) to 400 ft (122 m).

From the height 400 ft (122 m) during mild climb at rate of climb 600 fpm (3 m/s) accelerate airplane to airspeed 108 KIAS (200 km/hr IAS). Throttle back the engines to maximum continuous power and continue the climb at this airspeed.

CAUTION

START THE REDUCTION OF POWER BY REDUCING THE TORQUE TO 90% AS A MAXIMUM. ONLY THEN, SET THE PROPELLER CONTROL LEVERS TO 1,900 RPM.

At a height of 1,500 ft (457 m) above the runway accelerate the airplane to a airspeed of 135 KIAS (250 km/hr IAS) and cancel stand-by regime of the automatic bank control system and spoilers.

(cont.)

(b) Take–off with water injection

NOTE

1. The airplane performance indicated in this section of Flight Manual at take–off airport air temperature of +23 °C (73 °F) or higher, or at atmospheric pressure and air temperature as shown in Fig. 4–3, page 4–32, are only guaranteed when using the appropriate degree of water injection.

2. Referto SECTION4, page 4–33 – Use of water injection for detailed information on the preparation of the airplane for take–off with water injection.

3. The piloting technique with water injection is the same as that of normal take–off – see the paragraph (a).

At a torque min. 60%, the co–pilot shall switch the water injection on.

NOTE

Normal operation of the water injection system is characterized by a steady lighting of the WATER INJECTION cell and a drop of ITT by 20 to 30 °C at the moment of switching the system on.

At a height of 1,500 ft (457 m) above the runway drain remaining water in the system.

TAKE – OFF WAT CURVES

(WING FLAPS 0°)

The graph in Fig. 5–9a illustrates the curves of maximum permissible take–off weight for pressure airport altitude and air temperature for gross gradient of climb with one engine inoperative 2.4 %.

The graph in Fig. 5–9b illustrates the curves of maximum permissible take–off weight for pressure airport altitude and air temperature for maximum emergency energy 5.4 MJ absorbed by each wheel brake during aborted take–off.

Use the graph shown in Fig. 5–7 to convert atmospheric pressure into airport altitude.

Associated conditions:

Engines	one engine inoperative, the other engine operating at maximum contingency power
Propellers	2,080 RPM
Wing flaps	0°
Landing gear	UP
Heating	OFF
Airframe deicing system	OFF
Airspeed	V_2 = 94 KIAS (175 km/hr IAS)

Example:

Input data:

Pressure airport altitude	2,459 ft (750 m)
Ambient air temperature	30 °C (86 °F)

Result:

Maximum permissible take–off weight	14,550 lb (6,600 kg) from Fig. 5–9a 14,550 lb (6,600 kg) from Fig. 5–9b

CAUTION

THE ACTUAL MAXIMUM PERMISSIBLE TAKE–OFF WEIGHT IS THE LOWEST ONE OF THE WEIGHTS DETERMINED BY FLIGHT MANUAL SECTION 5, PARA TAKE–OFF WAT CURVES, TAKE–OFF FIELD LENGTHS, NET TAKE–OFF FLIGHT PATH DATA AND EN–ROUTE DATA WITH THE LIMITATION GIVEN IN SECTION 2 IN MIND.

MAXIMUM PERMISSIBLE TAKE-OFF WEIGHT FOR PRESSURE ALTITUDE AND TEMPERATURE

(Wing flaps 0°)

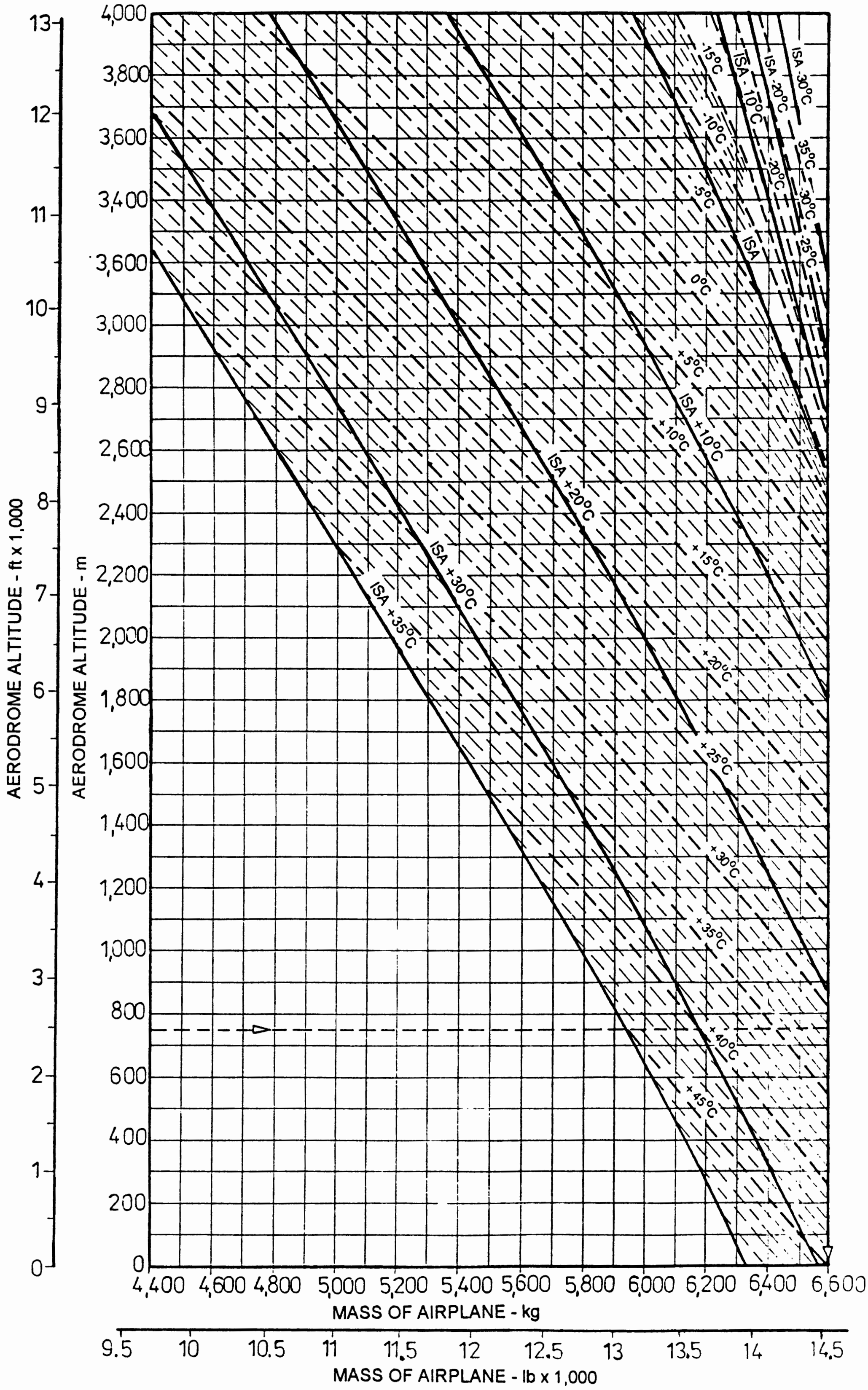

Fig. 5 – 9a

MAXIMUM PERMISSIBLE TAKE-OFF WEIGHT FOR PRESSURE ALTITUDE AND TEMPERATURE

(Wing flaps 0°)

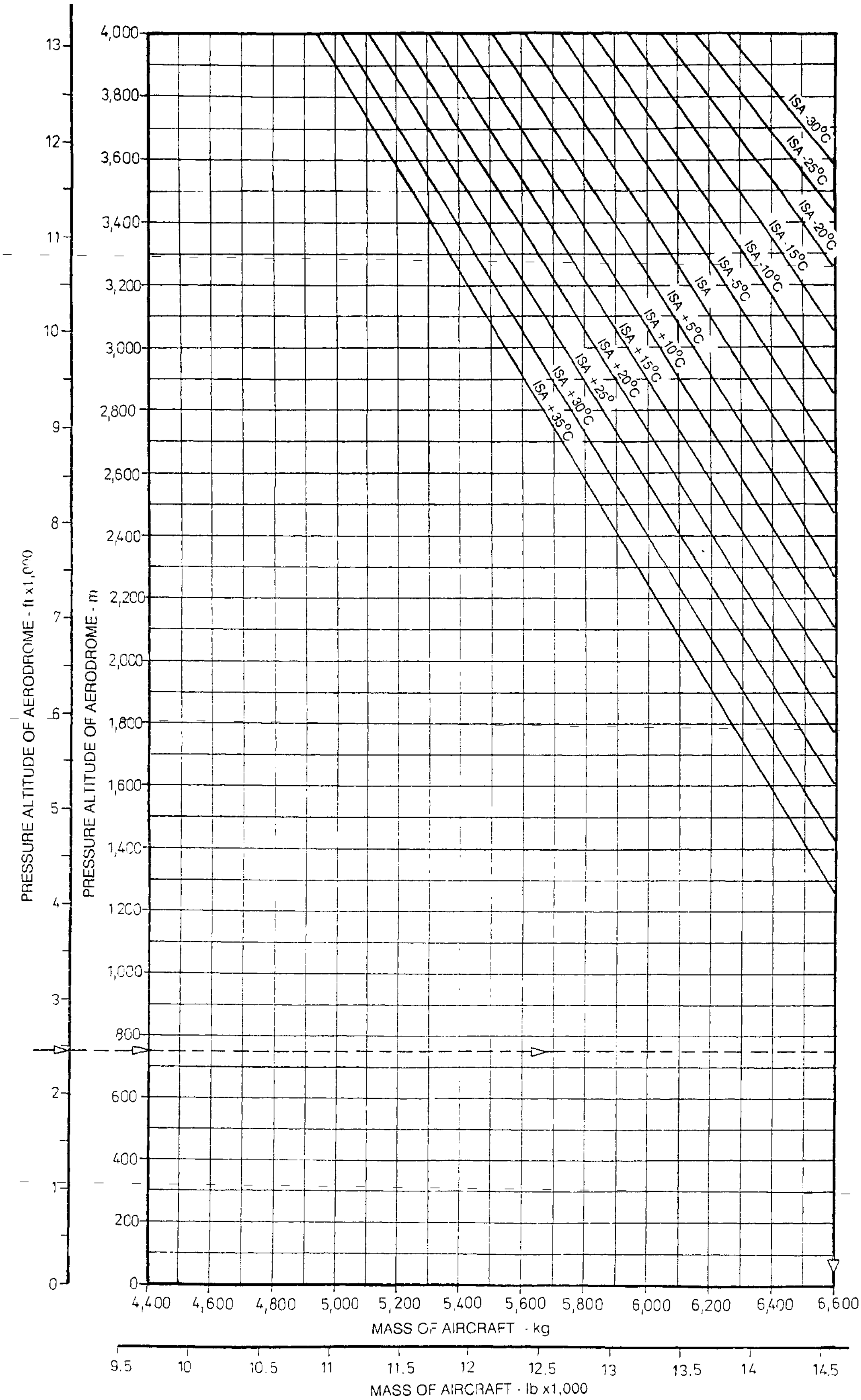

Fig. 5-9b

TAKE–OFF CLIMB GRADIENTS

(WING FLAPS 0°)

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TAKE-OFF FIELD LENGTHS

(WING FLAPS 0°)

(a) Using the graph in Fig. 5-10a determine the "D" value and the decision airspeed V_1 for take-off (TODA) and accelerate-stop (ASDA) distance available, runway slope and head (tail) wind component.

If the horizontal line drawn in the middle of the graph "D", intersect the vertical line beyond the grid (i.e. the V_1 is greater than 97 KIAS (180 km/h IAS)), the value of "D" shall be read at the intersection of the horizontal line with the line denoting the decision airspeed V_1 = 97 KIAS (180 km/h IAS).

If the horizontal line drawn in the middle of the graph "D", intersect the perpendicular line before the grid (i.e. the V_1 is less than 86 KIAS (160 km/h IAS)), the value of "D" shall be read at the intersection of the vertical line with the line denoting the decision airspeed V_1 = 86 KIAS (160 km/h IAS).

(b) Using the graph in Fig. 5-11a determine the maximum permissible take-off weight for ambient air temperature, airport altitude and the value of "D".

(c) Using the graph in Fig. 5-12a determine the "R" value and the decision airspeed V_1 for take-off run (TORA) and accelerate-stop (ASDA) distance available, runway slope and head (tail) wind component.

If the horizontal line drawn in the middle of the graph "R", intersect the vertical line beyond the grid (i.e. the V_1 is greater than 97 KIAS (180 km/h IAS)), the value of "R" shall be read at the intersection of the horizontal line with the line denoting the decision airspeed V_1 = 97 KIAS (180 km/h IAS).

If the horizontal line drawn in the middle of the graph "R", intersect the vertical line before the grid (i.e. the V_1 is less than 86 KIAS (160 km/h IAS)), the value of "R" shall be read at the intersection of the vertical line with the line denoting the decision airspeed V_1 = 86 KIAS (160 km/h IAS).

NOTE

Correction curves for the effect of wind in the graphs Fig. 5-10a, 5-12a are determined for 50% for the head wind speed value reported and 150% value of tail wind speed reported. If is wind speed greater then 38.8 kts (20 m/s) use value 38.8 kts (20 m/s) in the graph.

(d) Using the graphs in Fig. 5-13a, determine the maximum permissible take-off weight for ambient air temperature, airport altitude and the value of "R".

(e) For decision airspeed V_1, use the weight obtained from "D" and "R", whichever is lower. If the maximum permissible take-off weight obtained from "R" and "D" are the same and equal to the maximum take-off weight 14,550 lb (6,600 kg), use the greater V_1 (if they are different)

(cont.)

(f) The values determined according to (a) and (c) apply to a hard, dry runway. The influence of other conditions of the runway surface shall be determined by dividing the available distances before using the graphs in Fig. 5–10a and 5–12a by a coefficient corresponding to the type and the condition of the runway surface – see the tables 5/I and 5/II (page 5–18, 5–19).

(g) Use the lower of the weights obtained according to (b) and (d) for the determination of the maximum permissible take–off weight based on the take–off field lengths.

CAUTION

THE ACTUAL MAXIMUM PERMISSIBLE TAKE–OFF WEIGHT IS THE LOWEST ONE OF THE WEIGHTS DETERMINED BY FLIGHT MANUAL SECTION 5, PARA TAKE–OFF WAT CURVES, TAKE–OFF FIELD LENGTHS, NET TAKE–OFF FLIGHT PATH DATA AND EN–ROUTE DATA WITH THE LIMITATION GIVEN IN SECTION 2 IN MIND.

(h) Determine the value "D" – balanced take–off distance, i.e. the required take–off distance and required accelerate–stop distance, from graph in Fig. 5–11a as a function of ambient air temperature, airport altitude and airplane take–off weight.

(i) Determine the value "R" – balanced take–off run, i.e. the required take–off run and required accelerate–stop distance, from graph in Fig. 5–13a as a function of ambient air temperature, airport altitude and airplane take–off weight.

EXAMPLES GIVEN IN GRAPHS IN FIG. 5–10a, 5–11a, 5–12a, 5–13a

(Wing flaps 0°)

1. Determination of maximum take–off weight and airspeed V_1

Input data:

Example	A	C
Ambient temperature	+20 °C (68 °F)	30 °C (86 °F)
Pressure airport altitude	2,461 ft (750 m)	2,461 ft (750 m)
Take–off run available (TORA)	8,366 ft (2,550 m)	4,101 ft (1,250 m)
Accelerate–stop distance available (ASDA)	8,366 ft (2,550 m)	4,429 ft (1,350 m)
Take–off distance available (TODA)	8,366 ft (2,550 m)	5,085 ft (1,550 m)
Slope of runway	0.5 % uphill	1% uphill
Wind	tail wind 5 kts (2.5 m/s)	head wind 19.5 kts (10 m/s)
Water injection	yes	yes

Results (Wing flaps 0°):

Example	A	C
Value of "D" (see Fig. 5–10a)	6,201 ft (1,890 m)	5,413 ft (1,650 m)
Airspeed V1 according to "D" (see Fig. 5–10a)	97 KIAS (180 km/h IAS)	96 KIAS (178 km/h IAS)
Maximum permissible take–off weight according to "D" (see Fig. 5–11a)	14,550 lb (6,600 kg)	14,550 lb (6,600 kg)
Value of "R" (see Fig. 5–12a)	6,430 ft (1,960 m)	5,183 ft (1,580 m)
Airspeed V_1 according to "R" (see Fig. 5–12a)	97 KIAS (180 km/h IAS)	96 KIAS (178 km/h IAS)
Maximum permissible take–off weight according to "R" (see Fig. 5–13a)	14,550 lb (6,600 kg)	14,550 lb (6,600 kg)

NOTE

Heavy line denotes values obtained according to conditions set in paragraphs (g) and (e).

2. Determination of required take–off distance (TOD), take–off run and accelerate–stop distance (example D)

Input data:

Ambient air temperature	+35 °C (95 °F)
Pressure airport altitude	820 ft (250 m)
Water injection	used
Airplane weight	13,999 lb (6,350 kg)

Results:

Required take–off distance (see Fig. 5–11a)	4,167 ft (1,270 m)

(cont.)

Required take-off run (see Fig. 5–13a)	3,871 ft (1,180 m)
Required accelerate-stop distance	
– see Fig. 5–11a	4,167 ft (1,270 m) *
– see Fig. 5–13a	3,871 ft (1,180 m) *

* – greater value is considered

VALUE OF "D" AND DECISION AIRSPEED FOR TAKE–OFF DISTANCE AVAILABLE (TODA) AND ACCELERATE–STOP DISTANCE AVAILABLE (ASDA) (Wing flap 0°)

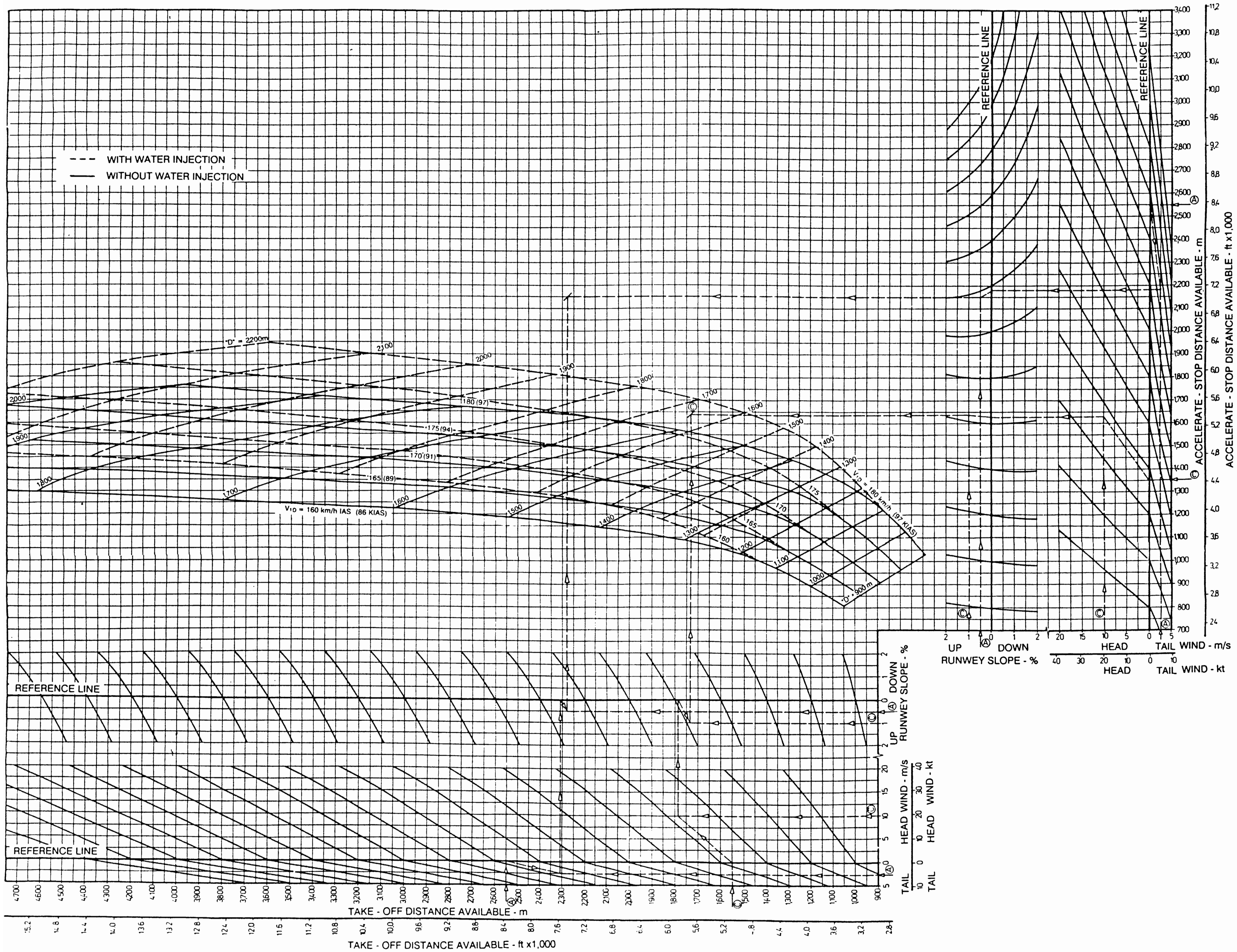

Fig. 5 – 10a

MAXIMUM PERMISSIBLE TAKE-OFF WEIGHT FOR TAKE-OFF DISTANCE AVAILABLE (TODA) AND ACCELERATE-STOP DISTANCE AVAILABLE (ASDA) (Wing flaps 0°)

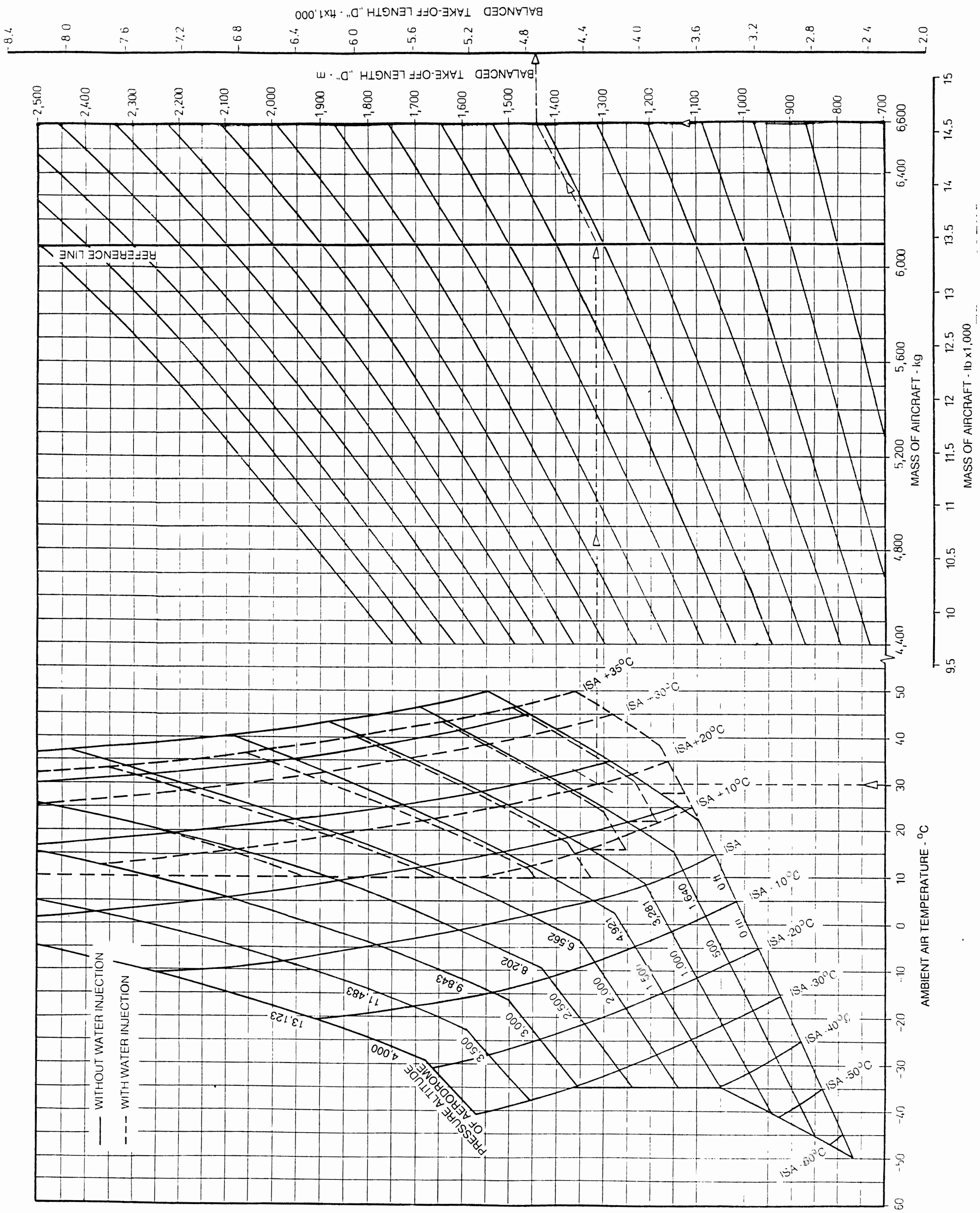

Fig. 5 – 11a

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VALUE OF "R" AND DECISION AIRSPEED FOR TAKE-OFF RUN AVAILABLE (TORA) AND ACCELERATE-STOP DISTANCE AVAILABLE (ASDA) (Wing flaps 0°)

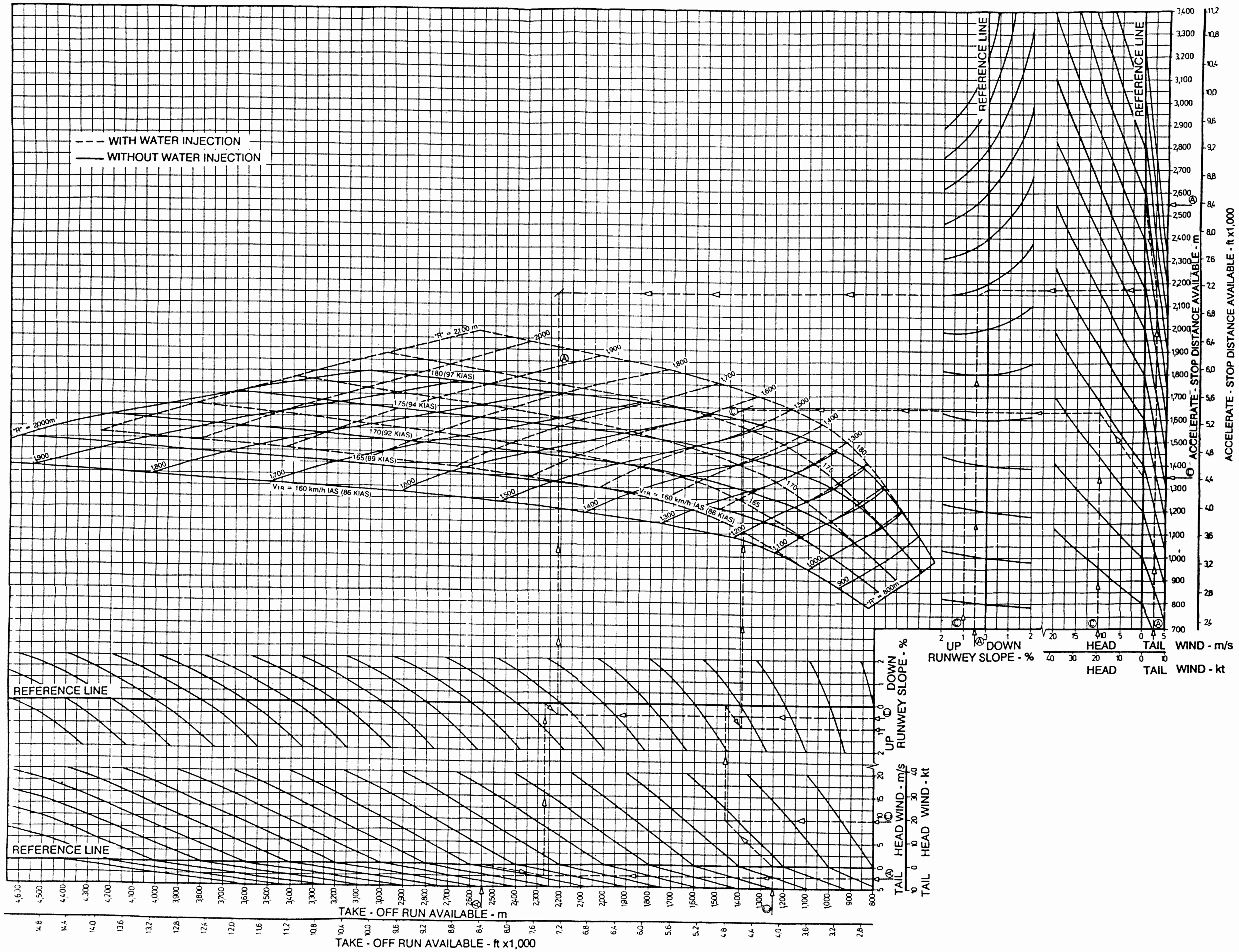

Fig. 5 – 12a

MAXIMUM PERMISSIBLE TAKE-OFF WEIGHT FOR TAKE-OFF RUN AVAILABLE (TORA) AND ACCELERATE-STOP DISTANCE AVAILABLE (ASDA) (Wing flaps 0°)

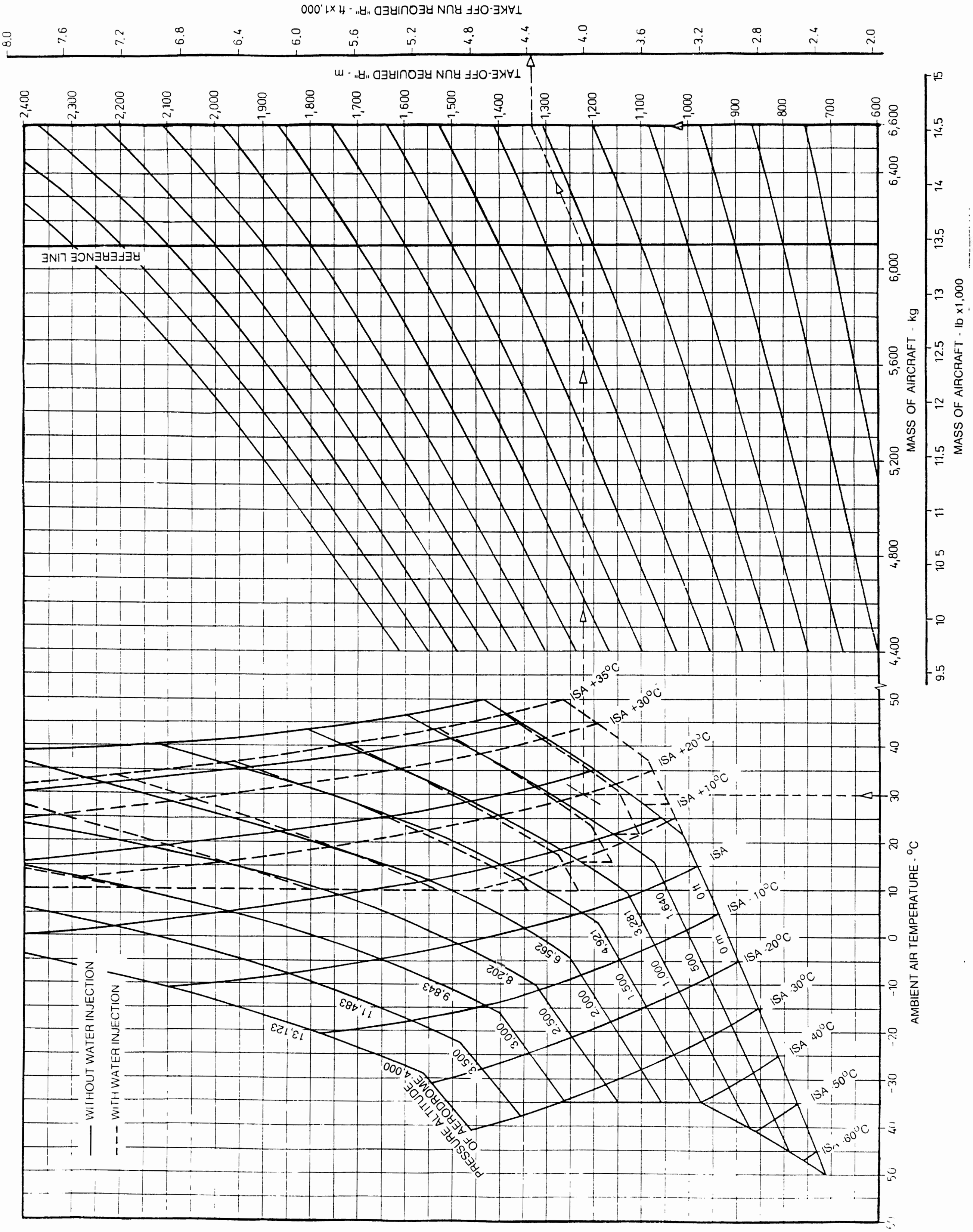

Fig. 5 – 13a

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NET TAKE–OFF FLIGHT PATH DATA

(WING FLAPS 0°)

(a) Conditions:

On determining the net take–off flight path with one engine inoperative it is presumed that:

- the engine will fail prior to reaching the take–off safety airspeed V_2
- the propeller of the failed engine is in feathered position
- the heating is switched off
- the separator vanes are up (retracted)
- at the end of clearway the airplane will reach the height of 35 ft (10.7 m)
- changes in the heading of airplane during the climb are less than 15°
- the airplane weight in all segments equals the take–off weight (the lowest of weights determined by Flight Manual Section 5 para Take–off WAT curves, Take–off field lengths and Enroute data are used)
- the ambient air temperature in all segments corresponds with the value reported at the beginning of take–off
- operating engine:

  1st and 2nd segment – Maximum contingency power

  3rd segment – Intermediate contingency power

(b) Definition

Net take–off flight part consists of:

Reference zero

It is the beginning of the coordinate system in which individual points of net take–off flight path are defined.
The vertical axis of this coordinate system intersects the point of flight at a height of 35 ft (10.7 m) above runway at the end of the take–off distance available (TODA). The horizontal axis is 35 ft (10.7 m) below this point.

First segment

This segment of climb begins at reference zero at the height of 35 ft (10.7 m) above runway elevation and ends at the height where the landing gear is fully retracted. The wing flaps are in cruising position (0°), airspeed V_2 = 97 KIAS (180 km/hr IAS).

(cont.)

Second segment

This segment of climb begins at the end of first segment and ends at the height of 6 minutes point for use of max. contingency power above the runvay. The wing flaps are in cruising position (0°), airspeed V_2 = 97 KIAS (180 km/h IAS).

Third segment

Acceleration of the airplane at the height of 6 minutes point for use of max. contingency power above the runway from airspeed 97 KIAS (180 km/hr IAS) to airspeed 100 KIAS (185 km/hr IAS) and climbing to the height 1,500 ft (457 m) above runway with intermediate contingency power. Wing flaps are fully retracted.

(c) Construction of net take–off flight path

The graphs needed for drawing net take–off flight path are shown in Figs. 5–15a, 5–16a, 5–17a, 5–18, 5–19, 5–20 and 5–21.

The correction curves for the influence of wind in these graphs are determined for 50% of the head wind speed value and 150% of tail wind speed value reported.
If the calculated trajectory does not pass above the obstacles with a reserve of 35 ft (10.7 m) at least, a new drawing of the net take–off flight path should be done for a reduced weight.

CAUTION

THE ACTUAL MAXIMUM PERMISSIBLE TAKE–OFF WEIGHT IS THE LOWEST ONE OF THE WEIGHTS DETERMINED BY FLIGHT MANUAL SECTION 5, PARA TAKE–OFF WAT CURVES, TAKE–OFF FIELD LENGTHS, NET TAKE–OFF FLIGHT PATH DATA AND EN–ROUTE DATA WITH THE LIMITATION GIVEN IN SECTION 2 IN MIND.

NOTE

If is wind speed greater then 38.8 kts (20 m/s) use value 38.8 kts (20 m/s) in the graph.

(cont.)

(d) Example:

Input data:

Pressure airport altitude	2,461 ft (750 m)
Ambient air temperature at the level of runway	+30 °C (86 °F)
Head wind	20 kts (10.3 m/s)
Take–off weight	14,109 lb (6,400 kg)

Calculation:

the 1st segment (landing gear retraction during climbing)

- see Fig. 5–15a net climb gradient $\gamma_1 = 0.9$ %
- see Fig. 5–16a increase of horizontal distance $\Delta l_1 = 1{,}189$ ft (362 m) = 0.195 Nm
- increase of height above the runway

$$\Delta h_1 = \frac{\Delta l_1 \times \gamma_1}{100} = \frac{1{,}189 \times 0.9}{100} = 10.7 \text{ ft}$$

$$(\Delta h_1 = \frac{362 \times 0.9}{100} = 3.3 \text{ m})$$

- height above the runway at the end of the segment:

$h_1 = h_0 + \Delta h_1 = 35 + 10.7 = 45.7$ ft

($h_1 = 10.7 + 3.3 = 14$ m)

- horizontal distance covered at the end of the segment with respect to reference zero:

$l_1 = l_0 + \Delta l_1 = 0 + 1{,}189 = 1{,}189$ ft = 0.195 Nm

($l_1 = 0 + 362 = 362$ m = 0.362 km)

the 2nd segment (climbing to height of 6 minutes point for use of max. contingency power above the runway)

- see Fig. 5–17a: net climb gradient: $\gamma_2 = 2.35$ %
- time for climb at the 2nd segment with max. contingency power t_2:

from Fig. 5–18: $t_1 = 15.8$ sec at climbing to 35 ft (10.7 m)
$h_1 = 46$ ft (14 m)

$t_{max} = 6$ minutes = 360 sec

$t_2 = t_{max} - t_1 = 360 - 15.8 = 344.2$ sec = 5.7367 min

(cont.)

- approximately half height of the 6 minutes point above runway is 755 ft (230 m) when pressure altitude of airport is 2,461 ft (750 m) then altitude for reading from Fig. 5−19 equals:

  2,461 + 755 = 3,216 ft

  (750 + 230 = 980 m)

  ambient air temperature is +30 °C (86 °F)

  from Fig. 5−19 value $1/\sqrt{\Delta} = 1.086$

  airspeed at the 2nd segment:
  V_2 = 97 KIAS = 102 kts CAS (from Fig. 5−1)
  V_2 = 180 km/hr IAS = 192 km/hr CAS

- rate of climb at the 2nd segment:

$$V_{y2} = \frac{\gamma_2}{100} \times \frac{1}{\sqrt{\Delta}} \times \frac{V_2}{3.6} = \frac{2.35}{100} \times 1.086 \times \frac{192}{3.6} = 1.3611\ \text{m/s} = 267.9\ \text{ft/min}$$

- increase of height at the 2nd segment:

  $\Delta h_2 = V_{y2} \times t_2 = 267.9 \times 5.7367 = 1{,}537$ ft
  ($\Delta h_2 = V_{y2} \times t_2 = 1.3611 \times 344.2 = 468.5$ m)

- height above the runway at the end of the 2nd segment:

  $h_2 = h_1 + \Delta h_2 = 46 + 1{,}537 = 1{,}583$ ft
  ($h_2 = h_1 + \Delta h_2 = 14 + 468.5 = 482.5$ m)

  The height above the runway at the end of the 2nd segment is higher than 1,500 ft (457 m) then:

- correction height above the runway at the end of the 2nd segment:

  h_{2cor} = 1,500 ft (457 m)

- correction increase of height at the 2nd segment:

  $\Delta h_{2cor} = 1{,}500 - h_1 = 1{,}500 - 46 = 1{,}454$ ft
  ($\Delta h_{2cor} = 457 - h_1 = 457 - 14 = 443$ m)

- increase of horizontal distance:

$$\Delta l_2 = \frac{\Delta h_{2cor}}{\gamma_2} \times 100 = \frac{1{,}454}{2.35} \times 100 = 61{,}872\ \text{ft} = 10.177\ \text{Nm}$$

$$(\Delta l_2 = \frac{\Delta h_{2cor}}{\gamma_2} \times 100 = \frac{443}{2.35} \times 100 = 18{,}851\ \text{m} = 18.851\ \text{km})$$

- total horizontal distance covered at the end of the segment with respect to reference zero

  $l_2 = l_1 + \Delta l_2 = 0.195 + 10.177 = 10.372$ Nm
  ($l_2 = l_1 + \Delta l_2 = 0.362 + 18.851 = 19.213$ km)

(cont.)

3rd segment (when h_2 is less than 1,500 ft (457 m) – for this example the height h_2 is higher than 1,500 ft (457 m) therefore calculation is not carried out)

- height above runway at the end of the segment: 1,500 ft (457 m)
- increase of height at the 3rd segment:

  $\Delta h_3 = h_3 - h_2$

- from Fig. 5–21: net climb gradient: $\gamma_3 = 0.5$ %
- increase of horizontal distance:

  $$\Delta l_3 = \frac{\Delta h_3}{\gamma_3} \times 100$$

- total horizontal distance covered at the end of the segment with respect to reference zero:

  $l_3 = l_2 + \Delta l_3$

Brief review of calculation is in Table 5/IIIa – next page.

Graphic presentation of the example is shown in Fig. 5–14a

Tab. 5/IIIa (Wing flaps 0°)

Take-off segment	Height above the runway at start of the segment	Increase of height above the runway at the segment	Height above the runway at the end of the segment	Net climb gradient at the segment	Horizontal distance covered from reference zero to the start of the segment	Increase of the horizontal distance at the segment	Total horizontal distance covered at the end of the segment with respect to reference zero
	[ft (m)]	Δh [ft (m)]	[ft (m)]	γ [%]	[Nm (km)]	Δl [Nm (km)]	[km (Nm)]
1	35 (10.7)	10.7 (3.3)	46 (14)	0.9	0	0.195 (0.362)	0.195 (0.362)
2	46 (14)	1,454 443	1,500 (457)	2.35	0.195 (0.362)	10.177 (18.851)	10.372 (19.213)
3	1,500 (457)	0	1,500 (457)	0.5	10.372 (19.213)	0	10.372 (19.213)

$$\Delta h = \frac{\Delta l \times \gamma}{100}$$

$$\Delta l = \frac{\Delta h}{\gamma} \times 100$$

NET TAKE - OFF FLIGHT PATH (graph illustrating the example)

(Wing flaps 0°)

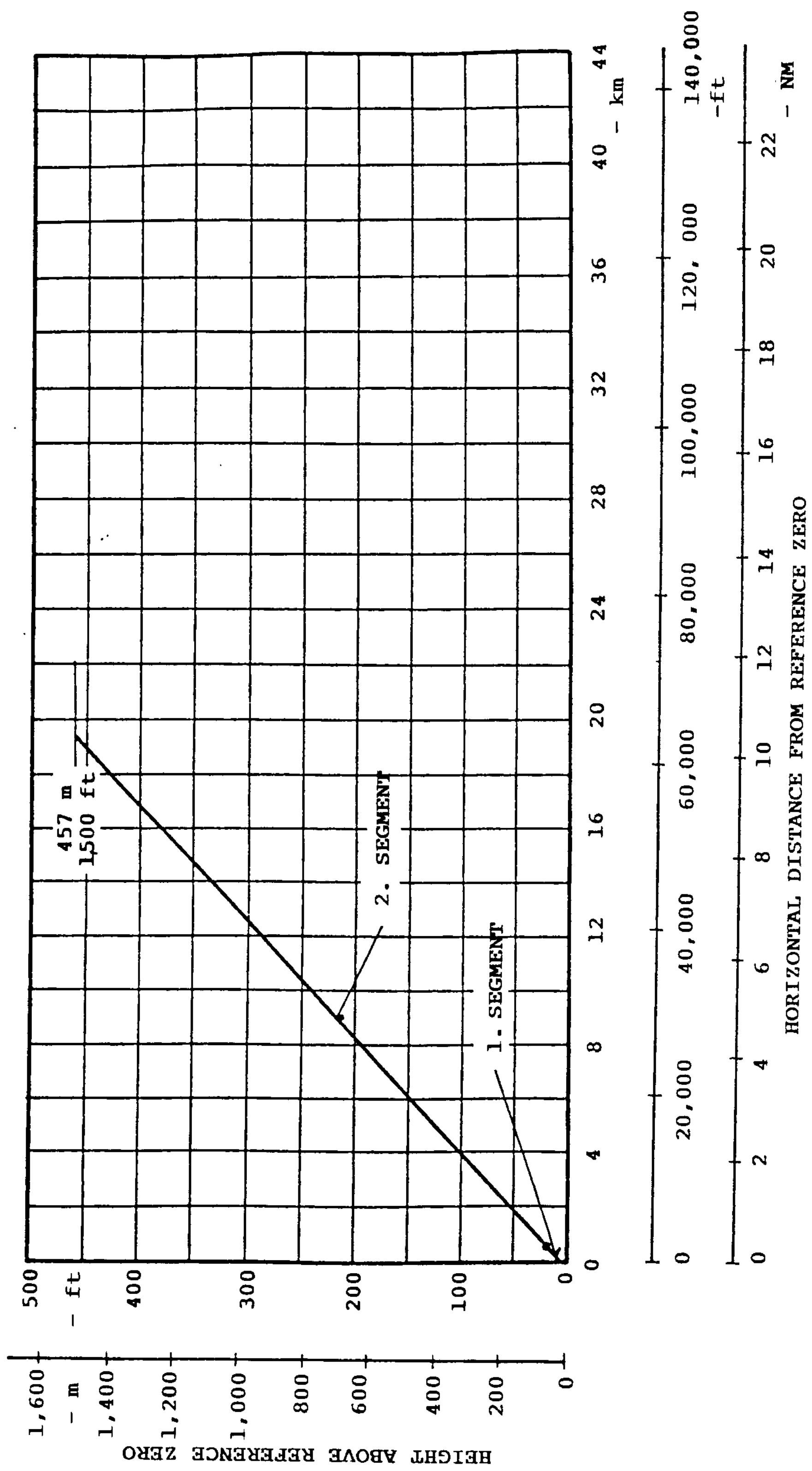

Fig. 5 - 14a

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NET CLIMB GRADIENT IN THE 1ST SEGMENT OF THE TAKE-OFF

(Wing flaps 0°)

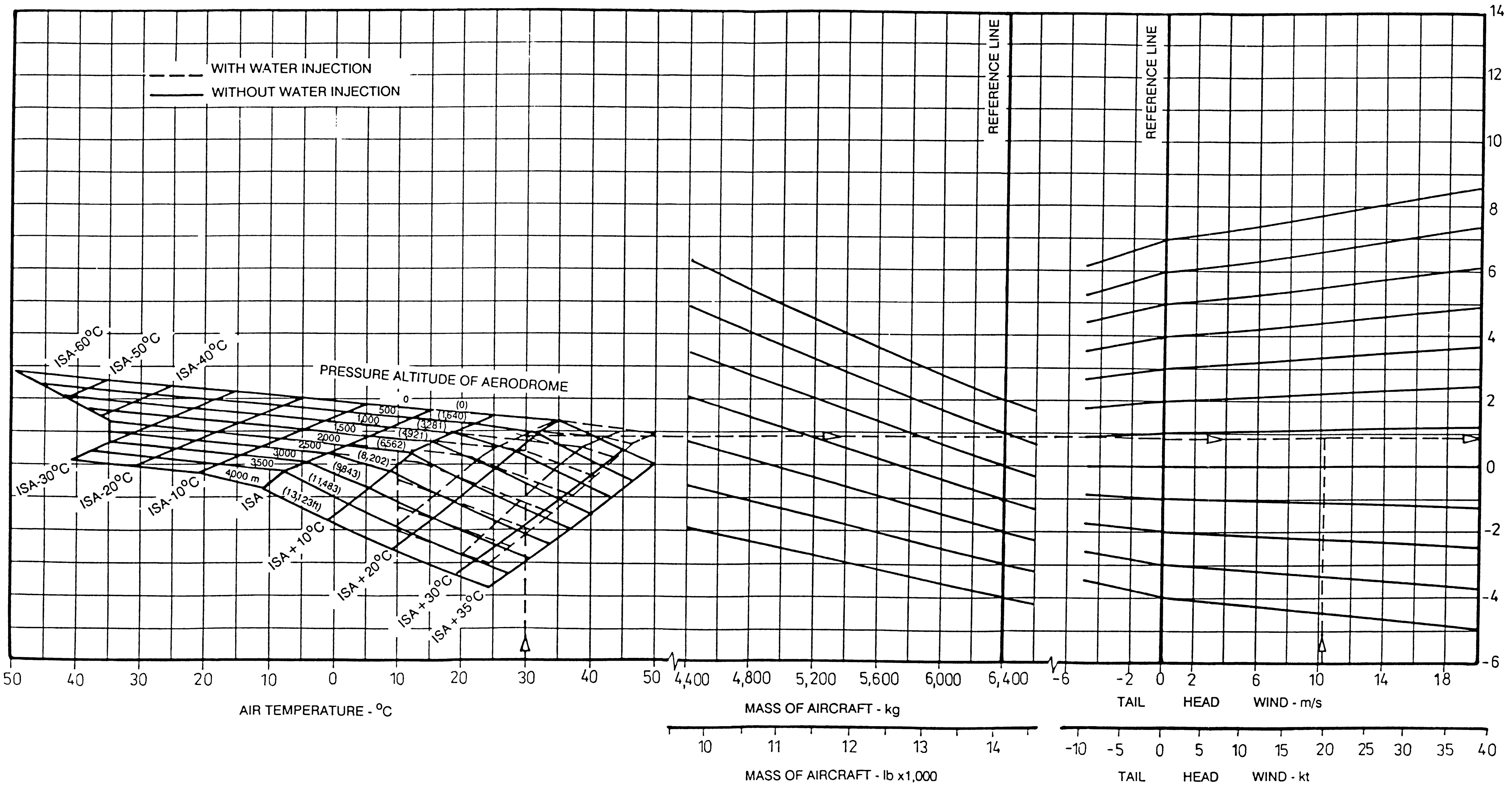

Fig. 5 – 15a

INCREASE OF THE HORIZONTAL DISTANCE IN THE 1ST SEGMENT OF THE TAKE-OFF

(Wing flaps 0°)

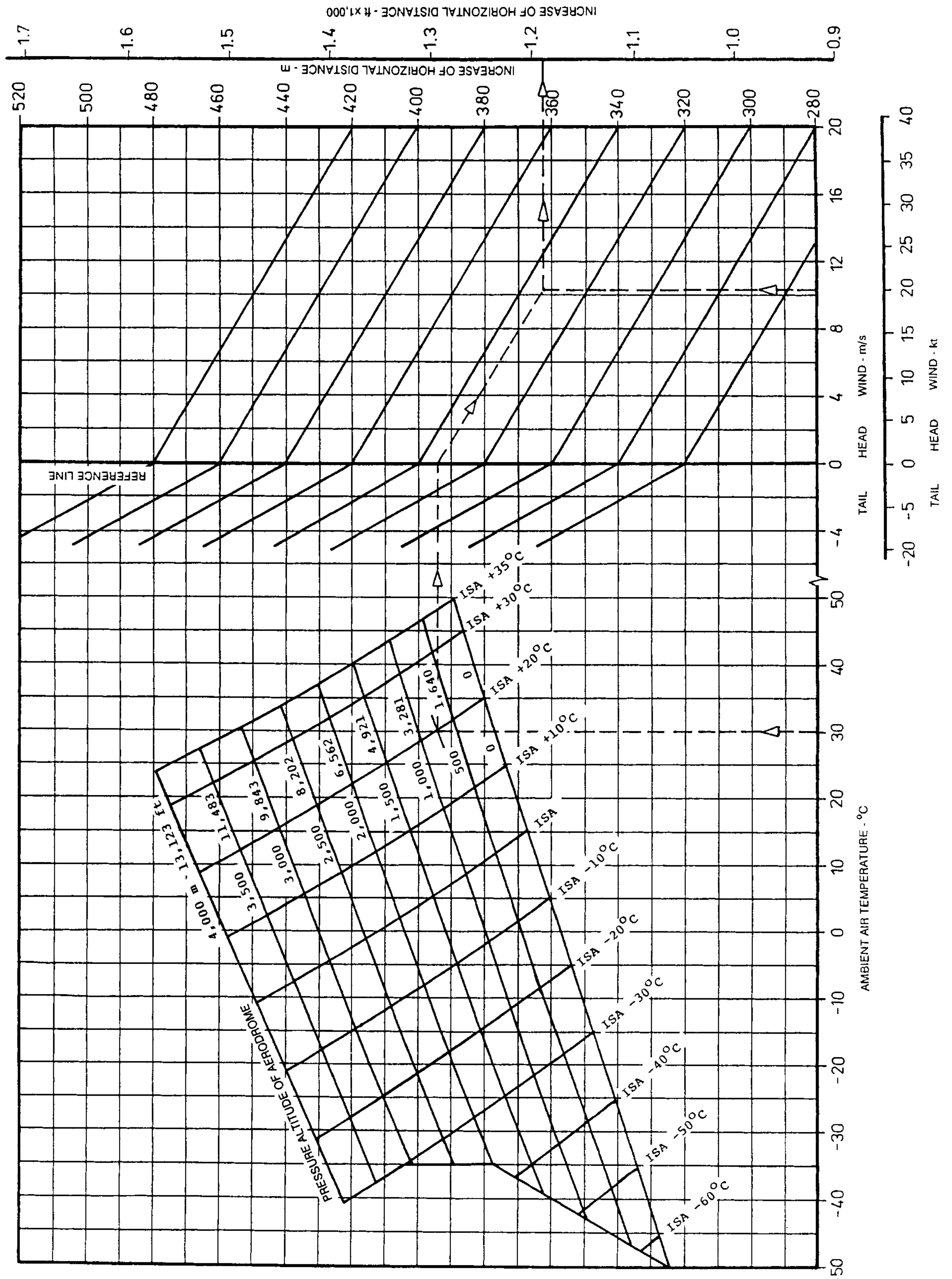

Fig. 5 – 16a

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NET CLIMB GRADIENT IN THE 2ND SEGMENT OF THE TAKE-OFF
(Wing flaps 0°)

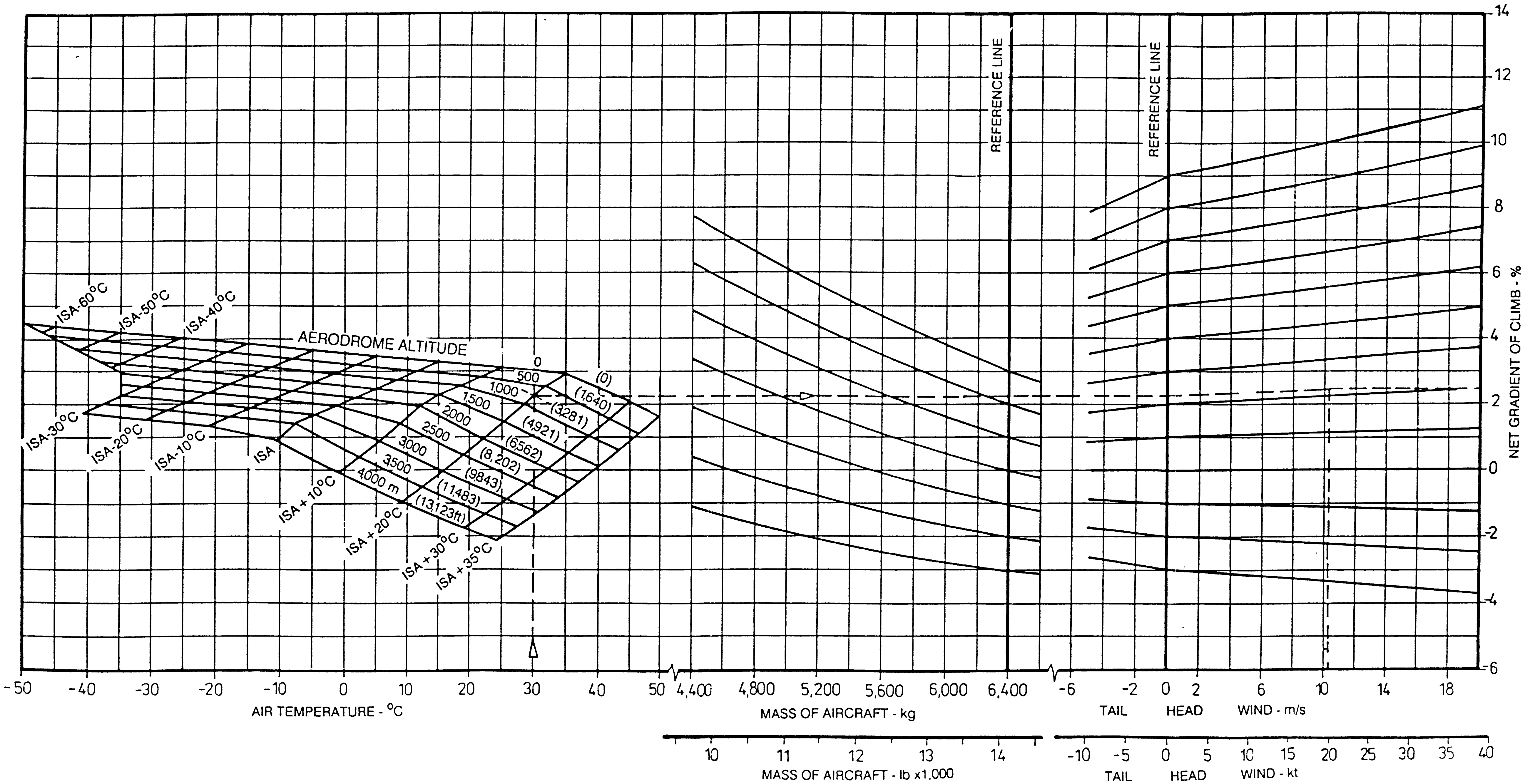

Fig. 5 – 17a

EN–ROUTE DATA

The en–route data are plotted in Fig. 5–22 as WAT curves giving maximum permissible weight ensuring minimum net gradient of climb of 0% with one engine inoperative in respect of obstacles en–route.

When entering the graph the flight altitude shall be taken as the sum of the obstacle elevation and a height margin of 2,000 ft (610 m).

From the weight thus obtained, the maximum permissible take–off weight for en–route obstacles clearance can be determined by adding the weight of fuel consumed before reaching the obstacle.

The fuel consumption shall be determined from the graph in Fig. 5–23.

The estimated take–off weight with which the graph is to be entered shall be taken as the sum of weight obtained from the graph in Fig. 5–22 and the distance of the obstacle from the airport of departure in kilometres (see example) plus distance to alternate airport. If this sum is greater than 14,550 lb (6,600 kg), the value of the take–off weight shall be 14,550 lb (6,600 kg).

The flight level (flight pressure altitude) used shall not be lower than the obstacle elevation plus a height margin of 2,000 ft (600 m).

CAUTION

THE ACTUAL MAXIMUM PERMISSIBLE TAKE–OFF WEIGHT IS THE LOWEST ONE OF THE WEIGHTS DETERMINED BY FLIGHT MANUAL SECTION 5, PARA TAKE–OFF WAT CURVES, TAKE–OFF FIELD LENGTHS, NET TAKE–OFF FLIGHT PATH DATA AND EN–ROUTE DATA WITH THE LIMITATION GIVEN IN SECTION 2 IN MIND.

MAXIMUM PERMISSIBLE WEIGHT FOR EN-ROUTE OBSTACLE CLEARANCES

is shown in Fig. 5–20

Associated conditions:

Engines	one engine inoperative the other one operating at intermediate contingency power
Flaps	0°
Landing gear	UP
Airspeed	108 KIAS (200 km/hr IAS)
Heating	ON
Deicing	OFF

Example:

Input data:

Pressure flight altitude (obstacle elevation + height margin) =
= 8,000 + 2,000 ft = 10,000 ft
(2,400 + 610 m = 3,010 m)

Air temperature	– 5 °C (23 °F)

Result:

Maximum permissible weight	13,448 lb (6,100 kg)

MAXIMUM PERMISSIBLE WEIGHT FOR EN-ROUTE OBSTACLE CLEARANCES

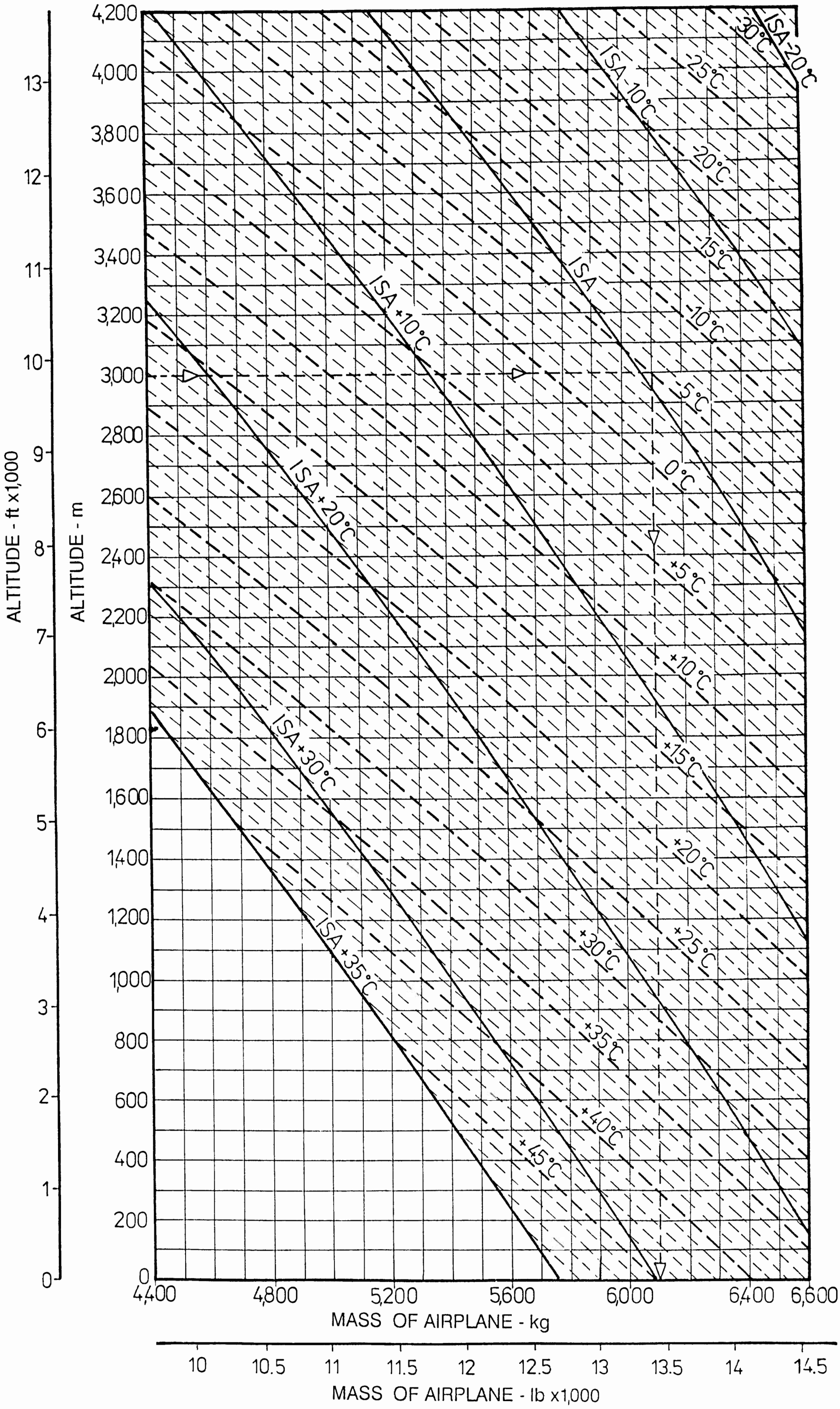

Fig. 5 – 22

FUEL CONSUMPTION FOR EN–ROUTE OBSTACLE CLEARANCES

AT ECONOMICAL FLIGHT CONDITION

is shown on Fig. 5–23

Associated conditions:

Engines	operating at economical flight condition (see end of this section FUEL CONSUMPTION)
Heating	ON
Compensation fuel allowance (for destination and alternate airport)	5%

Example:

Input data:

Distance of the obstacle	404 miles (650 km)
Pressure flight altitude (obstacle elevation +height margin)	12,000 + 2,000 = 14,000 ft (3,590 + 610 = 4,200 m)
Flight level	14,000 ft (4,200 m)
Deviation of ambient air temperature from ISA:	ISA –5 °C
Estimated take–off weight (weight from Fig. 5–22 + fuel consumed before reaching the obstacle)	5,480 + 650 = 6,130 kg (13,514 lb)
Head wind	21.6 kts (40 km/hr)

Result:

Fuel consumption	1,477 lb (670 kg) (from Fig. 5–23)

Final result:

Maximum permissible take–off weight (weight + fuel consumption)	12,081 + 1,477 = 13,559 lb (5,480 + 670 = 6,150 kg)

FUEL CONSUMPTION FOR EN-ROUTE OBSTACLE CLEARANCES FOR ECONOMICAL FLIGHT CONDITION

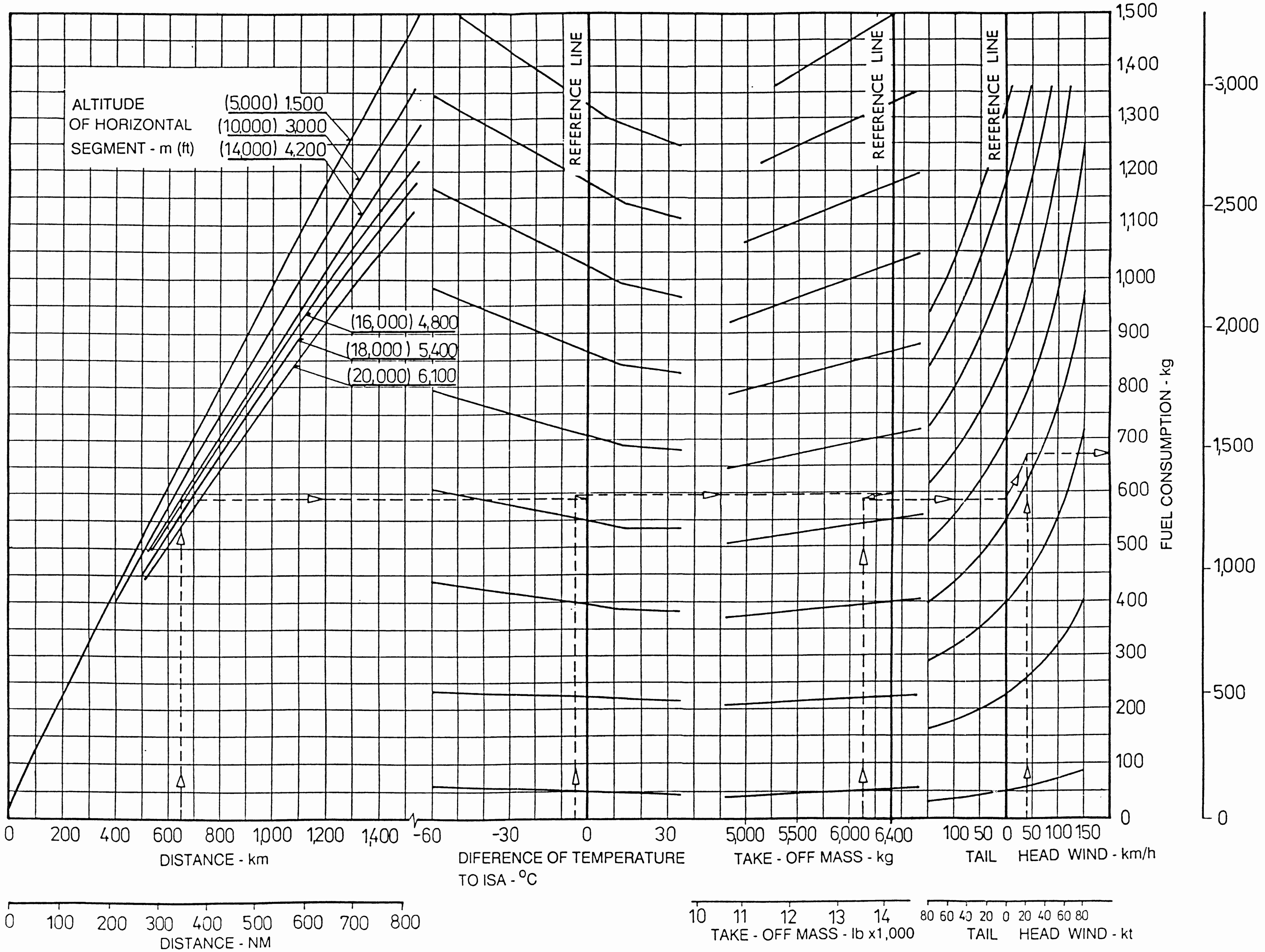

Fig. 5 – 23

LANDING PROCEDURES AND AIRSPEEDS

APPROACH AIRSPEED (AT PASSAGE OVER THE RUNWAY THRESHOLD)

Conditions:

(a) Flaps in landing position (42°)

- Landing gear extended
- Both engines at idle or one engine inoperative and the other idling — 84 KIAS (155 km/hr IAS)

(b) Flaps in take–off position (18°)

- Landing gear – extended
- Both engines at idle or one engine inoperative and the other idling — 89 KIAS (165 km/hr IAS)

These airspeeds do not vary with landing weight and centre of gravity position.

MISSED APPROACH WITH BOTH ENGINES OPERATING

The approach may be aborted at any moment at a height of at least 100 ft (30 m) and within the whole airspeed range typical of this portion of flight.
Engine acceleration time (from the initial power setting up to 95% of Max. take–off power setting) is approx. 5 seconds. Accelerate the engine by smooth application of power from the flight idle position to the Max. take–off position within 3 seconds.

(a) Missed approach from a height exceeding 200 ft (61 m) (wing flaps 18°, landing gear extended)

- after reaching full take–off power retract the landing gear and rotate the airplane into the climb
- during climb maintain an airspeed of 84 KIAS (155 km/hr IAS)
- after reaching a height of 400 ft (122 m) above the runway during mild climb at rate of climb 600 fpm (3 m/s) accelerate to airspeed 97 KIAS (180 km/hr IAS) fully retract the wing flaps then accelerate airplane to the airspeed of 108 KIAS (200 km/hr IAS) and maintain this airspeed for further climb
- after reaching a height of 1,500 ft (457 m) accelerate to airspeed 135 KIAS (250 km/hr IAS)

CAUTION

IF THE CABIN HEATING AND ENGINE AIR INTAKE DEICING IS OPEN THEN AVOID EXCEEDING THE MAXIMUM PERMISSIBLE ITT.

(b) Missed approach from a height not exceeding 200 ft (61 m) (wing flaps 42°, landing gear extended)

- simultaneously with increasing the engine power perform transition to climb with airspeed of 84 KIAS (155 km/hr IAS)
- retract the landing gear
- after reaching take–off power at airspeed of 84 KIAS (155 km/hr IAS) retract the flaps to 18°
- maintain 84 KIAS (155 km/hr IAS) during the climb
- after reaching a height of 400 ft (122 m) above the runway during mild climb at rate of climb 600 fpm (3 m/s) accelerate to airspeed 97 KIAS (180 km/hr IAS) fully retract the wing flaps then accelerate airplane to the airspeed of 108 KIAS (200 km/hr IAS) and maintain this airspeed for further climb
- after reaching a height of 1,500 ft (457 m) accelerate to airspeed135 KIAS (250 km/hr IAS)

MISSED APPROACH WITH ONE ENGINE INOPERATIVE

Missed approach with one engine inoperative (the propeller in the feathered position) and flaps extended to 18° can be safely carried out from a height exceeding 200 ft (61 m). It is necessary to keep the procedure sequence as follows:

- Continue descent on the glide path, set intermediate contingency power or maximum contingency power on operating engine and retract the landing gear.
- Perform transition to climb and maintain an airspeed of 84 KIAS (155 km/hr IAS)
- At a height of 400 ft (122 m) accelerate at least to 97 KIAS (180 km/hr IAS), retract the wing flaps and ABC tab (if extended).
- Accelerate to airspeed 100 KIAS (185 km/hr IAS) and maintain this airspeed for further climb to a height of 1,500 ft (457 m) above the runway.
- Carry out flight at a holding pattern with flaps retracted and an airspeed of at least 108 KIAS (200 km/hr IAS).

NOTE

The maximum contingency power should only be used at missed approach with one engine inoperative if the engine failure occurred during the approach and not during the take–off.

APPROACH UNDER ICING CONDITIONS

Carry out the approach under icing conditions with flaps in take–off position (18°) regardless of whether the deicing system operates normally or it has partially or totally failed.

If the deicing system operates normally than maintain an approach airspeed of 89 KIAS (165 km/hr IAS).

If the deicing system totally or partially has failed or it is not obvious that the ice has been removed from the lifting surfaces then maintain an approach airspeed of 100 KIAS (185 km/hr IAS).

LANDING PROCEDURES

Piloting technique, on which the following information above landing performance is based, is as follows:

(a) With both engines operating

At a height of 50 ft (15 m) above runway reduce the engine power to idle.

At the height of 10 ft (3 m) above runway begin the flare–out so that the airspeed of descent is 200 to 100 ft/min (1 to 0.5 m/s) at a height of 1.5 to 3 ft (0.5 to 1 m) above runway. At this moment extend the spoilers.

Immediately after touch–down set full reverse power on both engines and after nose–wheel touch apply full brakes while keeping spoiler push–button depressed.

(b) With one engine inoperative

At the height of 50 ft (15 m) above runway reduce the power of the operating engine to idle.

At a height of 10 ft (3 m) above runway begin the flare–out so that the speed of descent is 200 to 100 ft/min (1–0.5 m/s) at a height of 1.5 to 3 ft (0.5 to 1 m) above runway. At this moment extend the spoilers.

Immediately after touch–down set full reverse power on the operating engine. Eliminate the tendency to turn when reverse power is selected by nose wheel pedal steering, brakes and full push on the control column. During braking keep the spoiler control push–button depressed.

Actual landing distance with one engine operating is 20% longer than actual landing distance with both engines operating.

During landing on unpaved runway with either one or both engines operating relieve the nose wheel of load after touch–down and selection of reverse power by pulling the control column back.

Landing on the runway with very low friction (ice)

Actual landing distance on the runway with very low friction with both engines in operation will be 60% longer compared with the actual landing distance mentioned in para Landing procedures (a).

(cont.)

Landing under icing conditions

Due to the higher landing airspeed used under these conditions the actual landing distance will be increased by 35% compared with the normal distance.

CAUTION

AVOID ABRUPT DEFLECTIONS OF THE CONTROL SURFACES.

NOTE

In case long runways it isn't necessary to use reverse. First pilot decides for use reverse.

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MAXIMUM PERMISSIBLE WEIGHT FOR ALTITUDE AND TEMPERATURE (LANDING WAT CURVES)

Landing WAT curves with use of Maximum contingency power at missed approach are plotted in Fig. 5−24

Use the graph in Fig. 5−7 to convert atmospheric pressure into airport altitude.

Associated conditions:

Engines	one engine inoperative the other one operating at Maximum contingency power
Wing flaps	18°
Landing gear	UP
Heating	OFF
Deicing	OFF
Airspeed	V_2 = 84 KIAS (155 km/hr IAS)

Example:

Input data:

Pressure airport altitude	2,460 ft (750 m)
Ambient air temperature	+30 °C (86 °F)

Result:

Maximum permissible landing weight	14,109 lb (6,400 kg)

CAUTION

THE ACTUAL LANDING WEIGHT SHALL NOT EXCEED THE MAXIMUM PERMISSIBLE WEIGHT DETERMINED ACCORDING TO FLIGHT MANUAL SECTION 5, PARA LANDING WAT CURVES AND LANDING FIELD LENGTHS AND THE MAXIMUM LANDING WEIGHT GIVEN IN FLIGHT MANUAL SECTION 2.

LANDING WAT CURVES WITH USE OF MAXIMUM CONTINGENCY POWER AT MISSED APPROACH

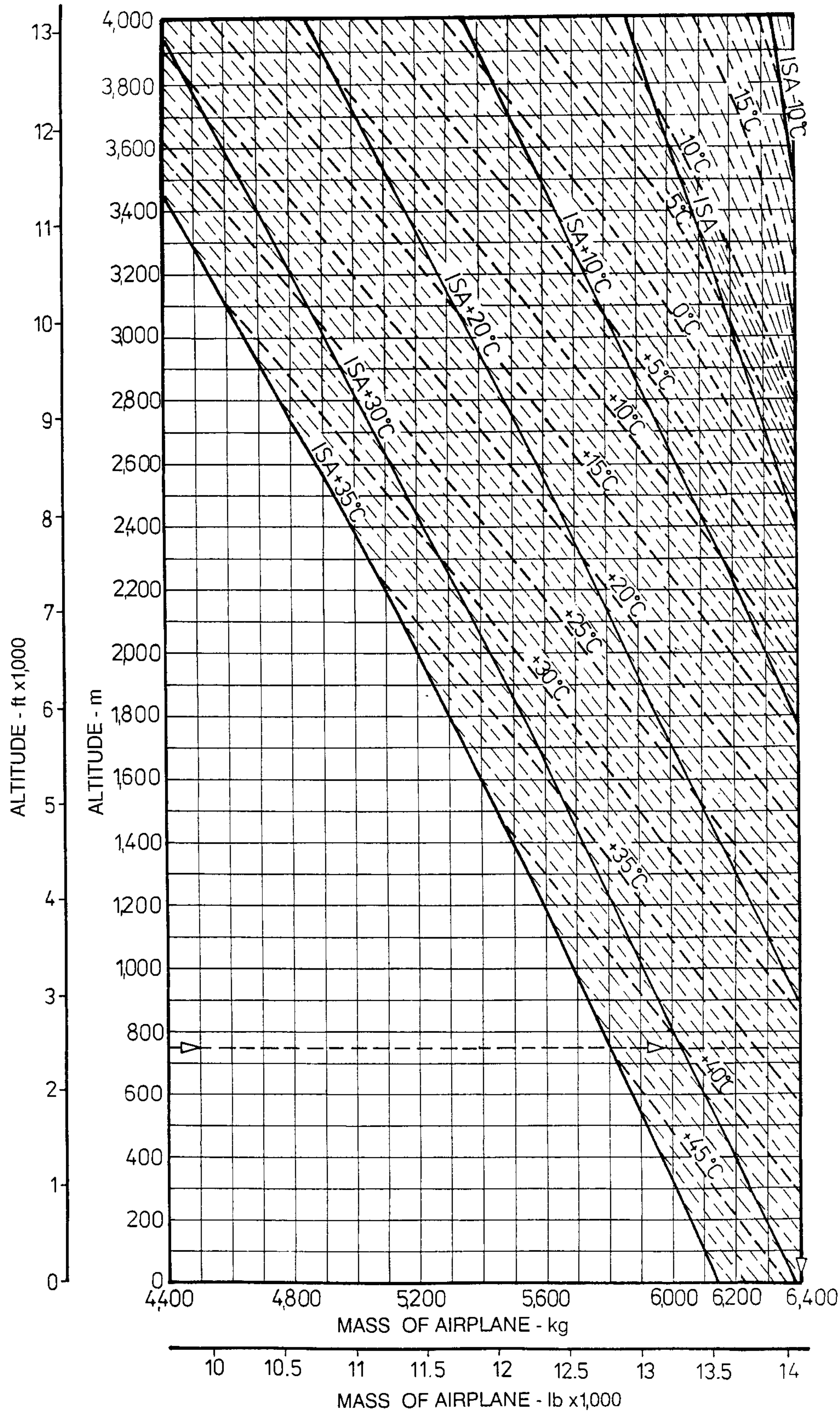

Fig. 5 – 24

Landing WAT curves with use of Intermediate contingency power at missed approach

are plotted in Fig. 5–25

Use the graph in Fig. 5-7 to convert atmospheric pressure into airport altitude.

Associated conditions:

Engines	one engine inoperative the other one operating at Intermediate contingency power
Wing flaps	18°
Landing gear	UP
Heating	OFF
Deicing	OFF
Airspeed	V_2 = 84 KIAS (155 km/hr IAS)

Example:

Input data:

Pressure airport altitude	2,460 ft (750 m)
Ambient air temperature	+30 °C (86 °F)

Result:

Maximum permissible landing weight	12,500 lb (5,670 kg)

CAUTION

THE ACTUAL LANDING WEIGHT SHALL NOT EXCEED THE MAXIMUM PERMISSIBLE WEIGHT DETERMINED ACCORDING TO FLIGHT MANUAL SECTION 5, PARA LANDING WAT CURVES AND LANDING FIELD LENGTHS AND THE MAXIMUM LANDING WEIGHT GIVEN IN FLIGHT MANUAL SECTION 2.

LANDING WAT CURVES WITH USE OF INTERMEDIATE CONTINGENCY POWER AT MISSED APPROACH

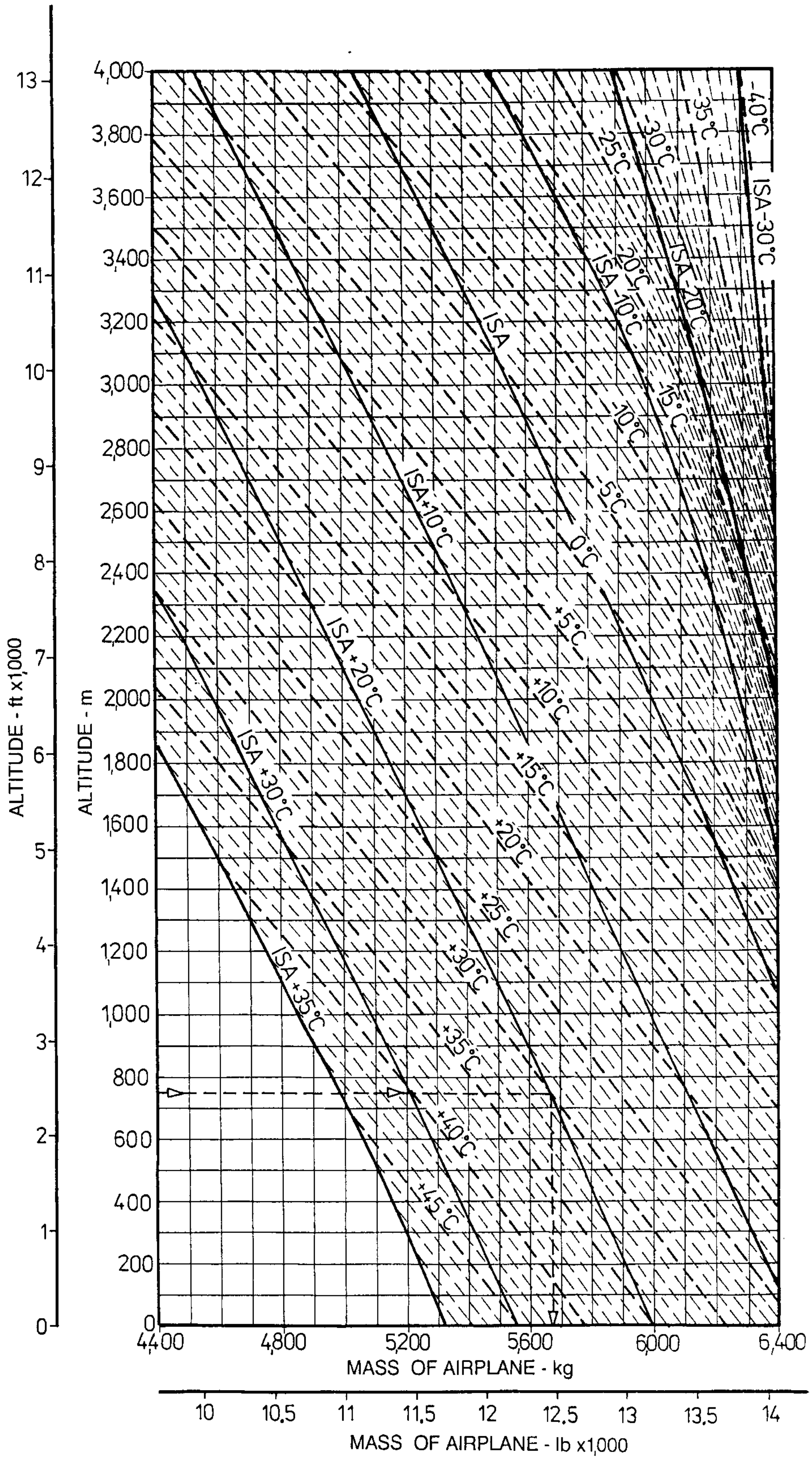

Fig. 5 – 25

LANDING CLIMB GRADIENTS

GROSS GRADIENTS OF CLIMB AT MISSED APPROACH

Gross gradients of climb at missed approach for the deviation of ambient air temperature from ISA, pressure altitude and landing weight are plotted in graph in Fig. 5–26.

Associated conditions:

Engines	Max. take–off power
Wing flaps	18°
Landing gear	DOWN
Heating	OFF
Deicing	OFF
Airspeed	84 KIAS (155 km/hr IAS)

Example:

Input data:

Pressure altitude	2,460 ft (750 m)
Deviation of ambient air temperature from ISA	ISA +17.2 °C (ISA+31 °F)
Landing weight	13,228 lb (6,000 kg)

Result:

Gross gradient of climb at missed approach	11.6 %

GROSS GRADIENT OF CLIMB AT MISSED APPROACH

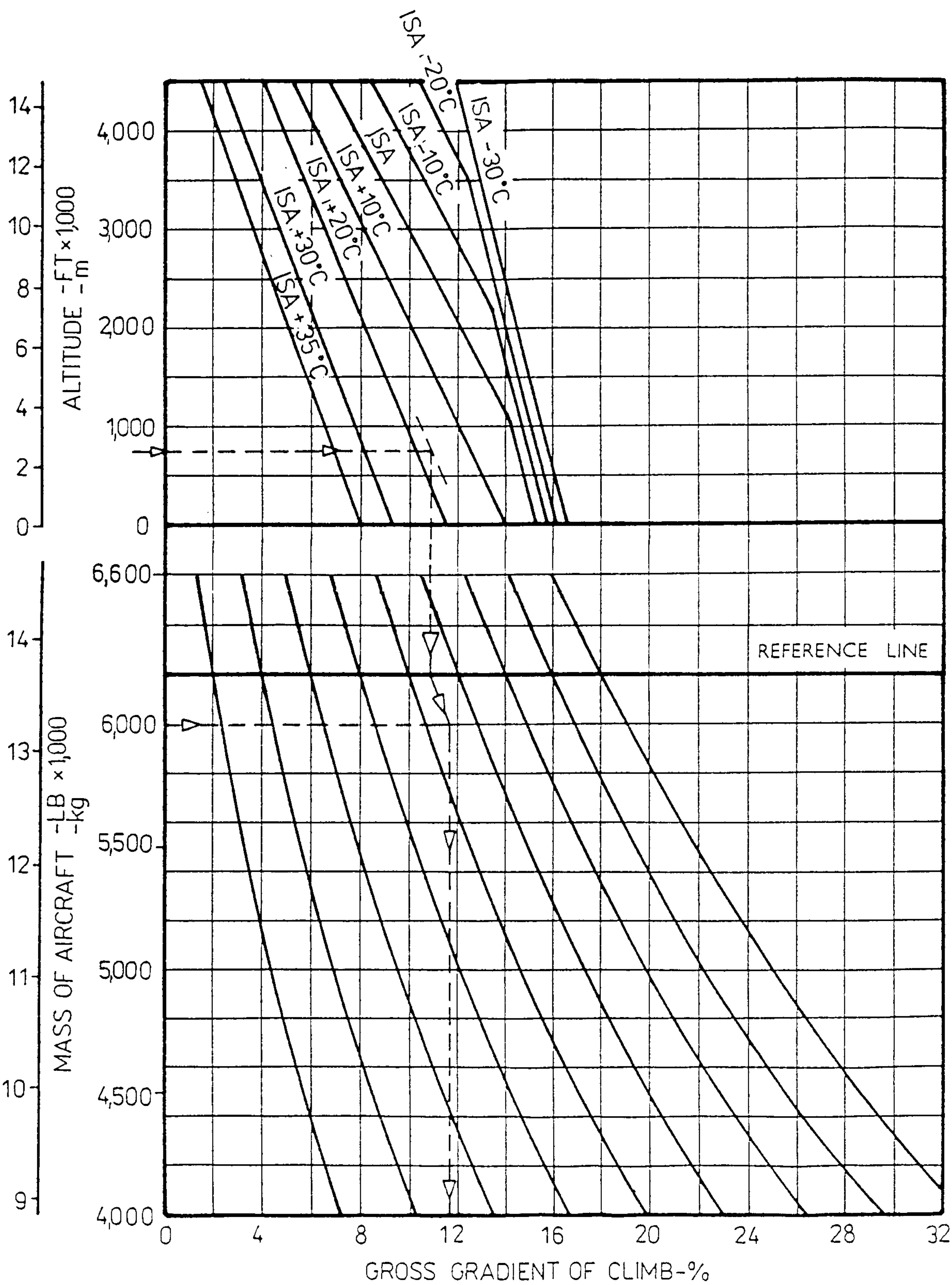

Fig. 5 – 26

GROSS GRADIENTS OF CLIMB AT BALKED LANDING

Gross gradients of climb at balked landing for the deviation of ambient air temperature from ISA, pressure altitude and landing weight are plotted in graph in Fig. 5–27.

Associated conditions:

Engines	Max. take–off power
Wing flaps	42°
Landing gear	DOWN
Heating	OFF
Deicing	OFF
Airspeed	V_{REF} = 84 KIAS (155 km/hr IAS)

Example:

Input data:

Pressure altitude	2,460 ft (750 m)
Deviation of ambient air temperature from ISA	ISA +17.2 °C (ISA+31 °F)
Landing weight	13,228 lb (6,000 kg)

Result:

Gross gradient of climb at balked landing	8.0 %

GROSS GRADIENT OF CLIMB AT BALKED LANDING

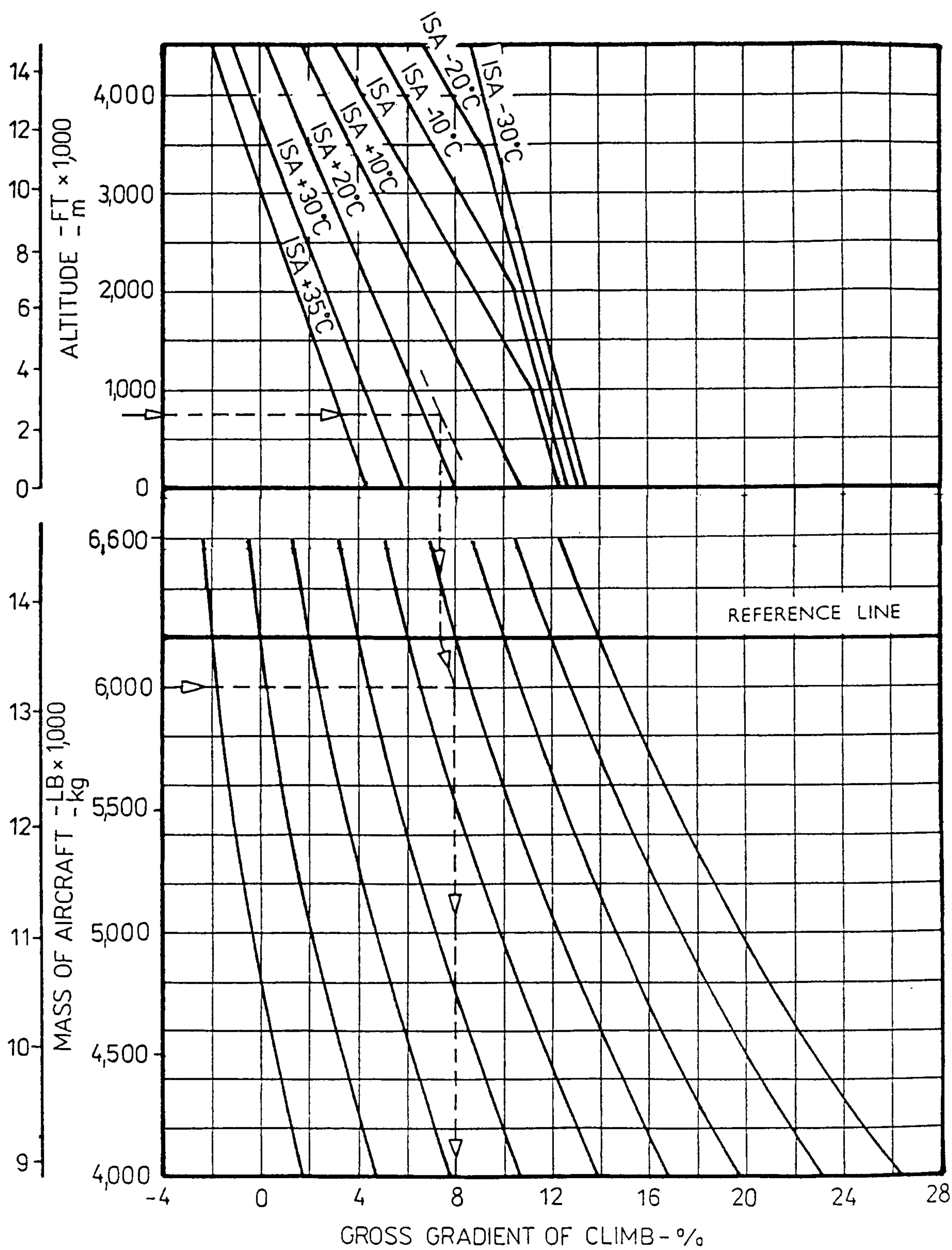

Fig. 5 – 27

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LANDING FIELD LENGTHS

In Fig. 5–28 the maximum permissible landing weight for pressure airport altitude, landing distance available (LDA), ambient air temperature, head/tail wind speed, runway slope and LDA–factor is plotted. The factor of 1.67 shall be applied to determine the maximum permissible landing weight on arrival (destination) airports and the factor of 1.43 – on alternate airports.

The graph is valid for a hard, dry runway. The influence of other runway surface conditions shall be determined by dividing landing distance available before entering the graph by the coefficient indicated in the table 5/IV.

CAUTION

THE ACTUAL LANDING WEIGHT MUST NOT EXCEED THE MAXIMUM PERMISSIBLE WEIGHT DETERMINED ACCORDING TO FLIGHT MANUAL, SECTION 5 PARA LANDING WAT CURVES AND LANDING FIELD LENGTHS AND THE MAXIMUM LANDING WEIGHT GIVEN IN FLIGHT MANUAL SECTION 2.

NOTE

Correction curves for the effect of wind in the graph in Fig. 5–28 are determined for 50% values of headwind speeds and 150% values tailwind speeds reported. If is wind speed greater then 38.8 kts (20 m/s) use value 38.8 kts (20 m/s) in the graph.

The landing distance required from a height of 50 ft (15 m) above runway with both engines operating with the use of reverse power during landing run for ambient air temperature, pressure airport altitude, landing weight, head/tail wind speed, runway slope and the required landing distance factor, is given in Fig. 5–28.

The factor of 1.67 shall be applied on arrival (destination) airports, the factor of 1.43 – on alternate airports, the factors are written above the corresponding scale for the landing distance required.
The graph is valid for a hard, dry runway. The influence of other runway surface conditions shall be determined by multiplying the obtained landing distance required by the coefficient given in the table 5/IV.

NOTE

Data of landing distances are based on flight test results and recounts are without influence of reverse both engines and recounts to full range of operational atmospheric conditions, weights, winds and slopes.
The spoilers can be controlled only by left pilot.

MAXIMUM PERMISSIBLE LANDING WEIGHT VERSUS LANDING DISTANCE AVAILABLE (LDA)

is shown in Fig. 5–28 example A

Associated conditions:

Wing flaps	42°
Landing gear	DOWN
Gradient of descent to the height of 50 ft (15 m)	5 %
Engine power at a height lower than 50 ft (15 m)	IDLE
Reference airspeed at approach	V_{REF} = 84 KIAS (155 km/hr IAS)
Touch–down airspeed	78 KIAS (145 km/hr IAS)
Spoiler extension height	about 1.5 ft (0.5 m)
Deceleration means	Wheel brakes +spoilers+ reverse
Landing distance available factor for:	
– destination airports	1.67
– alternate airports	1.43

Type and condition of the runway surface:

(a) Hard dry runway

(b) Paved runway with friction coefficient ranging from 0.35 to 0.4

Example:

Input data A

Landing distance available	
– destination airport	2,730 ft (832 m)
– alternate airport	2,335 ft (712 m)
Wind	13.5 kts (7 m/s)
Runway slope	1.25 % downhill
Ambient air temperature	+30 °C (86 °F)
Deviation of ambient air temperature from ISA	ISA +22.9 °C (ISA + 41.2 °F)
Pressure airport altitude	4,000 ft (1,220 m)

(cont.)

Results:

(a) For hard dry runway:

Maximum permissible landing weight for destination or alternate airport from Fig. 5–28	11,460 lb (5,200 kg)

(b) For paved runway with friction coefficient ranging from 0.35 to 0.4

Coefficient for dividing of lengths from Tab. 5/IV	1.03
Landing distance available:	
– destination airport 2,730 / 1.03	= 2,650 ft (808 m)
– alternate airport 2,335 / 1.03	= 2,267 ft (691 m)
Maximum permissible landing weight from Fig. 5–28:	
– destination airport	9,568 lb (4,340 kg)
– alternate airport	9,568 lb (4,340 kg)

LANDING DISTANCE REQUIRED WITH BOTH ENGINES OPERATING

The landing distance required from a height of 50 ft (15 m) above runway with both engines operating with the use of reverse power is shown in 5–28 example B

Associated conditions:

Wing flaps	42°
Landing gear	DOWN
Gradient of descent to the height of 50 ft (15 m)	5 %
Engine power at a height lower that 50 ft (15 m)	IDLE
Reference airspeed at approach	V_{REF} = 84 KIAS (155 km/hr IAS)
Touchdown airspeed	78 KIAS (145 km/hr IAS)
Spoiler extension height	about 1.5 ft (0.5 m)
Deceleration means	Wheel brakes + spoilers+ reverse
Landing distance required factor for:	
– destination airport	1.67
– alternate airport	1.43

Type and condition of the runway surface:

(a) Hard dry runway

(b) Paved runway with friction coefficient ranging from 0.35 to 0.4

(cont.)

Example:

Input data B :

Ambient air temperature	+11 °C (51.8 °F)
Deviation of ambient air temperature from ISA	ISA +10.8 °C (ISA+19.4 °F)
Airport altitude	7,500 ft (2,286 m)
Landing weight	12,280 lb (5,570 kg)
Wind	3 kts (1.5 m/s)
Runway slope	1.5 % uphill

Result:

Landing distance required from Fig. 5–28:

(a) For hard dry runway:

- on destination airport 3,012 ft (918 m)
- on alternate airport 2,578 ft (786 m)

NOTE

The landing distance required on a wet runway amounts to 1.15 of the landing distance required on a dry runway.

(b) For paved runway with friction coefficient ranging from 0.35 to 0.40

Coefficient for multiplying of lengths from Tab. 5/IV – 1.03

Landing distance available:

– on destination airport 3,012 x 1.03 = 3,102 ft (945 m)

– on alternate airport 2,578 x 1.03 = 2,655 ft (809 m)

MAXIMUM PERMISSIBLE LANDING WEIGHT VERSUS LANDING DISTANCE AVAILABLE (LDA)

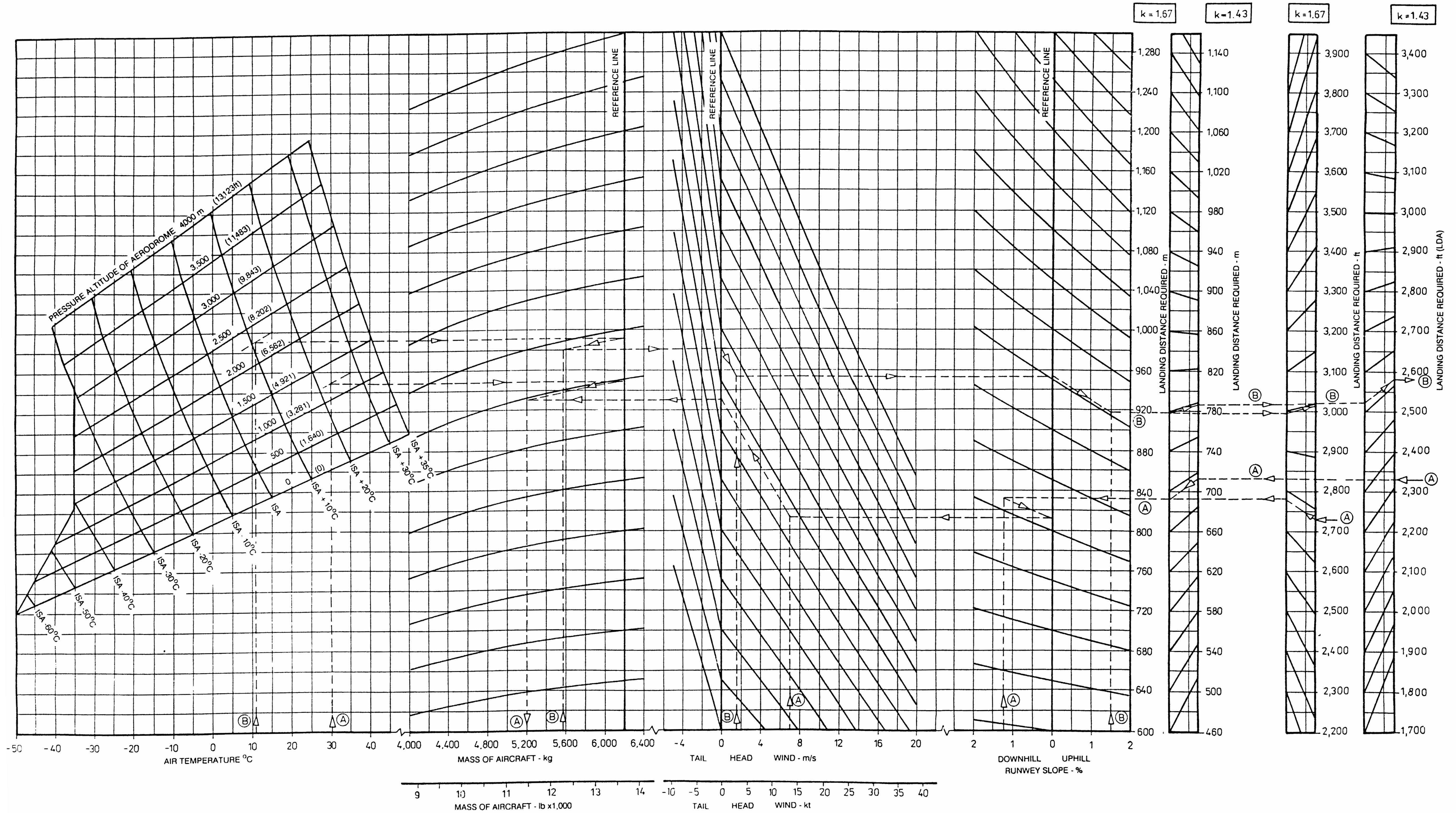

Fig. 5 – 28

COEFFICIENTS FOR RUNWAY SURFACE CONDITIONS FOR ADJUSTING LANDING DISTANCE AVAILABLE AND THE LANDING DISTANCE REQUIRED

Tab. 5/IV

Type and condition of the runway	Coefficient
Paved runway with a layer of slush or wet snow not exceeding 0.5 in (12 mm)	1.05
Paved runway with friction coefficient ranging from 0.2 to 0.25	1.10
Paved runway with friction coefficient ranging from 0.25 to 0.3	1.07
Paved runway with friction coefficient ranging from 0.3 to 0.35	1.05
Paved runway with friction coefficient ranging from 0.35 to 0.4	1.03
Paved runway with friction coefficient ranging from 0.4 to 0.45	1.01
Paved runway with friction coefficient more than 0.45	1.00
Unpaved runway with a strength of 85.4 psi (6 kg/cm^2)	1.07
Unpaved soft sandy runway	1.12

FUEL CONSUMPTION IN HORIZONTAL FLIGHT

This section contains information concerning:

A. fuel consumption per NM (km) with two engines operating

B. fuel consumption per NM (km) with one engine operating

C. fuel consumption per hour with two engines operating

Information on fuel consumption during flight with two engines operating is given for typical flight conditions:

Marking	Name	Condition is given by:
MCR	Maximum continuous power	n_G = 97%
0.9 MCR	0.9 of Maximum continuous power	n_G = 95.5%
0.8 MCR	0.8 of Maximum continuous power	n_G = 94 %
EFC	Economical	airspeeds according to the table given below

Economical condition (EFC) is given by these airspeeds:

Pressure altitude ft (m)	6,000 (1,800)	8,000 (2,400)	10,000 (3,000)	12,000 (3,600)	14,000 (4,200)	16,000 (4,800)	18,000 (5,400)	20,000 (6,100)
Airspeed KIAS (km/hr IAS)	148 (275)	144 (267)	139 (259)	136 (252)	135 (250)	134 (248)	133 (246)	132 (244)

FUEL CONSUMPTION PER NM (KM) WITH TWO ENGINES OPERATING

FUEL CONSUMPTION PER NM (KM) with two engines operating		lb/NM (kg/km)		
Pressure altitude ft (m)	EFC	0.8 MCR	0.9 MCR	MCR
6,000 (1,800)	3.677 (0.900)	3.889 (0.952)	4.085 (1.000)	4.204 (1.029)
8,000 (2,400)	3.558 (0.871)	3.734 (0.914)	3.852 (0.943)	4.007 (0.981)
10,000 (3,000)	3.391 (0.830)	3.570 (0.874)	3.717 (0.910)	3.852 (0.943)
12,000 (3,600)	3.227 (0.790)	3.415 (0.836)	3.521 (0.862)	3.636 (0.890)
14,000 (4,200)	3.113 (0.762)	3.268 (0.800)	3.350 (0.820)	3.501 (0.857)
16,000 (4,800)	2.999 (0.734)	3.121 (0.764)	3.178 (0.778)	3.415 (0.836)
18,000 (5,400)	2.884 (0.706)	2.974 (0.728)	3.007 (0.736)	3.313 (0.811)
20,000 (6,100)	2.778 (0.680)	2.803 (0.686)	2.807 (0.687)	3.305 (0.809)

The table is valid for ISA atmospheric conditions and for the airplane weight of 13,228 lb (6,000 kg).

Per each 220 lb (100 kg) of airplane weight reduction the fuel consumption decreases by 0.0123 lb/NM (0.003 kg/km)

FUEL CONSUMPTION PER NM (KM) WITH ONE ENGINE OPERATING

FUEL CONSUMPTION PER NM (km) with one engine operating			lb/NM (kg/km)		
Pressure altitude ft (m)	Airspeed KIAS (km/hr IAS)				
	115 (213)	120 (223)	126 (233)	131 (242)	136 (252)
4,000 (1,200)	3.260 (0.798)	3.174 (0.777)	3.125 (0.765)	3.117 (0.763)	3.146 (0.770)
5,000 (1,500)	3.186 (0.780)	3.117 (0.763)	3.080 (0.754)	3.084 (0.755)	3.121 (0.764)
6,000 (1,800)	3.121 (0.764)	3.064 (0.750)	3.039 (0.744)	3.052 (0.747)	3.105 (0.760)
7,000 (2,100)	3.060 (0.749)	3.015 (0.738)	3.003 (0.735)	3.027 (0.741)	3.088 (0.756)
8,000 (2,400)	3.007 (0.736)	2.970 (0.727)	2.970 (0.727)	3.007 (0.736)	–
9,000 (2,700)	2.958 (0.724)	2.933 (0.718)	2.941 (0.720)	2.990 (0.732)	–
10,000 (3,000)	2.913 (0.713)	2.900 (0.710)	2.925 (0.716)	–	–

The table is valid for the following conditions:

- The propeller of the inoperative engine — feathered position
- Heating — ON
- Deicing — OFF
- ISA condition

The table is valid for ISA atmospheric conditions and for the airplane weight 13,228 lb (6,000 kg). Per each 220 lb (100 kg) of airplane weight reduction the fuel consumption per 0.54 NM (1 km) decreases by 1%. The lowest fuel consumption condition is marked with a thick line in table.

FUEL CONSUMPTION PER HOUR WITH TWO ENGINES OPERATING

FUEL CONSUMPTION PER HOUR with two engines operating			lb/hr (kg/hr)	
Pressure altitude ft (m)	EFC	0.8 MCR	0.9 MCR	MCR
6,000 (1,800)	617 (280)	721 (327)	802 (364)	855 (388)
8,000 (2,400)	589 (267)	699 (317)	769 (349)	816 (370)
10,000 (3,000)	571 (259)	672 (305)	741 (336)	794 (360)
12,000 (3,600)	551 (250)	648 (294)	701 (318)	761 (345)
14,000 (4,200)	534 (242)	626 (284)	670 (304)	728 (330)
16,000 (4,800)	516 (234)	604 (274)	639 (290)	694 (315)
18,000 (5,400)	498 (226)	582 (264)	608 (276)	661 (300)
20,000 (6,100)	478 (217)	556 (252)	573 (260)	624 (283)

The table is valid for ISA atmospheric conditions and for the airplane weight 13,228 lb (6,000 kg).The conversion into non–standard conditions must be carried out:

– <u>at constant airspeed IAS (EFC)</u>

according to the formula:

$$Q = Q_{ST} \times \sqrt{T/T_{ST}}$$

where:

Q – fuel consumption per hour under non–standard conditions (lb/hr) or (kg/hr)

Q_{ST} – fuel consumption per hour in ISA conditions (lb/hr) or (kg/hr) from Table

T – absolute temperature (K) (°C + 273 °C)

T_{ST} – absolute standard temperature (K) (ISA + 273 °C)

(cont.)

– <u>at gas generator constant speed (MCR, 0.9 MCR, 0.8 MCR)</u>

by adding the correction:

+ 2.2 lb (1 kg) / – 1 °C (–1.8 °F)

– 2.2 lb (1 kg) / + 1 °C (+1.8 °F)

deviations of ambient air temperature from ISA

The table of fuel consumptions per hour is made up for the weight of 13,228 lb (6,000 kg). Per each 220 lb (100 kg) of airplane weight reduction the consumption per hour decreases approximately by 4.4 lb/hr (2 kg/hr).

The fuel consumption per hour is only valid for ISA conditions , the heating is on, but do not account for the influence of switching on the deicing system. When the deicing is switched on, the fuel consumption per hour increases with the engine power as follows:

- at maximum continuous power – by 22 lb/hr (10 kg/hr) of deicing operation at most
- at economical power – by 13 lb/hr (6 kg/hr) of deicing operation at most

LIST OF EFFECTIVE PAGES

SECTION	PAGE	DATE
BOOK 1 & 2		
Title page		
Section 0		
	0-1	May 30/01
	0-2	May 30/01
	0-3	May 30/01
	0-4	May 1/96
	0-5	May 30/01
	0-6	Mar 1/96
	0-7	Mar 1/96
	0-8	Mar 1/96
	0-9	Mar 1/96
	0-10	Mar 1/96
BOOK 1		
General – I		
	1-i	Mar 1/96
	1-ii	Mar 1/96
	1-1	May 1/98
	1-2	May 30/01
	1-3	Mar 1/96
	1-4	Mar 1/96
	1-5	Mar 1/96
	1-6	Mar 1/96
	1-7	Apr 1/98
	1-8	Mar 1/96
	1-9	Mar 1/96
	1-10	Mar 1/96
	1-11	Mar 1/96
	1-12	Mar 1/96
	1-13	Apr 1/98
	1-14	Mar 1/96
	1-15	Mar 1/96
	1-16	Apr 1/98
	1-17	Apr 1/98
	1-18	Mar 1/96
	1-19	Mar 1/96
	1-20	Mar 1/96
	1-21	Mar 1/96
	1-22	Mar 1/96
	1-23	Mar 1/96
	1-24	Mar 1/96

SECTION	PAGE	DATE
Limitations – II		
CAI Approved	2-i	Apr 1/98
CAI Approved	2-ii	Apr 1/98
CAI Approved	2-1	May 1/98
CAI Approved	2-2	May 1/96
CAI Approved	2-3	Mar 1/96
CAI Approved	2-4	Mar 1/96
CAI Approved	2-5	Mar 1/96
CAI Approved	2-6	Mar 1/96
CAA Approved	2-7	May 30/01
CAI Approved	2-8	Mar 1/96
CAI Approved	2-9	Apr 1/98
CAI Approved	2-10	Mar 1/96
CAI Approved	2-11	Mar 1/96
CAI Approved	2-12	Mar 1/96
CAI Approved	2-13	Mar 1/96
CAI Approved	2-14	Apr 1/98
CAI Approved	2-15	Apr 1/98
CAI Approved	2-16	Mar 1/96
CAI Approved	2-17	Mar 1/96
CAI Approved	2-18	Mar 1/96
CAI Approved	2-19	May 1/98
CAI Approved	2-20	Apr 1/98
CAI Approved	2-21	Apr 1/98
CAI Approved	2-22	Apr 1/98
CAI Approved	2-23	May 1/98
CAI Approved	2-24	Apr 1/98
CAI Approved	2-25	Apr 1/98
CAI Approved	2-26	Mar 1/96
CAI Approved	2-27	Mar 1/96
CAI Approved	2-28	Mar 1/96
CAI Approved	2-29	May 1/98
CAI Approved	2-30	Mar 1/96
Emergency Procedures – III		
CAI Approved	3-i	Mar 1/96
CAI Approved	3-ii	Mar 1/96
CAI Approved	3-1	Apr 1/98
CAI Approved	3-2	Apr 1/98
CAI Approved	3-3	Apr 1/98
CAI Approved	3-4	Apr 1/98
CAI Approved	3-5	Mar 1/96

LIST OF EFFECTIVE PAGES

SECTION	PAGE	DATE
Emergency Procedures – III		
CAI Approved	3-6	Mar 1/96
CAI Approved	3-7	Mar 1/96
CAI Approved	3-8	Mar 1/96
CAI Approved	3-9	Apr 1/98
CAI Approved	3-10	Apr 1/98
CAI Approved	3-11	Apr 1/98
CAI Approved	3-12	Apr 1/98
CAI Approved	3-13	Apr 1/98
CAI Approved	3-14	Apr 1/98
CAI Approved	3-15	Mar 1/96
CAI Approved	3-16	Apr 1/98
CAI Approved	3-17	Apr 1/98
CAI Approved	3-18	Apr 1/98
CAI Approved	3-19	Apr 1/98
CAI Approved	3-20	Apr 1/98
Abnormal Procedures – IIIA		
CAA Approved	3A-i	May 30/01
CAI Approved	3A-ii	Apr 1/98
CAI Approved	3A-1	Apr 1/98
CAI Approved	3A-2	Apr 1/98
CAI Approved	3A-3	Mar 1/96
CAI Approved	3A-4	Apr 1/98
CAI Approved	3A-5	Apr 1/98
CAI Approved	3A-6	Apr 1/98
CAI Approved	3A-7	Apr 1/98
CAI Approved	3A-8	Mar 1/96
CAA Approved	3A-9	May 30/01
CAA Approved	3A-10	May 30/01
CAA Approved	3A-11	May 30/01
CAI Approved	3A-12	Apr 1/98
CAI Approved	3A-13	Apr 1/98
CAI Approved	3A-14	Apr 1/98
CAI Approved	3A-15	Apr 1/98
CAI Approved	3A-16	Mar 1/96
CAI Approved	3A-17	Apr 1/98
CAI Approved	3A-18	Apr 1/98
CAI Approved	3A-19	Apr 1/98
CAI Approved	3A-20	Apr 1/98
CAI Approved	3A-21	Apr 1/98
CAI Approved	3A-22	Mar 1/96
CAI Approved	3A-23	Apr 1/98
CAI Approved	3A-24	Apr 1/98
CAI Approved	3A-25	Apr 1/98
CAI Approved	3A-26	Apr 1/98
Normal Procedures – IV		
CAI Approved	4-i	Apr 1/98
CAI Approved	4-ii	Apr 1/98
CAI Approved	4-1	Apr 1/98
CAI Approved	4-2	Apr 1/98
CAI Approved	4-3	Apr 1/98
CAI Approved	4-4	Mar 1/96
CAI Approved	4-5	Apr 1/98
CAI Approved	4-6	Apr 1/98
CAI Approved	4-7	Apr 1/98
CAI Approved	4-8	Apr 1/98
CAI Approved	4-9	Apr 1/98
CAI Approved	4-10	Apr 1/98
CAI Approved	4-11	Apr 1/98
CAI Approved	4-12	Apr 1/98
CAI Approved	4-13	Apr 1/98
CAI Approved	4-14	Apr 1/98
CAI Approved	4-15	Apr 1/98
CAI Approved	4-16	Apr 1/98
CAI Approved	4-17	Apr 1/98
CAI Approved	4-18	Apr 1/98
CAI Approved	4-19	Apr 1/98
CAI Approved	4-20	Apr 1/98
CAI Approved	4-21	Apr 1/98
CAI Approved	4-22	Apr 1/98
CAI Approved	4-23	Apr 1/98
CAI Approved	4-24	Apr 1/98
CAI Approved	4-25	Apr 1/98
CAI Approved	4-26	Mar 1/96
CAI Approved	4-27	Apr 1/98
CAI Approved	4-28	Apr 1/98
CAI Approved	4-29	Apr 1/98
CAI Approved	4-30	Apr 1/98
CAI Approved	4-31	Apr 1/98
CAI Approved	4-32	Apr 1/98

LIST OF EFFECTIVE PAGES

SECTION	PAGE	DATE
Normal Procedures – IV		
CAI Approved	4–33	Apr 1/98
CAI Approved	4–34	Mar 1/96
CAI Approved	4–35	Apr 1/98
CAI Approved	4–36	Apr 1/98
CAA Approved	4–37	May 30/01
CAI Approved	4–38	Apr 1/98
CAI Approved	4–39	Apr 1/98
CAI Approved	4–40	Apr 1/98
CAI Approved	4–41	Apr 1/98
CAI Approved	4–42	Apr 1/98
CAI Approved	4–43	Apr 1/98
CAI Approved	4–44	May 1/98
CAI Approved	4–45	Apr 1/98
CAI Approved	4–46	Apr 1/98
CAI Approved	4–47	Apr 1/98
CAI Approved	4–48	Apr 1/98
Performance – V		
CAI Approved	5–i	Mar 1/96
CAI Approved	5–ii	Mar 1/96
CAI Approved	5–1	Apr 1/98
CAI Approved	5–2	Mar 1/96
CAI Approved	5–3	Mar 1/96
CAI Approved	5–4	May 1/96
CAI Approved	5–5	May 1/96
CAI Approved	5–6	Mar 1/96
CAI Approved	5–7	Mar 1/96
CAI Approved	5–8	Mar 1/96
CAI Approved	5–9	Mar 1/96
CAI Approved	5–10	Mar 1/96
CAI Approved	5–11	Apr 1/98
CAI Approved	5–12	Mar 1/96
CAI Approved	5–13	May 1/96
CAI Approved	5–14	Mar 1/96
CAI Approved	5–15	Mar 1/96
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CAI Approved	5–19	Mar 1/96
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CAI Approved	5–24	Mar 1/96
CAI Approved	5–25	May 1/96
CAI Approved	5–26	Mar 1/96
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CAI Approved	5–29	May 1/96
CAI Approved	5–30	Mar 1/96
CAI Approved	5–31	Mar 1/96
CAI Approved	5–32	May 1/96
CAI Approved	5–33	Mar 1/96
CAI Approved	5–34	Mar 1/96
CAI Approved	5–35	Mar 1/96
CAI Approved	5–36	Mar 1/96
CAI Approved	5–37	Mar 1/96
CAI Approved	5–38	Mar 1/96
CAI Approved	5–39	May 1/96
CAI Approved	5–40	May 1/96
CAI Approved	5–41	Mar 1/96
CAI Approved	5–42	Mar 1/96
CAI Approved	5–43	May 1/96
CAI Approved	5–44	May 1/96
CAI Approved	5–45	May 1/96
CAI Approved	5–46	May 1/96
CAI Approved	5–47	Mar 1/96
CAI Approved	5–48	Mar 1/96
CAI Approved	5–49	May 1/96
CAI Approved	5–50	May 1/96
CAI Approved	5–51	May 1/96
CAI Approved	5–52	May 1/96
CAI Approved	5–53	May 1/96
CAI Approved	5–54	Apr 1/98
CAI Approved	5–55	May 1/96
CAI Approved	5–56	May 1/96
CAI Approved	5–57	May 1/96
CAI Approved	5–58	Mar 1/96

LIST OF EFFECTIVE PAGES

SECTION	PAGE	DATE
Performance – V		
CAI Approved	5–59	Mar 1/96
CAI Approved	5–60	May 1/96
CAI Approved	5–61	Mar 1/96
CAI Approved	5–62	Mar 1/96
CAI Approved	5–63	May 1/96
CAI Approved	5–64	Mar 1/96
CAI Approved	5–65	Mar 1/96
CAI Approved	5–66	Mar 1/96
CAI Approved	5–67	May 1/96
CAI Approved	5–68	Mar 1/96
CAI Approved	5–69	Mar 1/96
CAI Approved	5–70	Mar 1/96
CAI Approved	5–71	May 1/96
CAI Approved	5–72	Mar 1/96
CAI Approved	5–73	May 1/96
CAI Approved	5–74	May 1/96
CAI Approved	5–75	Mar 1/96
CAI Approved	5–76	May 1/96
CAI Approved	5–77	Mar 1/96
CAI Approved	5–78	Mar 1/96
CAI Approved	5–79	Mar 1/96
CAI Approved	5–80	Mar 1/96
CAI Approved	5–81	May 1/96
CAI Approved	5–82	May 1/96
CAI Approved	5–83	Mar 1/96
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CAI Approved	5–88	Mar 1/96
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CAI Approved	5–91	May 1/96
CAI Approved	5–92	May 1/96
CAI Approved	5–93	May 1/96
CAI Approved	5–94	May 1/96
CAI Approved	5–95	Mar 1/96
CAI Approved	5–96	Mar 1/96
CAI Approved	5–97	Mar 1/96
CAI Approved	5–98	May 1/96

SECTION	PAGE	DATE
CAI Approved	5–99	May 1/96
CAI Approved	5–100	Mar 1/96
CAI Approved	5–101	May 1/96
CAI Approved	5–102	Mar 1/96
CAI Approved	5–103	May 1/96
CAI Approved	5–104	Mar 1/96
CAI Approved	5–105	May 1/96
CAI Approved	5–106	Mar 1/96
CAI Approved	5–107	Mar 1/96
CAI Approved	5–108	Mar 1/96
CAI Approved	5–109	Mar 1/96
CAI Approved	5–110	Mar 1/96
CAI Approved	5–111	May 1/96
CAI Approved	5–112	May 1/96
CAI Approved	5–113	Mar 1/96
CAI Approved	5–114	Mar 1/96
CAI Approved	5–115	Mar 1/96
CAI Approved	5–116	Mar 1/96
CAI Approved	5–117	Mar 1/96
CAI Approved	5–118	Mar 1/96
BOOK 2		
Weight &		
Balance – VI		
	6–i	Mar 1/96
	6–ii	Mar 1/96
	6–1	May 1/96
	6–2	Mar 1/96
	6–3	May 1/96
	6–4	Mar 1/96
	6–5	Mar 1/96
	6–6	Mar 1/96
	6–7	Mar 1/96
	6–8	Mar 1/96
	6–9	Mar 1/96
	6–10	Mar 1/96
	6–11	Mar 1/96
	6–12	Mar 1/96
	6–13	Mar 1/96
	6–14	Mar 1/96
	6–15	Mar 1/96
	6–16	Mar 1/96

LIST OF EFFECTIVE PAGES

SECTION	PAGE	DATE
Weight & Balance – VI		
	6–17	Mar 1/96
	6–18	Mar 1/96
	6–19	Mar 1/96
	6–20	Mar 1/96
	6–21	Mar 1/96
	6–22	May 1/96
	6–23	May 1/96
	6–24	May 1/96
	6–25	Mar 1/96
	6–26	Mar 1/96
	6–27	Mar 1/96
	6–28	Mar 1/96
	6–29	Mar 1/96
	6–30	Mar 1/96
Systems of airplane – VII		
	7–i	Mar 1/96
	7–ii	Mar 1/96
	7–1	Mar 1/96
	7–2	Mar 1/96
	7–3	Mar 1/96
	7–4	Mar 1/96
	7–5	Apr 1/98
	7–6	Mar 1/96
	7–7	Mar 1/96
	7–8	Apr 1/98
	7–9	Mar 1/96
	7–10	Mar 1/96
	7–11	Apr 1/98
	7–12	Mar 1/96
	7–13	Mar 1/96
	7–14	Mar 1/96
	7–15	Mar 1/96
	7–16	Mar 1/96
	7–17	Mar 1/96
	7–18	Mar 1/96
	7–19	Mar 1/96
	7–20	Mar 1/96
	7–21	Mar 1/96
	7–22	Mar 1/96

SECTION	PAGE	DATE
	7–23	Mar 1/96
	7–24	Mar 1/96
	7–25	Mar 1/96
	7–26	Mar 1/96
	7–27	Mar 1/96
	7–28	Mar 1/96
	7–29	Apr 1/98
	7–30	Apr 1/98
	7–31	Apr 1/98
	7–32	Mar 1/96
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	7–58	Mar 1/96
	7–59	Mar 1/96
	7–60	Mar 1/96
	7–61	Mar 1/96
	7–62	Mar 1/96
	7–63	Mar 1/96
	7–64	Mar 1/96
	7–65	Mar 1/96

LIST OF EFFECTIVE PAGES

SECTION	PAGE	DATE
Systems of airplane – VII		
	7–66	Mar 1/96
	7–67	Mar 1/96
	7–68	May 30/01
	7–69	Mar 1/96
	7–70	Mar 1/96
	7–71	Mar 1/96
	7–72	Mar 1/96
	7–73	Mar 1/96
	7–74	Mar 1/96
	7–75	Mar 1/96
	7–76	Mar 1/96
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	7–112	Mar 1/96
	7–113	Mar 1/96
	7–114	Mar 1/96
	7–115	Mar 1/96
	7–116	Mar 1/96
	7–117	Mar 1/96
	7–118	Mar 1/96
	7–119	Mar 1/96
	7–120	Mar 1/96
Handling, Servicing & Maintenance – VIII		
	8–i	Mar 1/96
	8–ii	Mar 1/96
	8–1	Mar 1/96
	8–2	Mar 1/96
	8–3	Mar 1/96
	8–4	Mar 1/96
	8–5	Mar 1/96
	8–6	Mar 1/96
	8–7	Mar 1/96
	8–8	Mar 1/96
	8–9	Mar 1/96
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	8–12	Mar 1/96
	8–13	Mar 1/96
	8–14	Mar 1/96
	8–15	Mar 1/96
	8–16	Mar 1/96
	8–17	Mar 1/96
	8–18	Mar 1/96
	8–19	Mar 1/96
	8–20	Mar 1/96
	8–21	Mar 1/96
	8–22	Mar 1/96

LIST OF EFFECTIVE PAGES

SECTION	PAGE	DATE
Supplements		
– IX	9-1	Mar 1/96
	9-2	Mar 1/96
	9-3	Mar 1/96
	9-4	Mar 1/96
	9-5	Mar 1/96
	9-6	Mar 1/96
No. 1a	1 of 12	Mar 28/97
No. 1c	1 of 10	Mar 28/97
No. 1d	1 of 8	Mar 28/97
No. 1f	1 of 6	Mar 28/97
No. 1g	1 of 8	Mar 28/97
No. 1i	1 of 6	Mar 28/97
No. 1k	1 of 28	Mar 28/97
No. 1m	1 of 26	Mar 28/97
No. 1n	1 of 32	Mar 28/97
No. 1p	1 of 6	Mar 28/97
No. 1r	1 of 6	Mar 28/97
No. 1s	1 of 12	Mar 12/98
No. 4	1 of 8	Apr. 10/97
No. 19a	1 of 10	Mar. 25/99
No. 20 i	1 of 6	Jun. 1/98
No. 34	1 of 12	Mar. 20/99

SECTION	PAGE	DATE

LIST OF EFFECTIVE PAGES

SECTION	PAGE	DATE

SECTION	PAGE	DATE

TABLE OF CONTENTS

BOOK 1

BOOK 2

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WEIGHT & BALANCE

TABLE OF CONTENTS

ITEM **PAGE**

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THE L 410 UVP-E20 AIRPLANE WEIGHING FORM

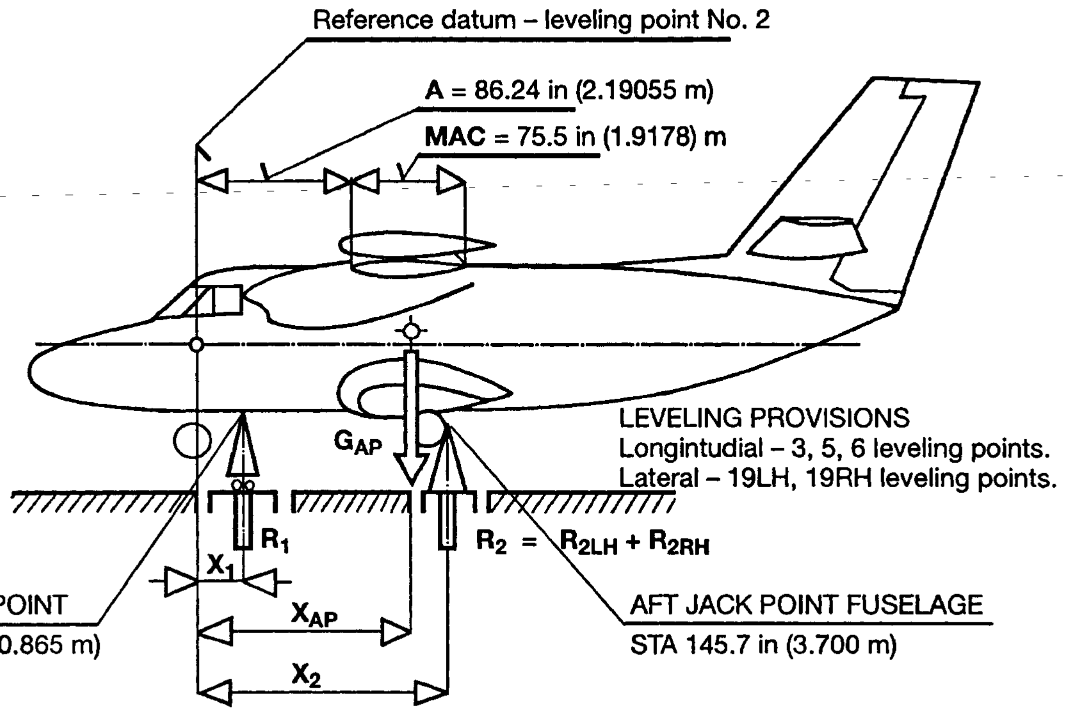
Manufacturer	LET, a.s. Kunovice – CZECH REPUBLIC
Airplane type	L 410 UVP – E20
Registration mark	
Serial No.	91 2533
Maximum take-off weight	14,550 lb (6, 600 kg)
C.G. Position Limit	see AFM pages 2-2, 6-23, 6-24

CAUTION

THE PILOT IS OBLIGATED TO TAKE IN THE CALCULATION OF AIRPLANE CENTRE OF GRAVITY STEWARD'S WEIGHT AND MOMENT (SEE THIS AFM, SEC. 9 SUPPLEMENT NO. 1P), AND WEIGHT AND MOMENT OF BAGGAGE IN THE REAR BAGGAGE COMPARTMENT (SEE THIS AFM, SEC 9 SUPPLEMENT NO. 1R).

ALL DIMENSIONS IN **INCHES (METRES)**

THE AIRPLANE HAS BEEN WEIGHED ON SUPPORTS WITH LANDING GEAR EXTENDED



STA – Station, a position along the fuselage measured from reference datum.

Fig. 6 – 1

VALUES DETERMINED BY WEIGHING AND DIMENSIONS			
WEIGHTS			DIMENSIONS
Gross (airplane + jacks)	Tare (jacks)	Net (airplane)	
R_1 lb kg	P_1 lb kg	R_1 lb kg	X_1 34.05 in (0.865 m)
R_{2LH} lb kg	P_{2LH} lb kg	R_{2LH} lb kg	X_2 145.7 in (3.700 m)
R_{2RH} lb kg	P_{2RH} lb kg	R_{2RH} lb kg	
Basic Empty Weight		G_{AP} lb kg	

The Basic Empty Weight includes:

(a) The weight of airplane structure in accordance with Technical specification.

(b) Unusable fuel 29.2 lb (12.8 kg), standard quantity of oil in both engines 47.6 lb (21.6 kg), hydraulic fluid 39.4 lb (17.85 kg).

VALUES DETERMINED BY CALCULATION	
Position of the airplane centre of gravity relative to the reference datum – C.G. Arm	Position of the centre of gravity relative to the mean aerodynamic chord (at empty weight)
$X_{AP} = \frac{R_1 \,.\, X_1 + (R_{2LH} + R_{2RH}) \,.\, X_2}{G_{AP}} =$	$X_T = \frac{(X_{AP} - A) \,.\, 100\%}{MAC} =$
$X_{AP} =$ in m	$X_T =$ % MAC
MOMENT $= G_{AP} \,.\, X_{AP} =$ lb.in kg.m	

The centre of gravity position at the airplane basic empty weight (as specified on page 6–2) complies with Technical specification of the L 410 UVP–E20 airplane and ensures that the established centre of gravity position limit of 26% to 30% MAC at the maximum take–of weight G_{TO} = 14,550 lb (6,600 kg) will not be exceeded.

The check of centre of gravity position and airplane weight in operation is accomplished in accordance with the L 410 UVP–E20 WEIGHT AND MOMENT LIMITS shown in the L 410 UVP–E20 AFM on pages 6–23, 6–24 taking basic weight and balance data into consideration.

....

Date Signature

....

Date Customer's Representative

WEIGHT AND BALANCE RECORD

L 410 UVP-E20				SERIAL NUMBER							
DATE	ITEM NO.			WEIGHT CHANGE						RUNNING BASIC EMPTY WEIGHT	
				ADDED (+)			REMOVED (-)				
	In	Out		Wt. (lb)	Arm (in)	Moment (lb.in/100)	Wt. (lb)	Arm (in)	Moment (lb.in/100)	Wt. (lb)	Moment (lb.in/100)

WEIGHT AND BALANCE RECORD

L 410 UVP-E20 | SERIAL NUMBER

DATE	ITEM NO.			WEIGHT CHANGE						RUNNING BASIC EMPTY WEIGHT	
				ADDED (+)			REMOVED (-)				
	In	Out		Wt. (kg)	Arm (m)	Moment (kg.m)	Wt. (kg)	Arm (m)	Moment (kg.m)	Wt. (kg)	Moment (kg.m)

17 PASSENGER CONFIGURATION

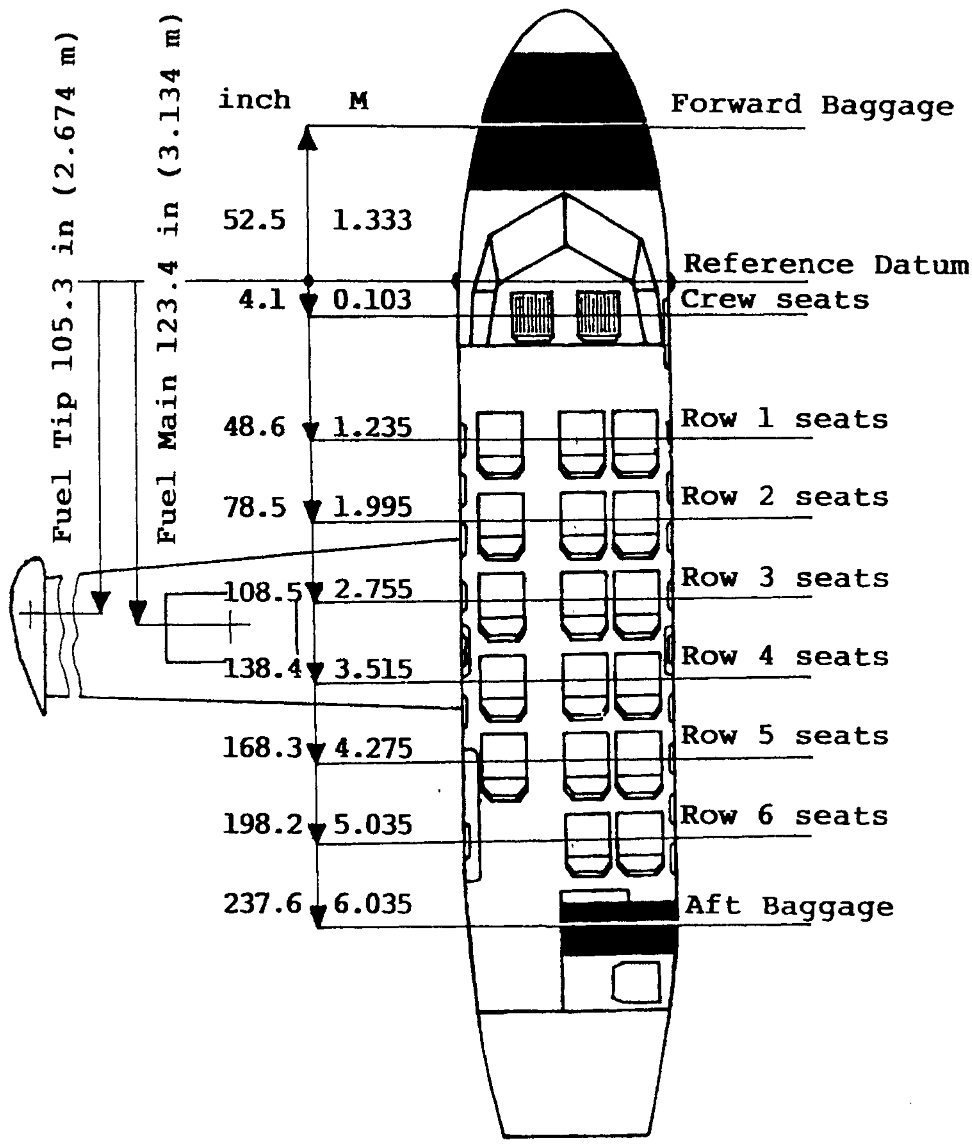


Fig. 6 – 2

WEIGHT AND BALANCE LOADING FORM
17 PASSENGER CONFIGURATION

				Payload lb (kg)	Moment lb.in/100 (kg.m)
F.S.	–52.5 in	(–1.333 m)	Forward Baggage		
F.S.	4.1 in	(0.103 m)	Crew Seat		
F.S.	48.6 in	(1.235 m)	Seat Row 1		
F.S.	78.5 in	(1.995 m)	Seat Row 2		
F.S.	108.5 in	(2.755 m)	Seat Row 3		
F.S.	138.4 in	(3.515 m)	Seat Row 4		
F.S.	168.3 in	(4.275 m)	Seat Row 5		
F.S.	198.2 in	(5.035 m)	Seat Row 6		
F.S.	237.6 in	(6.035 m)	Aft Baggage		
TOTAL PAYLOAD AND MOMENT						(a)

EMPTY WEIGHT AND MOMENT OF EXISTING CONFIGURATION			(b)
ZERO FUEL WEIGHT AND MOMENT (a) + (b)			(c)
MAXIMUM ALLOWABLE FUEL	2,865 lb (1,300 kg)		
ACTUAL FUEL WEIGHT AND MOMENT			(d)
TAKE–OFF WEIGHT AND MOMENT (c) + (d)			
EFFECT OF THE RECTRACTED LANDING GEAR	– –	–23.800 (–27.414)	
EFFECT OF STANDARD PASSENGER GOING TO TOILET	170 (77.1)	362.4 (417.5)	

PAYLOAD AND FUEL MOMENT FOR 17 PASSENGER CONFIGURATION

Moments listed are lb.in/100 for weights located as shown

Payload weight (lb)	40	80	120	160	200	240	280	320	360	400	440	480	500	600	660
F.S. 4.1 in Crew seats	1.6	3.3	4.9	6.6	8.2	9.8	11.5	13.1	14.8	16.4	18.0	-	-	-	-
F.S. 48.6 in seat Row 1	19.4	38.9	58.3	77.8	97.2	116.6	136.1	155.5	175.0	194.4	213.8	233.3	243.0	291.6	320.8.
F.S. 78.5 in seat Row 2	31.4	62.8	94.2	125.6	157.0	188.4	219.8	251.2	282.6	314.0	345.4	376.8	392.5	471.0	518.1
F.S. 108.5 in seat Row 3	43.4	86.8	130.2	173.6	217.0	260.4	303.8	347.2	390.6	434.0	477.4	520.8	542.5	651.0	716.1
F.S. 138.4 in seat Row 4	55.4	110.7	166.1	221.4	276.8	332.2	387.5	442.9	498.2	553.6	609.0	664.3	692.0	830.4	913.4
F.S. 168.3 in seat Row 5	67.3	134.6	202.0	269.3	336.6	403.9	471.2	538.6	605.9	673.2	740.5	807.8	841.5	1,009.8	1,110.8
F.S. 198.2 in seat Row 6	79.4	158.8	238.2	317.6	397.0	476.4	555.8	635.2	714.6	794.0	873.4	-	-	-	-

Baggage weight (lb)	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	330
F.S. -52.5 in Forward Baggage	-10.5	-21.0	-31.5	-42.0	-52.5	-63.0	-73.5	-84.0	-94.5	-105.0	-115.5	-	-	-	-	-
F.S. 237.6 in Aft Baggage	47.5	95.1	142.6	190.1	237.8	285.1	332.6	380.2	427.6	475.2	522.7	570.2	617.8	665.3	712.8	784.1

Fuel weight (lb)	200	300	400	500	600	660	700	800	1,000	1,200	1,400	1,600	1,800	2,000	2,205
F.S. 123.4 in Fuel Main	246.8	370.2	493.6	617.0	740.4	814.4	863.8	987.2	1,234.0	1,480.8	1,727.6	1,974.4	2,221.2	2,468.0	2,721.0
F.S. 105.3 in Fuel Tip	210.6	315.9	421.2	526.5	631.8	695.0	-	-	-	-	-	-	-	-	-

PAYLOAD AND FUEL MOMENT FOR 17 PASSENGER CONFIGURATION

Moments listed are kg.m for weights located as shown

Payload weight (kg)	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300
F.S. 0.103 m Crew seats	2.1	4.1	6.2	8.2	10.3	12.4	14.4	16.5	18.5	20.6	22.7	-	-	-	-
F.S. 1.235 m seat Row 1	24.7	49.4	74.1	98.8	123.5	148.2	172.9	197.6	222.3	247.0	271.7	296.4	321.1	345.8	370.5
F.S. 1.995 m seat Row 2	39.9	79.8	119.7	159.6	199.5	239.4	279.3	319.2	359.1	399.0	438.9	478.8	518.7	558.6	598.5
F.S. 2.755 m seat Row 3	55.1	110.2	165.3	220.4	275.5	330.6	385.7	440.8	495.9	551.0	606.1	661.2	716.3	771.4	826.5
F.S. 3.515 m seat Row 4	70.3	140.6	210.9	281.2	351.5	421.8	492.1	562.4	632.7	703.0	773.3	843.6	913.9	984.2	1,054.5
F.S. 4.275 m seat Row 5	85.5	171.0	256.5	342.0	427.5	513.0	598.5	684.0	769.5	855.0	940.5	1,026.0	1,111.5	1,197.0	1,282.5
F.S. 5.035 m seat Row 6	100.7	201.4	302.1	402.8	503.5	604.2	704.9	805.6	906.3	1,007.0	-	-	-	-	-

Baggage weight (kg)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
F.S. -1.333 m Forward Baggage	-13.3	-26.7	-40.0	-53.3	-66.7	-80.0	-93.3	-106.6	-120.0	-133.3	-	-	-	-	-
F.S. 6.035 m Aft Baggage	60.4	120.7	181.1	241.4	301.8	362.1	422.5	482.8	543.2	603.5	663.9	724.2	784.6	844.9	905.3

Fuel weight (kg)	100	200	300	400	500	600	700	800	900	1,000
F.S. 3.134 m Fuel Main	313.4	626.8	940.2	1,253.6	1,567.0	1,880.4	2,193.8	2,507.2	2,820.6	3,134.0
F.S. 2.674 m Fuel Tip	267.4	534.8	802.2	-	-	-	-	-	-	-

19 PASSENGER CONFIGURATION

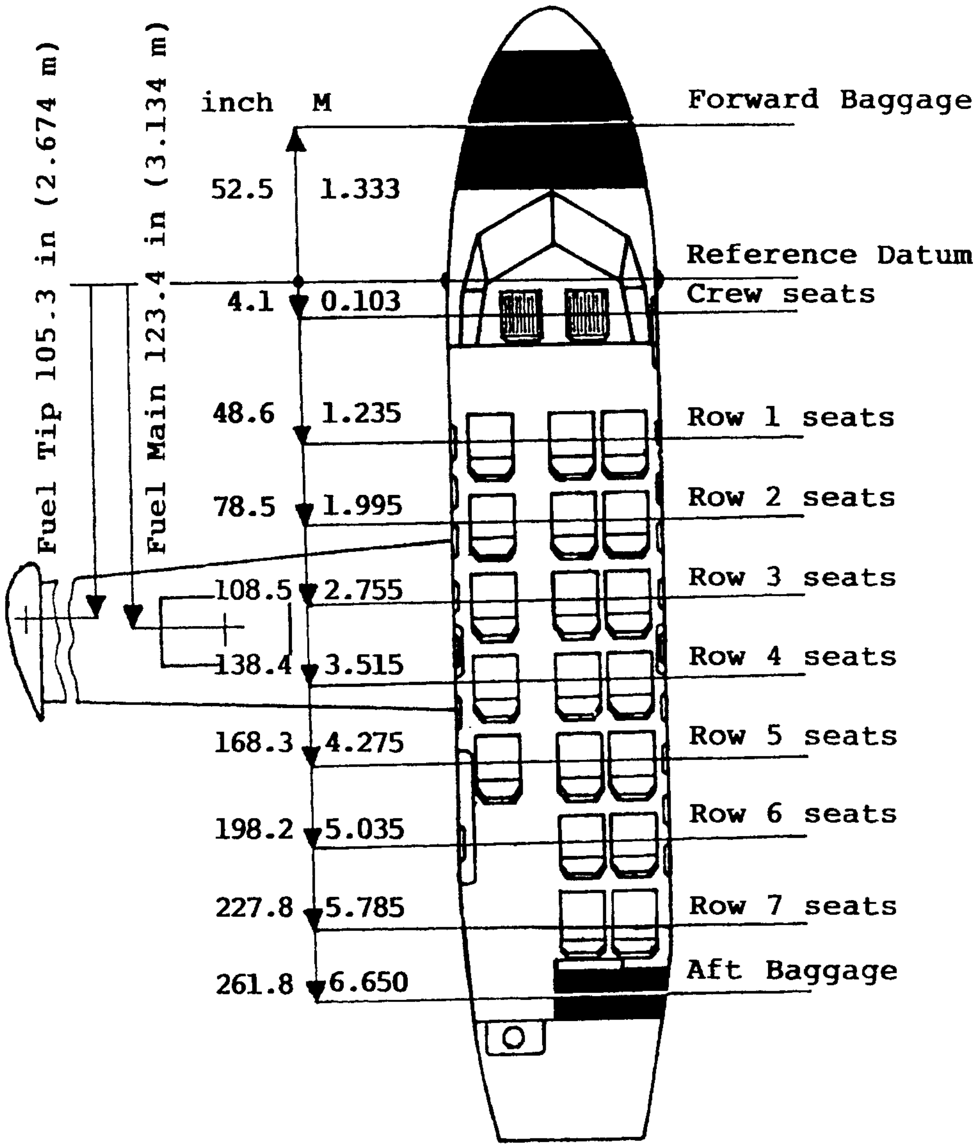


Fig. 6 – 3

WEIGHT AND BALANCE LOADING FORM
19 PASSENGER CONFIGURATION

				Payload lb (kg)	Moment lb.in/100 (kg.m)	
F.S.	–52.5 in	(–1.333 m)	Forward Baggage			
F.S.	4.1 in	(0.103 m)	Crew Seat			
F.S.	48.6 in	(1.235 m)	Seat Row 1			
F.S.	78.5 in	(1.995 m)	Seat Row 2			
F.S.	108.5 in	(2.755 m)	Seat Row 3			
F.S.	138.4 in	(3.515 m)	Seat Row 4			
F.S.	168.3 in	(4.275 m)	Seat Row 5			
F.S.	198.2 in	(5.035 m)	Seat Row 6			
F.S.	227.8 in	(5.785 m)	Seat Row 7			
F.S.	261.8 in	(6.650 m)	Aft Baggage			
TOTAL PAYLOAD AND MOMENT						(a)
EMPTY WEIGHT AND MOMENT OF EXISTING CONFIGURATION						(b)
ZERO FUEL WEIGHT AND MOMENT (a) + (b)						(c)
MAXIMUM ALLOWABLE FUEL				2,865 lb (1,300 kg)		
ACTUAL FUEL WEIGHT AND MOMENT						(d)
TAKE–OFF WEIGHT AND MOMENT (c) + (d)						
EFFECT OF THE RECTRACTED LANDING GEAR				– –	–23.800 (–27.414)	
EFFECT OF STANDARD PASSENGER GOING TO TOILET				170 (77.1)	362.4 (417.5)	

PAYLOAD AND FUEL MOMENT FOR 19 PASSENGER CONFIGURATION

Moments listed are lb.in/100 for weights located as shown

Payload weight (lb)	40	80	120	160	200	240	280	320	360	400	440	480	500	600	660
F.S. 4.1 in Crew seats	1.6	3.3	4.9	6.6	8.2	9.8	11.5	13.1	14.8	16.4	18.0	-	-	-	-
F.S. 48.6 in seat Row 1	19.4	38.9	58.3	77.8	97.2	116.6	136.1	155.5	175.0	194.4	213.8	233.3	243.0	291.6	320.8
F.S. 78.5 in seat Row 2	31.4	62.8	94.2	125.6	157.0	188.4	219.8	251.2	282.6	314.0	345.4	376.8	392.5.	471.0	518.1
F.S. 108.5 in seat Row 3	43.4	86.8	130.2	173.6	217.0	260.4	303.8	347.2	390.6	434.0	477.4	520.8	542.5	651.0	716.1
F.S. 138.4 in seat Row 4	55.4	110.7	166.1	221.4	276.8	332.2	387.5	442.9	498.2	553.6	609.0	664.3	692.0	830.4	913.4
F.S. 168.3 in seat Row 5	67.3	134.6	202.0	269.3	336.6	403.9	471.2	538.6	605.9	673.2	740.5	807.8	841.5	1,009.8	1,110.8
F.S. 198.2 in seat Row 6	79.4	158.8	238.2	317.6	397.0	476.4	555.8	635.2	714.6	794.0	873,4	-	-	-	-
F.S. 227.8 in seat Row 7	91.1	182.2	273.2	364.3	455.4	546.5	637.6	728.6	819.7	910.8	1,001.9	-	-	-	-

Baggage weight (lb)	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	330
F.S. -52.5 in Forward Baggage	-10.5	-21.0	-31.5	-42.0	-52.5	-63.0	-73.5	-84.0	-94.5	-105.0	-115.5	-	-	-	-	-
F.S. 261.8 in Aft Baggage	52.4	104.7	157.1	209.4	261.8	314.2	366.5	418.9	471.2	523.6	576.0	628.3	680.7	733.1	785.4	863.9

Fuel weight (lb)	200	300	400	500	600	660	700	800	1,000	1,200	1,400	1,600	1,800	2,000	2,205
F.S. 123.4 in Fuel Main	246.8	370.2	493.6	617.0	740.4	814.4	863.8	987.2	1,234.0	1,480.8	1,727.6	1,974.4	2,221.2	2,468.0	2,721.0
F.S. 105.3 in Fuel Tip	210.6	315.9	421.2	526.5	631.8	695.0	-	-	-	-	-	-	-	-	-

PAYLOAD AND FUEL MOMENT FOR 19 PASSENGER CONFIGURATION

Moments listed are kg.m for weights located as shown

Payload weight (kg)	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300
F.S. 0.103 m Crew seats	2.1	4.1	6.2	8.2	10.3	12.4	14.4	16.5	18.5	20.6	22.7	-	-	-	-
F.S. 1.235 m seat Row 1	24.7	49.4	74.1	98.8	123.5	148.2	172.9	197.6	222.3	247.0	271.7	296.4	321.1	345.8	370.5
F.S. 1.995 m seat Row 2	39.9	79.8	119.7	159.6	199.5	239.4	279.3	319.2	359.1	399.0	438.9	478.8	518.7	558.6	598.5
F.S. 2.755 m seat Row 3	55.1	110.2	165.3	220.4	275.5	330.6	385.7	440.8	495.9	551.0	606.1	661.2	716.3	771.4	826.5
F.S. 3.515 m seat Row 4	70.3	140.6	210.9	281.2	351.5	421.8	492.1	562.4	632.7	703.0	773.3	843.6	913.9	984.2	1,054.5
F.S. 4.275 m seat Row 5	85.5	171.0	256.5	342.0	427.5	513.0	598.5	684.0	769.5	855.0	940.5	1,026.0	1,111.5	1,197.0	1,282.5
F.S. 5.035 m seat Row 6	100.7	201.4	302.1	402.8	503.5	604.2	704.9	805.6	906.3	1,007.0	-	-	-	-	-
F.S. 5.785 m seat Row 7	115.7	231.4	347.1	462.8	578.5	694.2	809.9	925.6	1,041.3	1,157.0	-	-	-	-	-

Baggage weight (kg)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
F.S. -1.333 m Forward Baggage	-13.3	-26.7	-40.0	-53.3	-66.7	-80.0	-93.3	-106.6	-120.0	-133.3	-	-	-	-	-
F.S. 6.650 m Aft Baggage	66.5	133.0	199.5	266.0	332.5	399.0	465.5	532.0	598.5	665.0	731.5	798.0	864.5	931.0	997.5

Fuel weight (kg)	100	200	300	400	500	600	700	800	900	1,000
F.S. 3.134 m Fuel Main	313.4	626.8	940.2	1,253.6	1,567.0	1,880.4	2,193.8	2,507.2	2,820.6	3,134.0
FS. 2.674 m Fuel Tip	267.4	534.8	802.2	-	-	-	-	-	-	-

CARGO CONFIGURATION FROM 17 PASSENGER VERSION

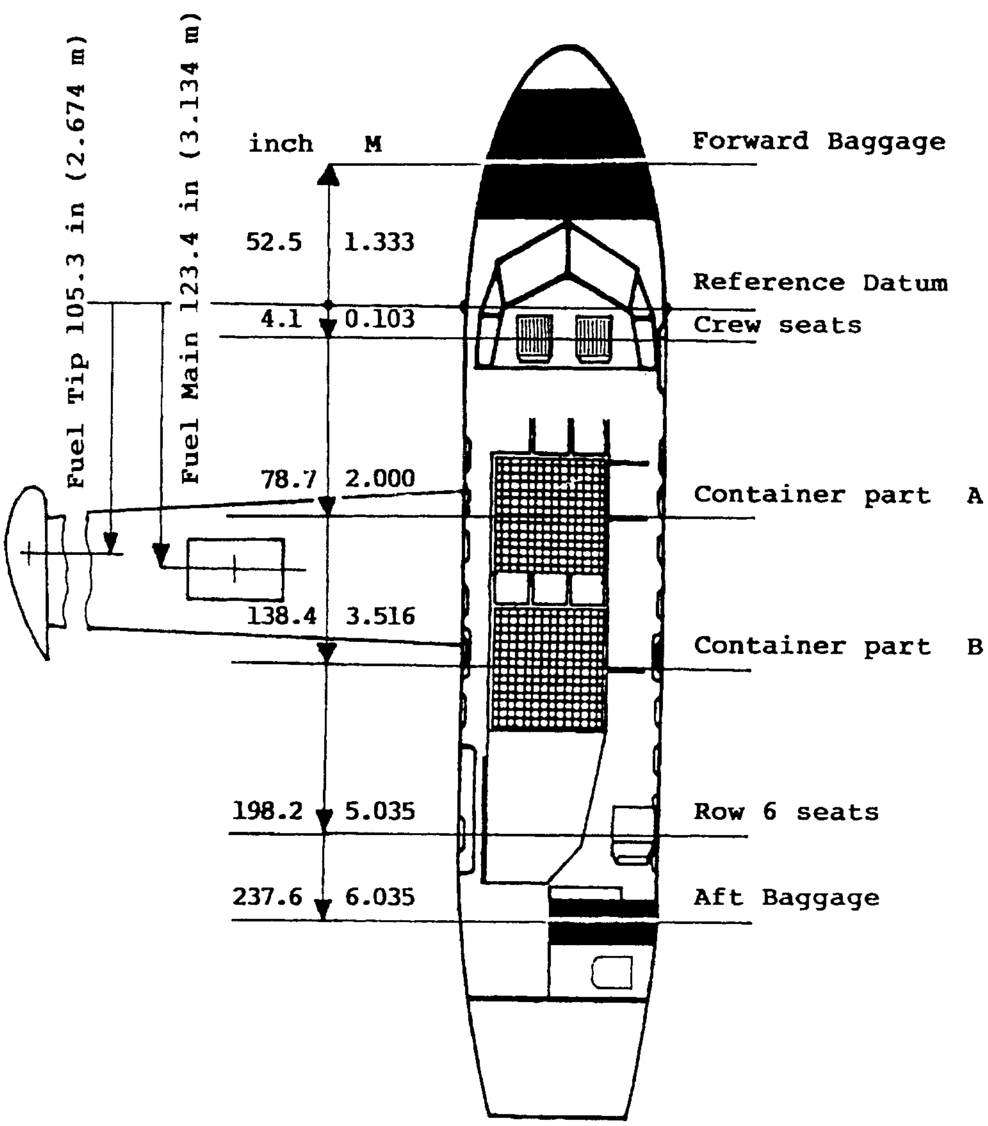


Fig. 6 – 4

WEIGHT AND BALANCE LOADING FORM

CARGO CONFIGURATION FROM 17 PASSENGER VERSION

				Payload lb (kg)	Moment lb.in/100 (kg.m)	
F.S.	-52.5 in	(-1.333 m)	Forward Baggage			
F.S.	4.1 in	(0.103 m)	Crew Seat			
F.S.	78.7 in	(2.000 m)	Cargo Container A			
F.S.	138.4 in	(3.516 m)	Cargo Container B			
F.S.	198.2 in	(5.035 m)	Seat Row 6			
F.S.	237.6 in	(6.035 m)	Aft Baggage			
TOTAL PAYLOAD AND MOMENT						(a)
EMPTY WEIGHT AND MOMENT OF EXISTING CONFIGURATION						(b)
ZERO FUEL WEIGHT AND MOMENT (a) + (b)						(c)
MAXIMUM ALLOWABLE FUEL				2,865 lb (1,300 kg)		
ACTUAL FUEL WEIGHT AND MOMENT						(d)
TAKE-OFF WEIGHT AND MOMENT (c) + (d)						
EFFECT OF THE RECTRACTED LANDING GEAR				– –	-23.800 (-27.414)	
EFFECT OF STANDARD PASSENGER GOING TO TOILET				170 (77.1)	362.4 (417.5)	

PAYLOAD AND FUEL MOMENT FOR CARGO CONFIGURATION FROM 17 PASSENGER VERSION

Moments listed are lb.in/100 for weights located as shown

Payload weight (lb)	40	80	120	160	200	280	320	360	400	440	600	700	800	900	1,102
F.S. 4.1 in Crew seats	1.6	3.3	4.9	6.6	8.2	11.5	13.1	14.8	16.4	18.0	-	-	-	-	-
F.S. 78.7 in Cargo container A	31.5	63.0	94.4	126.0	157.4	220.4	251.8	283.3	314.8	346.3	472.2	550.9	629.6	708.3	867.3
F.S. 138.4 in Cargo container B	55.3	110.7	166.0	221.4	276.8	387.5	442.8	498.2	553.6	609.0	830.4	968.8	1,107.2	1,245.6	1,525.1
F.S. 198.2 in seat Row 6	79.4	158.8	238.2	317.6	397.0	-	-	-	-	-	-	-	-	-	-

Baggage weight (lb)	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	330
F.S. -52.5 in Forward Baggage	-10.5	-21.0	-31.5	-42.0	-52.5	-63.0	-73.5	-84.0	-94.5	-105.0	-115.5	-	-	-	-	-
F.S. 237.6 in Aft Baggage	47.5	95.1	142.6	190.1	237.8	285.1	332.6	380.2	427.6	475.2	522.7	570.2	617.8	665.3	712.8	784.1

Fuel weight (lb)	200	300	400	500	600	660	700	800	1,000	1,200	1,400	1,600	1,800	2,000	2,205
F.S. 123.4 in Fuel Main	246.8	370.2	493.6	617.0	740.4	814.4	863.8	987.2	1,234.0	1,480.0	1,727.6	1,974.4	2,221.2	2,468.0	2,721.0
F.S. 105.3 in Fuel Tip	210.6	315.9	421.2	526.5	631.8	695.0	-	-	-	-	-	-	-	-	-

PAYLOAD AND FUEL MOMENT FOR CARGO CONFIGURATION FROM 17 PASSENGER VERSION

Moments listed are kg.m for weights located as shown

Payload weight (kg)	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	400	500
F.S. 0.103 m Crew seats	2.1	4.1	6.2	8.2	10.3	12.4	14.4	16.5	18.5	20.6	22.7	-	-	-	-	-	-
F.S. 2.000 m Cargo container A	40.0	80.0	120.0	160.0	200.0	240.0	280.0	320.0	360.0	400.0	440.0	480.0	520.0	560.0	600.0	800.0	1,000.0
F.S. 3.516 m Cargo container B	70.3	140.6	211.0	281.3	351.6	421.9	492.2	562.6	632.9	703.2	773.5	843.8	914.2	984.5	1,054.8	1,406.4	1,758.0
F.S. 5.035 m seat Row 6	100.7	201.4	302.1	402.8	503.5	-	-	-	-	-	-	-	-	-	-	-	-

Baggage weight (kg)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
F.S. -1.333 m Forward Baggage	-13.3	-26.7	-40.0	-53.3	-66.7	-80.0	-93.3	-106.6	-120.0	-133.3	-	-	-	-	-
F.S. 6.035 m Aft Baggage	60.4	120.7	181.1	241.4	301.8	362.1	422.5	482.8	543.2	603.5	663.9	724.2	784.6	844.9	905.3

Fuel weight (kg)	100	200	300	400	500	600	700	800	900	1,000
F.S. 3.134 m Fuel Main	313.4	626.8	940.2	1,253.6	1,567.0	1,880.4	2,193.8	2,507.2	2,820.6	3,134.0
F.S. 2.674 m Fuel Tip	267.4	534.8	802.2	-	-	-	-	-	-	-

CARGO CONFIGURATION FROM 19 PASSENGER VERSION

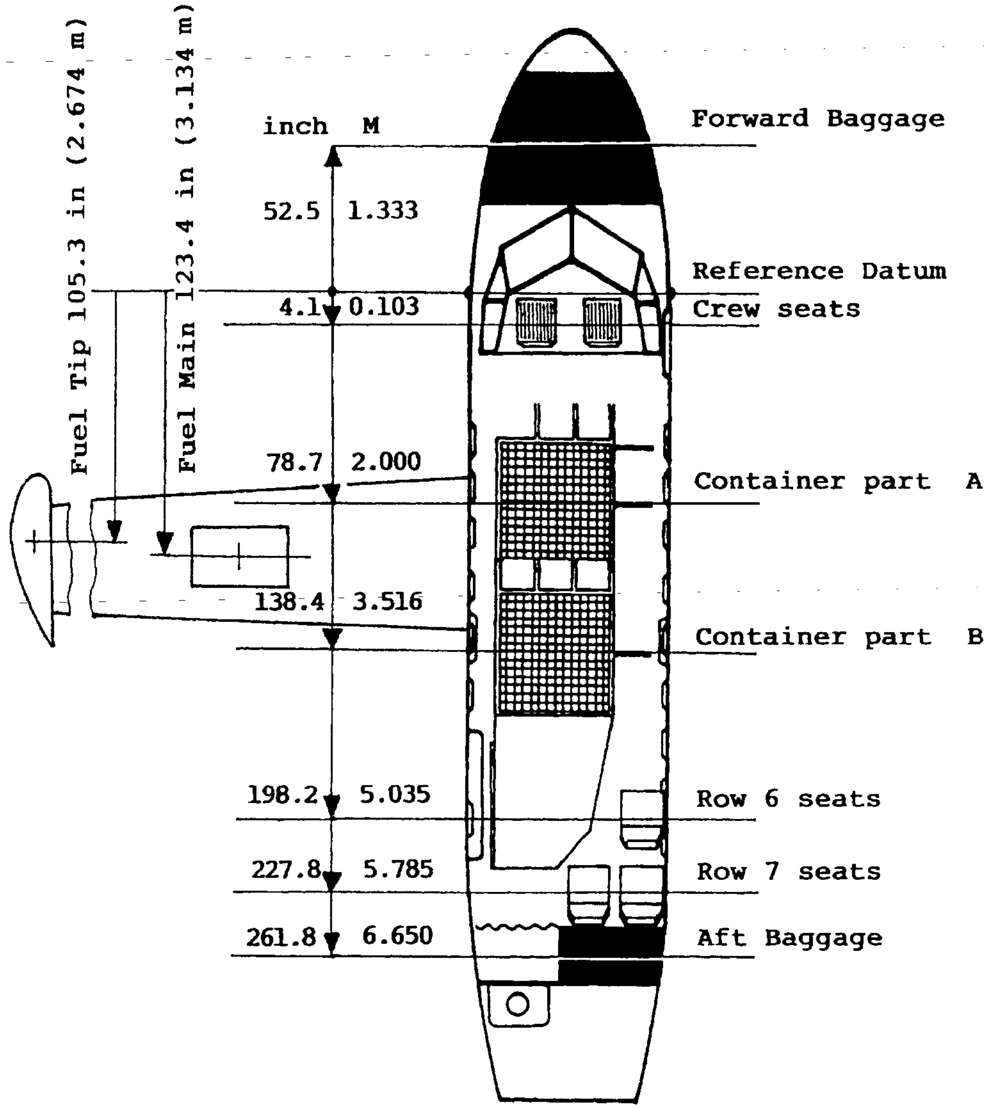


Fig. 6 – 5

WEIGHT AND BALANCE LOADING FORM

CARGO CONFIGURATION FROM 19 PASSENGER VERSION

					Payload lb (kg)	Moment lb.in/100 (kg.m)	
F.S.	-52.5 in	(-1.333 m)	Forward Baggage				
F.S.	4.1 in	(0.103 m)	Crew Seat				
F.S.	78.7 in	(2.000 m)	Cargo Container A				
F.S.	138.4 in	(3.516 m)	Cargo Container B				
F.S.	198.2 in	(5.035 m)	Seat Row 6				
F.S.	227.8 in	(5.785 m)	Seat Row 7				
F.S.	261.8 in	(6.650 m)	Aft Baggage				
TOTAL PAYLOAD AND MOMENT							(a)
EMPTY WEIGHT AND MOMENT OF EXISTING CONFIGURATION							(b)
ZERO FUEL WEIGHT AND MOMENT (a) + (b)							(c)
MAXIMUM ALLOWABLE FUEL				2,865 lb (1,300 kg)			
ACTUAL FUEL WEIGHT AND MOMENT							(d)
TAKE-OFF WEIGHT AND MOMENT (c) + (d)							
EFFECT OF THE RECTRACTED LANDING GEAR					– –	-23.800 (-27.414)	
EFFECT OF STANDARD PASSENGER GOING TO TOILET					170 (77.1)	362.4 (417.5)	

PAYLOAD AND FUEL MOMENT FOR CARGO CONFIGURATION FROM 19 PASSENGER VERSION

Moments listed are lb.in/100 for weights located as shown

Payload weight (lb)	40	80	120	160	200	280	320	360	400	440	600	700	800	900	1,102
F.S. 4.1 in Crew seats	1.6	3.3	4.9	6.6	8.2	11.5	13.1	14.8	16.4	18.0	-	-	-	-	-
F.S. 78.7 in Cargo container A	31.5	63.0	94.4	126.0	157.4	220.4	251.8	283.3	314.8	346.3	472.2	550.9	629.6	708.3	867.3
F.S. 138.4 in Cargo container B	55.3	110.7	166.0	221.4	276.8	387.5	442.8	498.2	553.6	609.0	830.4	968.8	1,107.2	1,245.6	1,525.1
F.S. 198.2 in seat Row 6	79.4	158.8	238.2	317.6	397.0	-	-	-	-	-	-	-	-	-	-
F.S. 227.8 in seat Row 7	91.1	182.2	273.2	364.3	455.4	637.6	728.6	819.7	910.8	1,001.9	-	-	-	-	-

Baggage weight (lb)	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	330
F.S. -52.5 in Forward Baggage	-10.5	-21.0	-31.5	-42.0	-52.5	-63.0	-73.5	-84.0	-94.5	-105.0	-115.5	-	-	-	-	-
F.S. 261.8 in Aft Baggage	52.4	104.7	157.1	209.4	261.8	314.2	366.5	418.9	471.2	523.6	576.0	628.3	680.7	733.1	785.4	863.9

Fuel weight (lb)	200	300	400	500	600	660	700	800	1,000	1,200	1,400	1,600	1,800	2,000	2,205
F.S. 123.4 in Fuel Main	246.8	370.2	493.6	617.0	740.4	814.4	863.8	987.2	1,234.0	1,480.8	1,727.6	1,974.4	2,221.2	2,468.0	2,721.0
F.S. 105.3 in Fuel Tip	210.6	315.9	421.2	526.5	631.8	695.0	-	-	-	-	-	-	-	-	-

PAYLOAD AND FUEL MOMENT FOR CARGO CONFIGURATION FROM 19 PASSENGER VERSION

Moments listed are kg.m for weights located as shown

Payload weight (kg)	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	400	500
F.S. 0.103 m Crew seats	2.1	4.1	6.2	8.2	10.3	12.4	14.4	16.5	18.5	20.6	22.7	-	-	-	-	-	-
F.S. 2.000 m Cargo container A	40.0	80.0	120.0	160.0	200.0	240.0	280.0	320.0	360.0	400.0	440.0	480.0	520.0	560.0	600.0	800.0	1,000.0
F.S. 3.516 m Cargo container B	70.3	140.6	211.0	281.3	351.6	421.9	492.2	562.6	632.9	703.2	773.5	843.8	914.2	984.5	1,054.8	1,406.4	1,758.0
F.S. 5.035 m seat Row 6	100.7	201.4	302.1	402.8	503.5	-	-	-	-	-	-	-	-	-	-	-	-
F.S. 5.785 m seat Row 7	115.7	231.4	347.1	462.8	578.5	694.2	809.9	925.6	1,041.3	1,157.0	-	-	-	-	-	-	-

Baggage weight (kg)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
F.S. -1.333 m Forward Baggage	-13.3	-26.7	-40.0	-53.3	-66.7	-80.0	-93.3	-106.6	-120.0	-133.3	-	-	-	-	-
F.S. 6.650 m Aft Baggage	66.5	133.0	199.5	266.0	332.5	399.0	465.5	532.0	598.5	665.0	731.5	798.0	864.5	931.0	997.5

Fuel weight (kg)	100	200	300	400	500	600	700	800	900	1,000
F.S. 3.134 m Fuel Main	313.4	626.8	940.2	1,253.6	1,567.0	1,880.4	2,193.8	2,507.2	2,820.6	3,134.0
F.S. 2.674 m Fuel Tip	267.4	534.8	802.2	-	-	-	-	-	-	-

WEIGHT AND BALANCE LOADING FORM
19 PASSENGER CONFIGURATION

example of loading

				Payload lb (kg)	Moment lb.in/100 (kg.m)
F.S.	−52.5 in	(−1.333 m)	Forward Baggage	220 (100)	−115.5 (−133.3)
F.S.	4.1 in	(0.103 m)	Crew Seat	375 (170)	15.4 (17.5)
F.S.	48.6 in	(1.235 m)	Seat Row 1	510 (231)	247.9 (285.3)
F.S.	78.5 in	(1.995 m)	Seat Row 2	510 (231)	400.4 (460.8)
F.S.	108.5 in	(2.755 m)	Seat Row 3	510 (231)	553.4 (636.4)
F.S.	138.4 in	(3.515 m)	Seat Row 4	510 (231)	705.8 (812.0)
F.S.	168.3 in	(4.275 m)	Seat Row 5	510 (231)	858.3 (987.5)
F.S.	198.2 in	(5.035 m)	Seat Row 6	340 (154)	674.9 (775.4)
F.S.	227.8 in	(5.785 m)	Seat Row 7	340 (154)	774.5 (890.9)
F.S.	237.6 in	(6.035 m)	Aft Baggage	147 (67)	384.8 (445.6)

	Payload lb (kg)	Moment lb.in/100 (kg.m)	
TOTAL PAYLOAD AND MOMENT	3,972 (1,800)	4,499.9 (5,178.1)	(a)
EMPTY WEIGHT AND MOMENT OF EXISTING CONFIGURATION	8,929 (4,050)	9,371.9 (10,797.3)	(b)
ZERO FUEL WEIGHT AND MOMENT (a) + (b)	12,901 (5,850)	13,871.8 (15,975.4)	(c)
MAXIMUM ALLOWABLE FUEL	2,865 lb (1,300 kg)		
ACTUAL FUEL WEIGHT AND MOMENT	1,208 (550)	1,490.7 (1,723.7)	(d)
TAKE−OFF WEIGHT AND MOMENT (c) + (d)	14,109 (6,400)	15,362.5 (17,699.1)	

WEIGHT AND MOMENT LIMITS

(C.G. IN % MAC OR INCHES, MOMENT IN LB.IN/100, WEIGHT IN LB)

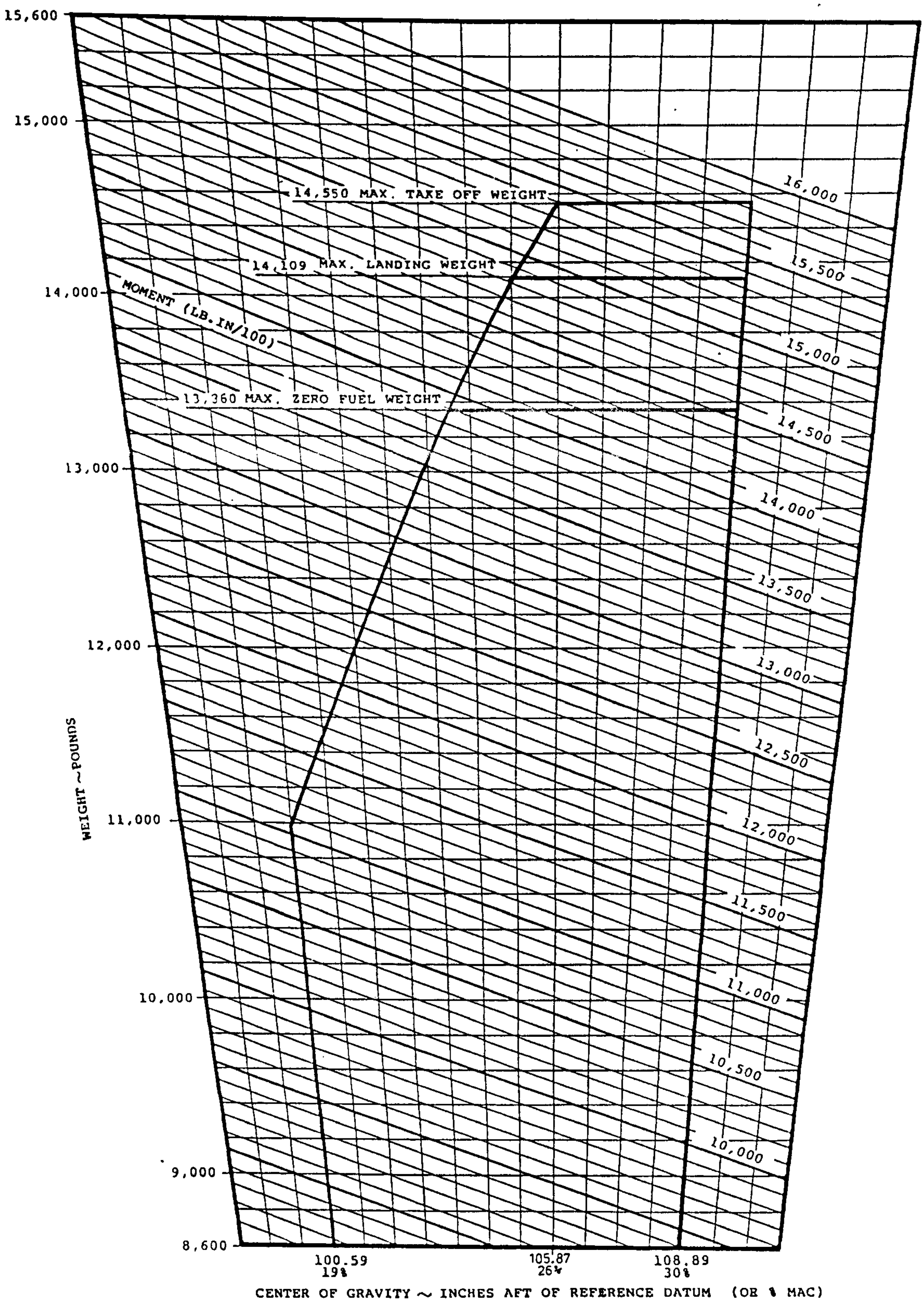


Fig. 6 – 6

WEIGHT AND MOMENT LIMITS

(C.G. IN % MAC OR METRES, MOMENT IN KG.LB, WEIGHT IN KG)

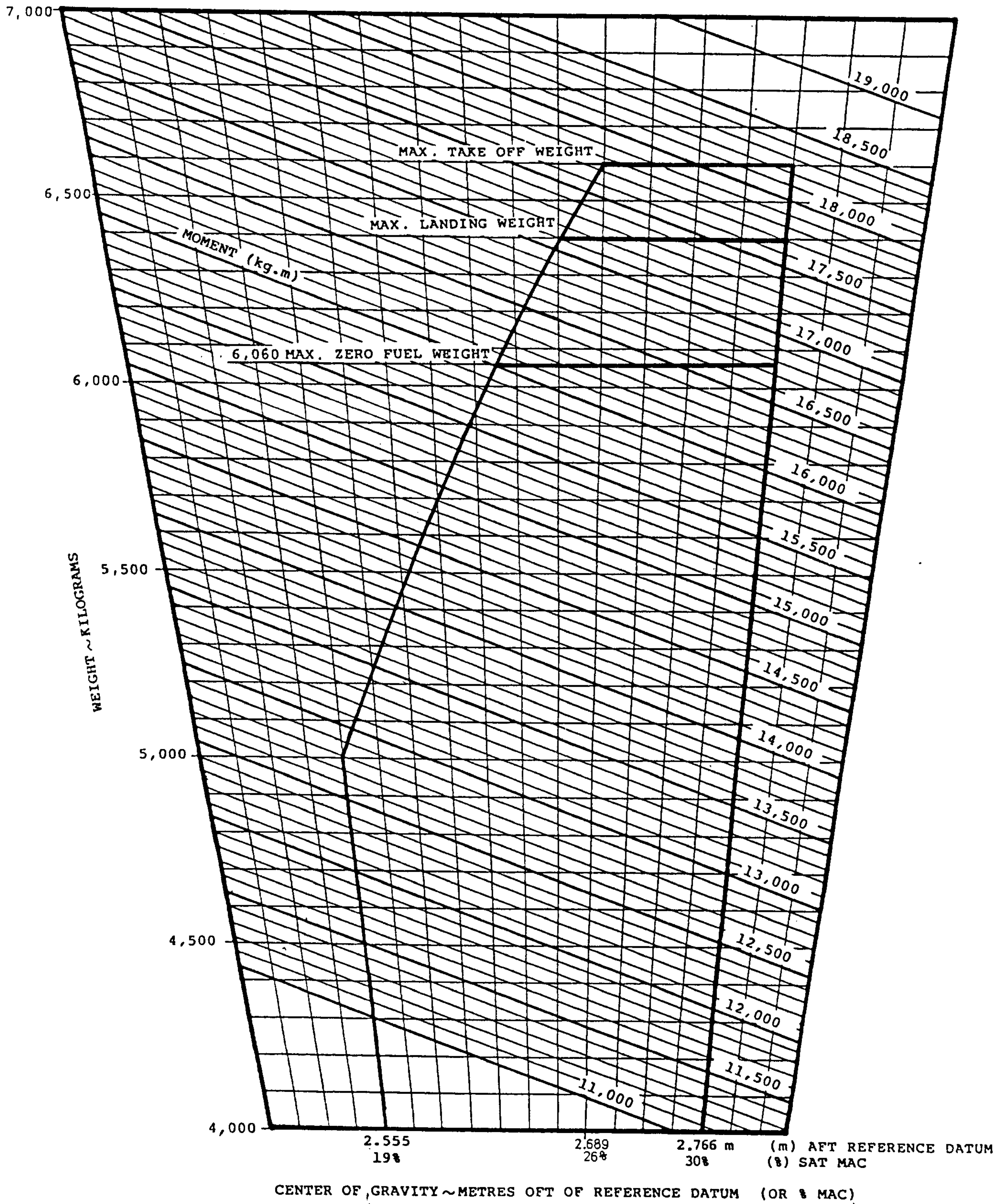


Fig. 6 – 7

EQUIPMENT LIST

ITEM	QTY.	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100
ENGINE					
Engine incl. agregates on the M 601 E engine	2	396.00	873.03	675.000	584.310
Oil cooler 443 512 506 705	2	11.00	24.25	27.610	23.963
Fuel heater 443 958 219 001	2	5.90	13.00	16.520	14.332
Fuel pump LUN 6283–8	2	5.54	12.21	15.180	13.171
Fuel cleaner LUN 7691.01–8	2	4.40	9.70	12.232	10.615
Hydraulic pump LUN 6102.01–8	2	3.58	7.89	8.204	7.113
Alternator LUN 2102.01–8	2	21.00	46.30	51.136	44.291
Water injection pump LUN 5155–8	1	3.65	8.05	9.070	7.457
Submersible centrifugal pump LUN 6281–8	2	1.80	3.97	4.940	4.282
Fuel collection tank 621 1232 (621 1242)	1 + 1	7.20	15.87	22.664	19.618
Centre fuel tank L 410.6612 (L 410.6622)	1 + 1	10.80	23.81	33.696	29.245
Outer fuel tank L 410.6613 (L 410.6623)	1 + 1	8.40	18.52	26.124	22.675
Additional fuel tank L 410.6631 (L 410.6641)	1 + 1	8.60	18.96	26.660	23.141
Wing tip tank B 560 700 L,P	2	56.00	123.46	149.520	129.781
Extinguisher bottle PPL(8)	2	12.77	28.15	44.357	38.455
PROPELLER					
Propeller V 510	2	177.30	390.88	147.620	139.964
Auxiliary pump LUN 7840–8	2	6.40	14.11	18.426	15.942
Cyclic conntactor LUN 2601–8	2	0.80	1.76	1.464	1.268
HYDRAULICS, LANDING GEAR, FLAPS					
Hand hydraulic pump LUN 6100.03–8	1	2.25	4.96	–0.164	–0.136
Brake accumulator LUN 6900–8	1	0.80	1.76	2.744	2.376
Hydraulic accumulator LUN 6953.02–8	1	4.30	9.48	13.490	11.682
Hydraulic accumulator LUN 6995.05–8	1	4.30	9.48	14.080	12.045
Main landing gear cylinder LUN 7108.12–7 (7108.11–7)	2	18.40	40.57	49.312	42.805
TAB cylinder LUN 7134–8	2	1.90	4.19	5.576	4.833
Spoiler cylinder LUN 7138–8	1	0.95	2.10	3.504	3.042

(cont.)

ITEM	QTY.	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100
Flaps cylinder LUN 7231.02–8	1	5.65	12.46	14.503	12.557
Nose landing gear cylinder LUN 7233.04–8	1	3.40	7.50	–2.703	–2.332
Bake valve LUN 7367.03–8	4	2.16	4.76	–1.576	–1.368
Shuttle valve LUN 7368.01–8	2	1.10	2.43	–1.076	–0.937
Reduction valve LUN 7514.02–8	1	0.84	1.85	2.398	2.075
Hydraulic cleaner LUN 7613.02–8	1	0.68	1.50	1.972	1.712
Hydraulic cleaner LUN 7613.02–8	1	0.68	1.50	2.074	1.801
Hydraulic cleaner LUN 7614.01–8	1	1.34	2.95	3.913	3.391
Hydraulic cleaner LUN 7614.03–8	1	1.34	2.95	3.866	3.345
Main landing gear leg incl. damper (3 257 900–7, 3 257 906.7, 3 258 900–7, 3 257 906.7)	2	106.80	235.45	328.800	284.579
Nose landing gear leg incl. servomechanism (3 259 900–7, 3 259 911.7)	1	43.70	96.34	–26.613	–23.137
Main landing gear wheel K 38–1100–7	2	39.00	85.98	131.742	114.415
Brake K 38–1200–7	2	51.00	112.44	172.273	149.623
Nose landing gear K 39–1100–7	1	6.00	13.23	–1.800	–1.562
Nose landing gear wheel tire 550 x 225 mod. 4	1	9.07	19.99	–2.803	–2.361
Main landing gear wheel tire 720 x 310 mod. 3	2	45.08	99.38	152.400	132.245
Inertia sensor UA 27A–13 (UA 27A–14)	2	1.60	3.53	5.517	4.794
ICE PROTECTION, OXYGEN EQUIPMENT					
Pitot tube LUN 1157	2	0.90	1.98	–0.560	–0.483
Rubber deicer:					
wing – inside P–20–1 (P–20–2)	2	5.30	11.68	11.819	10.377
wing – outer P–25–1 (P–25–2)	2	7.16	15.79	16.754	14.547
stabilizer P–24–1 (P–24–2)	2	5.00	11.02	37.500	32.539
fin P–26–1	1	2.00	4.41	18.140	15.746
INSTRUMENT					
Encoding altimeter KEA 130A	2	1.72	3.80	–1.000	–0.868
Airspeed indicator LUN 1113.13–8	2	1.50	3.31	–0.892	–0.781
Vertical speed indicator LUN 1140.03–8	2	1.50	3.31	–0.892	–0.781
Turn and bank indicator LUN 1215.03	2	2.40	5.29	–1.428	–1.249
Horizon AIM 520–1A	1	0.68	1.50	–0.405	–0.348

(cont.)

ITEM	QTY.	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100
Airspeed indicator LUN 1108.06–8	1	0.50	1.10	–0.293	–0.255
Generator speed indicator LUN 1347.03–8	2	1.10	2.43	–0.654	–0.564
Propeller speed indicator LUN 1348.03–8	2	1.10	2.43	–0.654	–0.564
ITT indicator LUN 1370.02.8	2	1.40	3.09	–0.834	–0.717
Three pointer indicator LUN 1538.01–8	2	1.20	2.64	–0.714	–0.613
Airspeed signalizator LUN 1173.12–8	1	0.50	1.10	–0.295	–0.255
Fuel gauge indicator LUN 1634.01–8	2	1.75	3.86	–1.042	–0.896
Wing tip fuel gauge indicator LUN 1674	2	1.60	3.53	–0.952	–0.819
Fuel flow indicator PC 900	2	0.72	1.59	–0.423	–0.369
Fletner position indicator LUN 1687–8	1	0.25	0.55	–0.051	–0.043
Landing gear position indicator LUN 1694–8	1	0.26	0.57	–0.155	–0.132
Ambient air temperature two–pointer indicator LUN 5610.01–8	1	0.50	1.10	–0.298	–0.255
Clock ACS–1M	1	0.66	1.46	–0.192	–0.166
ELECTRICAL POWER					
Inverter 3 x 36V LUN 2450	2	25.00	55.12	–38.600	–33.410
Windshield L, R TKS 109.00.000.PS	2	31.30	69.00	–10.172	–8.694
Inverter 1 x 115V LUN 2460	2	23.12	50.97	–27.960	–24.281
Accumulator battery 20 NKBN 2503 or SAFT P/N 26 108	2	45.40	100.10	–85.540	–74.094
NAVIGATION					
Radioaltimeter KRA 405	2	12.82	28.26	76.792	66.646
Audio box 24H–70	2	1.54	3.49	0.099	0.086
Flight data recorder BUR–1–2G	1	35.03	77.23	216.80	188.210

ITEM	QTY.	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100
PASSENGER COMPARTMENT EQUIPMENT					
1st passenger seats row	3	17.40	38.36	21.489	18.643
2nd passenger seats row	3	17.40	38.36	34.713	30.113
3rd passenger seats row	3	17.40	38.36	47.937	41.621
4th passenger seats row	3	17.40	38.36	61.161	53.090
5th passenger seats row	3	17.40	38.36	74.385	64.560
6th passenger seats row	2	11.70	25.79	58.910	51.116
7th passenger seats row	2	11.70	25.79	67.685	58.750
Toilet B 590 601 N (No of instalation B 591 537 N or B 590 600 N)	1	8.60	18.96	59.340	51.495

EQUIPMENT LIST FOR OPTIONAL EQUIPMENT

ITEM	QTY.	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100

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SYSTEMS OF AIRPLANE

TABLE OF CONTENTS

(cont.)

AIRFRAME

The airframe consists of three independent units: fuselage, wing and tail unit. Various aluminium alloys, high–strength steels, creep–resisting steels and different kinds of laminates – all with surface protection – are used in these structures.

FUSELAGE (Fig. 7 - 1)

The fuselage is an all–metal structure consisting of 27 fuselage frames and bulkheads, longitudinal stiffeners, floor and ceiling longitudinal ribs, floor, outer skins and landing gear nacelles. The front part of the fuselage begins with a nose cone, made of glassfibre–reinforced plastic, and ends at frame No 8. The nose cone covers the radar, antennas and searchlights. The front baggage compartment is situated in the upper space between frame No 2 and frame No 4. The nose landing gear bay is located between frame No 1 and frame No 4. Electric and radio equipment bays are located on the sides of the landing gear bay. The cockpit is arranged between bulkhead No 4 and frame No 7.

The fuselage center section, between frames No 8 and No 18, accommodates the passenger cabin. Four wing attachments are located at frame No 12 and No 14 and landing gear spars form the bottom of these frames. Electric systems components have room on the ceiling. Hydraulic system components are housed in the LH landing gear nacelle, a water tank is installed in the RH landing gear nacelle.

The rear section of the fuselage extends from frame No 18 to frame No 27 and terminates in a tail cone made of glassfibre–reinforced plastic.

The are the baggage compartment and toilet in the rear fuselage section. Room for airplane instruments (special versions) is provided aft of frame No21.

The tail attachment fittings are located at the reinforced frames No 25 and No 26.

WING (Fig. 7 - 2)

The wing is an all–metal structure and consists of two spars, cross ribs and skin with stringers. The wing has two torsional continuous cavities in front of the front spar and between the front and aft spars. The wing is attached to the fuselage by means of four attachment lugs, located on the wing rib No 3. The four engine attachment fittings are located on ribs No 8 and No 10. Three wing tip tank attachment fittings are located on ribs No 31. Rubber fuel tanks are installed between the front and rear spars.
The double–slotted wing flaps are split into an inner (ribs No 4 to No 10) and outer section (ribs No 10 to No 20). The ailerons are between ribs No 20 and No 31 . Ground spoilers are between ribs No 11 and No 20. Automatic bank control tabs are located between ribs No 27 and No 31 . The ailerons are fabric–covered. The LH aileron is fitted with a trim tab.

TAIL UNIT (Fig. 7 – 3 & 7 – 4)

The tail unit consists of a horizontal tail, composed of a horizontal stabilizer and an elevator and a vertical tail with a fixed fin as vertical stabilizer and a rudder.

Horizontal Stabilizer

The horizontal stabilizer is an all–metal structure with two spars, ribs and skin stiffened with stringers. The stabilizer is attached to the fuselage by means of four attachment fittings.

Elevator

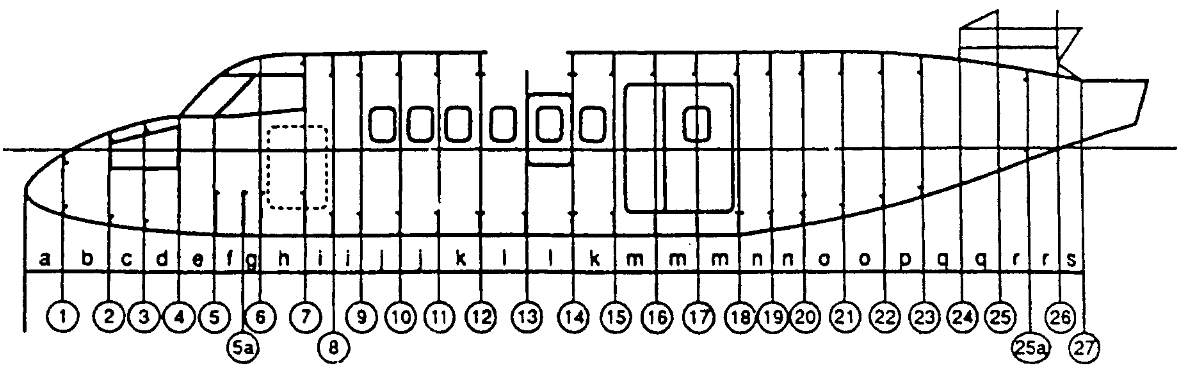
The elevator consists of a left and right section interconnected by a countershaft. The elevator has a metal skeleton and fabric covering. It is hinged on the stabilizer. The elevator is fitted with all–metal trim tabs.

Vertical Stabilizer

The vertical stabilizer is a fixed fin all–metal structure with two beams, ribs and skin stiffened with stringers. The fin is fitted to the fuselage by means of four attachment fittings.

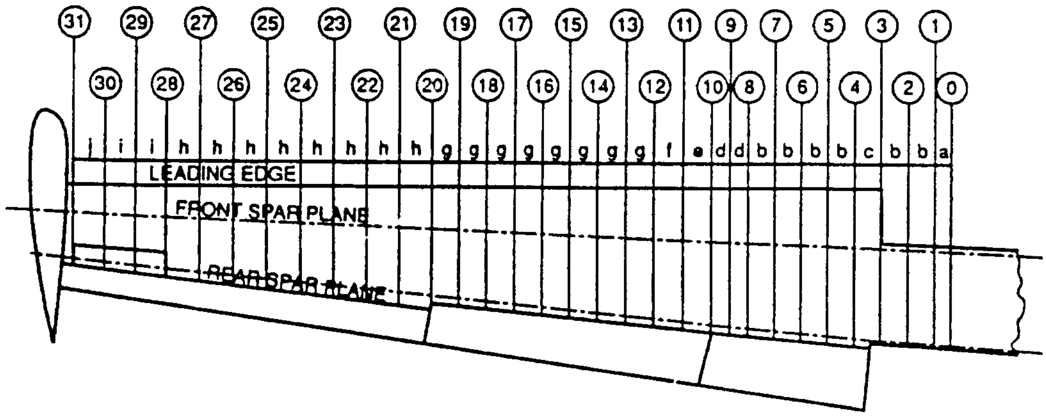
Rudder

The rudder is an all–metal structure and has fabric covering. It is hinged on the fin. The rudder is fitted with a metal trim tab.



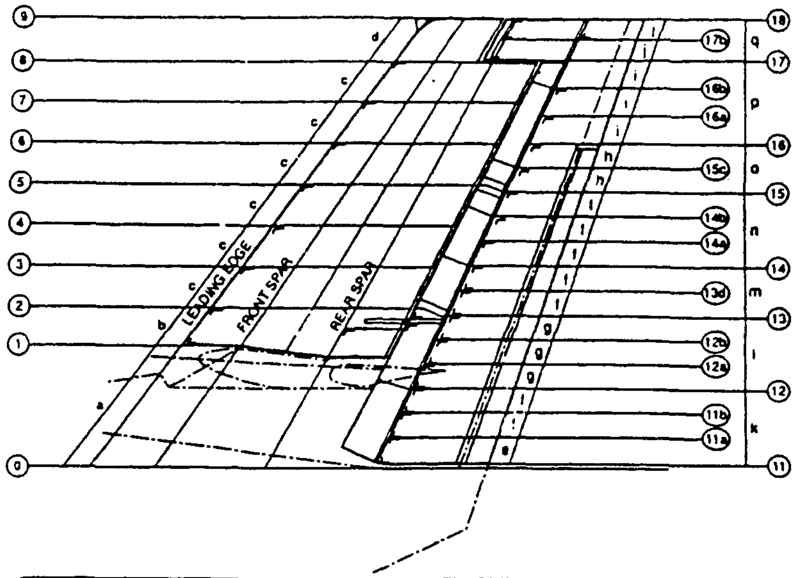
	mm	inch		mm	inch		mm	inch		mm	inch		mm	inch
a	417	16.42	e	407	16.02	i	325	12.80	m	485	19.09	q	445	17.52
b	535	21.06	f	333	13.11	j	460	18.11	n	380	14.96	r	353	13.90
c	402	15.83	g	200	7.87	k	500	19.69	o	470	18.50	s	280	11.02
d	403	15.87	h	530	20.87	l	545	21.46	p	463	18.23			

Fig. 7 – 1 Fuselage Station Diagram



	mm	inch		mm	inch		mm	inch		mm	inch		mm	inch
a	175	6.89	c	285	11.22	e	305	12.01	g	303	11.93	i	330	12.99
b	290	11.42	d	200	7.87	f	321	12.64	h	360	14.17	j	340	13.39

Fig. 7 – 2 Wing Station Diagram



	mm	inch		mm	inch		mm	inch		mm	inch		mm	inch
a	905	35.63	e	201	7.91	i	205	8.07	m	364	14.33	q	308	12.13
b	282	11.10	f	182	7.17	j	154	6.06	n	548	21.50			
c	300	11.81	g	181	7.13	k	565	22.24	o	354	13.94			
d	323	12.72	h	177	6.97	l	543	21.38	p	615	24.21			

Fig. 7 – 3 Vertical Stabilizer and Rudder Station Diagram

	mm	inch		mm	inch
a	175	6.89	e	427	16.81
b	160	6.30	f	90	3.54
c	335	13.19	g	162.5	6.40
d	337	13.27			

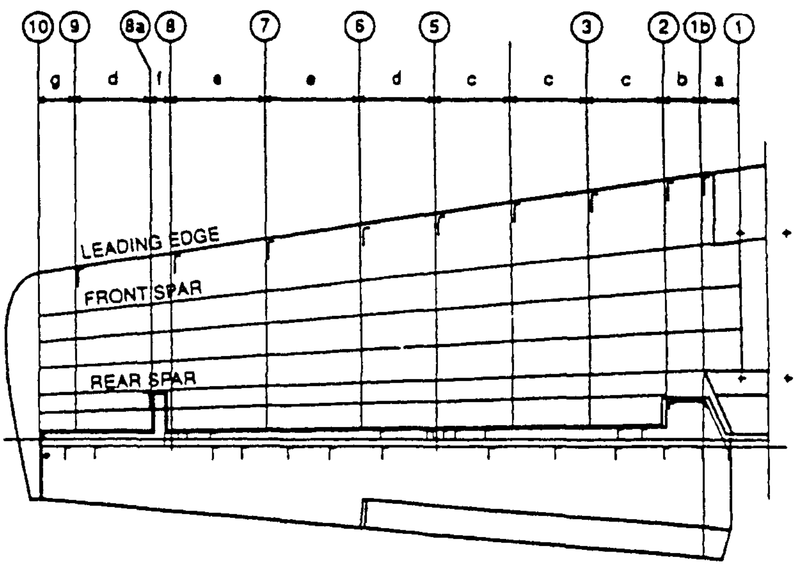


Fig. 7 – 4 Horizontal Stabilizer and Elevator Station Diagram

FLIGHT CONTROLS

LONGITUDINAL CONTROL

(a) **Elevator control**

Elevator control is performed with two interconnected control sticks of pilot and co-pilot, with a system of tie rods and levers through the rear gear shaft. The control sticks movement in the direction of pushing is limited to the spring stop, which operates at elevator deflection of by 7° down and secures appropriate force characteristic in the longitudinal control in flight with negative load factor.

(b) **Elevator trim tabs control**

The elevator trim tabs are controlled with the help of hand wheels located on the front control panel. Control movement is brought to a trim tab by means of ropes. Movement of the trim tab is not connected to movement of the elevator automatically. The trim tab deflection is checked on mechanical indicator located next to the control wheel.

DIRECTIONAL CONTROL

(a) **Rudder control**

The rudder control is performed with two interconnected blocks of the foot control of pilot and co-pilot with the help of tie rods and cable system. The stops limit both the rudder deflection and the pedal deflection. The pedals will reach the stop at a control force about 980 N (220 lb [100 kg]).

(b) **Rudder trim tab control**

The rudder trim tab control is deflected by electromechanism. The electromechanism is controlled by the change-over switch TURN located on the front control panel with switched on circuit breaker TRIM TABS on the overhead panel. The position of the rudder trim tab control is indicated on the electric indicator that is in front of the change-over switch TURN. The indicator is supplied through the circuit breaker CENTRAL WARNING DISPLAY/AIRFRAME on the overhead panel.

(c) **Ailerons control**

Ailerons control is performed by means of interconnected steering wheels of pilot and co-pilot through the system of tie rods and levers.

(d) **Aileron trim tab control**

The trim tab is installed on the left aileron. It is deflected by electromechanism. The electromechanism is controlled by the change-over switch BANK/LEFT/RIGHT on the front control panel with switched on circuit breaker TRIM TABS on the overhead panel. The neutral position of the trim tab is indicated by coming on the signal lamp located on the front control panel. The signal lamp is powered via the circuit breaker CENTRAL WARNING DISPLAY/AIRFRAME on the overhead panel. The signal lamp operation is checked after pressing SIGN push-button located on the LH control panel.

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PANELS

The example of instrument panels for the instalation of the Bendix/King SILVER CROWN navigation system is mentioned herein. The instrument panels of appropriate airplane are mentioned in the Section 9 – Supplements.

Legend for Fig. 7 – 5

No.	Name
1.	Reserved
2.	Individual ventilation nozzle
3.	Throttle valve WINDSHIELD WIPER
4.	Change–over switch IGNITION I II
5.	Change–over switch IGNITION I II
6.	Push–button PROP. FEATHERING MANUAL
7.	Push–button PROP. FEATHERING MANUAL
8.	Push–button PROP. FEATHERING AUTO
9.	Push–button PROP. FEATHERING MANUAL
10.	Push–button PROP. FEATHERING MANUAL
11.	Dual air temperature indicator (in the passenger cabin and the heating ducts)
12.	Push–button PROP. DEICING CHECK TIMER BLADES
13.	Stop
14.	Control lever of the hot air supply HEATING
15.	Control lever of the cold air supply VENTILATION
16.	Change–over switch WINDSHIELD HEATING TEST LH RH HEATING OFF
17.	Change–over switch EMERGENCY LIGHTING
18.	Switch OIL LEVEL CHECK
19.	Change–over switch EMERG. STATIC PRESS. SHUT OPEN
20.	Change–over switch PITOT PRESSURE I II
21.	Air distribution control lever WINDSHIELD
22.	Air supply control lever to the pilot's cabin COCKPIT AIR CONTROL

(cont.)

Legend for Fig. 7 - 5 - continued

No.	Name
23.	Amber signal lamp **OIL**
24.	Airspeed indicator
25.	Push-button (engine RH) **IELU**
26.	Push-button (engine LH) **IELU**
27.	Push-button (engine RH) **CENTRAL WARNING DISPLAY ENGINE**
28.	Push-button **CENTRAL WARNING DISPLAY ELECTRO**
29.	Push-button **CENTRAL WARNING DISPLAY AIRFRAME**
30.	Push-button (engine LH) **CENTRAL WARNING DISPLAY ENGINE**
31.	Push-button **SIGN.** (check of signalling cells not included in the Central Warning Display)
32.	Green signal lamp for pyrocartridge circuit check
33.	Switch **FIRE EXT.** **II I 0 I II**
34.	Push-button switch **ENG. FIRE SIGN. I**
35.	Push-button switch **ENG. FIRE SIGN. II**
36.	Push-button switch **ENG. FIRE SIGN. III**
37.	Push-button **FIRE DET. CHECK**

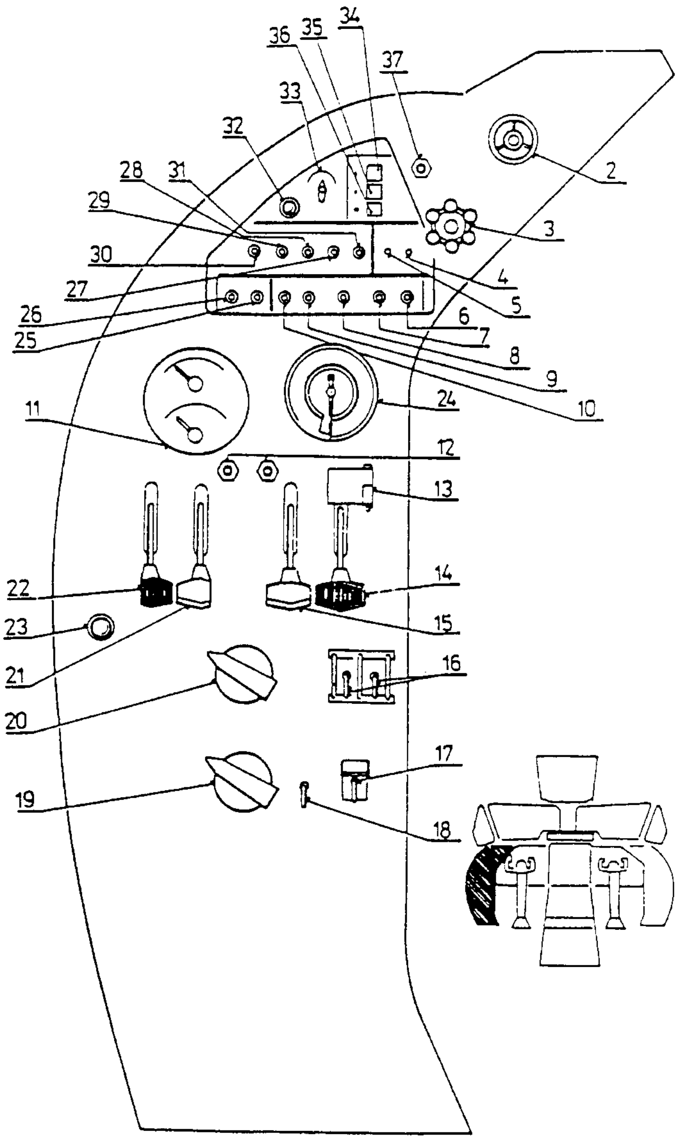

Fig. 7 – 5 LH control panel

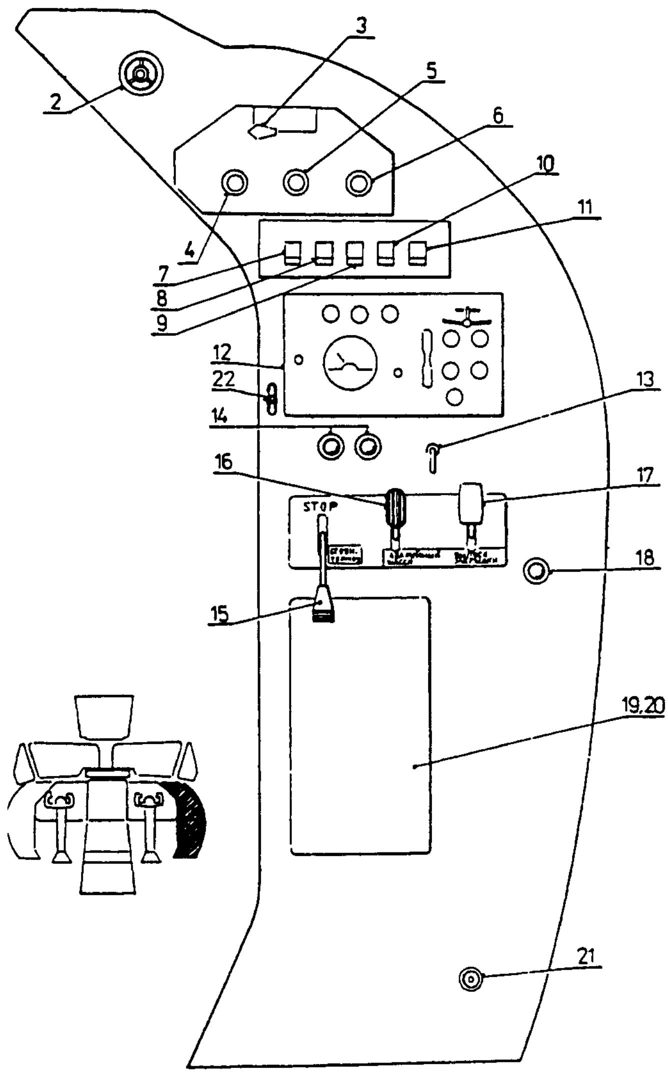

Fig. 7 – 6 RH control panel

Legend for Fig. 7-6

No.	Name
1.	Reserved
2.	Individual ventilation nozzle
3.	Switch INV. SELECT 115
4.	Switch VA METER
5.	Voltmeter switch INVERT. 36 V
6.	Voltmeter switch LH BUS-BAR, RH BUS-BAR, INVERT. 115V
7.	Push-button switch for heating STALL PROBE
8.	Push-button switch for heating STATIC HEADS I
9.	Push-button switch for heating STATIC HEADS II
10.	Push-button switch for heating PITOT HEADS I
11.	Push-button switch for heating PITOT HEADS II
12.	Control box of the airframe deicing
13.	Switch WATER DRAIN
14.	Green signal lamps IELU OPERATIVE LH RH
15.	Control lever of the parking brake PARKING BRAKE
16.	Control lever of the landing gear emergency extension (sealed) EMERG. EXTENSION LAND. GEAR
17.	Control lever of the wing flaps emergency extension (sealed) EMERG. EXTENSION WING FLAPS
18.	Amber signal lamp OIL
19.	Distribution box cover
20.	Distribution box with fuses
21.	Socket 27 V DC
22.	Pull rod with handle for fire extinguishing system of the front baggage compartment

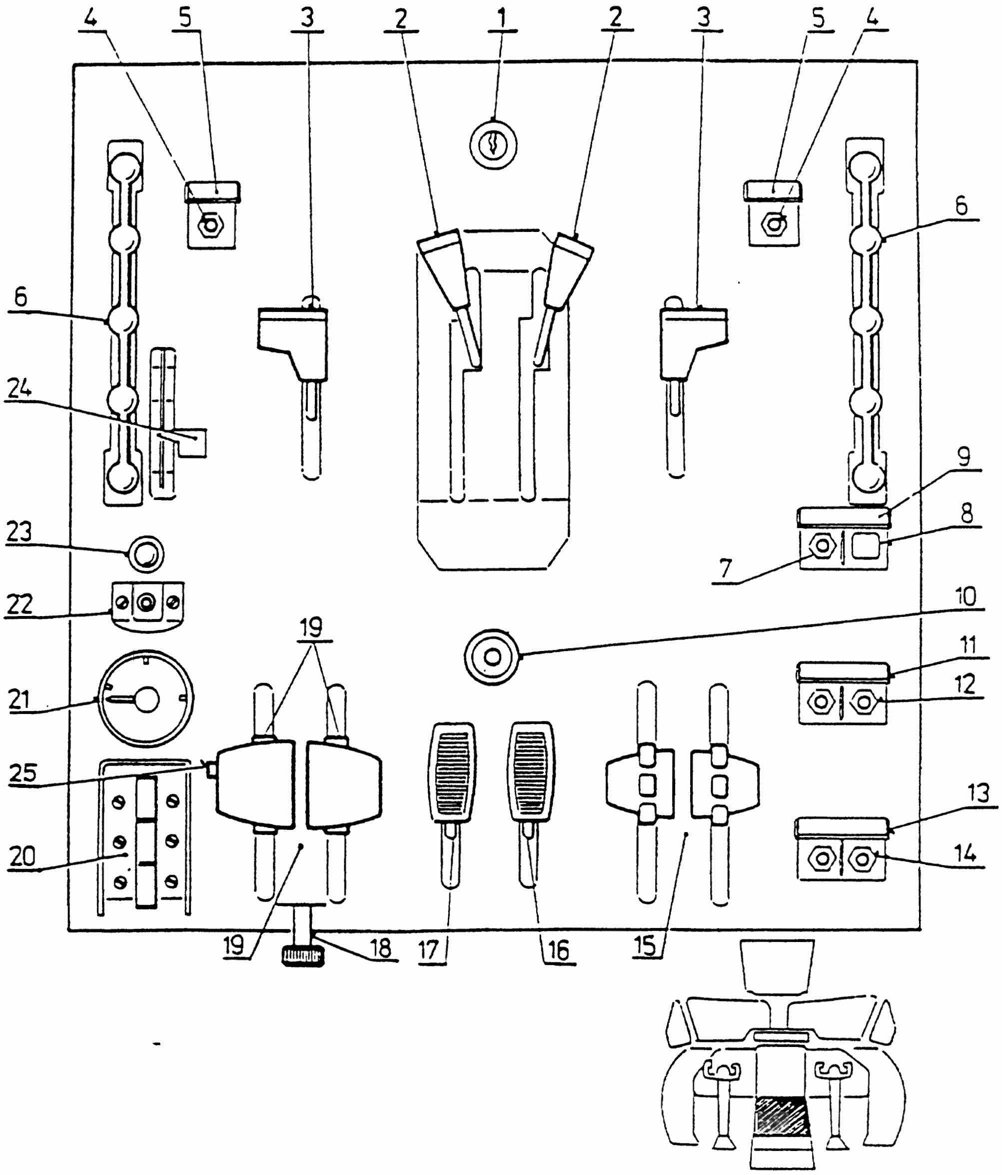

Fig. 7 - 7 Front control panel

Legend for Fig. 7 – 7

No.	Name
1.	Locking of fuel stop cock/Emergency throttle levers
2.	Fuel stop cock/Emergency throttle levers **FUEL STOP COCK** **EMERGENCY THROTTLE LEVER**
3.	Fuel fire cocks **OPEN – FUEL – SHUT** **SHUT – FUEL – OPEN**
4.	Manual feather push–button
5.	Cover **MANUAL FEATHER**
6.	Elevator trim tab control **NOSE – HEAVY – TAIL**
7.	Water injection push–button **ON**
8.	Water injection push–button **OFF**
9.	Double cover **WATER INJECTION**
10.	Mechanical indicator of nose landing gear leg position
11.	Double cover **DRY MOTORING RUN**
12.	Dry motoring run push–button
13.	Double cover (grey) **ENGINE STARTING**
14.	Engine starting push–button
15.	Propeller control levers (PCL)
16.	Friction lever of the propeller control levers **FRICTION PROP.**
17.	Friction lever of the throttle control levers **POWER FRICTION**
18.	Adjustable stop of the maximum take–off power **n_G ADJUSTMENT**
19.	Throttle control levers (TCL)
20.	Rudder trim tab change–over switch **TURN**
21.	Rudder trim tab position indicator
22.	Aileron trim tab control change–over switch **BANK** **LEFT – RIGHT**
23.	Green aileron trim tab position signal lamp
24.	Elevator trim tab position indicator
25.	GA push–button (GO–AROUND) (if autopilot is installed)

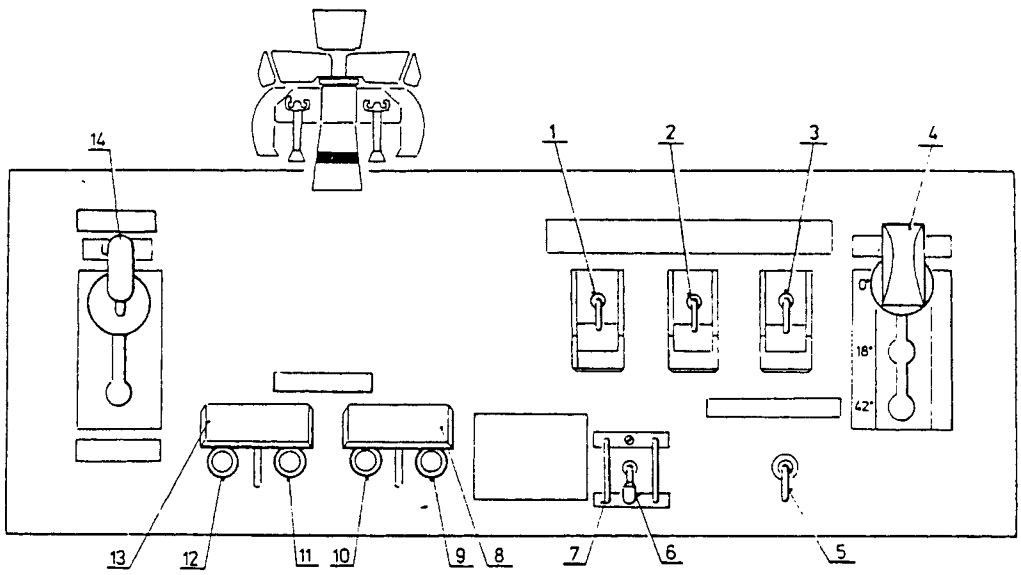

Fig. 7 – 8 Central control panel

Legend for Fig. 7 – 8

No.	Name
1.	Switch SPOILERS
2.	Switch AUT. BANK CONTROL
3.	Switch AUTOFEATHER
4.	Actuator WING FLAPS 0° 18° 42°
5.	Switch ANTISKID
6.	Switch PEDAL NOSE WHEEL STEERING MANUAL
7.	Fence
8.	Double cover (sealed) PRIM. SEC.
9.	Fire exting. push–button SEC.
10.	Fire exting. push–button PRIM.
11.	Fire exting. push–button SEC.
12.	Fire exting. push–button PRIM.
13.	Double cover (sealed) PRIM. SEC.
14.	Landing gear actuator LAND. GEAR UP DOWN

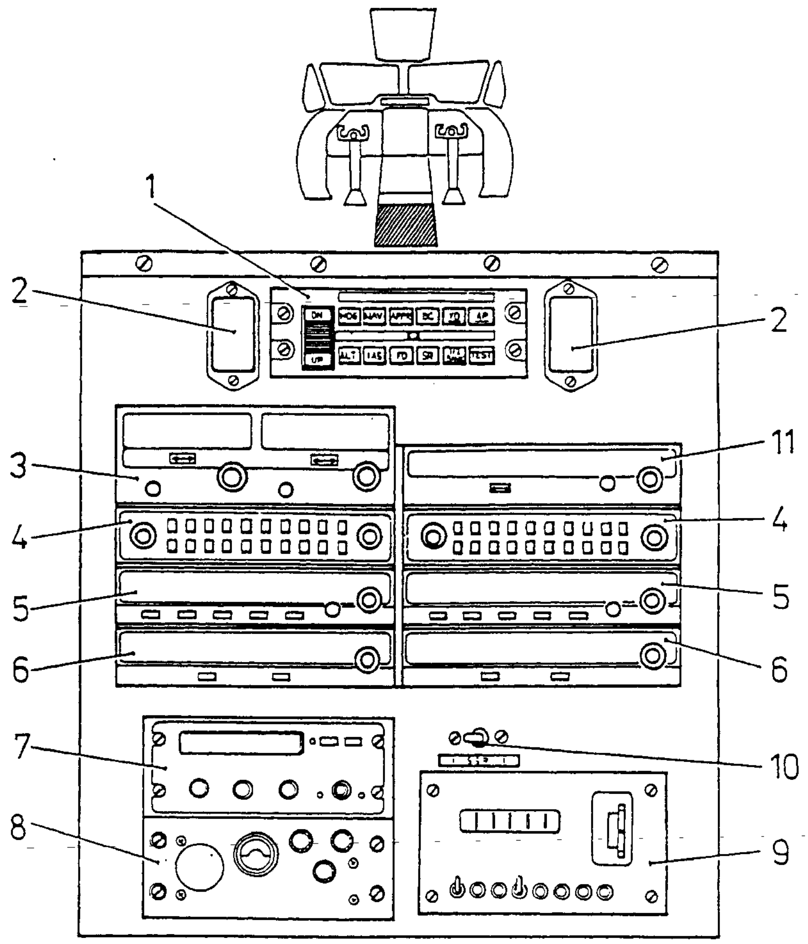

Fig. 7 – 9 Rear control panel

Legend for Fig. 7 – 9

No.	Name
1.	Control box of the autopilot
2.	Control box of the gyrocompasses
3.	Control box of the VHF/NAV
4.	Audio switch box
5.	Control box of the ADF
6.	Control box of the ATC
7.	Control box of the HF radiostation
8.	Control box of the voice recorder
9.	Control box of the flight data recorder
10.	Switch **I - SSR - II**

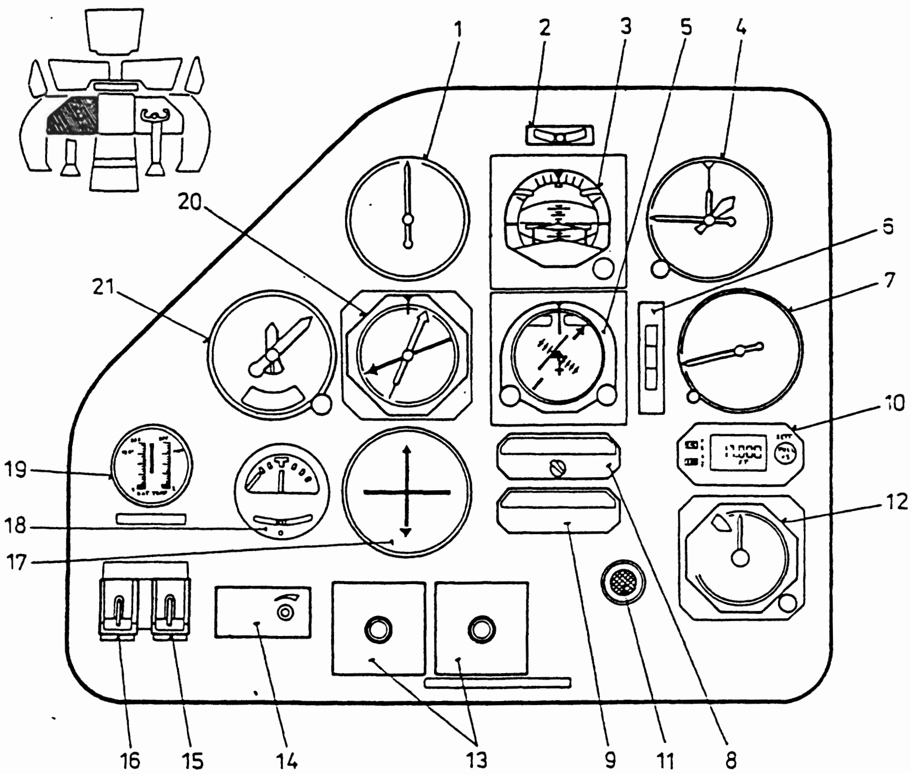

Fig. 7 – 10 LH instrument panel

Legend for Fig. 7 – 10

No.	Name
1.	Airspeed indicator
2.	Inclinometer indicator
3.	Gyro horizon
4.	Encoding altimeter
5.	Pictorial navigation indicator (PNI)
6.	MKR indicator
7.	Vertical speed indicator
8.	DME indicator
9.	DME indicator
10.	Altitude/vertical speed selector
11.	Microphone
12.	Radar altimeter indicator
13.	Rheostat II. circuit and rheostat I. circuit **LIGHTING CIRCUIT II** **LIGHTING CIRCUIT I**
14.	Instrument panel lighting **LIGHTING CIRCUIT I**
15.	Turn/bank indicator switch **TURN/BANK IND.**
16.	Gyro horizon switch **GYRO HORIZON**
17.	Course deviation indicator (CDI)
18.	Turn and bank indicator with correction cut–off switch
19.	Dual battery temperature indicator (if installed)
20.	Radio magnetic indicator (RMI)
21.	Altimeter

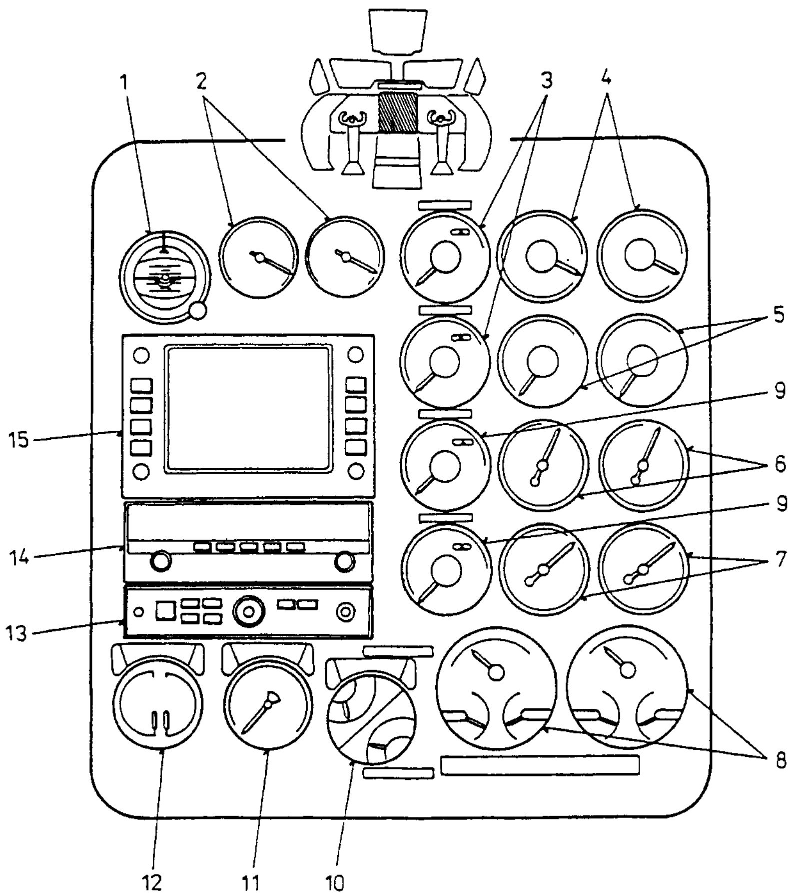

Fig. 7 – 11 Central instrument panel

Legend for Fig. 7 – 11

No.	Name
1.	Gyro horizon
2.	Fuel flow indicator
3.	Fuel gauge indicator **LH MAIN TANKS** **RH MAIN TANKS**
4.	Torque indicator
5.	Inter–turbine temperature indicator
6.	Gas generator speed indicator
7.	Propeller RPM indicator
8.	Three–pointer indicator (oil temperature, oil pressure, fuel pressure)
9.	Wing tip tank fuel quantity indicator **LH TIP TANKS** **RH TIP TANKS**
10.	Dual pressure gauge (Hydraulic system/Brake accumulator) **POWER SOURCE** **BRAKE ACCUM.**
11.	Pressure gauge (hand brake)
12.	Dual pressure gauge (feet operated brake)
13.	Graphic unit
14.	Receiver VOR/ILS
15.	Weather radar display

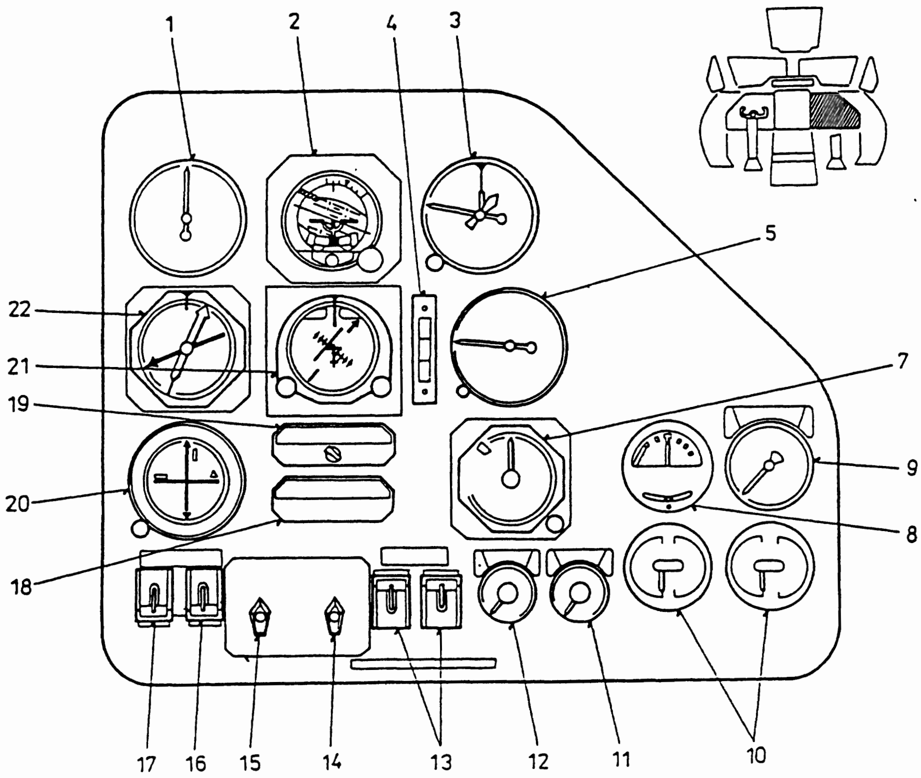

Fig. 7 – 12 RH instrument panel

Legend for Fig. 7 – 12

No.	Name
1.	Airspeed indicator
2.	Gyro horizon
3.	Encoding altimeter
4.	MKR indicator
5.	Vertical speed indicator
6.	Reserved
7.	Radar altimeter indicator
8.	Turn and bank indicator with correction cut–off–switch
9.	Manometer of front baggage compartment fire extinguisher
10.	Voltampermeter
11.	Voltmeter 115 V
12.	Voltmeter 36 V
13.	Switch WING TIP TANK FUEL TRANSFER
14.	Switch PROP. DEICING – STBY MAIN
15.	Switch WINDSHIELD HEATING – 0 I II
16.	Switch GYRO HORIZON
17.	Switch TURN/BANK IND.
18.	DME indicator
19.	DME indicator
20.	Course deviation indicator (CDI)
21.	Pictorial navigation indicator (PNI)
22.	Radio magnetic indicator (RMI)

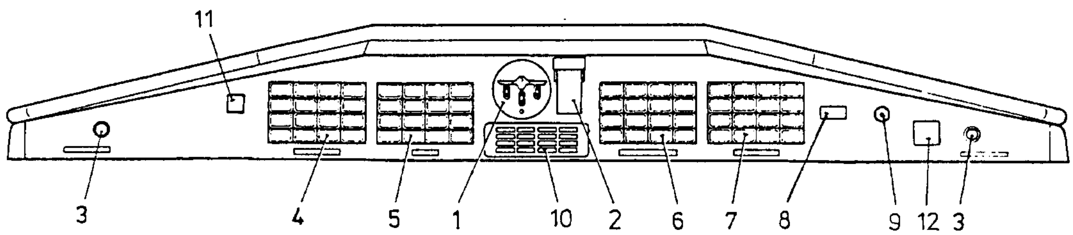

Fig. 7 – 13 Glareshield of the instrument panel

Legend for Fig. 7 – 13

1. Landing gear position indicator
2. Signalling cell of the wing flaps
3. Green signal lamp WINDSHIELD HEAT.
4. Central warning display LH ENGINE
5. Central warning display AIRFRAME
6. Central warning display ELECTRO
7. Central warning display RH ENGINE
8. Amber signal lamp PITOT HEATING
9. Switch FAST ERECT
10. Autopilot control box
11. Push–button NAV 1 / NAV 2 HSI - AP NAV. SOURCE
12. Signal cell HSI - AP NAV. SOURCE

✻ – mark if installed

● – mark for circuit breaker (the others are switches)

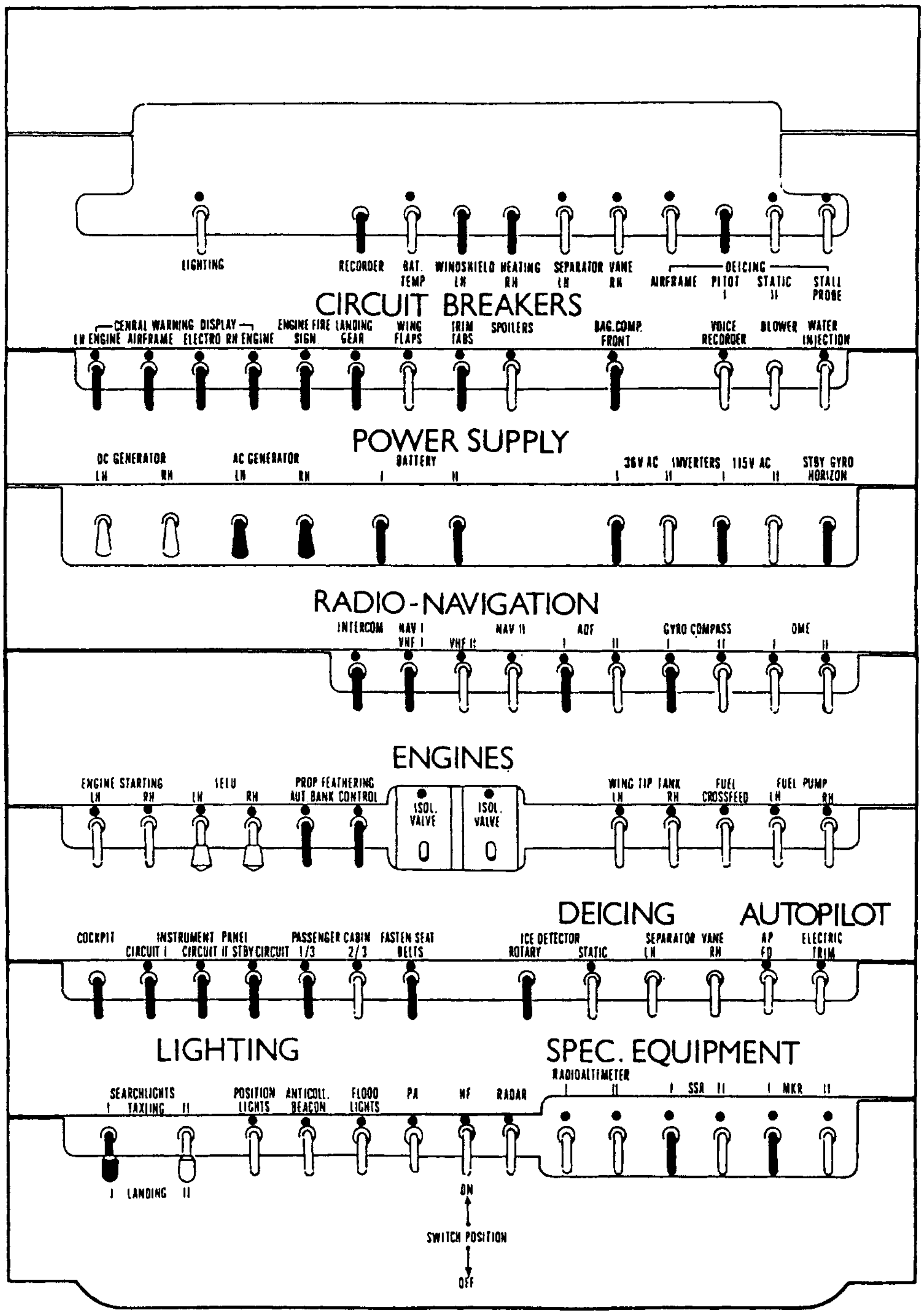

Fig. 7 – 14 Overhead panel

NOTE

The circuit breakers/switches shown in black color are actually marked with a amber strip in the airplane.

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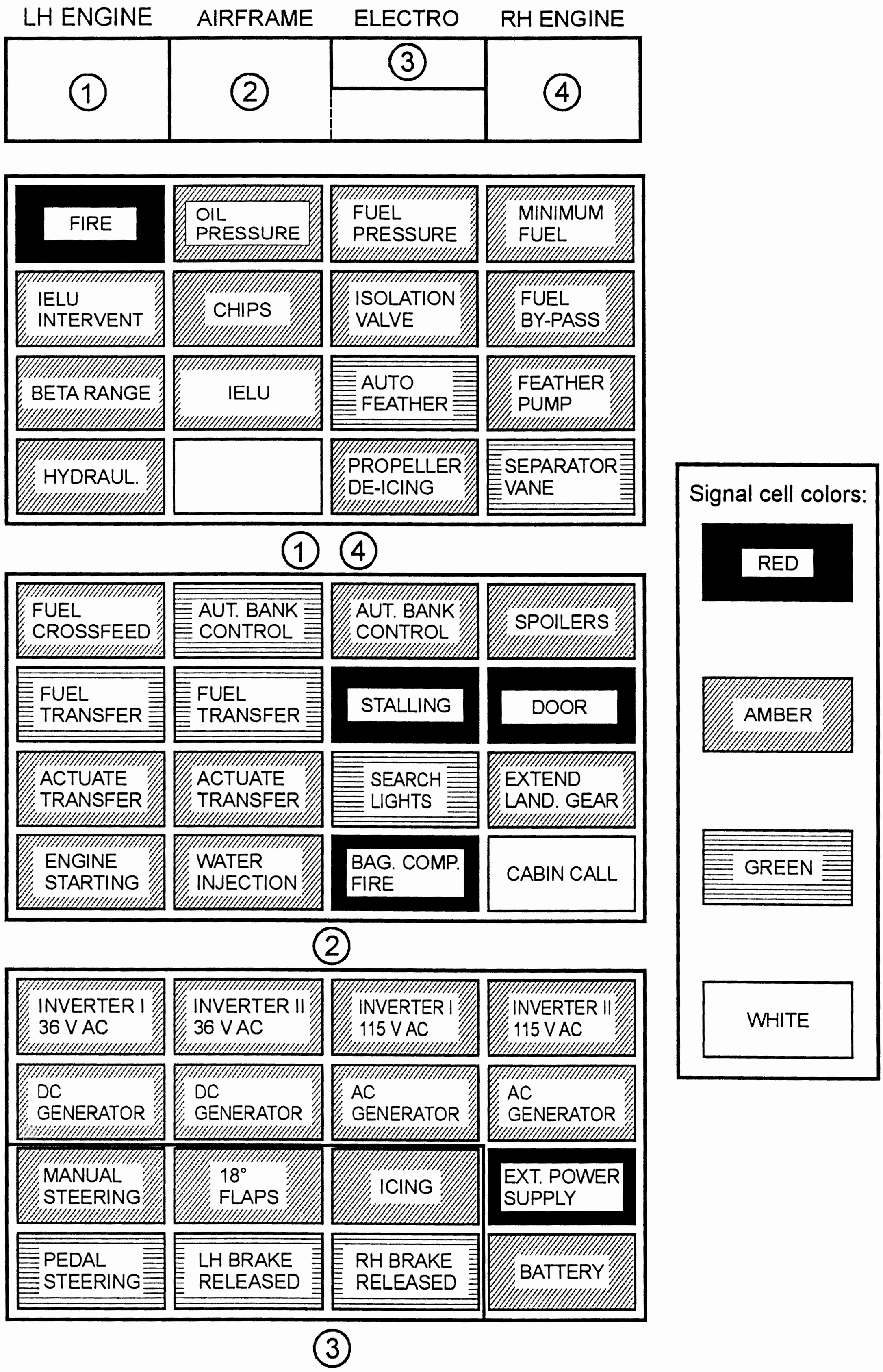

Fig. 7 – 15 Central warning display

Light signal	Indicated state	Procedure
FIRE (bell rings)	Increased temperature in fire zone of engine.	See Section 3, Engine fire.
OIL PRESSURE	Pressure in engine oil system less than 1.2 kp/cm^2 (17.1 psi).	See Section 3A, Oil pressure below minimum.
FUEL PRESSURE	Fuel pressure less than 0.3 kp/cm^2 (4.27 psi).	See Section 3A, Fuel.
MINIMUM FUEL	Fuel reserve in relevant group of tanks is down to 108 ± 5 kg (238 ± 11lb).	Check navigation estimates whether this is false alarm.
IELU INTERVENT	Indicated engine has been throttle back to reduced power output by electronic limiting system.	Check engine instruments for cause of intervention; if justified, follow Section 3A, Spontaneous IELU interventions.
CHIPS	Metal chips have formed a conductive layer on the magnetic drain plug in oil reservoir or in engine reduction gear.	See Section 3A, Metal chips in the oil.
ISOLATION VALVE	A. Switching on ISOL. VALVE on overhead control panel, when emergency fuel control circuit is utilized deliberately or : B. Automatic or manual feathering of malfunctioning engine when its torque is below 18%.	See Section 3A, Fuel. See Section 3A, Propeller.
FUEL BY-PASS	Excessive flow resistance of fuel filter has opened by-pass valve in fuel feed line to engine.	After landing report filter trouble to ground staff.
BETA RANGE	Propeller pitch is set to angle bellow angle for flight idle.	See Section 4, Engines and propellers.
IELU	Engine performance limiters switched off either deliberately, or by automatic feathering in response to engine power loss.	See Section 3A, Spontaneous IELU interventions and Automatic feathering.
AUTO FEATHER	Automatic feathering system is armed and the Throttle lever is set to more than 88% (or more than 92%) n_G.	See Section 3A, Automatic feathering.
FEATHER PUMP	Propeller feathering pump is running.	
HYDRAUL.	Hydraulic fluid temperature is higher than 85°C.	After landing report condition to the ground staff.
	Vacant - reserved.	
PROPELLER DE-ICING	Failure of some part of propeller de-icing system (including contactor).	See Section 3A, Deicing system.
SEPARATOR VANE	Separator vane in engine air inlet duct is not in closed position.	
FUEL CROSSFEED	Solenoid valve in fuel crossfeed line connecting LH and RH groups of fuel tanks, open.	See Section 4, Fuel system.

Light signal	Indicated state	Procedure
AUT. BANK CONTROL (green light)	Automatic bank control system is armed. PROP FEATHERING/ AUT BANK CONTROL circuit breakers on the overhead panel are on, and AUT. BANK CONTROL switch on the central control panel is on.	When airspeed exceeds 111 kt (205km/hr) IAS the light goes off and the system is disarmed.
AUT. BANK CONTROL (amber light)	Automatic extension of a ABC tab has taken place.	See Section 4, Controls.
SPOILERS	Spoilers are extended.	When button is released the spoilers retract and the light goes off.
FUEL TRANSFER	Fuel transfer pump in indicated wing tip tank delivers fuel.	See Section 3A, Fuel system
STALLING (and intermittently sounded horn)	Airspeed is only about 8 kt (15 km/hr) higher than the stalling speed.	Increase airspeed.
DOOR	Entry door, or door in the front part of the passenger cabin, or front baggage compartment door are not secured in closed position.	The signal goes off when door is closed properly.
ACTUATE TRANSFER	Fuel reserve in one group of tanks (one wing) is down to 220 kg (485 lb) but fuel transfer pump in wing-tip tank on that side is not running, or there is a failure of automatic switch of fuel transfer.	See Section 4, Fuel system.
SEARCH LIGHTS	Search lights switched on.	
EXTEND LAND GEAR (continuously sounding horn)	Wing flaps extended while landing gear is retracted, both engines to idling and airspeed below 111 kt (205 km/hr) IAS with the landing gear retracted.	Lights goes off when landing gear is extended or other conditions (necessary for coming on) are cancelled.
ENGINE STARTING	Starter-generator is working in starter mode. If more than 20 seconds has elapsed since ENGINE STARTING push-button (LH or RH) was depressed, this is a fault indication: the starting circuit has failed to disconnect automatically.	See Section 4, Engine starting.
WATER INJECTION	Operating pressure has built up in the water injection piping system.	See Section 4, Water injection.
BAG. COMP. FIRE	Presence of smoke at the smoke detector in front baggage compartment.	See Section 3, Front baggage compartment fire.
CABIN CALL	CREW CALL push-button in passenger cabin is activated.	Signal goes off when button is released.
MANUAL STEERING	Nose wheel steering is in MANUAL mode.	See Section 4, Controls.
PEDAL STEERING	Nose wheel steering is in PEDAL mode. The light will only come on to confirm the switching over when pedals are in neutral position.	See Section 4, Controls.

Light signal	Indicated state	Procedure
FLAPS 18°	Wing flaps in some other than 18° position (0° or 42°) on the ground.	Before take–off set flaps to 18°.
ICING	Increasing of the ice layer on the rotary ice detector.	See Section 4, Flight under icing condition.
LH BRAKE RELEASED RH BRAKE RELEASED	Hydraulic fluid delivered to LH or RH brake cylinder is being bypassed to return line in response to impulses from antiskid system.	
INVERTER36V AC (two lights)	Loss of voltage from AC inverter 3x36 V, 400 Hz (Inverter I or inverter II).	See Section 3A, Electrical system.
INVERTER 115V AC (two lights)	Loss of voltage from AC inverter 1x115 V, 400 Hz (Inverter I or inverter II).	See Section 3A, Electrical system.
DC GENERATOR (two lights)	Loss of voltage from LH or RH DC generator.	See Section 3A, Electrical system.
AC GENERATOR (two lights)	Loss of voltage from the LH or RH AC generator.	See Section 3A, Electrical system.
EXT. POWER SUPPLY	External electrical power is connected to airplane's DC main buses.	See Section 4, Engine starting and Electrical system.
BATTERY	One or both on–board batteries are disconnected from airplane's electrical DC main buses or failure in battery circuit.	See Section 4, Electrical system.

FUSE PANEL

The fuse panel is situated inside the pilot's cabin on the fuselage right panel between frames No 5 and 6. Spare fuses are located in the bag on the right side next to copilot.

NOTE

The fuse panel example mentioned herein is informative. The fuse values and text of the labels are differed according to the equipment of a particular airplane version. The labels on the fuse panel show protected system (e.g. OIL PRESSURE) and the fuse value (e.g. 0.63 A).

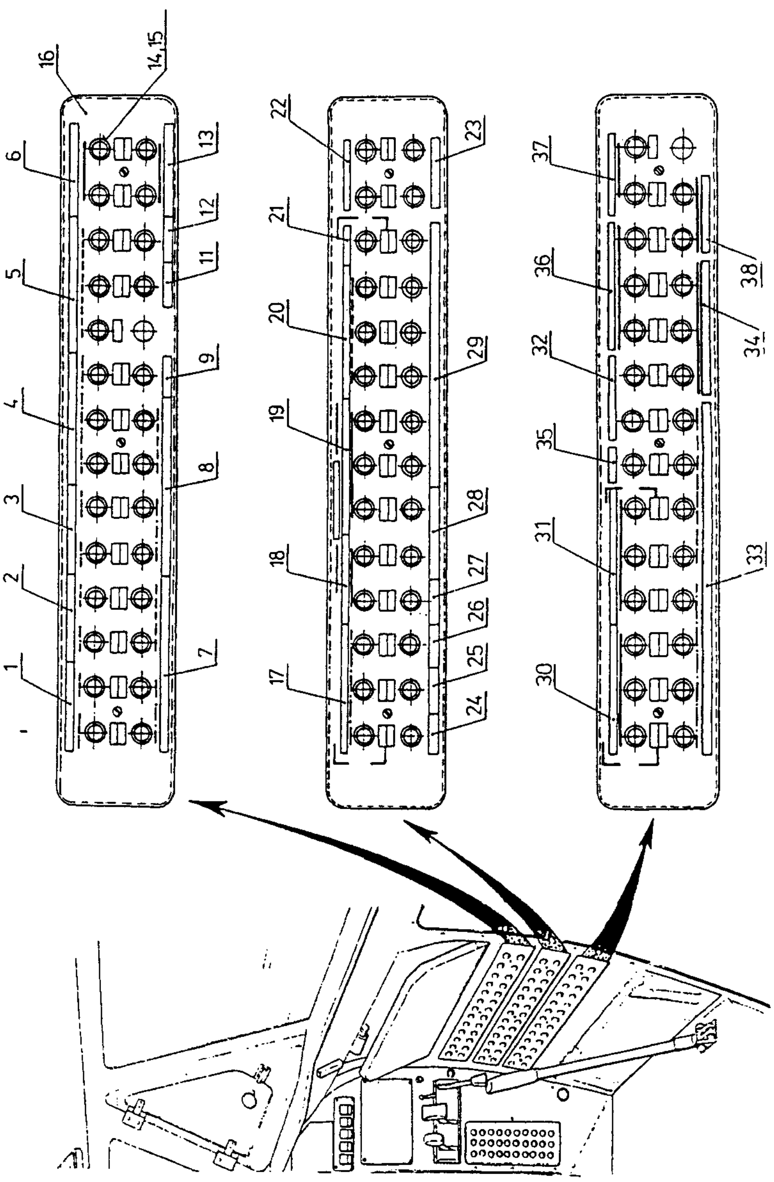

Fig. 7 - 15A Fuse panel

No.	Name	Value	Qty
1.	OIL. TEMP – fuse	0.63 A	2
2.	FUEL PRESS. – fuse	0.63 A	2
3.	OIL PRESS. – fuse	0.63 A	2
4.	FUEL GAUGE IND. – ICE DETECTOR – fuse	0.63 A	3
5.	FUEL GAUGE INDICATOR – fuse	0.63 A	3
6.	HYDRAULIC PRESS – fuse	0.63 A	2
7.	IGNITION – fuse	4 A	4
8.	TORQUE INDICATOR – fuse	0.4 A	4
9.	PYROCARTRIDGE TEST – fuse	0.4 A	1
10.	–	–	–
11.	NOSE WHEEL STEERING – fuse	4 A	1
12.	ANTISKID – fuse	4 A	1
13.	BRAKES – HYDRAULIC PRESS. – fuse	0.63 A	2
14.	Plug cartridge	–	–
15.	Fuse holder	–	–
16.	Cover	–	–
17.	CENTRAL WARNING DISPLAY LH ENGINE – fuse	1 A 1.6 A	1 1
18.	CENTRAL WARNING DISPLAY AIRFRAME – fuse	1 A	2
19.	CENTRAL WARNING DISPLAY ELECTRO – fuse	1 A 1.6 A	1 1
20.	CENTRAL WARNING DISPLAY RH ENGINE – fuse	1 A	3
21.	SIGNALLING CHECK – fuse	2 A	1
22.	RMI LH, RMI RH – fuse	1 A	2
23.	GYROCOMPASSES I,II 26 V / 400 Hz – fuse	1 A	2
24.	SIGNALLING – fuse	1.6 A	1
25.	LAND. GEAR ACOUST. SIGNALLING – fuse	4 A	1
26.	LIGHT STALLING SIGNAL – fuse	1 A	1
27.	ACOUSTIC STALLING SIGNAL – fuse	2 A	1
28.	HYDRAULIC SIGNALLING – fuse	0.4 A	2
29.	WING TIP FUEL TANK GAUGE – fuse	0.63 A	6
30.	VOLTMETER INVERTER 36 V I – fuse	1 A	3
31.	VOLTMETER INVERTER 36 V II – fuse	1 A	3
32.	EMER. LIGHTING – fuse	1 A	1
33.	TURN/BANK INDICATOR – fuse	0.4 A	8
34.	FLIGHT RECORDER – fuse	1 A 0.4 A	2 1
35.	AUTOPILOT – fuse	1 A	1
36.	RADAR – fuse	3.15 A 5 A	2 1

(cont.)

No.	Name	Value	Qty
37.	LOADSPEAKERS – fuse	2.5 A	2
38.	INTERCOM I, II – fuse	2 A	2

Colour identification of stripes above the fuses:

- - - - - - - green

–.–.–.–.–.–.–.– amber

———— white

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WING FLAPS, SPOILER SYSTEM AND ABC SYSTEM

WING FLAPS CONTROL (see Fig. 7 - 16)

The flaps control system is an electrohydraulic system. The electric circuit of flaps is switched on by FLAPS circuit breaker on the overhead panel. The flap control itself is performed with the controller located on the centre control panel. The controller has three fixed positions: 0° - 18° - 42°. The individual positions are indicated on the flaps position indicator on the glareshield of instrument panel. The indicator is supplied via the CWD/AIFRAMEcircuit breaker and right operation of all of its circuits can be checked by pushing the push button SIGN on the test panel on the left control panel.

The flaps can be extended into the position 42° only at an airspeed lower than 111 KIAS (205 km/hr IAS), at a higher speed the extension into this position is blocked automatically.

The limit switch which protects extension of the flaps at open cargo door is installed in the flaps control system.

The operational part of the wing flaps control is hydraulic. In case of the main hydraulic circuit failure it is possible to extend the flaps by means of an emergency hydraulic circuit. The needed pressure in this circuit is reached by pumping the hand pump.

SPOILERS CONTROL (see Fig. 7 - 17)

The spoiler control system is an electrohydraulic system. The power supply is led via the circuit breaker SPOILERSon the overhead panel and switch (which are controlled by pushing plateSPOILERS)on the central control panel. The system is armed by switching on these two switches.

The spoilers extending is performed by pushing the two pushbutton (which are controlled by pushing plate SPOILERS)on the left steering wheel. The pushbuttons are protected from unintentional pushing with the latch of the pressure plate. The spoilers are in the extended position only for time when the pushbuttons are held down. Spoilers extension is signalled by lighting up the amber signal cell SPOILERSon the central warning display.

AUTOMATIC BANK CONTROL (see Fig. 7 - 18)

The automatic bank control system (ABC) serves for automatic compensation of bank in case of an engine failure in flight, approach and aborted take-off.

The ABC system consist of two independent control tabs located on the wing tip a fornt of ailerons. The automatic bank control tabs are actuated by an electrohydraulic system, where the electric circuits are fed via the PROP FEATHERING/ AUT. BANK CONTROLcircuit breakers on the overhead control panel and the AUTOMATIC BANK CONTROLswitch on the central control panel.

When the circuit breakers and switch are on, and simulanteneously, TCL of both engines are in position corresponding to n_G min. 88% ± 1% (for OAT −50 °C to +20 °C) or min. 92% ± 1% (for OAT −20 °C to +50 °C) then the ABC system is in stand−by , ready to intervene, and this is indicated by the green AUT. BANK CONTROLsignal cell on the CWD.

(cont.)

If during take–off the torque of either engine drops to about 22%, the green AUT. BANK CONTROL signal cell goes out. The ABC tab on the side of the malfunctioning engine is blocked in its retracted position and the ABC tab on the side of the normally working engine is extended; simultaneously, the amber AUT. BANK CONTROL signal cell lights up.

During the approach, when the ABC system is not in stand by conditions in consequence of the position of TCLs, the automatic bank control tabs are extended not in response to diminishing torque, but in response to a reduction of the air pressure downstream of the compressor to less than 0.05 MPa (7.25 psi).

If the ABC system has not intervened, the ABC system is automatically disarmed when the speed reaches 111 kt (205 km/hr) IAS, and the green AUT. BANK CONTROL signal cell on the CWD goes out. When the speed declines to less than 111 kt (205 km/hr) IAS, the ABC system is automatically rearmed.

If the ABC system has intervened, the extended ABC tab retracts at 111 kt (205 km/hr) IAS, and the amber AUT. BANK CONTROL signal on the CWD goes out. When the airspeed declines to less than 111 kt (205 km/hr) IAS, the ABC tab does not extend again and ABC is not in stand–by.

CAUTION

IF ABC SYSTEM HAS INTERVENED, THE RESTORATION OF THE READINESS IS PERMITTED ONLY IN CASE OF SUCCESSFUL RESTARTING OF THE FAILED ENGINE IN FLIGHT. BEFORE THE STARTING OF FAILED ENGINE SWITCH OFF AND AGAIN ON PROP FEATHERING / AUT. BANK CONTROL CIRCUIT BREAKERS ON THE OVERHEAD PANEL.

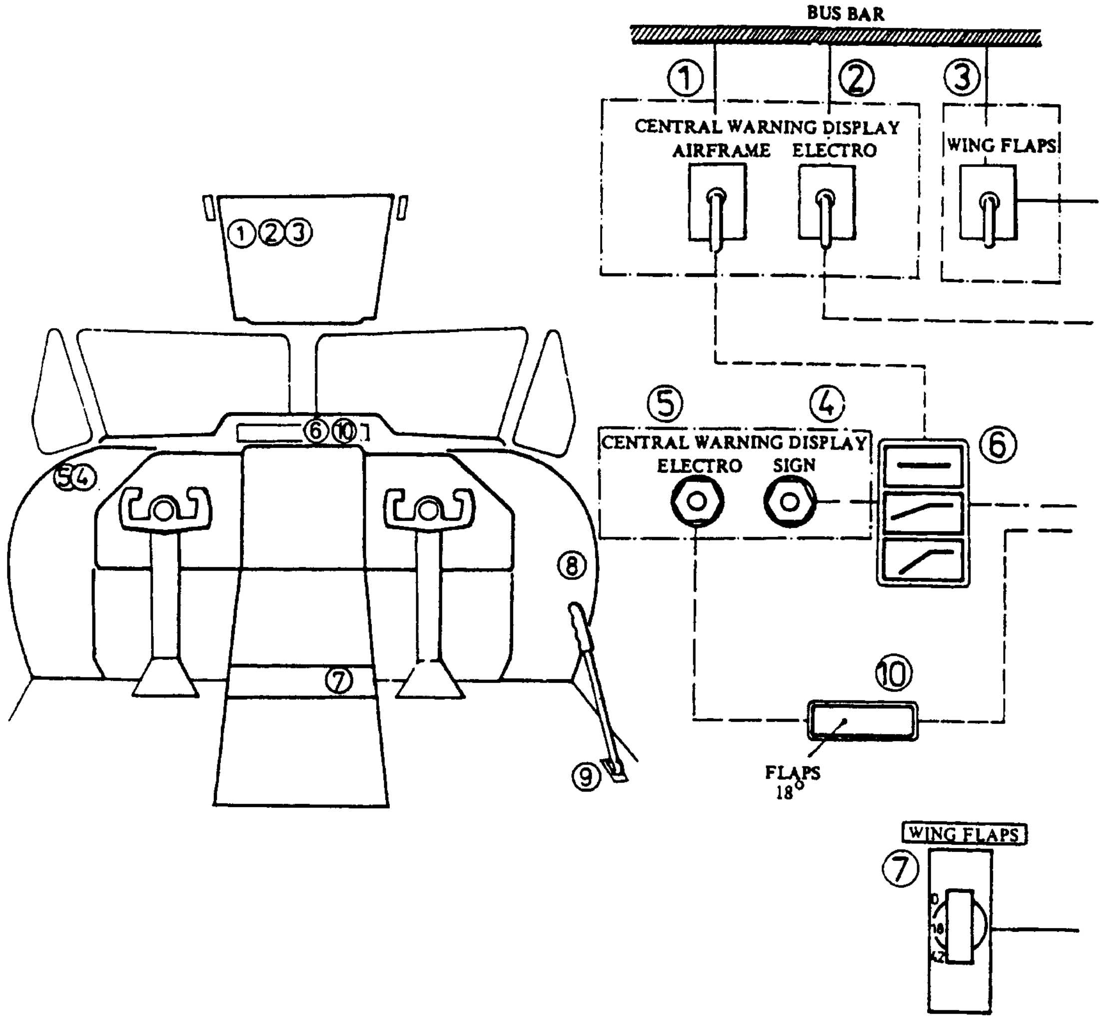
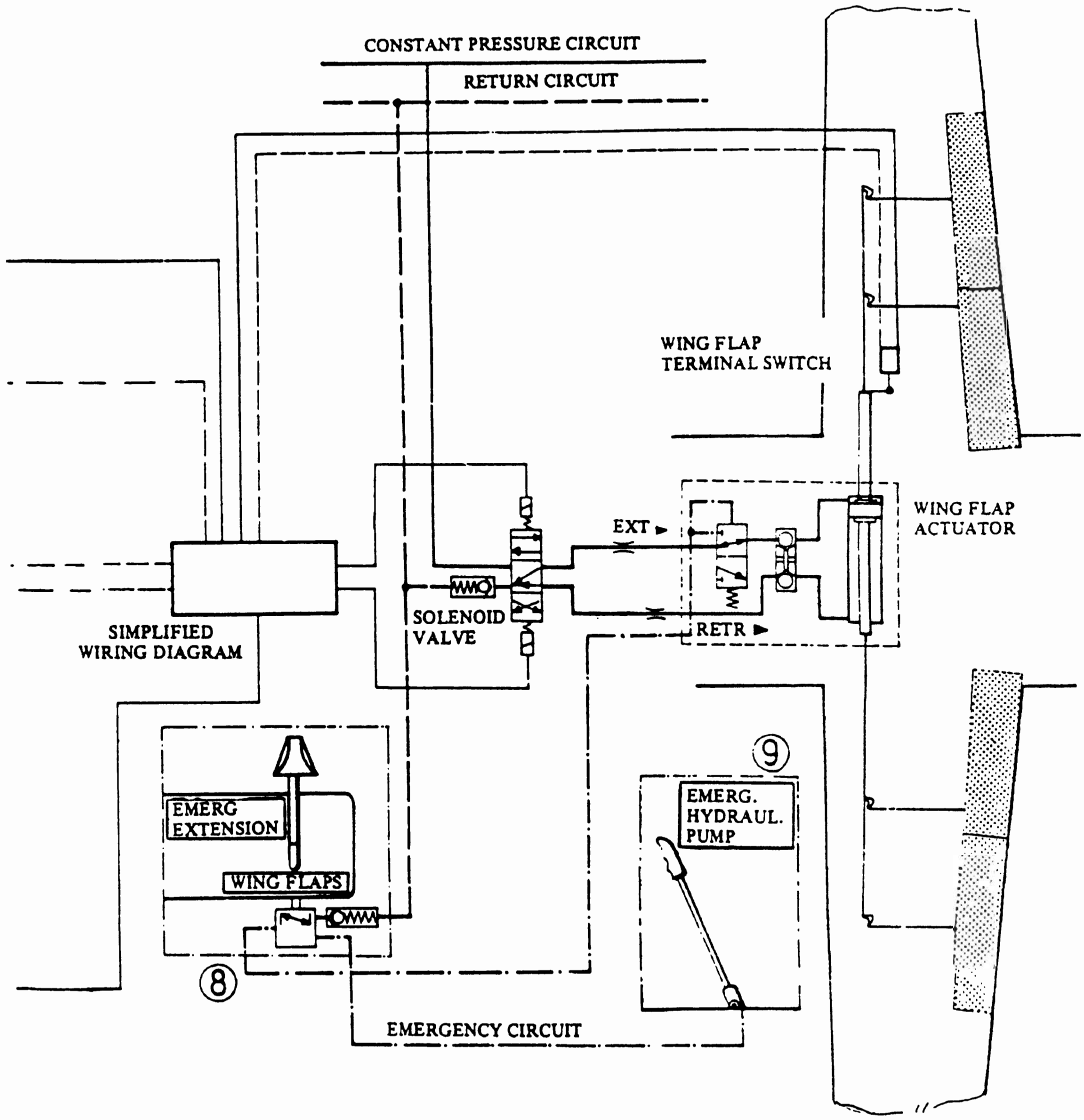


Fig. 7 – 16 Wing flaps control


CONSTANT PRESSURE CIRCUIT
RETURN CIRCUIT
WING FLAP
TERMINAL SWITCH
WING FLAP
ACTUATOR
EXT
RETR
SOLENOID
VALVE
SIMPLIFIED
WIRING DIAGRAM
EMERG
EXTENSION
WING FLAPS
8
9
EMERG.
HYDRAUL.
PUMP
EMERGENCY CIRCUIT

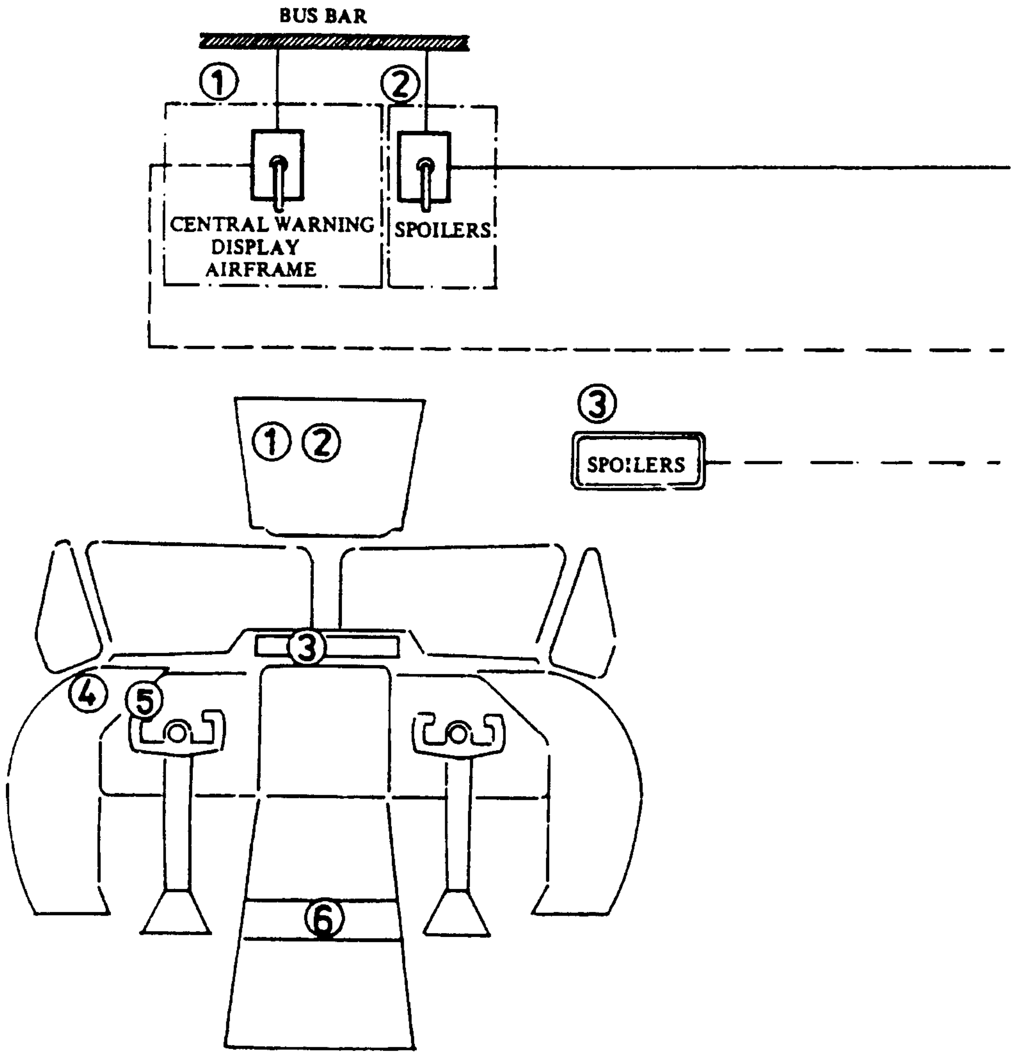
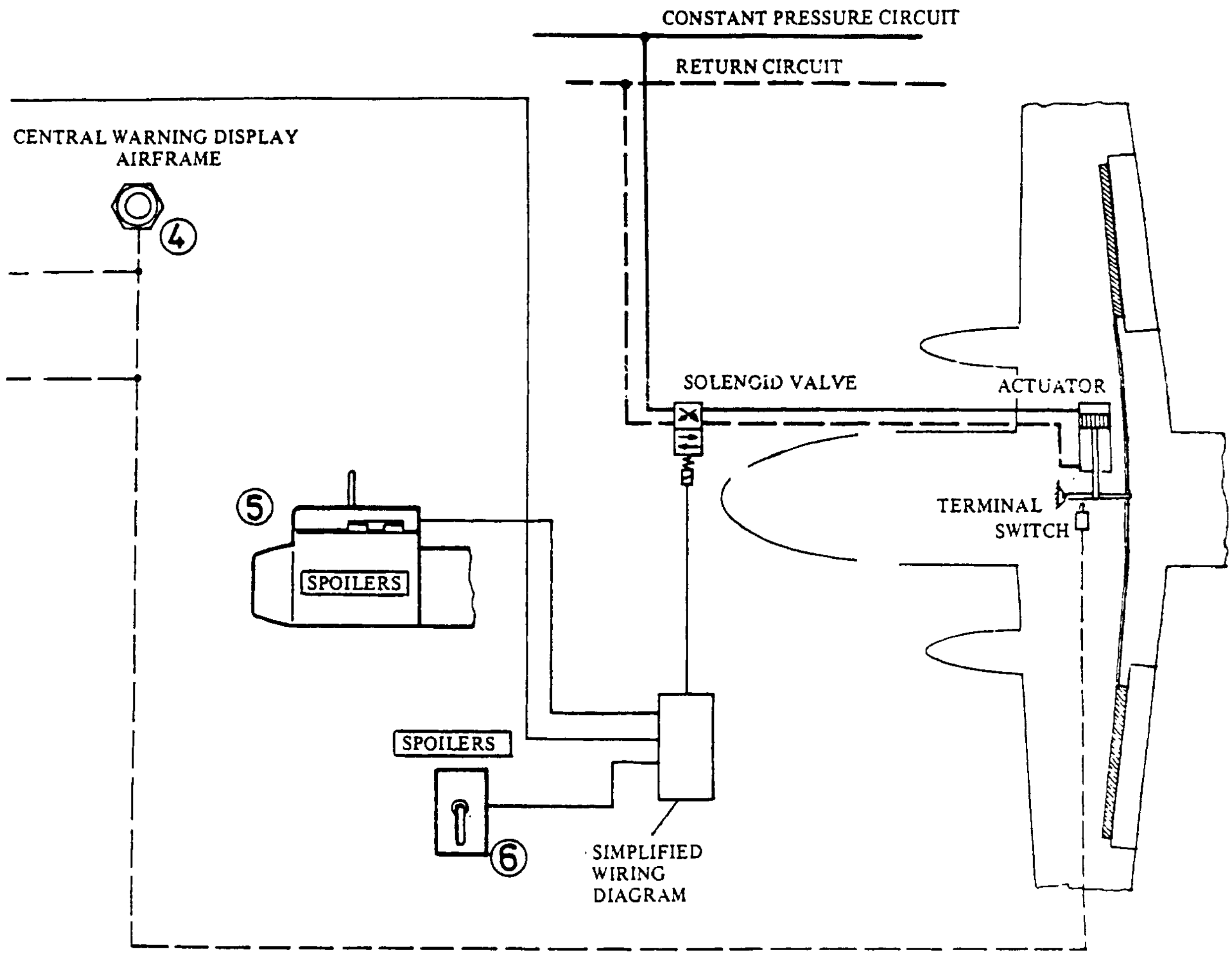


Fig. 7 – 17 Spoilers controls


CONSTANT PRESSURE CIRCUIT
RETURN CIRCUIT
CENTRAL WARNING DISPLAY
AIRFRAME
4
5
SPOILERS
SOLENOID VALVE
ACTUATOR
TERMINAL
SWITCH
SPOILERS
6
SIMPLIFIED
WIRING
DIAGRAM

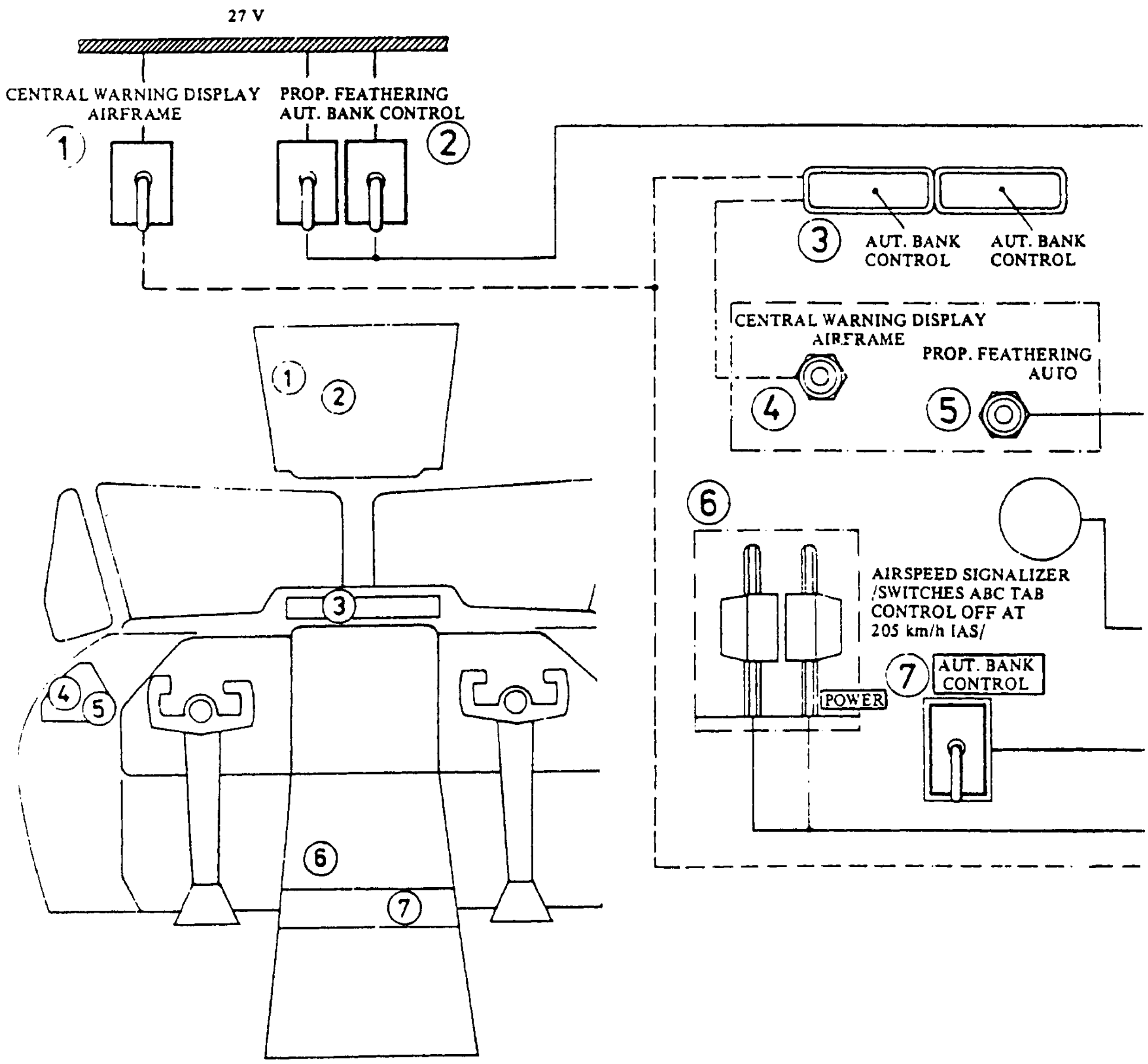
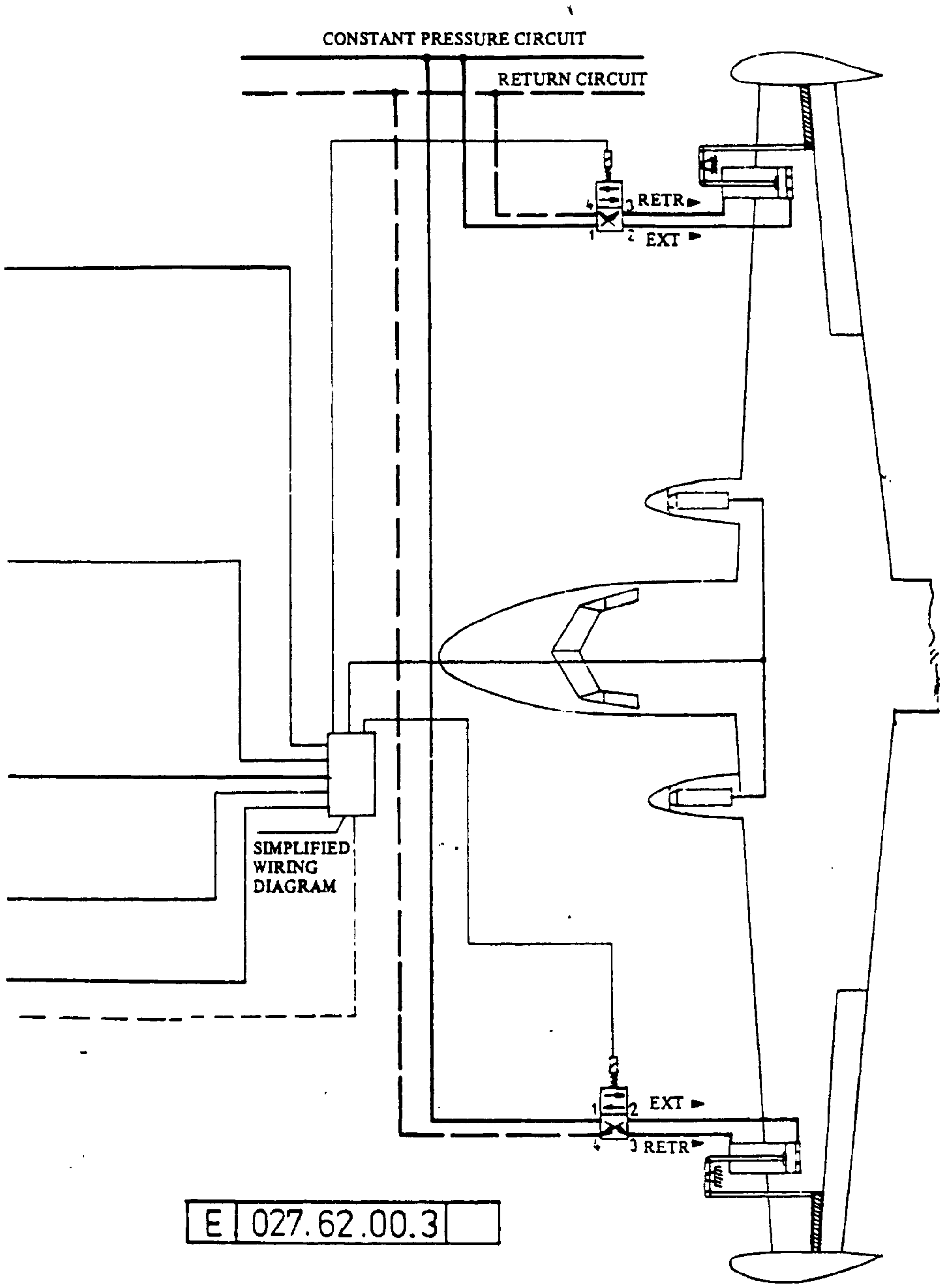


Fig. 7 – 18 Automatic bank control


CONSTANT PRESSURE CIRCUIT
RETURN CIRCUIT
RETR
EXT
SIMPLIFIED
WIRING
DIAGRAM
EXT
RETR
E 027.62.00.3

LANDING GEAR SYSTEM

The landing gear is of three-wheel design. It consists of the nose and main landing gear, a number of hydraulic, mechanical and electric systems with whose assistance the retracting and extending of landing gear, nose landing gear wheel steering and wheel braking is performed. The system is equipped with the emergency circuit for main and nose landing gear extending and wheel braking in the case of the main hydraulic circuit failure.

LANDING GEAR EXTENSION AND RETRACTION (see Fig. 7 - 19)

The landing gear extension and retraction system is electrohydraulic one. The control itself is performed by the landing gear actuator LAND. GEAR (located on the central control panel) by its putting into the position DOWN or UP. At moving the actuator from one position to other position the solenoid valve will switch on the electrohydraulic valve of the landing gear controls. Switching off the electrohydraulic valve is automatic after finishing the cycle (by limit switch).

The landing gear position indication is light, sound and mechanical indication. The light indication is performed with indicator lights located on the glareshield of instrument panel. Lighting on the green lights marks the extended position of the landing gear. An interposition of extending or retracting the landing gear is indicated by three red lights. If landing gear is retracted and locked then no lights light on the visual landing gear position indicator and the mechanical landing gear position indicators (on the landing gear nacelles and on the front control panel) are in down position.

The light indication EXTEND LANDING GEAR is installed on the airplane. This indication is in operation at decrease in an airspeed under 111 kt (205 km/hr) IAS at transition of TCL to idle power position or when wing flaps is extended and landing gear is retracted. The sound indication is in operation simultaneously with lighting on the light indication. The indication is switched off at landing gear extension or at moving either TCL in the direction of engine power increase, or increase in airspeed, or if wing flaps will be retratcted and landing gear is retracted. The landing gear position mechanic indicators are located at the landing gear nacelles and on the front control panel.

The landing gear emergency extension is performed with lever EMERG..EXTENSION LAND. GEAR located on the right hand control panel. The pressure into the extension branch is actuated with a hand pump.

NOSE LANDING GEAR WHEEL STEERING (see Fig. 7 - 20)

The nose landing gear wheel steering system operates in three modes:

(a) Taxiing (manual). This mode makes turning the wheel by $\pm 50^{\circ}$ possible.

(b) Take off and landing (pedal). This mode makes turning the wheel $\pm 4.5^{\circ}$ possible.

(c) Self-turning mode, in case of failure or not switching on power supply of a nose wheel steering solenoid valve as well as after setting the mode setting switch to neutral position.

Switching from the manual mode to the pedal mode is performed with the switch on the central control panel.

The described modes are signalized on the CWD in the cells MANUAL STEERING, PEDAL STEERING.

(cont.)

Limit switches are installed in the supply circuit of the system. One is on the front landing gear leg. It switches off the system after unsticking in take–off and switches on the system after a touch of the ground during landing, another switch is on the pedal steering console. It serves for switching to take–off and landing mode (pedal) at pedal neutral position only.

WHEEL BRAKE (see Fig. 7 - 21)

(a) **Main braking**

The main wheel brake system consists of reduction valves, brake valves located on brake pedals, shuttle valves, inertial transmitters and electrohydraulic distributor. The brake control is separate and it is performed with the left hand and right hand pilot's pedal. Hydraulic energy for braking is supplied from the high pressure main circuit and at failure the hydraulic energy is supplied from sources of the hydraulic accumulator. Brake pressure varies proportionately to the pressure on pedals from 0 to 4.4 + 0.3 MPa (45 + 3 kp/cm^2 [640 + 42 psi]). The brake operation is indicated on a dual pointer pressure gauge located on the central instrument panel.

The system is equipped with the antiskid system with inertial transmitter located at the main landing gear wheel. The ABS is supplied via the LANDING GEAR circuit breaker on the overhead panel and the ANTISKID switch on the central control panel. The ABS operation is indicated signal cells LH BRAKE RELEASED, RH BRAKE RELEASED.

(b) **Emergency braking**

At main braking circuit failure the emergency braking is used to brake the airplane. The braking is performed with the lever PARKING BRAKE on the right control panel and the hand pump. At emergency braking the ABS system is inoperative, that is why it is not permitted to exceed pressure 4.4 + 0.3 MPa (45 + 3 kp/cm^2 [640 + 42 psi])

(c) **Parking brake**

The parking brake is set by the lever PARKING BRAKE as well, and the hand pump. This is used as well as for replenishing of pressure in the emergency hydraulic accumulator. To brake the airplane on an apron pressure 2.45 + 0.5 MPa (25 + 5 kp/cm^2 [354 + 71 psi]) is used, and at engine test pressure 4.9 ± 0.5 MPa (50 ± 5 kp/cm^2 [711 ± 71 psi]) is used. The pressure is checked on the pressure gauge PARKING BRAKE located on the central instrument panel.

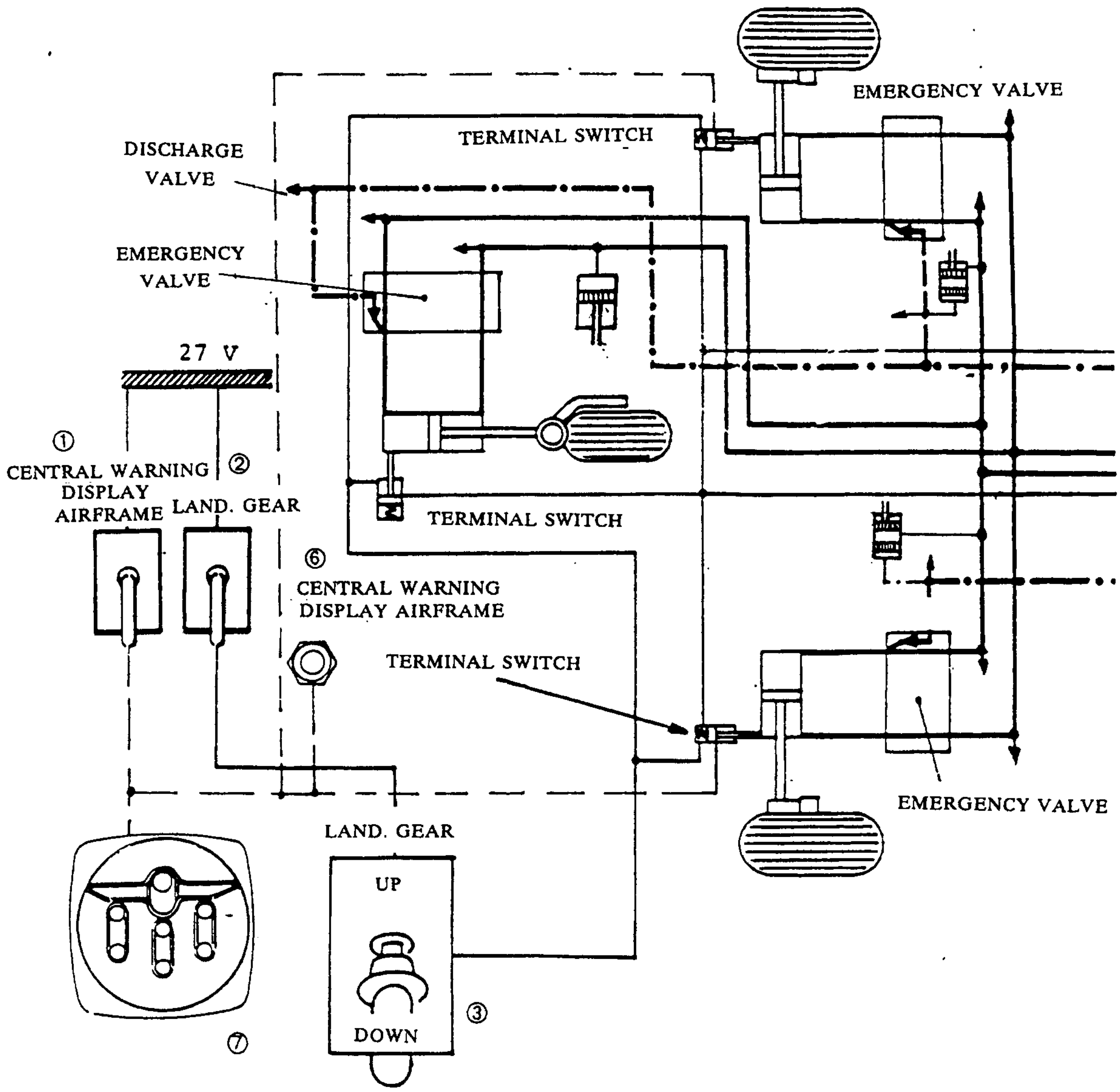
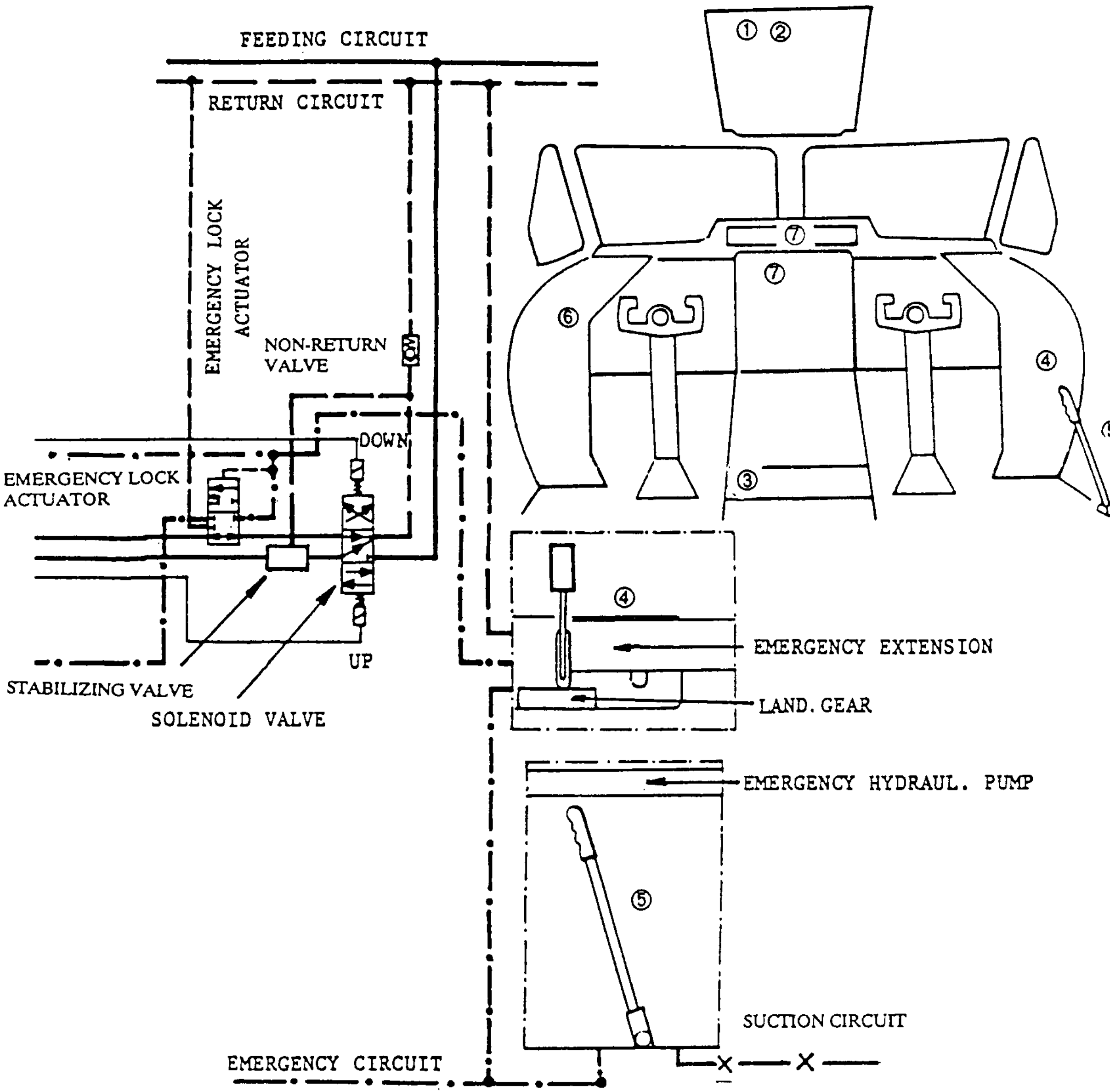


Fig. 7 - 19 Landing gear extension and retraction


FEEDING CIRCUIT
RETURN CIRCUIT
EMERGENCY LOCK ACTUATOR
NON-RETURN VALVE
DOWN
EMERGENCY LOCK ACTUATOR
UP
STABILIZING VALVE
SOLENOID VALVE
EMERGENCY EXTENSION
LAND. GEAR
EMERGENCY HYDRAUL. PUMP
SUCTION CIRCUIT
EMERGENCY CIRCUIT

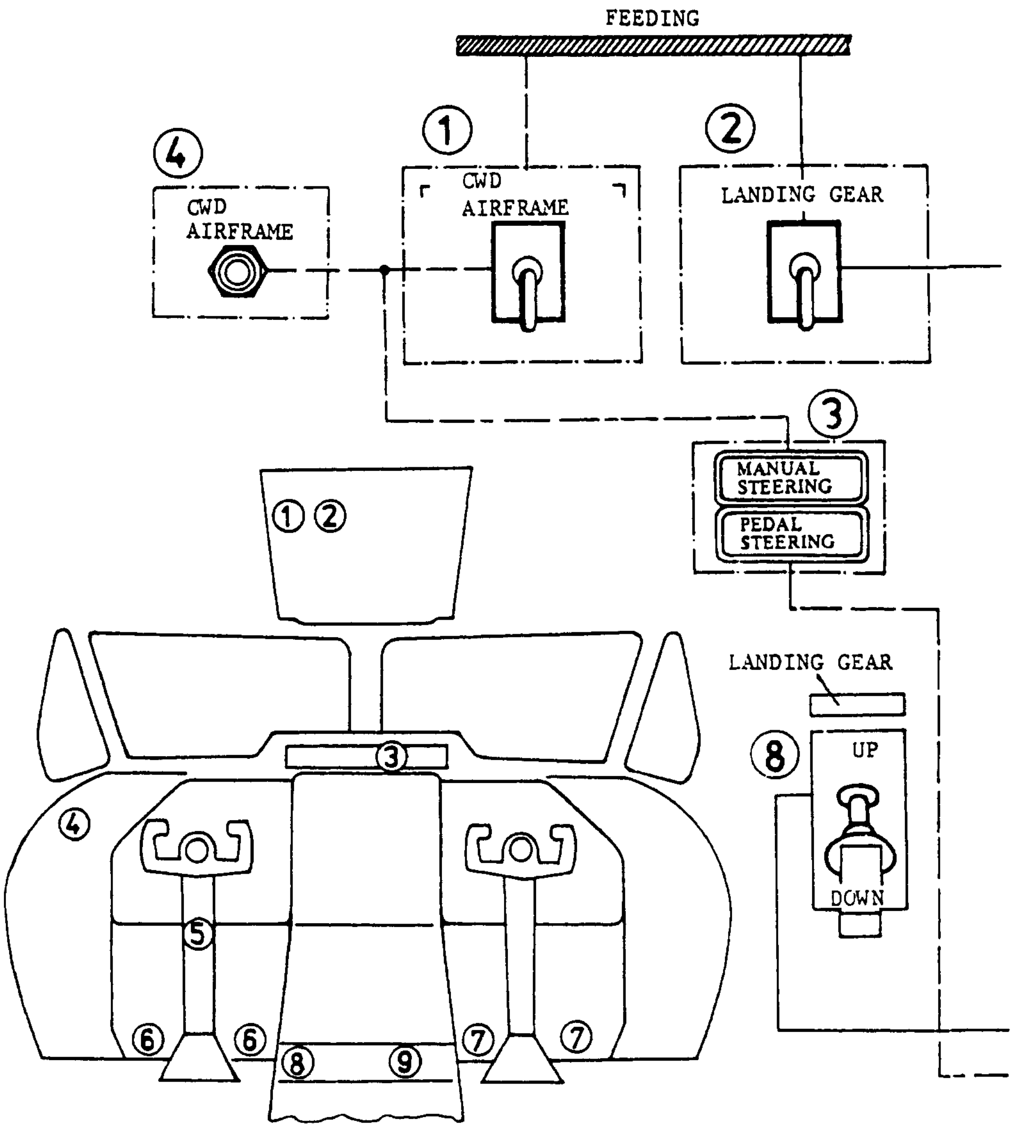
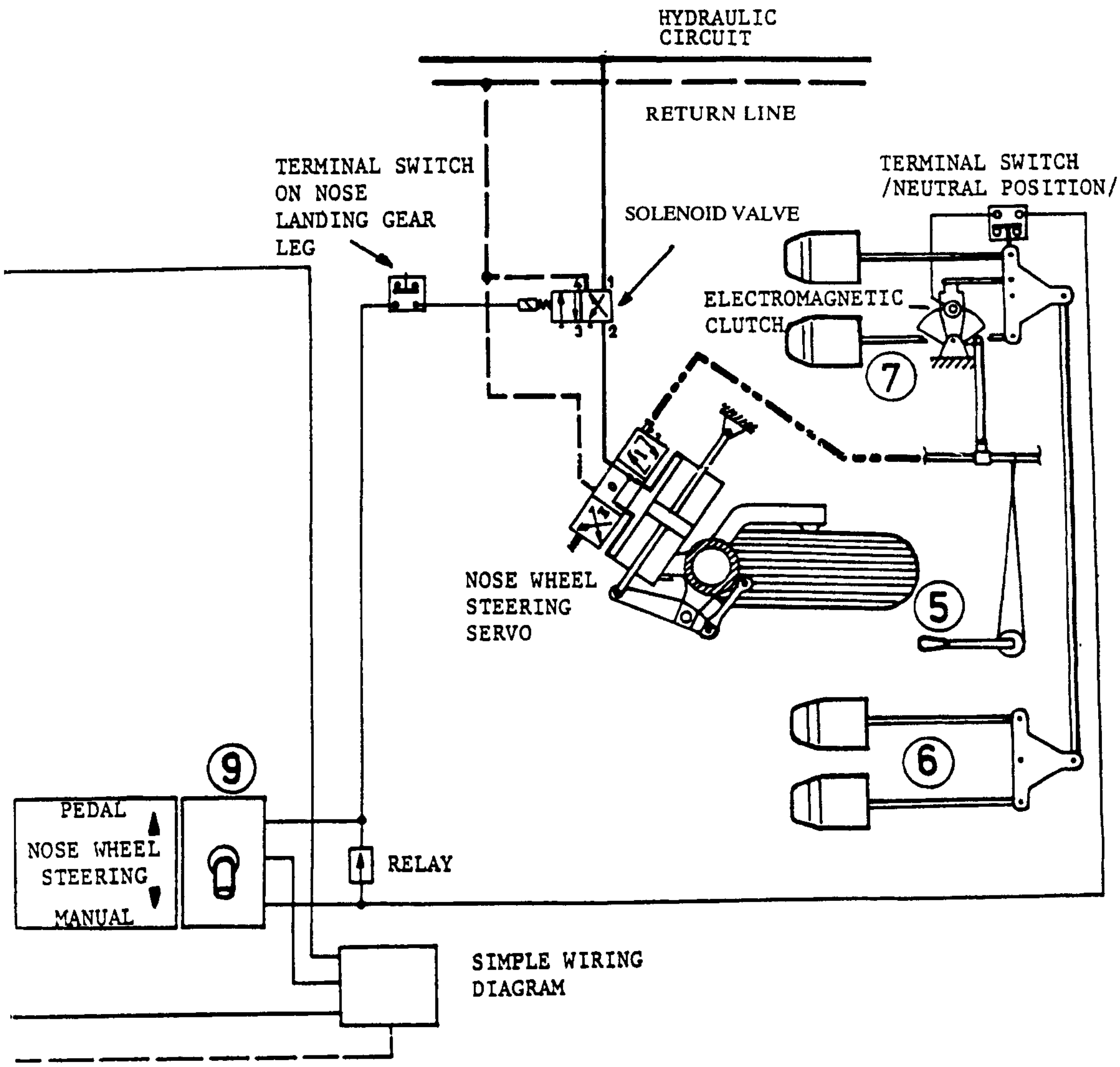


Fig. 7 – 20 Nose landing gear steering


HYDRAULIC
CIRCUIT
RETURN LINE
TERMINAL SWITCH
ON NOSE
LANDING GEAR
LEG
SOLENOID VALVE
TERMINAL SWITCH
/NEUTRAL POSITION/
ELECTROMAGNETIC
CLUTCH
7
NOSE WHEEL
STEERING
SERVO
5
6
9
PEDAL
NOSE WHEEL
STEERING
MANUAL
RELAY
SIMPLE WIRING
DIAGRAM

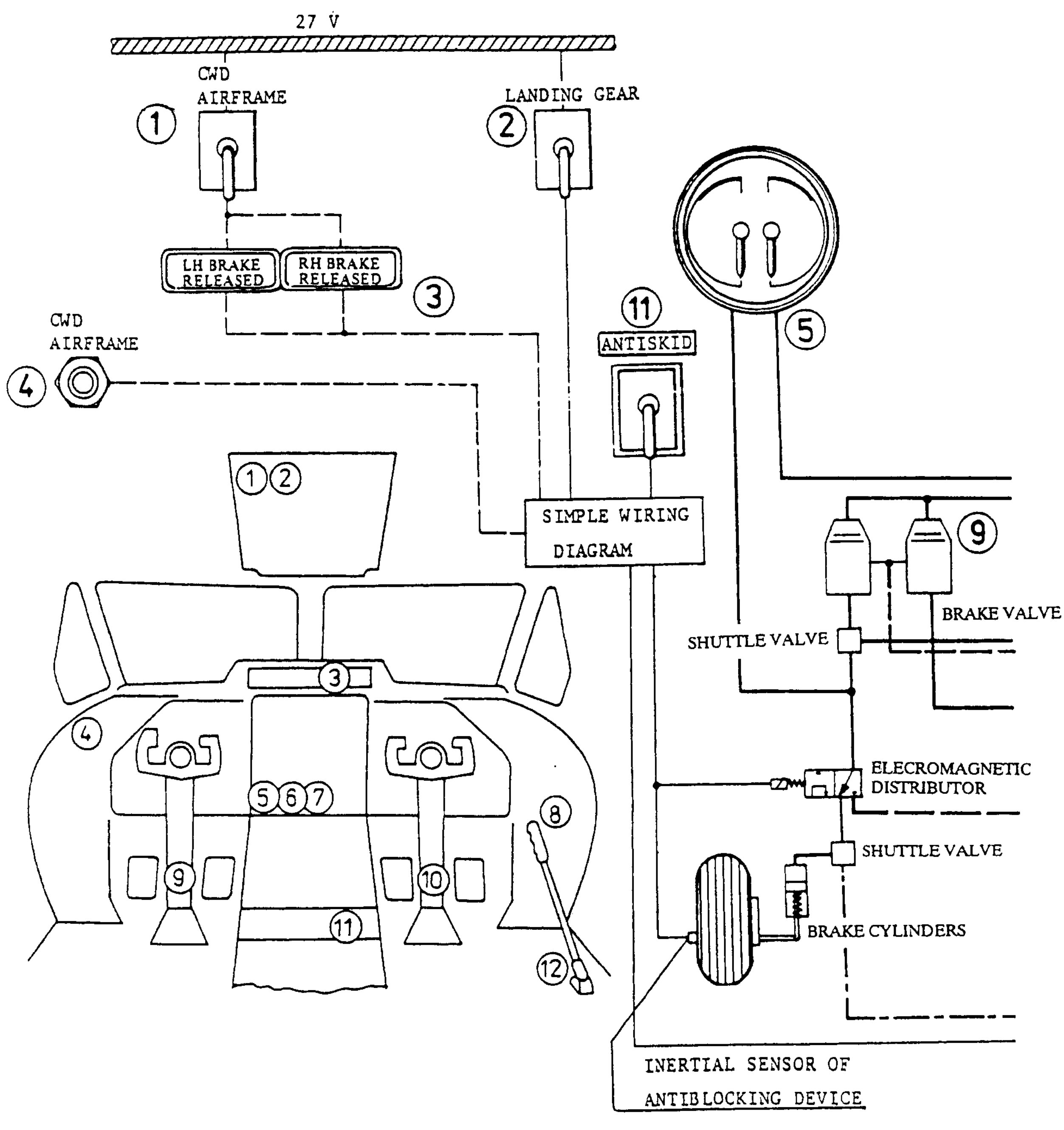
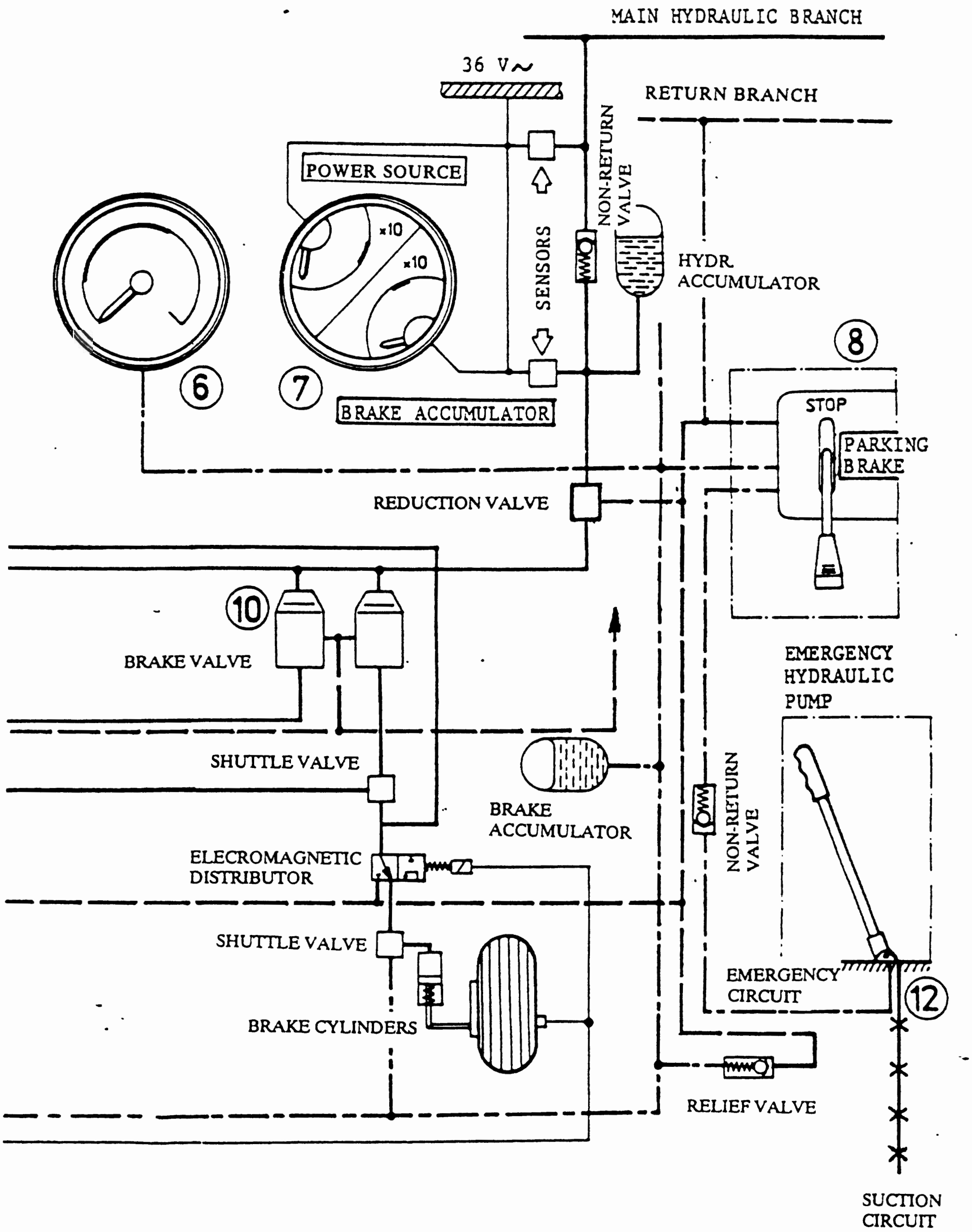


Fig. 7 – 21 Wheel brake


MAIN HYDRAULIC BRANCH
36 V~
RETURN BRANCH
NON-RETURN VALVE
POWER SOURCE
x10
x10
SENSORS
HYDR. ACCUMULATOR
8
6
7
BRAKE ACCUMULATOR
STOP
PARKING BRAKE
REDUCTION VALVE
10
BRAKE VALVE
EMERGENCY HYDRAULIC PUMP
SHUTTLE VALVE
BRAKE ACCUMULATOR
NON-RETURN VALVE
ELECROMAGNETIC DISTRIBUTOR
SHUTTLE VALVE
EMERGENCY CIRCUIT
12
BRAKE CYLINDERS
RELIEF VALVE
SUCTION CIRCUIT

DOOR, EMERGENCY EXIT AND WINDOWS

MAIN DOOR

The airplane can be entered through the main door on the LH side of the fuselage behind the single seats. The main door is divided: One part of the door can be tilted upwards by means of a lever which also fixes the door in open position, the other part of the door is secured closed and is used in airplane cargo modification only. Boarding the airplane is enabled by boarding stairs.

Cargo door opening:

Open the cargo door in the following way:

- open partly the entrace door;
- relase the pin (3) – see Fig. 7 – 24 and open partly the cargo door;
- turning the entrace door handle into the closed position slide the entrace door; locking rod into the cargo door locking rod sleeve;
- raise the cargo door together with the entrace door into the upper locked position by the lever

EMERGENCY EXITS

On the airplane are installed:

Emergency exits in the passenger compartment (emergency exit door – see Fig. 7 – 22, Fig. 7 – 23) on the LH and RH side of the passenger compartment between frames No. 13 and 14.
The passenger emergency exit door is locked in the locked position with two fixed pins in the upper side of the fuselage frame and with two movable pins down controlled by lever which is locked by a push–button . The push–button is covered with a detachable cover. The passenger emergency exit door is locked in the closed position from inside by a secure pin with a flag. The passenger emergency exit doors are sealed.

The emergency exit door in the front part of passenger compartment is locked in the closed position from inside by a pin with flag.

INDICATION OF CLOSING AND SECURING DOOR

Unlocking of the main door, front baggage compartment door and emergency exit door in the front part of passenger cabin is indicated by lighting on the signal cell DOOR on the central warning display. The impulse for switching on the indication circuit is supplied from the D701 limit switches located at the main door at frame No 18, at emergency exit door at frame 6 and two switches at the LH and RH front baggage compartment doors.

PILOT'S COCKPIT WINDOWS

The glass of the pilot cockpit consists of two front windows, two side rear windows and two outlook windows on both sides of the pilot cockpit located between the front and side rear windows.

The front windows are provided with electrically–heated glasses. The glass of the front windows is an organic electrically–heated glass. The front window is amply dimensioned for the case of a bird impact. The glass block is formed from three glasses stuck by a transparent material. Between the glasses there is a heating element. For the glass of the side rear windows is used organic glass of 0.2 in (5 mm) thickness .

The side triangular outlook windows are constructed so that one their part is tiltable which makes it possible to open windows in different operational situations and lock them in the open position. For windows is used organic glass of 0.32 in (8 mm) thicknes.

PASSENGER CABIN WINDOWS

Outlook for passengers is ensured through the windows on both sides of the passenger compartment.

The windows are doubled. For outer glass the organic glass is used thick 0.2 in (5 mm) (6 windows between frames No 9 and 12) and thick 0.12 in (3 mm) (the windows between frames No 12 and 18). The inner glasses are made of the same material of the thickness 0.12 in (3 mm) (between frames 9 and 12) and 0.08 in (2 mm) (between the frames No 1 and 18).

The windows are protected against moisture by their own atmosphere of dry air which is dried by means of heating in the case that the heating system is switched on. The heated air passes below the upholstering.

Scheme of opening the main door and emergency exits
FROM INSIDE

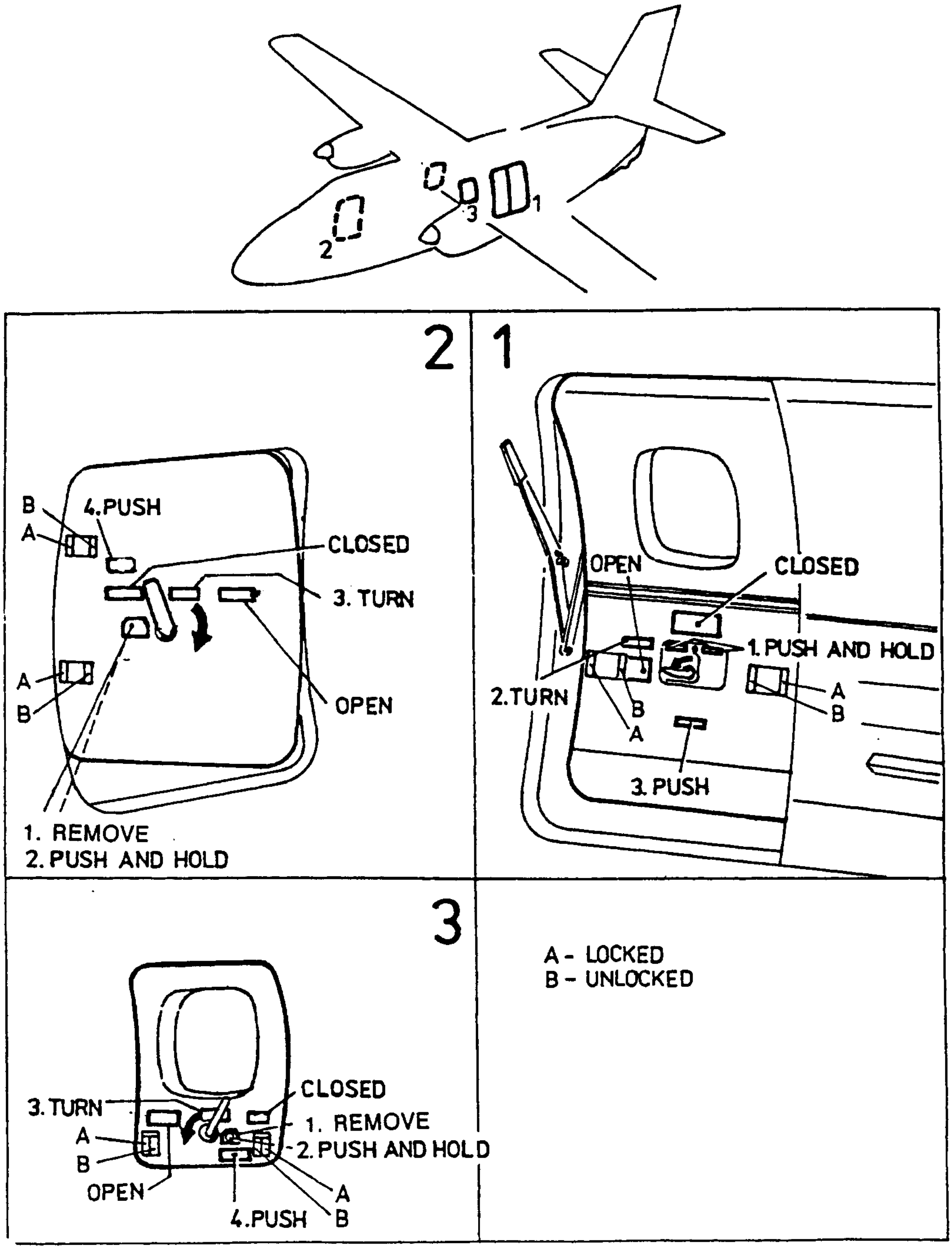


Fig. 7 – 22

Scheme of opening the main door and emergency exits

FROM OUTSIDE

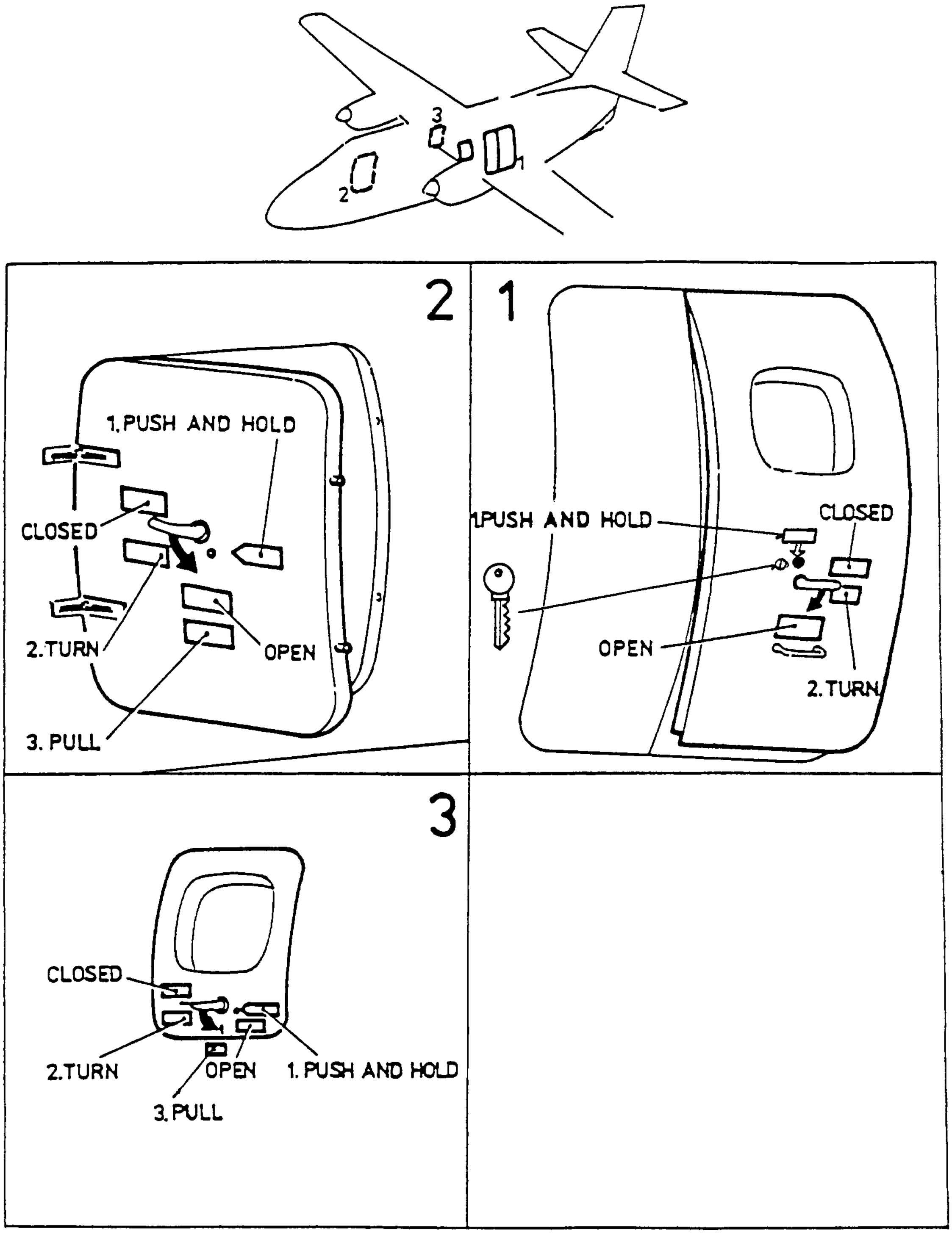


Fig. 7 – 23

Scheme of opening the cargo door

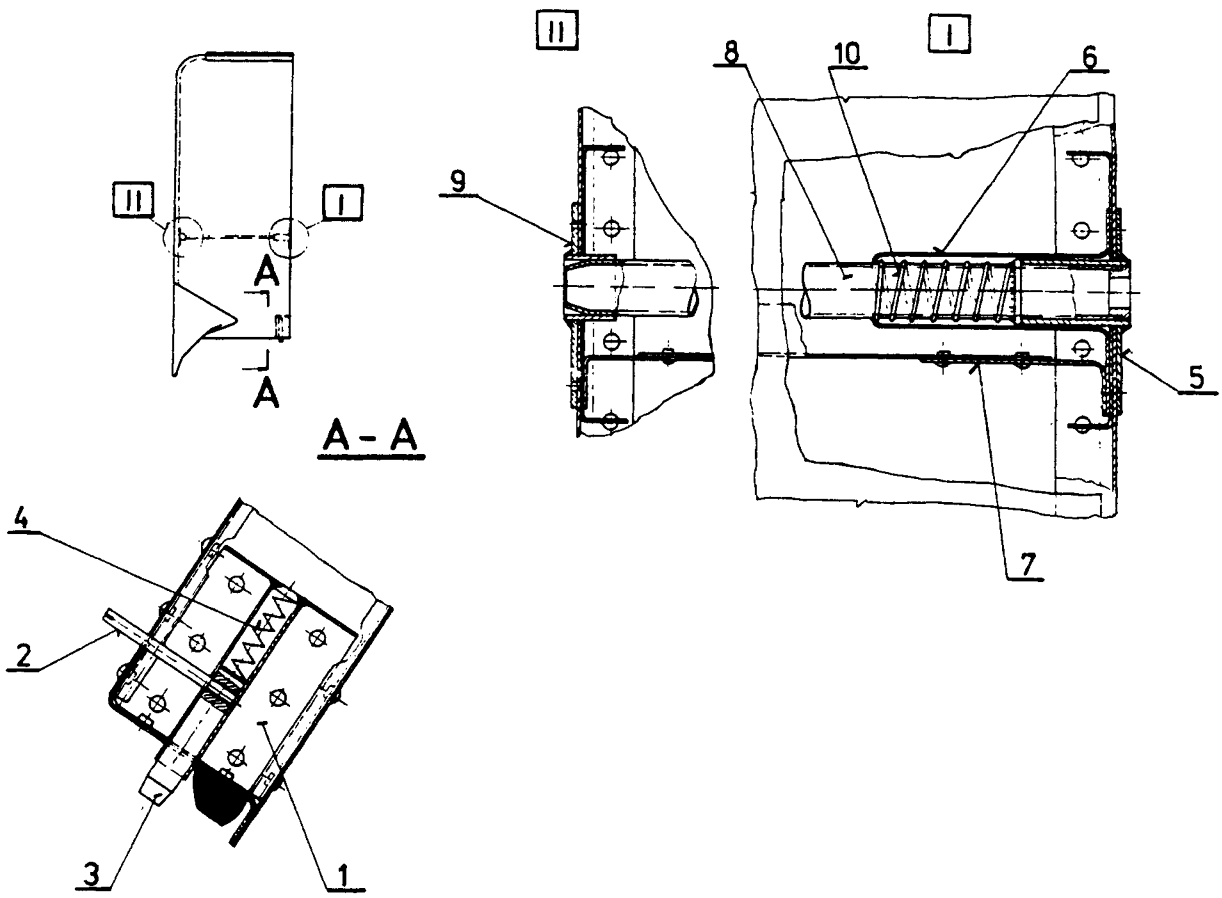


Fig. 7 – 24

(1) Pawl body; (2) Screw; (3) Pin; (4) Spring; (5) Guide; (6) Spring cover; (7) Stiffener; (8) Locking rod; (9) Guide; (10) Spring.

ENGINE

The airplane is equipped with two WALTER M 601 E engines and two the V 510 propellers. The engine is designed as a turboprop, two-shaft engine with reverse flow and free turbine.

Shaft power:

- maximum take-off	751 SHP (560 kW)
- maximum contingency	798 SHP (595 kW)
- maximum continuous	657 SHP (490 kW)

Speeds:

- gas generator	36,660 RPM (=100 %)
- free turbine	31,023 RPM
The way of starting	electric starter

POWER UNIT CONTROLS (see Fig. 7 - 25)

(a) **Throttle control lever (TCL)**

The TCL serves for engine power control from maximum reverse to maximum contingency rating. The position "idle" is the lowest recommended power level in flight.
The position "max. revers" corresponds maximum reverse power.

To protect an unintentional transition TCL to reverse position there are two locks on TCL:

- stop – located between guides behind TCL;
- pin in the groove of the guide controlled with a lever on TCL.

For moving TCL from "idle" position to "reverse" position is required:

- rotate the stop out;
- to lift the pin in the groove of the guide to move TCL back.

The "maximum contingency" position is used at abrupt drop of either engine during take-off. In order to set this power it is necessary to lift the pin in the groove of the guide, overcome the resistance of a spring stop, and to move the TCL into the forward position.

(b) **Fuel stop cock / Emergency throttle lever**

The fuel stop cock/Emergency throttle lever serves for opening and closing the fuel supply to a engine and for controlling engine operation rating in case of the fuel govemer failure (emergency circuit), too.

The Fuel stop cock/Emergency throttle lever has three fixed positions: MAX. POWER, OPEN (starting) and SHUT (see Fig. 7 - 25).

(c) **Maximum take-off power adjustable stop**

In the sector of TCLs is located the maximum take-off adjustable stop, which is sealed in its front position and it is not adjusted.

OIL SYSTEM

The oil system issued for engine lubricating and for supply of the propeller blades setting hydraulic system and the transmitter of torque.

The oil system is located in the engine space in front of the fire bulkhead and it consists of an oil tank (part of the engine), oil cooler, feathering pump and function parameters control system (oil pressure and temperature, minimum pressure signalization).

Oil pressure and temperature are indicated on the three-pointer indicator on the instrument panel. Minimum oil pressure is signalized by switching an amber cell OIL PRESSURE on CWD of an appropriate engine. The signalization of chips in oil is installed on the airplane. At occurrence of chips in oil a amber cell CHIPS on the relevant part of CWD (LH ENGINE or RH ENGINE) will light up.

LIMITERS

The system of limiters, whose core consists of the integrated engine limiter unit (IELU) with two limit levels, secures together with the fuel governor throttling at continuous exceeding of whichever of controlled parameters (n_G, n_P ITT, TQ, speed gradient ITT at engine starting) but in no case (incl. case of spontaneous intervention of IELU) under set level of limitation i.e.

- at the first level switched on: to TQ is about 70 %;
- at the second level switched on: to 60 % n_G.

The border for switching over from one level to another is altitude 700 m AGL. The switching in this altitude passes automatically a signal from a radar altimeter as follows: At climb from the first level to the second one and at descent from the second level to the first one.

The design of the IELU allows a partial check for operation of the ITT limiter circuits to be done by means of IELU push buttons located on the test panel on the left control panel. The check is carried out by ground staff.

The system of limiters is switched on by the circuit breakers IELU LH (RH) on the overhead panel before engine starting. IELU readiness (at switched on circuit breakers IELU LH (RH) on the overhead panel) is indicated by lighting up signal cells IELU OPERATIVE LH (RH) on the RH control panel.

The IELU OPERATIVE is mainly intended for checking on the ground that the first level limiting is switched on (after engine starting). In flight the IELU OPERATIVE indication serves as a supplementary information on the operation of the system of limiters.

The signalization lights under following conditions:

- at the first level switched on: if TQ is higher than 70 %;
- at the second level switched on: continuously.

When the system of limiters is switched off the amber IELU light on the CWD of the corresponding engine will come on.

Throhling by IELU control signal is indicated by lighting up the amber cell IELU INTERVENT on CWD.

WATER INJECTION SYSTEM

The water injection system ensures maximum take–off power at higher ambient air temperatures.

The water injection system becomes operative by switching on the WATER INJECTION circuit breaker on the overhead panel. The system is switched on by depressing the ON push button located under a cover marked WATER INJECTION on the front control panel.

When the maximum take–off power is reduced (i.e. when the TCL is moved to a position below 88%, or 92% n_G) the water injection system is automatically switched off. The water injection can be also be switched off by pressing the OFF push button under the cover marked WATER INJECTION on the front control panel.

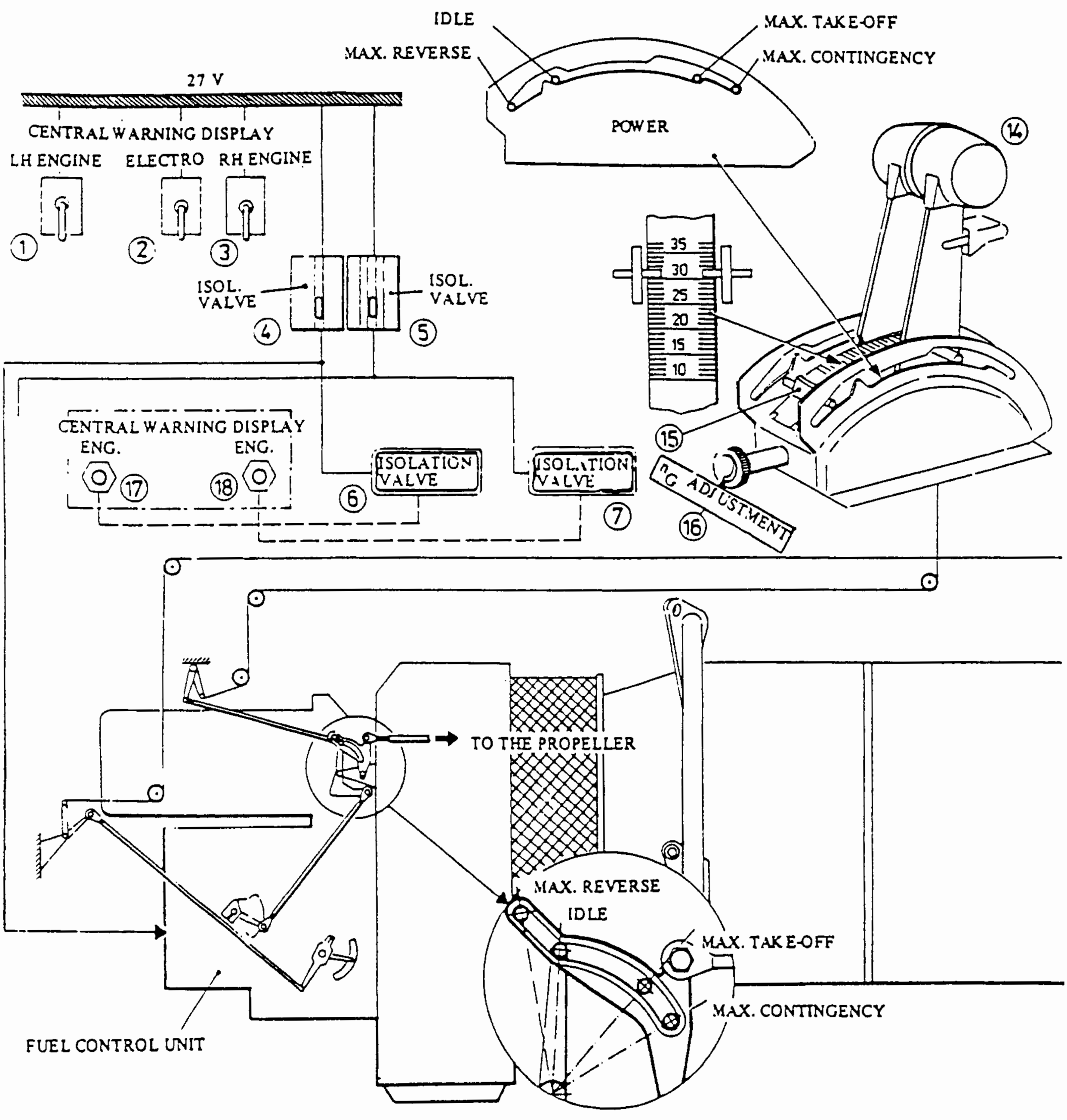
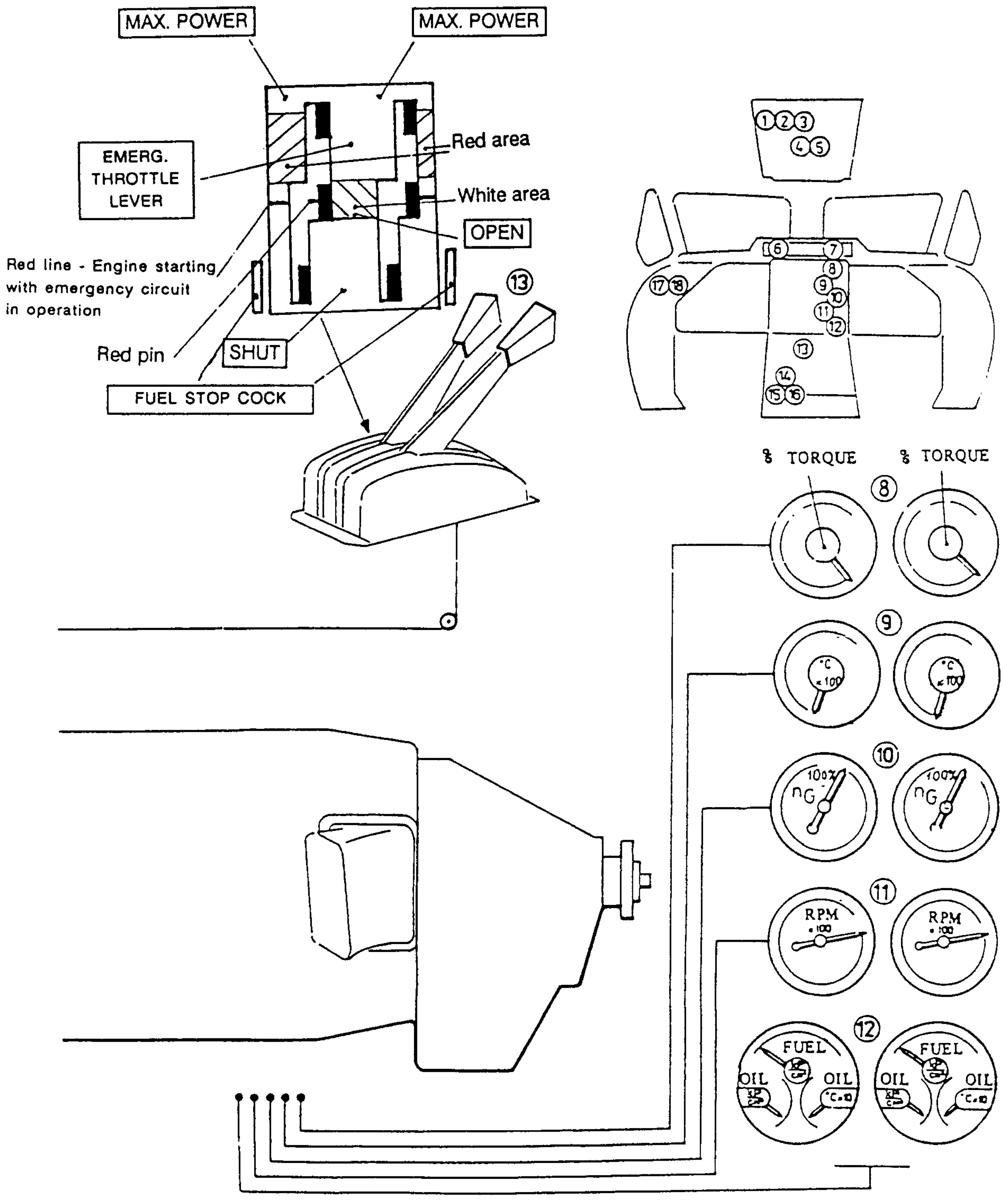
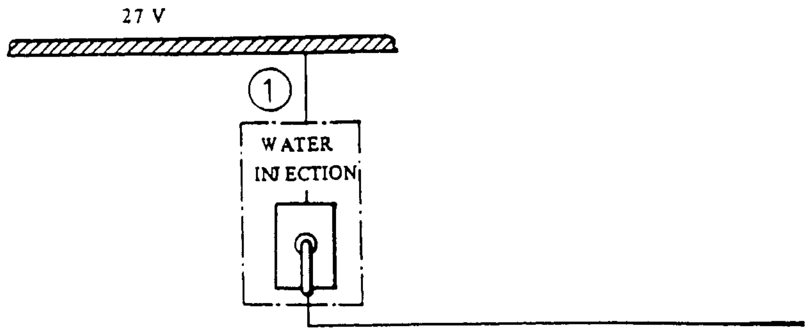


Fig. 7 – 25 Power unit controls


MAX. POWER
MAX. POWER
EMERG. THROTTLE LEVER
Red area
White area
OPEN
Red line - Engine starting with emergency circuit in operation
Red pin
SHUT
FUEL STOP COCK
% TORQUE
% TORQUE
°C x100
nG
100%
RPM x100
FUEL
OIL
OIL



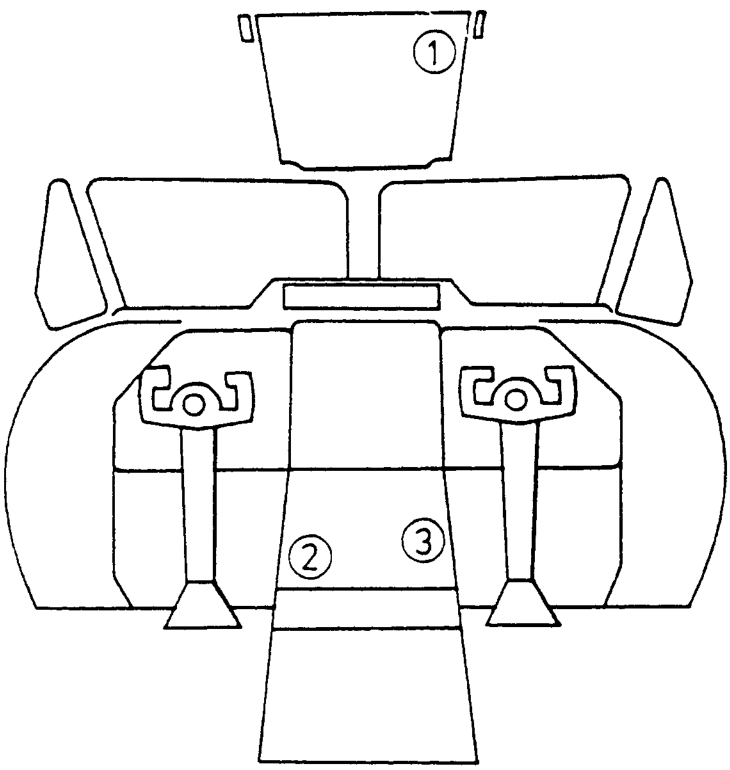
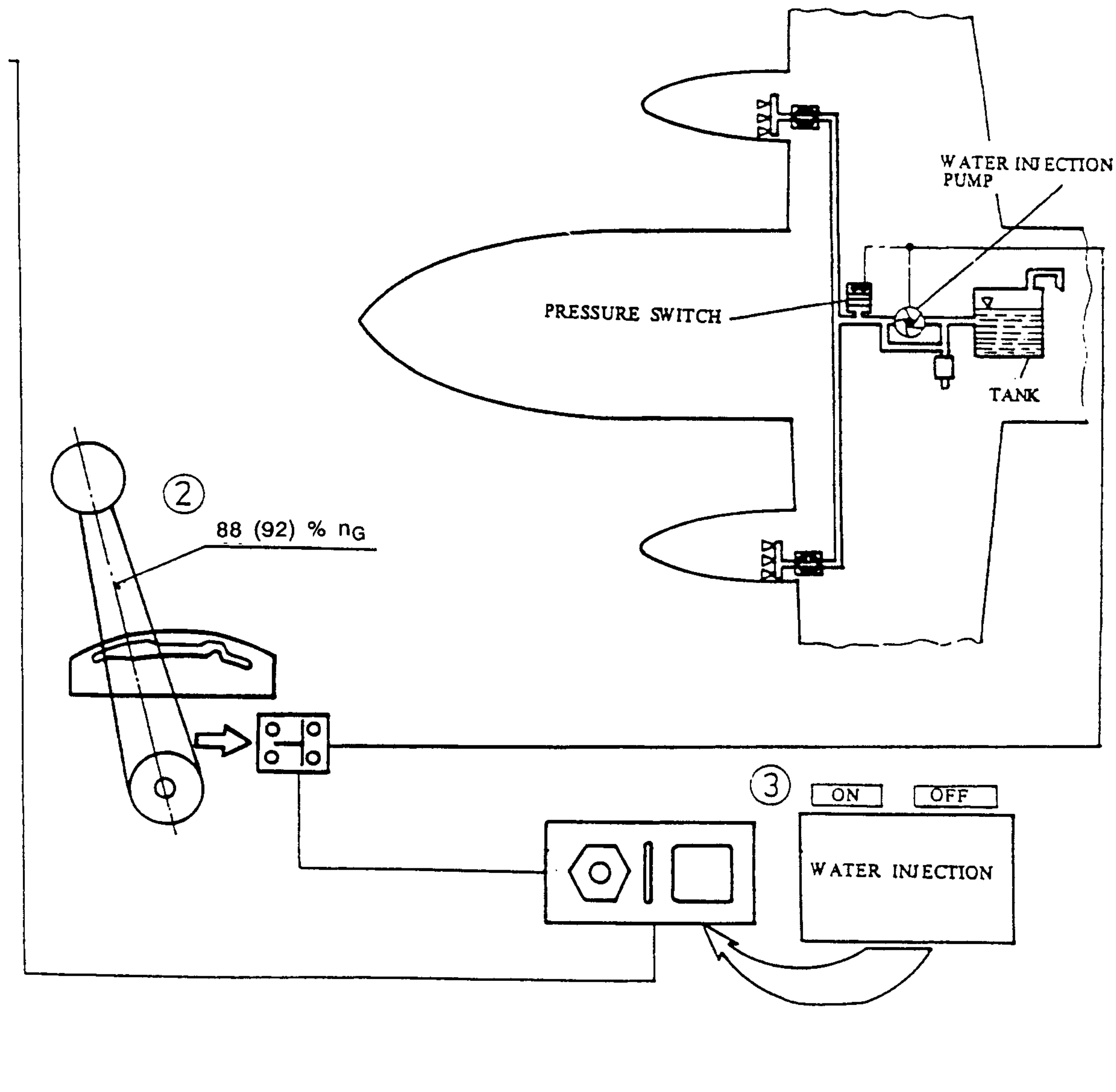


Fig. 7 – 26 Water injection system


WATER INJECTION
PUMP
PRESSURE SWITCH
TANK
2
88 (92) % nG
3
ON
OFF
WATER INJECTION

Intentionally left blank

PROPELLER

PROPELLER AND CONTROL (see Fig. 7 - 27)

Basic technical parameters of V 510 propeller:

Propeller diameter	90.55 in (2.3 m)
Number of blades	5
Direction of rotation	clockwise (viewed from the rear in the direction of flight)
Propeller speed control range	1,700 – 2,080 RPM
Maximum propeller speed limitation centrifugal regulator	Control in the range limitation conjugate connection between propeller setting and position of TCL.

Propeller control lever (PCL)

Serves for setting desired propeller speed and for emergency propeller feathering. PCL has three characteristic positions (max. speed – fine pitch, minimum speed and feathering), from them the position "feathering" is locked recess in the groove of the guide.

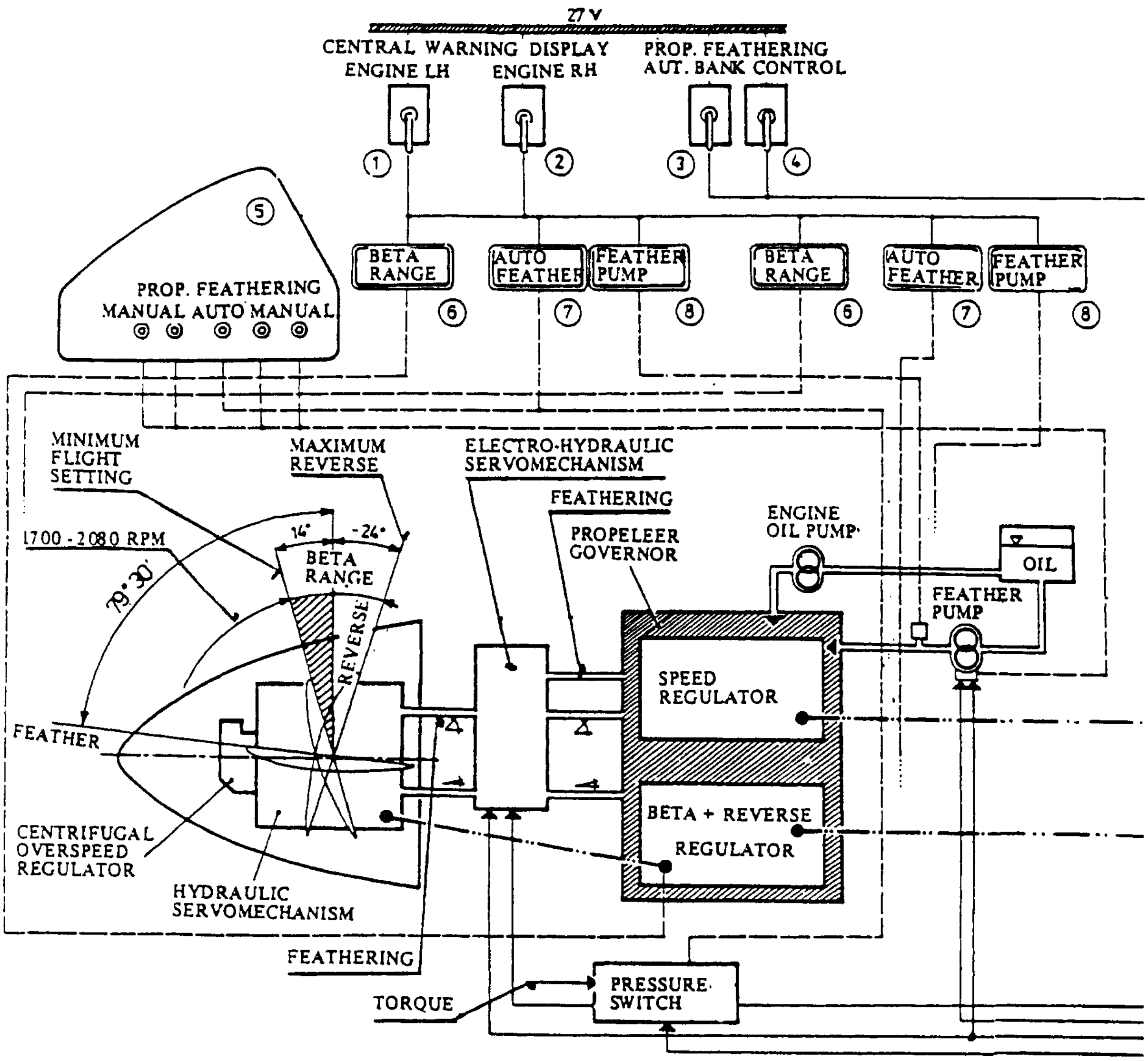
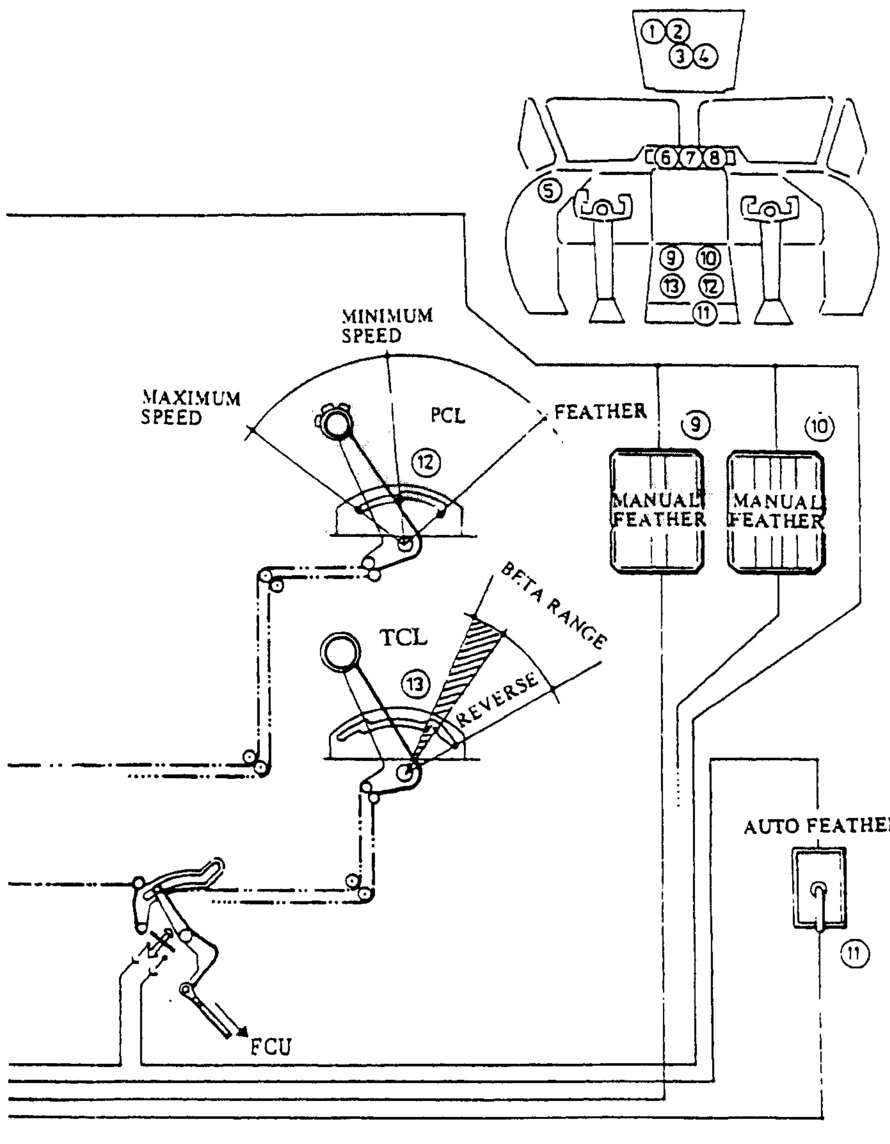


Fig. 7 – 27 Propeller control system


MINIMUM SPEED
MAXIMUM SPEED
PCL
FEATHER
MANUAL FEATHER
MANUAL FEATHER
BETA RANGE
TCL
REVERSE
AUTO FEATHER
FCU

FUEL SYSTEM (see Fig. 7 – 28)

The fuel system provides fuel supply to each engine in all assumptive operation conditions. The basic fuel system is composed of bag fuel tanks located inside the wing, connecting pipes, equipment for fuel distribution and instruments for indication of fuel amount and fuel pressure.

The main fuel system is divided into two identical subsystems – left hand (LH) and right hand (RH) subsystem. During normal operation each fuel subsystem feeds the corresponding engine. If it is necessary both the fuel subsystems can be interconnected by the electromagnetic valves located inside interconnecting pipe. Interconnecting allows to supply one engine from both fuel subsystem or both engines from one fuel subsystem. The volume of the fuel system is possible to increase by 320 kg (706 lb) of fuel carried in the wing tip fuel tanks each of 160 kg (353 lb) of fuel fitted on the wing tip ribs. The wing tip tank is equipped by the fuel pump and fuel quantity transmitter. The fuel from wing tip tank is supplied through the connecting pipe into additional fuel tank located inside the wing. The non–return valve is built in the connecting pipe to avoid overflow of fuel from main fuel system to the tip tank. The pressure switch attached onto connecting pipe switches on green signal cell FUEL TRANSFER when fuel pressure is increased (pressure from working pump). When fuel pressure is lost the pressure switch is switches off the pump in the wing tip tank and indication of fuel transfer. Fuel tanks expansion spaces are interconnected with piping with solenoid valve included. Solenoid valve is opened only in case of fuel transfer from wing–tip tank. In other cases it is closed to prevent undesirable transfer of fuel between tanks.

The pumps located in the tip tanks are switched on by the signal from fuel level indicator which is located in the central fuel tank in the wing when amount of fuel for one subsystem is decreased to 325 $\pm$ 75 kg (716 $\pm$ 165 lb)

If automatic fuel transfer becomes inoperative, the amber signal cell ACTUATE TRANSFER will be illuminated on the central warning display when amount of fuel in certain subsystem is less than 220 kg (485 lb) minimally. In this case the fuel pump in the wing tip tank is switched on manually by the WING TIP TANK FUEL TRANSFER switch on the RH instrument panel. The left/right WING TIP TANK FUEL TRANSFER switch is used for the transfer of fuel from the left/right wing tip tank.

The fuel supply to the engines is provided by booster pumps and engine pumps. When both pumps in the wing tip tanks are inoperative (for instance when both electric generators become inoperative), the fuel from tip tanks is not possible consumed.

The fuel supply is open and shut by the Fuel stop cock/Emergency throttle lever on the front control panel. The other levers control the fuel fire cock, located outside the engine fire zone. The booster pumps are switched on by FUEL PUMP LH, RH, circuit breakers on the overhead panel. The fuel is supplied into the engine through filter. If filter is contaminated, the differencial pressure switch switches on the amber cell FUEL BY–PASS which illuminates on the corresponding engine warning display. Under the engine is installed collecting fuel sump. The drainage fuel is returned from the sump back to the fuel tank by ejector.

The system of fuel transfer is switched on by FUEL CROSSFEED circuit breaker on the overhead panel due to reason of balancing of fuel amount in the LH and RH tanks. When circuit breaker is switched on the amber cell FUEL CROSSFEED illuminates on the CWD – AIRFRAME.

Fuel is drained from the fuel system through two drain valves and two drain necks installed symmetrically on both sides of the wing–to–fuselage fairing bottom part. Fuel from the wing tip tanks can be also drained through drain valve installed in the bottom part of the wing tip fuel tank.

FUEL SYSTEM INDICATORS (see Fig. 7 – 29)

The indicators provide indication of quantity and the pressure of fuel and fuel flow.

(a) Fuel quantity

To measure the fuel quantity in the main system is used:

- two sets of capacity fuel level indicators with signalization of minimum fuel level;
- two sets of capacity fuel level indicators in the wing tip fuel tanks;
- fuel level dipstick on the cap of filling outboard fuel tanks with the scale with 25 kg (55 lb) increments.

The fuel quantity in certain groups of fuel tanks is indicated by corresponding fuel level indicator on the central instrument panel. If a fault occurs in the system of fuel level indicator, the pointer of indicator remains in position which corresponds to the position in the time of fault and target do not revolve or pointer is on one of the two stops and target is revolving very quickly.

When fuel amount in the certain group of fuel tanks drops on 108 ± 15 kg (238 ± 33 lb) at cruise the amber cell MINIMUM FUEL illuminates on the central warning display, of certain engine.

The two sets of fuel level indicators with fuel gauges are used to measure the amount of fuel in the wing tip tanks. The function of the fuel level indicators of tip tanks is similar to the function of the fuel level indicators of the main system.

(b) Fuel pressure

The fuel pressure is checked by two systems. One system indicates on the three pointer indicator on the central instrument panel continuous value of fuel pressure behind fuel regulator (in front jets), the second one indicates only pressure reduction under minimum allowable value of running booster pumps (0.03 MPa = 0.3 kp/cm^2 [4.27 psi]) at which amber cell FUEL PRESSURE becomes illuminate on the central warning display. If fuel pumps are switched off the amber cell FUEL PRESSURE is illuminating always.

(c) Fuel flow rate

Fuel flow rate masurement is performed by two measurement systems. One is for the left hand engine and the other for the right one. Fuel led to the engines is indicated on the relevant fuel flow indicators (LH, RH) into which the electric signals from the turbine flow transmitters are brought. Two fuel flow rate indicators are located on the central instrument panel.

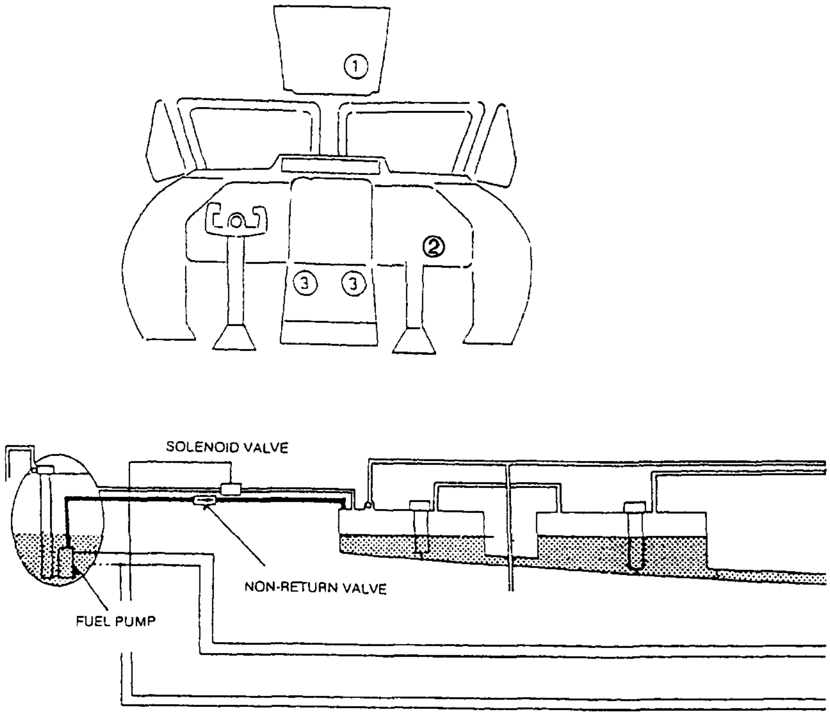
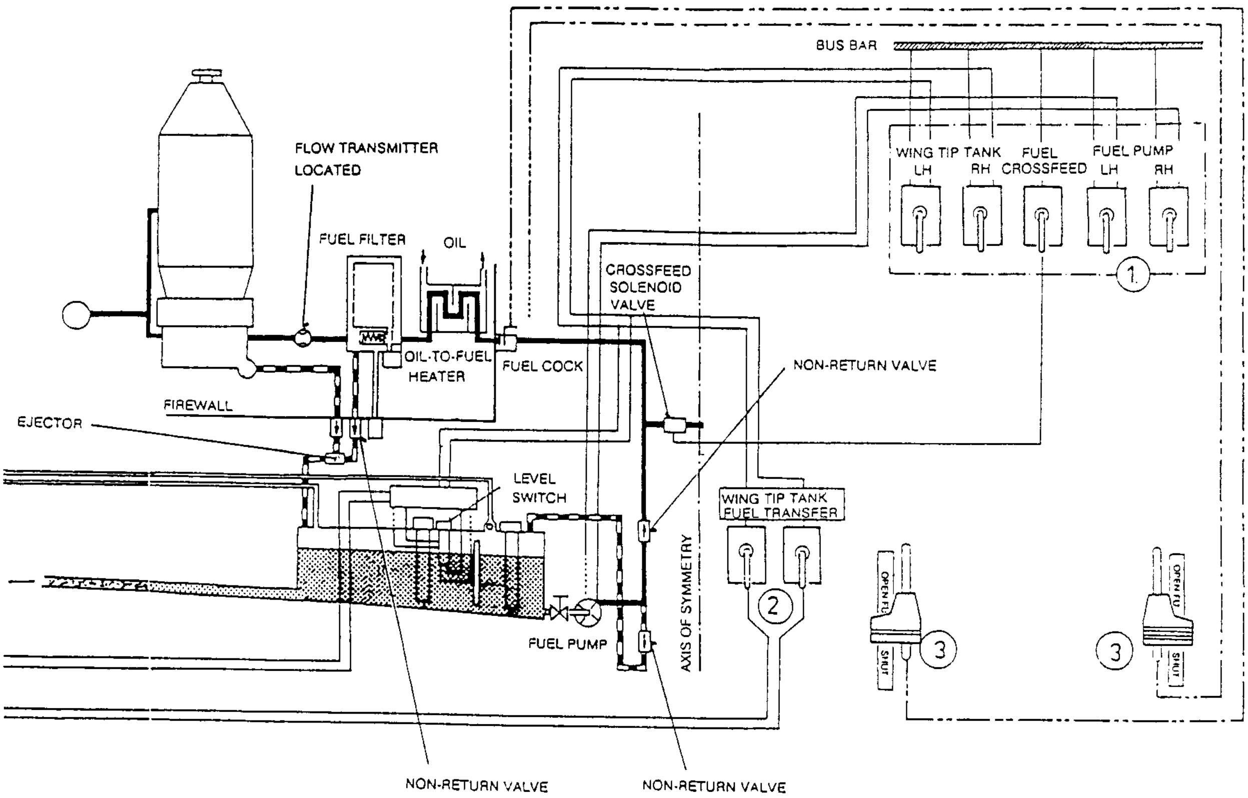


Fig. 7 – 28 Fuel system


BUS BAR
WING TIP TANK
LH
RH
FUEL
CROSSFEED
FUEL PUMP
LH
RH
1
FLOW TRANSMITTER
LOCATED
FUEL FILTER
OIL
CROSSFEED
SOLENOID
VALVE
OIL-TO-FUEL
HEATER
FUEL COCK
NON-RETURN VALVE
EJECTOR
FIREWALL
LEVEL
SWITCH
WING TIP TANK
FUEL TRANSFER
2
AXIS OF SYMMETRY
FUEL PUMP
3
3
NON-RETURN VALVE
NON-RETURN VALVE

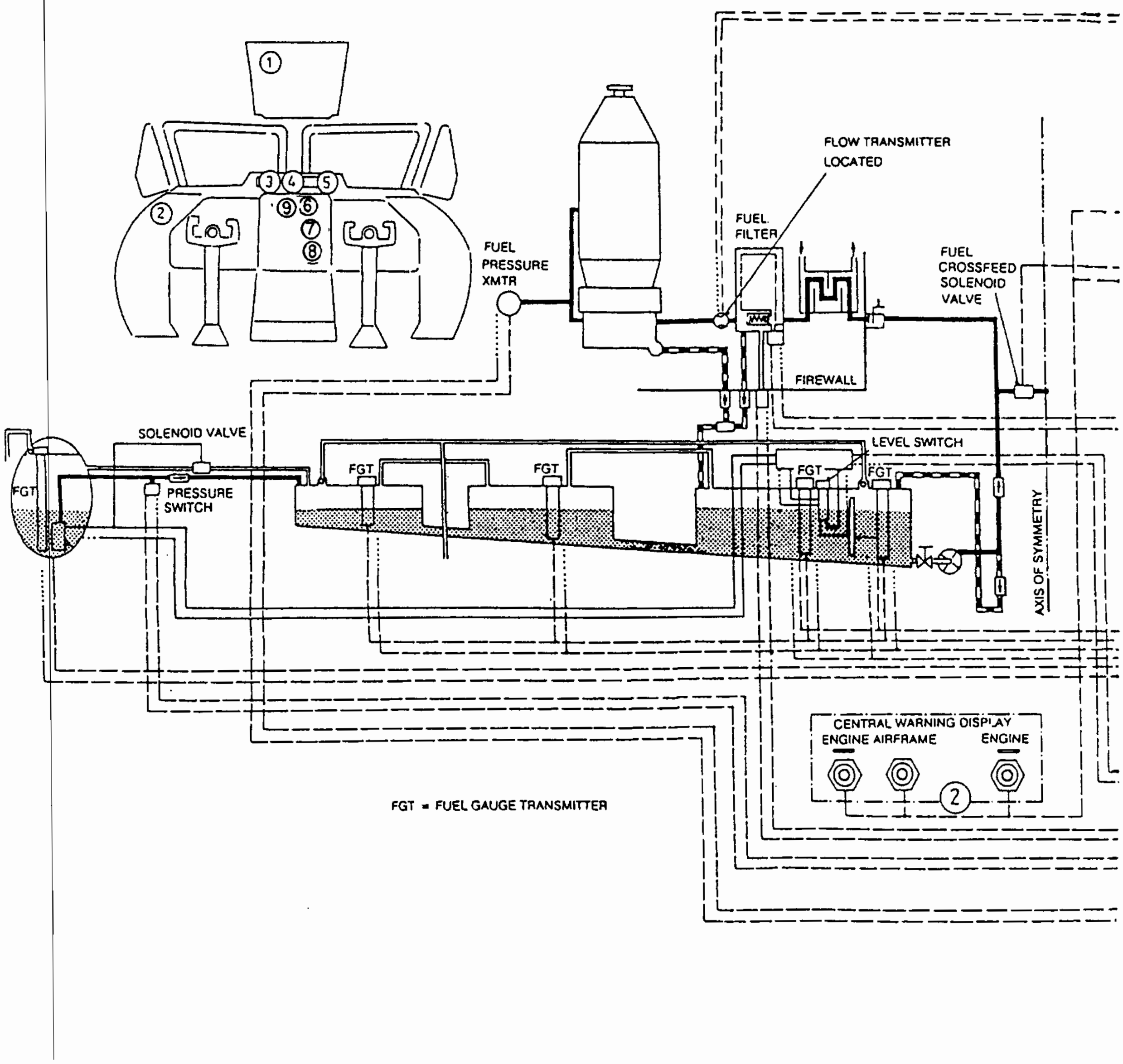
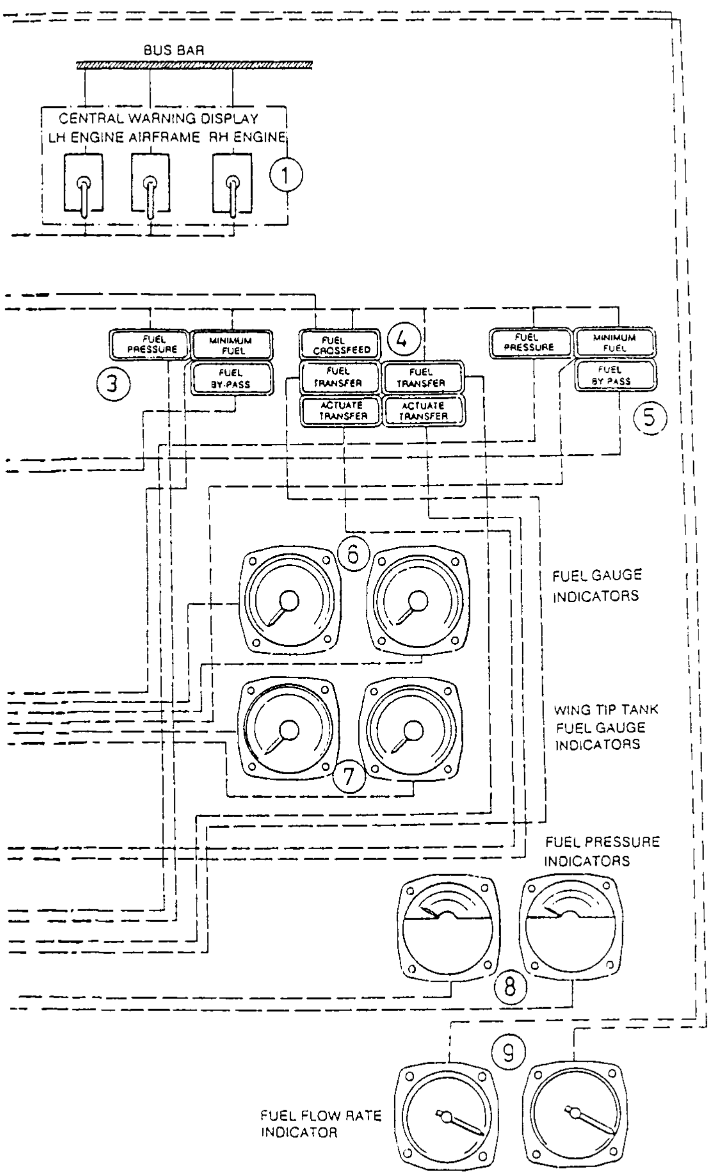


Fig. 7 – 29 Fuel system indicators


BUS BAR
CENTRAL WARNING DISPLAY
LH ENGINE AIRFRAME RH ENGINE
1
FUEL PRESSURE
MINIMUM FUEL
FUEL BY-PASS
3
FUEL CROSSFEED
4
FUEL TRANSFER
FUEL TRANSFER
ACTUATE TRANSFER
ACTUATE TRANSFER
FUEL PRESSURE
MINIMUM FUEL
FUEL BY PASS
5
6
FUEL GAUGE INDICATORS
WING TIP TANK FUEL GAUGE INDICATORS
7
FUEL PRESSURE INDICATORS
8
9
FUEL FLOW RATE INDICATOR

HYDRAULIC SYSTEM (see Fig. 7 – 30)

The hydraulic system consists of two independent hydraulic systems, the main and emergency system.

The main hydraulic system serves for:

- retracting and extending of the landing gear;
- retracting and extending of the flaps;
- nose landing wheel steering;
- main landing gear wheels braking;
- retracting and extending of spoilers;
- retracting and extending of ABC tabs.

As the pressure hydraulic energy sources there are two hydraulic piston pumps and two hydraulic accumulators of which one is located in the system and another is in the brake control system.
The pumps are installed on both engines, each engine has one pump. The pressure downstream of the pump is 14.4 – 0.4 MPa (147 – 4 kp/cm^2 [2,091 - 57 psi]). A safety valve is included in the system. The valve is adjusted to the pressure 165 ± 2 kp/cm^2 (2,347 ± 28 psi). The function check of the system is done with the help of electric pressure gauge. There are temperature pick–ups in return branches of the pumps. These pick–ups signalize the temperature raise above 85 ± 5°C by means of amber cells HYDRAUL. on the CWD.

The emergency hydraulic system secures:

- landing gear extension;
- flaps extension;
- emergency and parking braking of wheels.

As a hydraulic energy source in the emergency system there is a hand pump on the right hand side of the cockpit. The emergency system features its own hydraulic tank connected through piping to the main tank and to the return branch of the wheel brake systems.

Control of emergency extension of landing gear, flaps, parking (emergency) wheel braking is performed with valves by hand levers control, located on the right hand control panel.

To achieve the optimum service conditions for the hydraulic pumps the main hydraulic tank is connected to the air circuit, which provides pressurizing of the tank. The air is led into the circuit from the engine bleed air. Return valves prevent air leakage from circuits after engine shut down. An auxiliary air tank is installed serving as an air pressure reservoir for compensation of the leakage due to untightness of the circuit. The reduction valve is installed behind the auxiliary air tank. The safety valve protects the main hydraulic tank from overload. The pressure gauge for ground pressure check of the pressure in the hydraulic tank is installed in the left hand engine nacelle.

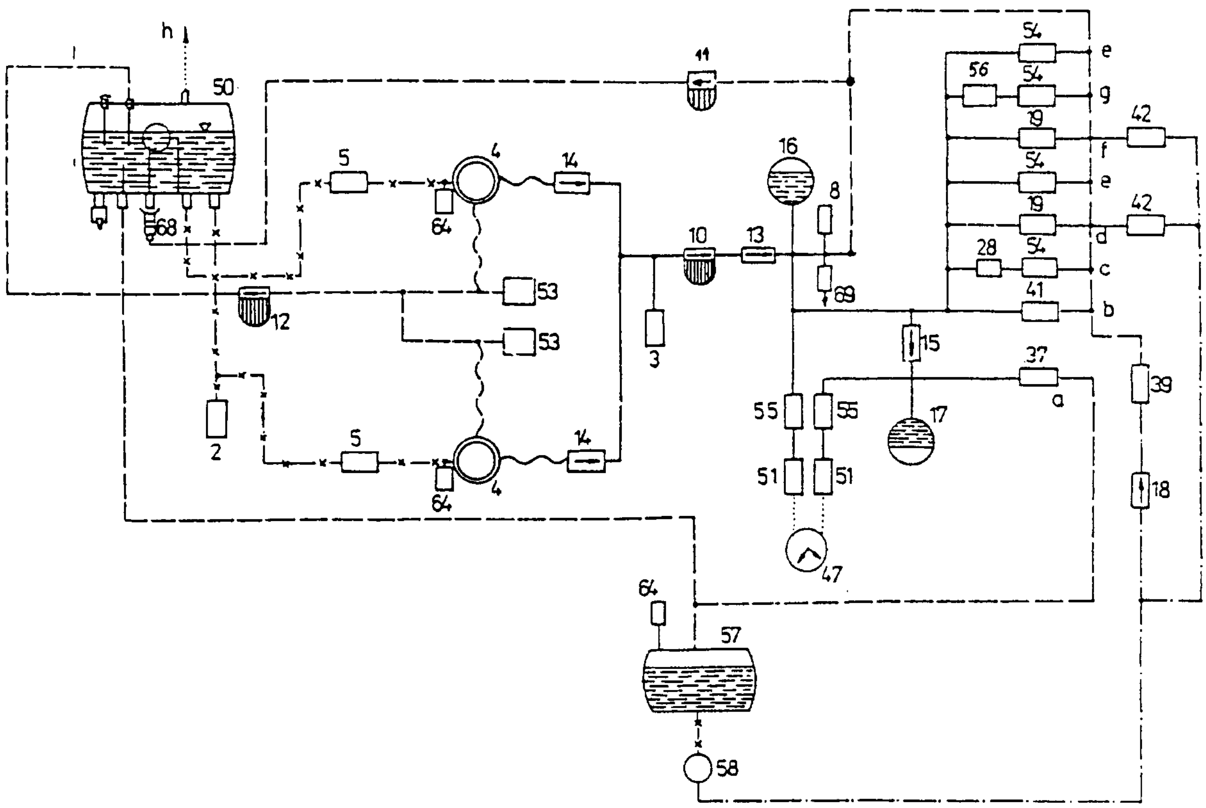


Fig. 7 – 30 Hydraylic system

a Main wheel braking circuit

b Wiper unit control

c Nose wheel steering servo circuit

d Circuit for landing gear extension and retraction

e Circuit for ABC tab extension and retraction

f Circuit for wing flap extension and retraction

g Circuit for spoiler extension and retraction

h Circuit for hydraulic tank pressurization system

(cont.)

Legend to Fig. 7 – 30

No.	Name
2	Suction filling connection
3	Pressure filling connection
4	Hydraulic pump
5	Disconnecting valve
8	Relief valve
10	Hydraulic filter
11	Hydraulic filter
12	Hydraulic filter
13	Non–return valve
14	Non–return valve
15	Non–return valve
16	Hydraulic accumulator
17	Hydraulic accumulator
18	Non–return valve
19	Solenoid valve
28	Choke dia. 0.04 in (1 mm)
37	Reduction valve
39	Hand–operated valve
41	Wiper throttle cock
42	Hand–operated valve
47	Dual pressure gauge
50	Hydraulic tank
51	Pressure transmitter
53	Hydraulic thermoswitch
54	Solenoid valve
55	Choke
56	Choke dia. 0.018 in (0.45 mm)
57	Emergency tank

(cont.)

Legend to Fig. 7 – 30 – continued

No.	Name
58	Hydraulic hand pump
64	Discharge valve
68	Non–return valve
69	Hydraulic fluid sampling valve

ELECTRICAL SYSTEMS (see Fig. 7 – 31)

Two generators are a main source of electric energy (DC power) (in AFM marked as DC generators). Each source features 28V voltage and 5.6 kW power. Two batteries each having 24 V voltage and 25 Ah capacity are stand–by source of DC current. Some important appliances are supplied directly from the battery as follows:

- from BATTERY I	- flight data recorder - extinguisher L.H. - stand–by gyro horizon
- from BATTERY II	- extinguisher R.H. - cockpit lighting

The instruments powered by AC power are fed via two inverters LUN 2450 (3 x 36 V /400 Hz), and two inverters LUN 2460 (115 V / 400 Hz) and two alternators LUN 2102. The inverters are fed from the direct current network with the voltage 28 V.
A socket for connecting a ground power source is installed on the airplane so that the airborne power distribution can be supplied.

DC POWER DISTRIBUTION

The DC electric network consists of two systems independent of each other. Each of them includes one DC generator and one battery. At operation of both DC generators or at feeding from the batteries or ground source these system are separated. Each system has one main bus bar (S1, S2) to which a generator is connected via a differential relay and battery connected via a contactor and via circuit breakers to this bus–bar. Three peripheral bus bars, two switchable (S1A, S1B or S2A, S3B) and one unswitchable (S2A or S3A), are fed from this main bus bar. Bus bar switching is automatical at switching off the differential relay (at DC generator failure) or at voltage loss on the given peripheral bus bar. After switch–over the appropriate peripheral bus bar is fed from the other system. Mutual connection of both the systems occurs only at failure of either generator. In this case the main bus bar (S1, S2) of both the systems is connected by a contactor. At short circuit in only one of the main bus bars a circuit breaker will not connect the bus bar to each other. At short circuit in peripheral bus bar the devices connected to the appropriate bus bar will not be fed. One of switchable peripheral bus bars is marked as a emergency one. The most important devices necessary for accomplishing of flight are connected to these bus bars. In case that only one emergency bus bar operates the devices fed either from the emergency bus bar or battery can operate.

Devices fed from S1A emergency bus bar:

ADF I, transponder I, RH artifical horizon, RH turn and bank indicator, internal instrument illumination – circuit I, 36 V AC inverter I, RH and LH feathering pump, landing gear – basic circuit, nose wheel steering system, landing gear position visual indication, LH ENGINE and AIFRAME panel on CWD, instrument panel lighting – circuit II, center landing and taxiing sarchlights, LH engine oil temperature indicator, LH fuel gauge, windshield deicing indication, indication of the air temperature in the heating duct and in the cabin, rudder trim and aileron trim tab controls, LH tip tank fuel indicator, wing flaps position indicator, alternator – RH.

(cont.)

Devices fed from S2B bus bar:

Navigation system I, VHF radiostation I, gyro compass I, intercom I, LH artifical horizon, standby artifical horizon, LH turn and bank indicator, RH engine oil temperature indicator, passenger cabin lighting – 1/3, FASTEN SEAT BELTS signalization, PITOT PRESSURE I and STATIC PRESSURE I heating, RH ENGINE and ELECTRO panel on CWD, signalization of engine fire, 115 V AC inverter I, standby lighting of the instrument panel, automatic and manual feathering, automatic bank control, RH fuel gauge, RH tip tank fuel indicator, front baggage compartment fire signalling, alternator – LH.

AC POWER DISTRIBUTION

Two LUN 2450 inverters function as a three–phase amplitude power (3x36 V/400 Hz) supply source for instruments. The inverters operate simultaneously without standby. In case of failure of either inverter the instrument supplied by failed inverter are switched automaticaly to another (operating) inverter.

Power supply of instruments with one–phase amplitude current 115 V/400 Hz is performed by two LUN 2460 inverters. The inverter No. I operates, the inverter No. II is a standby and it is switched on automatically at failure of the invertor No. I which results in renovation of power supply 115 V/400 Hz. All the inverters are fed from the direct current network with the voltage of 28V.

Two alternators with rated power 3.7 kVA for the supply of the electric windshield heating and propeller deicing are installed on the airplane. At normal operating mode the left hand alternator supplies the electric windshield heating and the right hand one supplies propeller deicing system. At failure of either alternators its loading is connected automatically to operative alternator, whose power is enough to feed both the systems without limitation.

The failures of all supply sources and inverters are indicated through the amber cells on the CWD – ELECTRO.

MEASUREMENT

On the RH control panel is located the panel of 115 V inverters mode switch and measuring instruments of electrical values. The instruments themselves (voltmeters and ampermeters) are located on the RH instrument panel. The LH voltampermeter indicates continuously voltage levels and the current of the left generator. The RH voltammeter indicates the emergency bus bar voltages, amperage and voltage of batteries, and amperage and voltage of the RH DC generator, according to the position of the selector switch on the RH control panel. The LH voltmeter indicates phase–to–phase voltages of the of the 36 V AC inverters, according to the position of the selector switch on the RH control panel. The RH voltmeter indicates voltage of the 115 V AC inverters, and phase voltage of the alternator I, II, according to the position of the selector switch on the RH control panel.

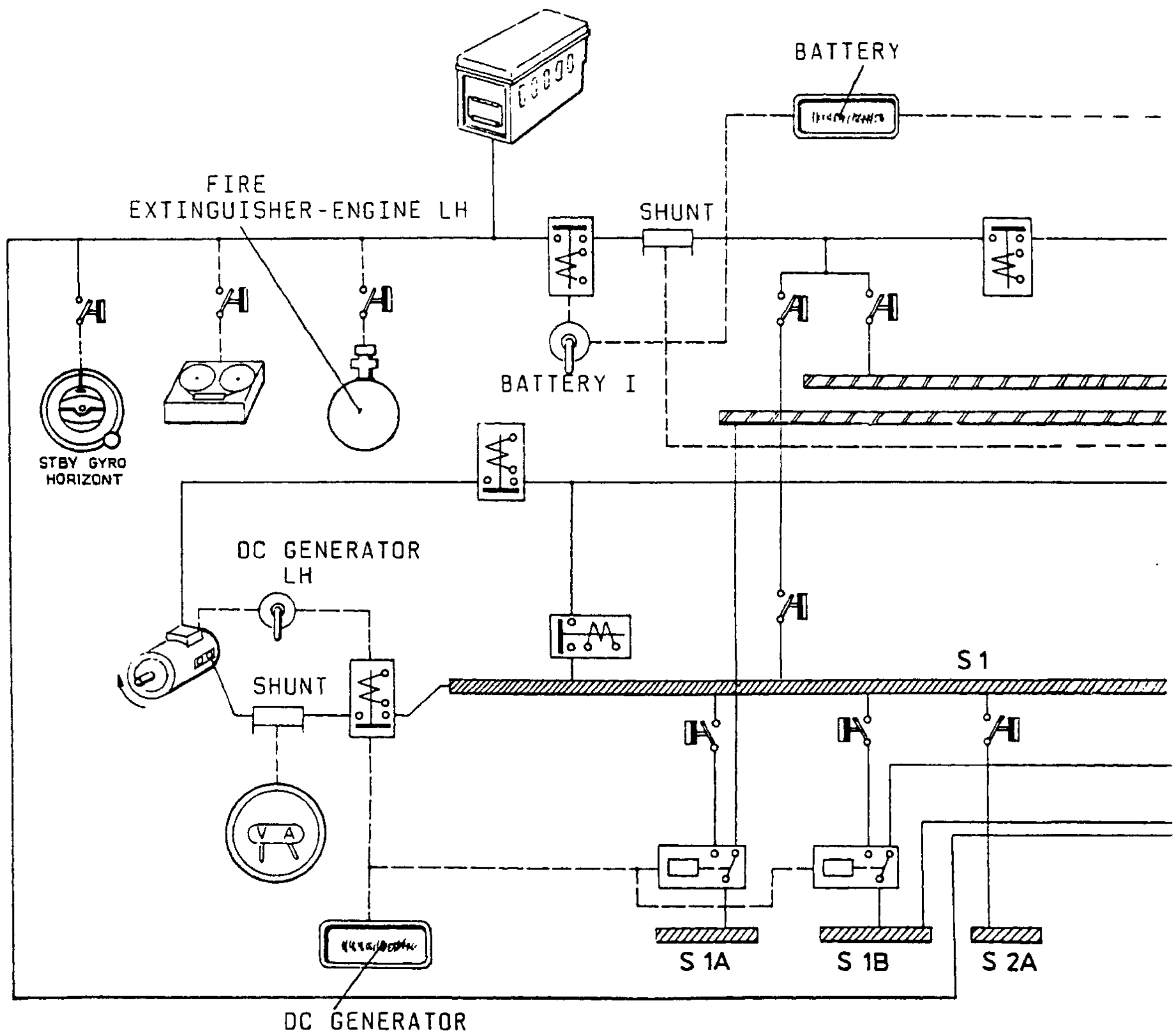
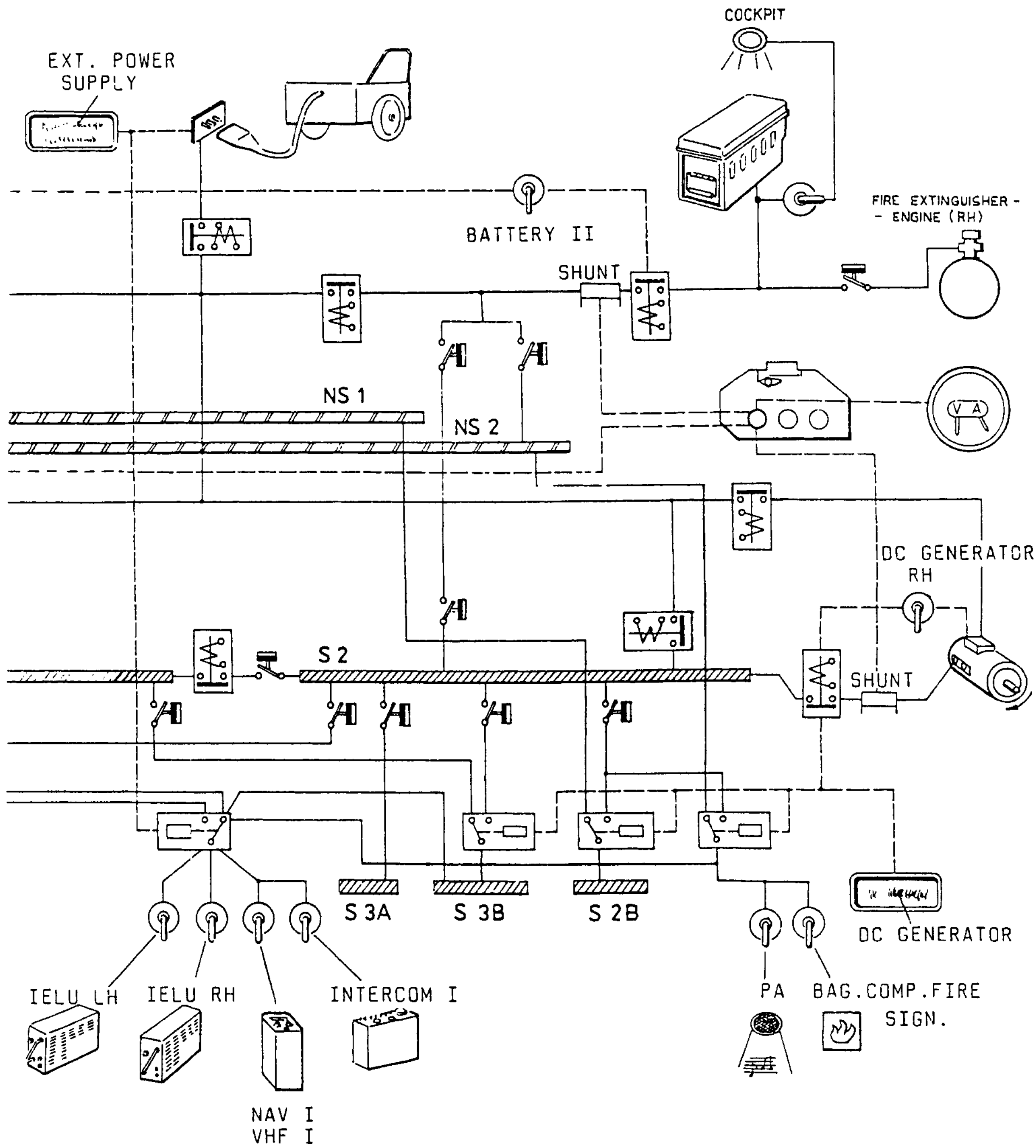


Fig. 7 – 31 Electrical system


COCKPIT
EXT. POWER
SUPPLY
FIRE EXTINGUISHER -
- ENGINE (RH)
BATTERY II
SHUNT
NS 1
NS 2
DC GENERATOR
RH
S 2
SHUNT
S 3A
S 3B
S 2B
DC GENERATOR
IELU LH
IELU RH
INTERCOM I
PA
BAG.COMP.FIRE
SIGN.
NAV I
VHF I

AIRPLANE LIGHTING SYSTEMS

LIGHT SYSTEM EXTERIOR (see Fig. 7 - 32)

Exterior lighting consists of:

- position lights;
- anticollision beacons;
- search lights.

The position lights are switched on with the POSITION LIGHTS circuit breaker. At POSITION LIGHTS circuit breaker switched on it is possible to switch on the lighting of a static ice detector by pushing the ICE DETECTOR LIGHTING push button on the left hand side of the cockpit. The anticollision beacons are switched on with the ANTICOLL BEACON circuit breaker. The sarchlights are switched on with the SEARCHLIGHTS TAXIING – LANDING I, II switches. By switching the switch I to the position TAXIING the one search light (central) will light up with power 125 W. By switching to the position LANDING the same search light will light up with power 250 W. By switching the switch II to the position TAXIING the two outside search lights will light up with power 2x125 W, by switching to the position landing the same search lights will light up with power 2x250 W.

CAUTION

DURATION OF CONTINUOUS OPERATION OF SEARCH LIGHTS IN POSITION LANDING IS 5 MINUTES MAXIMALLY.

FLIGHT COMPARTMENT LIGHTING

Flight compartment lighting consists of:

- cockpit lighting (see Fig. 7 - 33)
- instrument panel lighting
- passenger compartment lighting (see Fig. 7 - 34)
- transparencies FASTEN SAFETY BELTS and RETURN TO YOUR PLACE
- lighting of selected section and working places (the front baggage compartment, navigator's table, flight data recorder control box, toilet)
- sockets for connection of portable lamp.

Cockpit lighting is switched on with the switch COCKPIT. After switching on the lamp on the vertical channel will light up.

The instrument panel lighting and control panel lighting are switched on with circuit breaker INSTRUMENT PANEL - CIRCUIT I, CIRCUIT II and STBY CIRCUIT.

(cont.)

The lights that are switched on with:

(a) Circuit breaker CIRCUIT I:

- instrument panel lighting and rear control panel lighting
- compass lighting
- watch lighting

The lighting intensity can be controlled with the control knob on the LH instrument panel.

(b) circuit breaker CIRCUIT II:

1. Lighting of instruments

   The lighting intensity can be controlled with the RL–10 rheostat installed on the LH instrument panel.

2. Front and central control panel lighting and the overhead panel lighting

   LH and RH control panel lighting

   Ambient thermometer lighting

   Windshield heating and propeller deicing switches lighting.

   The lighting intensity can be controlled with the RL–10 rheostat installed on the LH instrument panel.

(c) circuit breaker STBY CIRCUIT:

- standby instrument panel lighting (in case of circuit I failure). Lighting intensity is not controlable.

(d) switch COCKPIT

- the lamp on the vertical channel – it can be used as emergency cockpit lighting.

The passenger compartment lighting is switched on with the PASSENGER CABIN 1/3 and 2/3 circuit breakers. The centre bulbs of the first ceiling lamp on the left side and the last ceiling lamp on the right hand side operate as a route identification lamps. Route identification lighting is supplied directly from the 27 V bus bar and is switched on automatically at open entry door on condition that the switch at the entry door is switched on. The circuit breaker LIGHTING is a joint switch of the front baggage compartment lighting, navigator's table lighting, flight data recorder lighting and toilet lighting. The switching on separate lamps is performed with switches located either at lamp jacket or of in adjacent area.

EMERGENCY LIGHTING SYSTEM

The airplane emergency lighting system consists of four transparencies of emergency lighting with inscription EXIT, which are located next to emergency exits and over the entry door and five search lights at the outside of the fuselage at places of emergency door and entry door. Transparencies and search lights light entry space at emergency disembarking of the airplane on the ground. The emergency lighting is connected to the airborne network via the emergency bus bar. In case airborne network supply fails the power supply will switch automatically on its own power supply source. The emergency lighting is switched on with the change–over EMERGENCY LIGHTING switch in the button part of the left control panel after tilfing the cover. It is possible to switch on the emergency lighting only at the CENTRAL WARNING DISPLAY AIRFRAME circuit breaker and the BATTERY I, BATTERY II switches on. In case airborne network supply fails the power supply will switch automatically on its own power supply source.

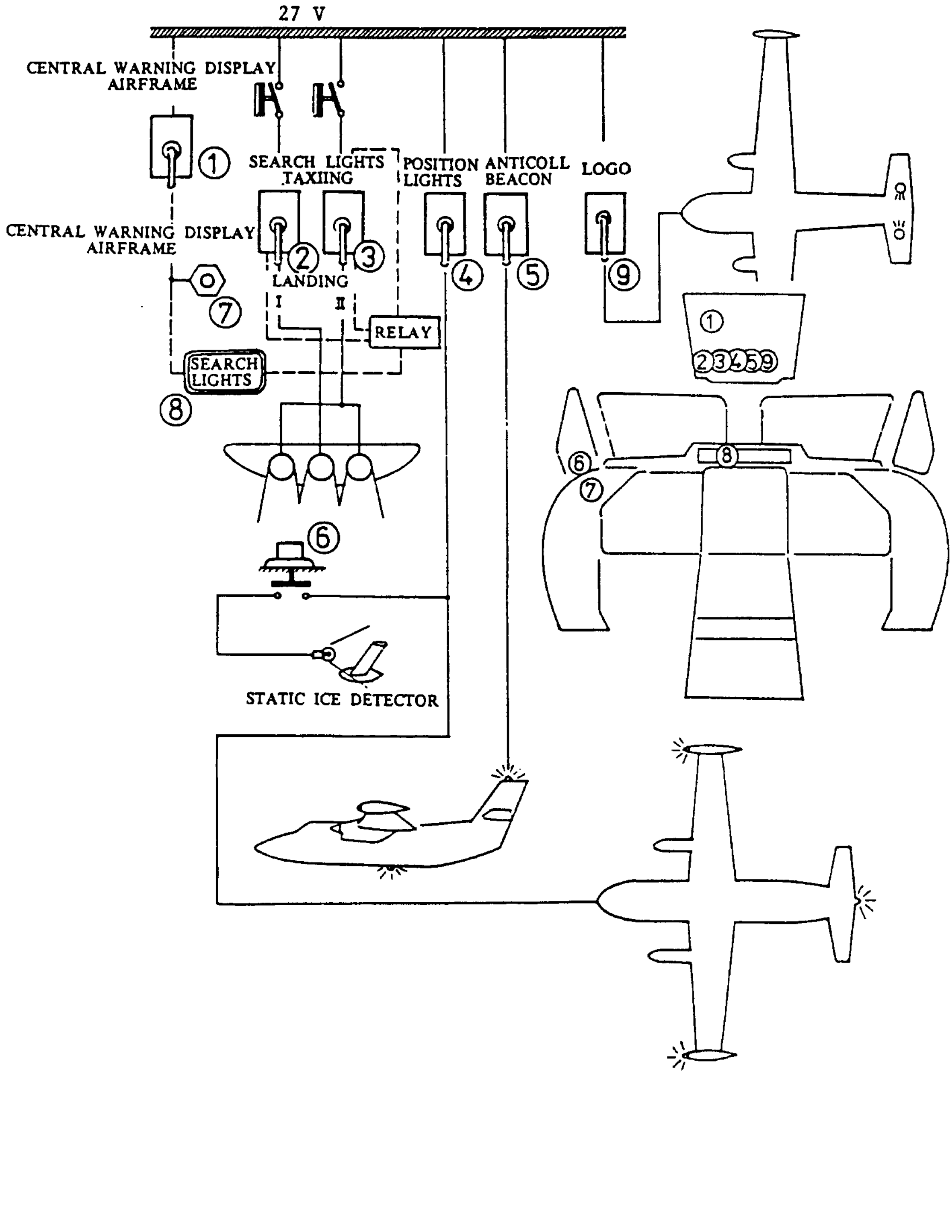


Fig. 7 – 32 Light system exterior

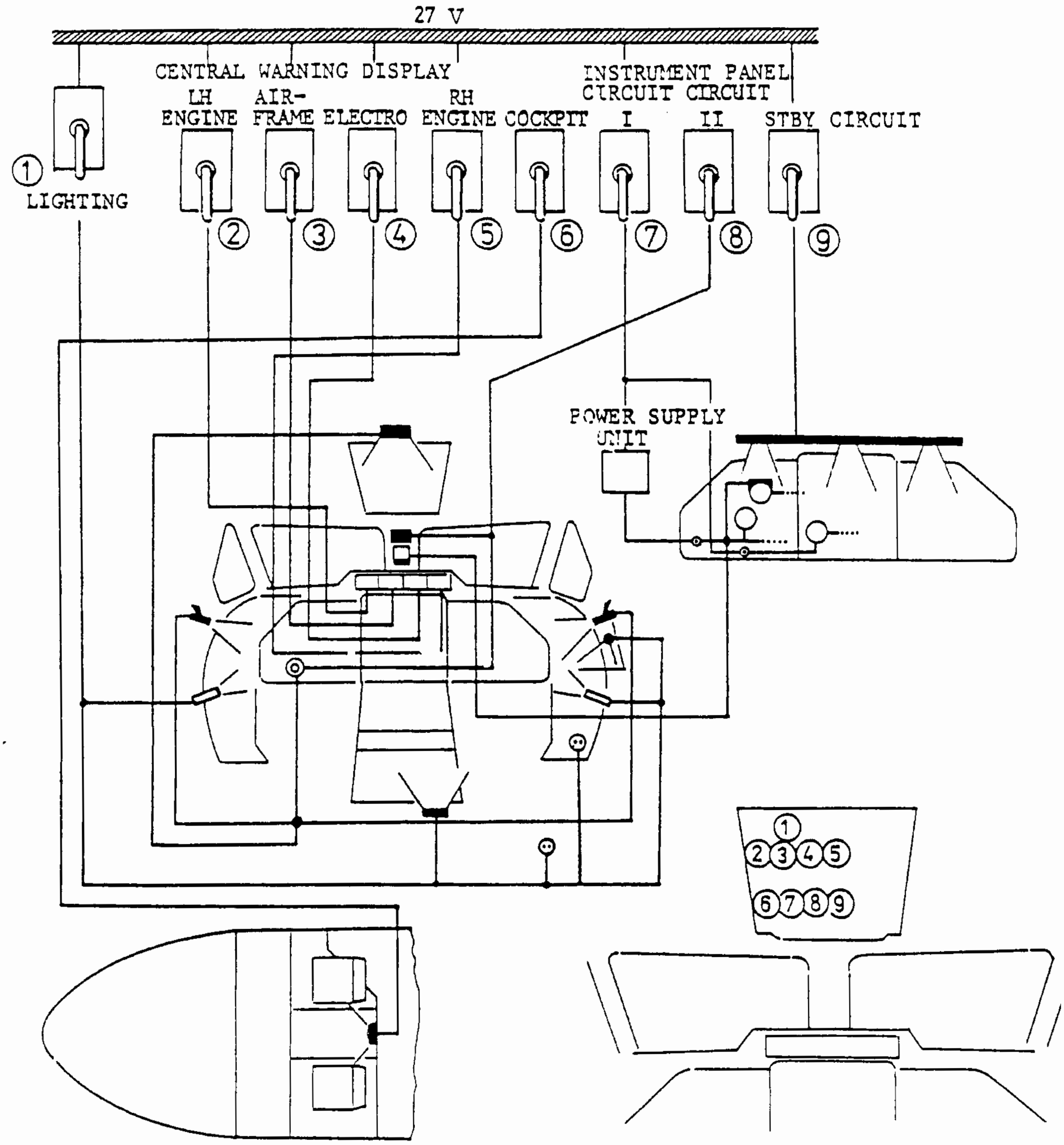


Fig. 7 – 33 Cockpit lighting

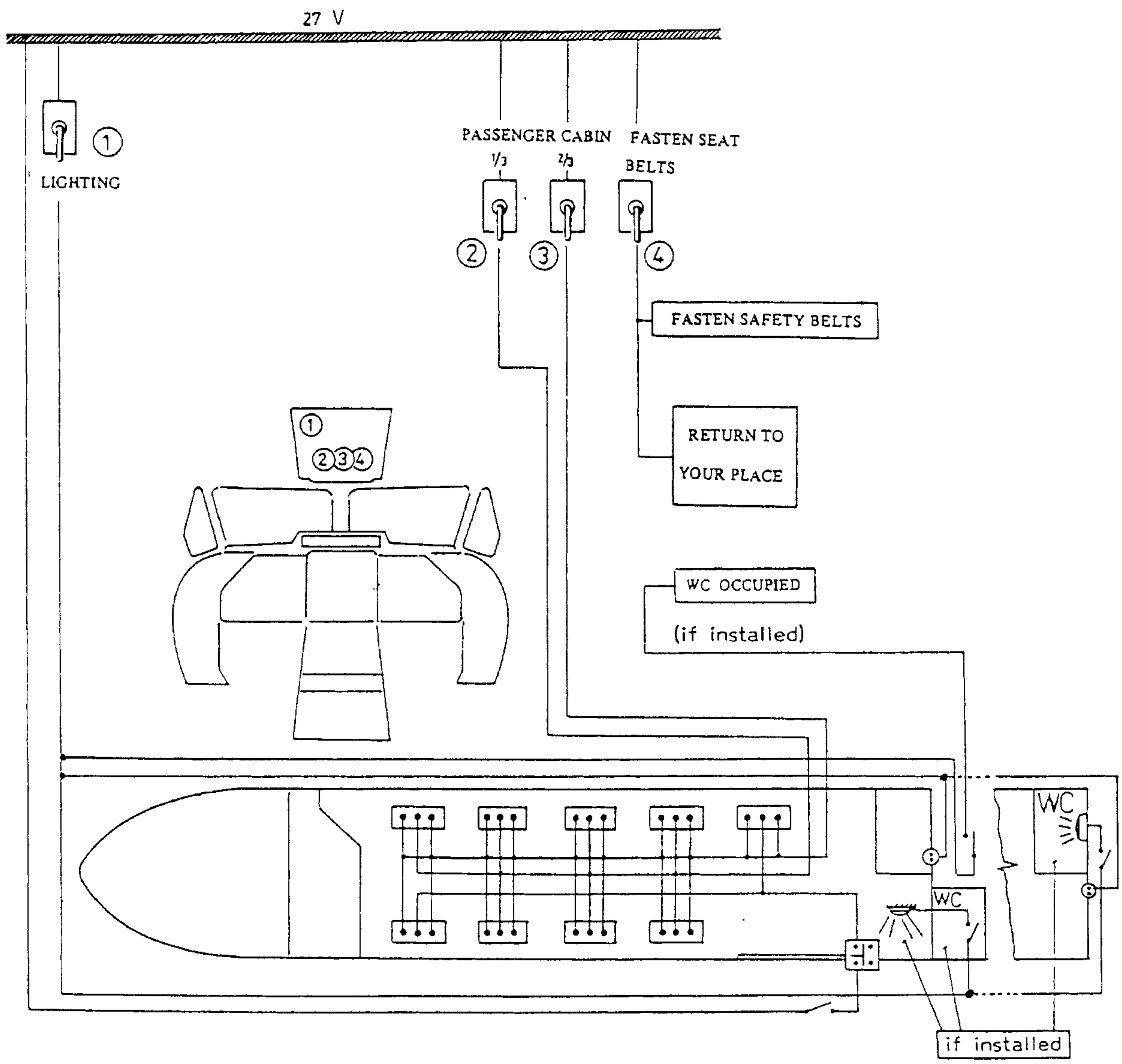


Fig. 7 – 34 Passenger compartment lighting

AIR CONDITIONING (see Fig. 7 - 35)

The system serves for creating of needed comfortable environment for passengers and crew. Hot air is led from engine compressors. Cooling air for ventilation is led from the atmosphere.

The system is controlled by means of levers VENTILATION, HEATING and COCKPIT AIR CONTROL, located on the left control panel. The lever VENTILATION opens and closes cold air supply from the atmosphere. The lever HEATING opens and closes hot air supply. Movement of the lever HEATING is limited tiltable latch with an inscription ABOVE −10°C. At ambient temperature below −10°C it is possible to tilt the latch (in this position you can see an inscription BELOW −10°C). The levers COCKPIT AIR CONTROL regulates air quantity for air conditioning of the cockpit (the left lever) and for air blowing on the side windows (the right lever). The air throttle levers are located below the bottom rim of the instruments panel. A pilot can set air conditioning intensity in his place in the cockpit.

INDICATING

On the left control panel, dual air temperature indicator shows air temperature in the system. Passenger compartment temperature is indicated on the upper indicator scale and heating air ducts temperature is indicated on the lower scale.

FANS (IF INSTALLED)

The fans are located in the pasesenger cabin on the vertical control channel above the transparencies, and on the rear baggage compartment wall.

Switching on:

FANS circuit breaker on the overhead panel	ON
FRONT FAN REAR on the window frame	ON

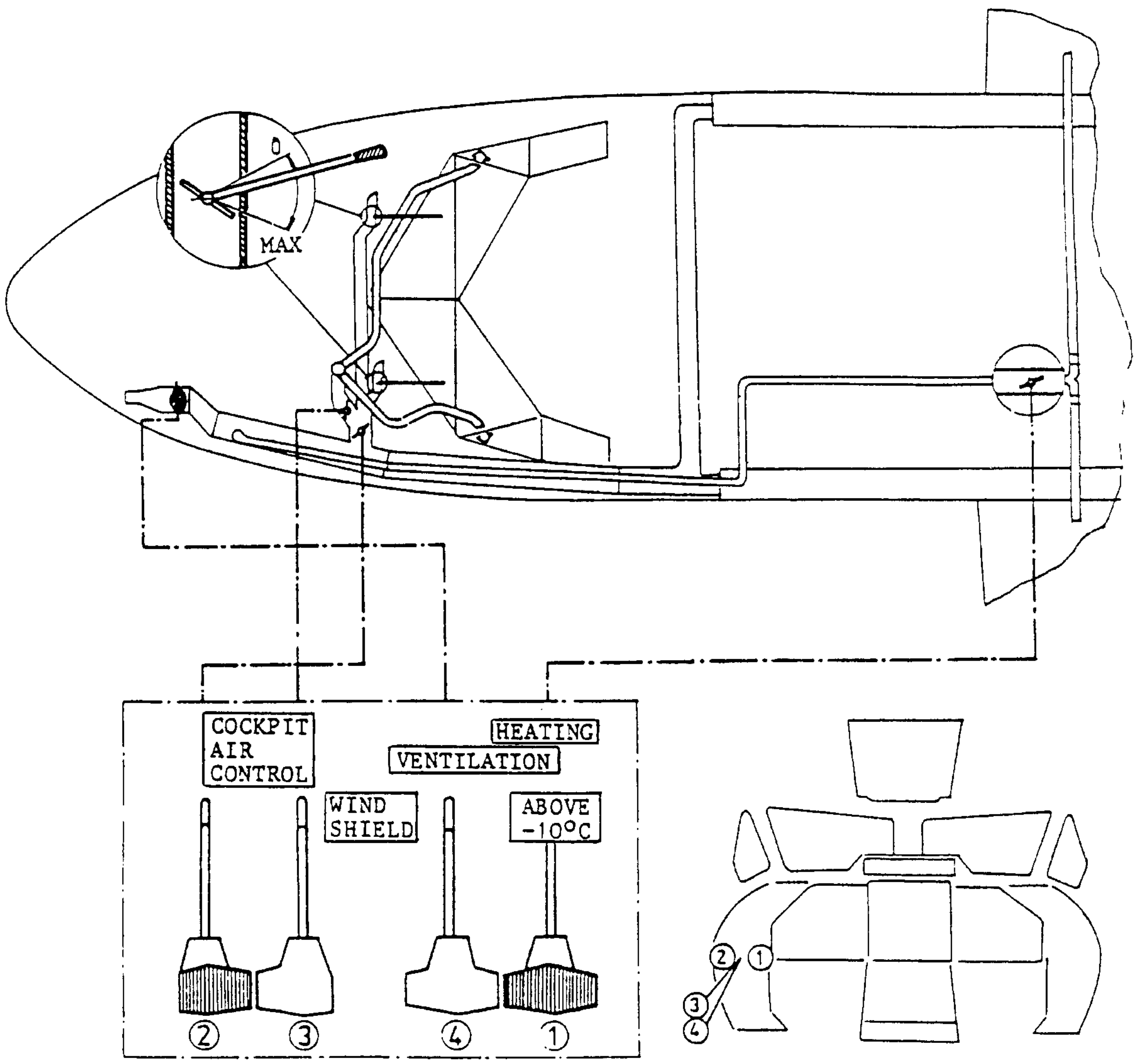


Fig. 7 – 35 Air conditioning

OXYGEN EQUIPMENT

On the airplane is installed a portable oxygen equipment – see section 9 – SUPPLEMENTS.

PITOT STATIC SYSTEM (see Fig. 7 – 36)

The pitot pressure circuit consists of two branches totally independent of each other and connected to pitot pressure probes located symmetrically on both the sides of the front fuselage part at places between frames No 4 and No 5. Selection of the probe whose from which instruments of pilot will be supplied from this probe is performed by PITOT PRESSURE I II turning the selector cock on the left hand control panel into the respective position (I – the left probe, II – the right probe).

The static pressure circuit is equipped with two main probes located on both the sides of the front fuselage parts between the 1st and 2nd frame and with one emergency probe under the fuselage nose cone. The instruments of pilot and copilot are supplied from two branches independent of each other. The connection of pilot instruments to the emergency branch of static pressure is performed with the EMERG. STATIC PRESS. SHUT/OPEN selector cock on the left hand control panel.

The ram pressure probe is located under the leading edge of the left wing and supplies the stall warning system.

All the pressure probes are equipped with heating elements.

Following instruments are connected to the pitot static system:

- two airspeed indicators
- a speed annunciator (extend landing gear)
- a stalling speed annunciator
- two altimeters (barometric or encoding)
  and 3rd barometric altimeter (if installed)
- two rate of climb indicator
- flight data recorder
- autopilot (if installed)

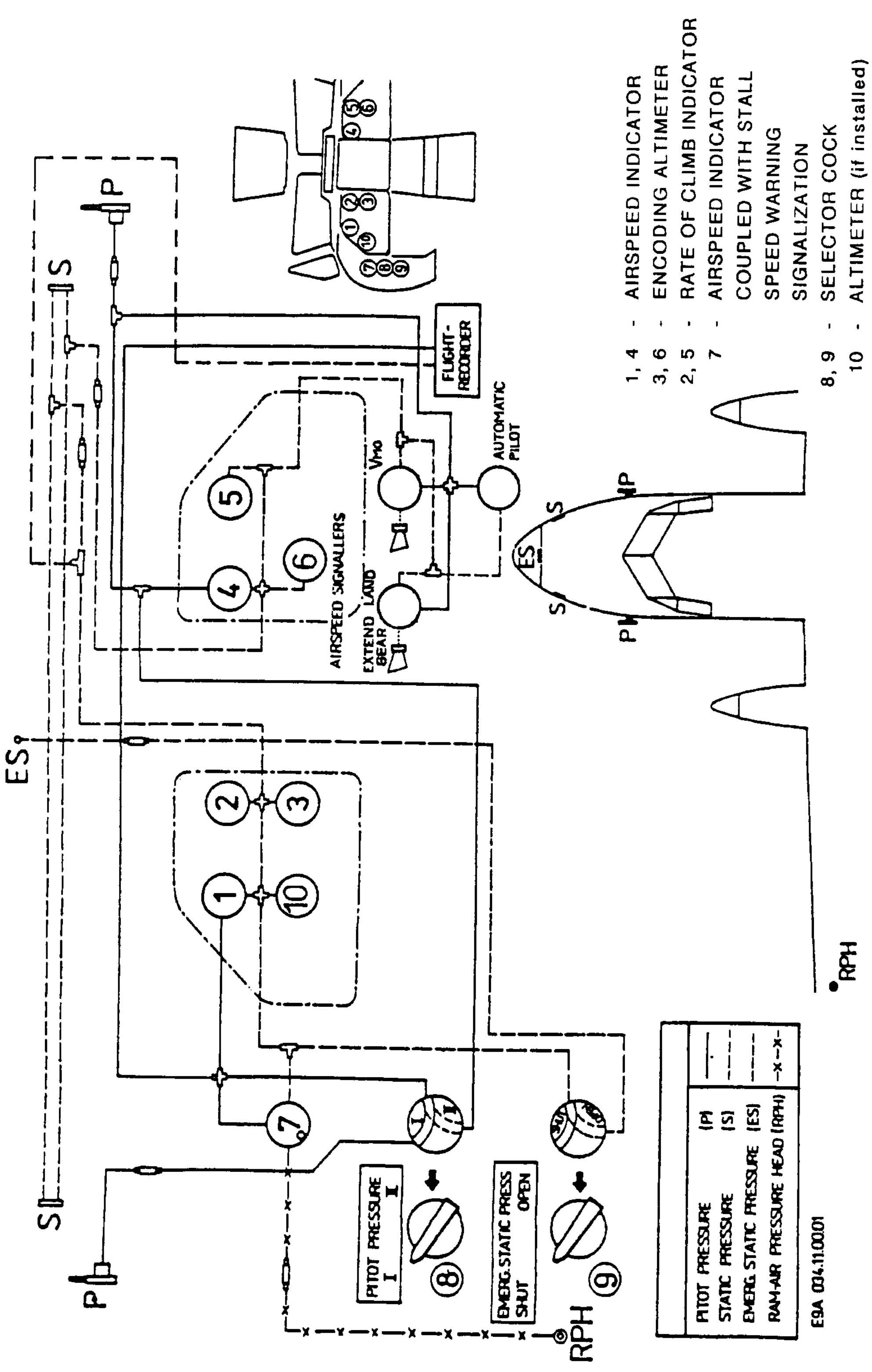


Fig. 7 – 36 Pitot static system

ICE AND RAIN PROTECTION

AIRFRAME DEICING SYSTEM (see Fig. 7 - 37)

The pneumatic deicing system serves for ice removal from the leading sections of wing and tail unit. The function of the deicer is based on the mechanical action of the flexible rubber boot, which is fixed to the leading edge of wing and tail unit. In this deicer there are small cells which are filled with air from the engine bleed.

The airframe deicing system is armed by switching on the circuit breaker DEICING AIRFRAME on the overhead panel.

The switching on is performed with the switch ON/OFF at the control box of the airframe deicing on the right hand control panel. With the selector in position AUTOM. cyclic filling of individual deicers is automatical. A cycling speed depends on the position of the selector FAST–SLOW. In case automatic cycling does not correspondent with the ice accreation speed or at timer failure use the hand control by switching the selector into the MANUAL position. Faultless operation (i.g. timer proper function) is checked as per lighting up of bulbs A, B and C on the control box.

To ensure proper deicing function, the pointer of the pressure gauge must be in the green field.

AIR INTAKES DEICING (see Fig. 7 - 38)

The leading edge of the air intake to the engines is hot air heated, the air being taken from both the engines behind the last (radial) compressor stage. The control of the hot air supply is derived from the control of the ice separator vanes inside the air channels and vanes in the lower part of the engine nacelle (in front of and behind the oil cooler). The air intakes deicing is armed by switching the circuit breakers SEPARATOR VANE LH, RH on the overhead panel.

The deicing switching on itself is performed by switching on the switches SEPARATOR VANE LH (RH). At switching the electromechanisms in the engine nacelles are actuated which results in:

(a) Separator vanes deflect into the operation position (down);

(b) Vanes in the cover engine nacelle part open (in front of and behind the oil cooler);

(c) The shut off cocks open hot air supply.

The deflection of separator vanes into the operation position is signalized by lighting up the green cell SEPARATOR VANE on CWD. As long as the vanes do not reach the end position the cells will flash and then they will light continuesly without flashing.

The system is switched off by switching off the switches SEPARATOR VANE LH, RH.

HEADS PRESSURE DEICING (see Fig. 7 – 39)

Pitot tubes, static pressure heads and ram pressure head have their own electric heating. Head pressure deicing is armed by switching on the circuit breakers DEICING PITOT STATIC I,II and STALL PROBE on the overhead panel. The switching on is performed by pushing five push buttons HEATING on the right hand control panel. At the same time the control bulbs in the pushbuttons will light up.

In case of failure and in case that whichever push button does not switch on the respective heating, the control bulb in the push button will not light up and amber signal cell PITOT HEATING on the glareshield of the instrument panel will light up. The switching off the HEATING is performed with a small push button below the switch on push button.

WINDSHIELD DEICING AND WIPER (see Fig. 7 – 40)

The windshield is heated electrically. The heating element (transparent layer) is devided into three sections.

A thermoregulator ensures tracking temperature 30°C. The windshield heating is fed by AC current from alternators on the condition that the circuit breakers WINDSHIELD HEATING LH, RH on the overhead panel are switched on. The heating has two steps.

Operation mode of the electric heating is set with the switch WINDSHIELD HEAT. 0–I–II on the right hand instrument panel. Heating function is indicated with the gren signal lamp WINDSHIELD HEAT.

Water is removed from the windshield by means of the wiper. The wiper is put into operation by opening the throttle valve WINIDSHIELD WIPER on the left hand control panel. The velocity of the wiper motion depends on the throttle cock opening.

PROPELLER DEICING (see Fig. 7 – 41)

To protect propellers from icing the propellers are electrically deiced by means of the heating elements supplied from alternators.

Propeller blades heating operates in cycles, the interval is set with the switch PROP. DEICING STBY MAIN on the right hand instrument panel. The position I of the switch corresponds to the interval of 40 s, position II corresponds to 80 s. At pre–flight check the cycle interval is 4 s.

Under normal conditions the circuit MAIN is switched on, STBY circuit is used in case of the main circuit failure. The proper deicing operation is indicated by lighting off both the signal cells on the central warning display.

DEICING DETECTION

Increase in ice layer on the airplane surface is indicated by lighting up the cell ICING on CWD. The indication is switched on with rotary detector located on the right hand side of the fuselage nose cone. The real ice layer is estimated according to the static detector located at the left cockpit side window.

The detection system is switched on with the switch ICE DETECTOR ROTARY on the overhead panel. The circuit breaker ICE DETECTOR STATIC switches on the static indicator heating only for time necessary to remove the ice.

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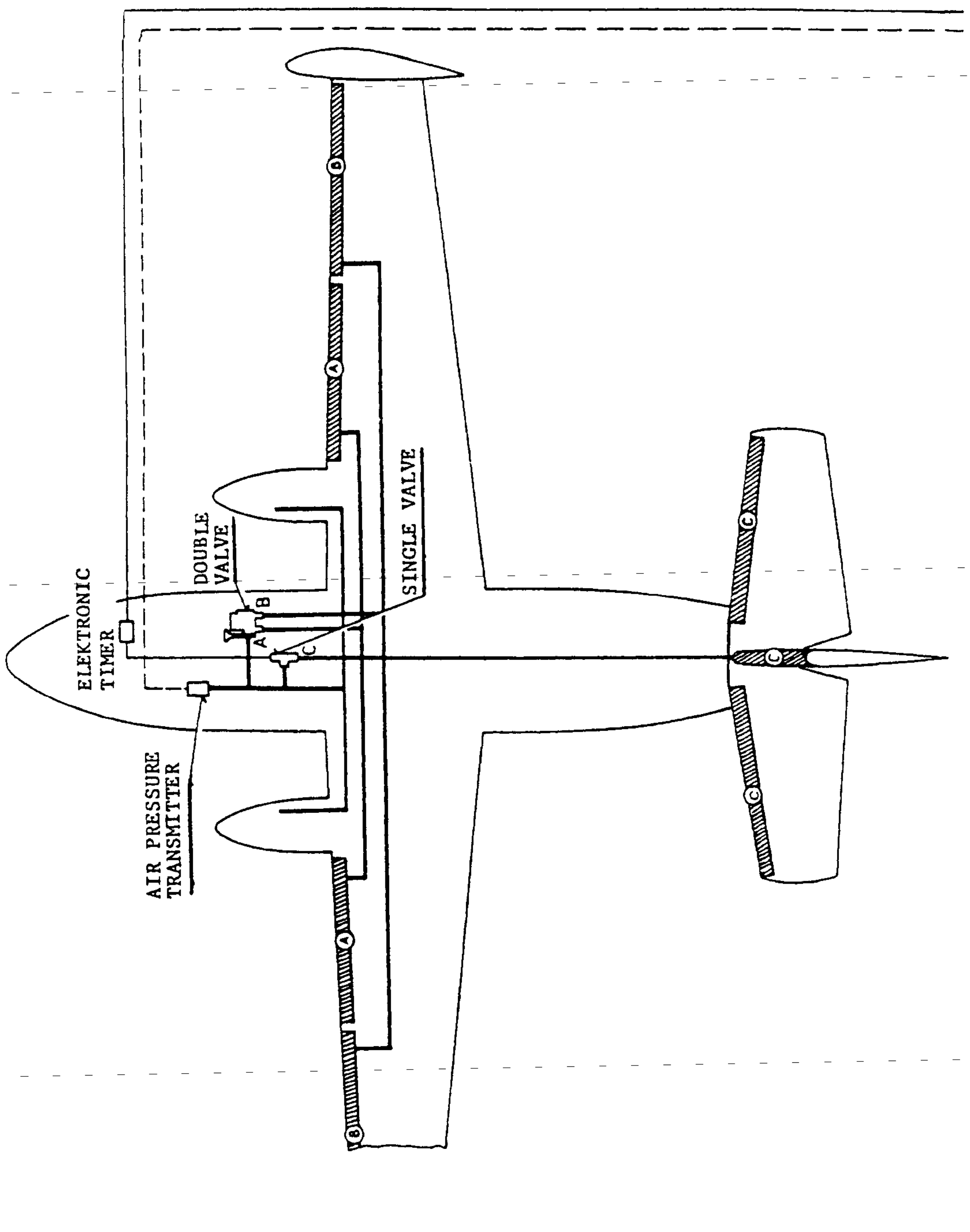
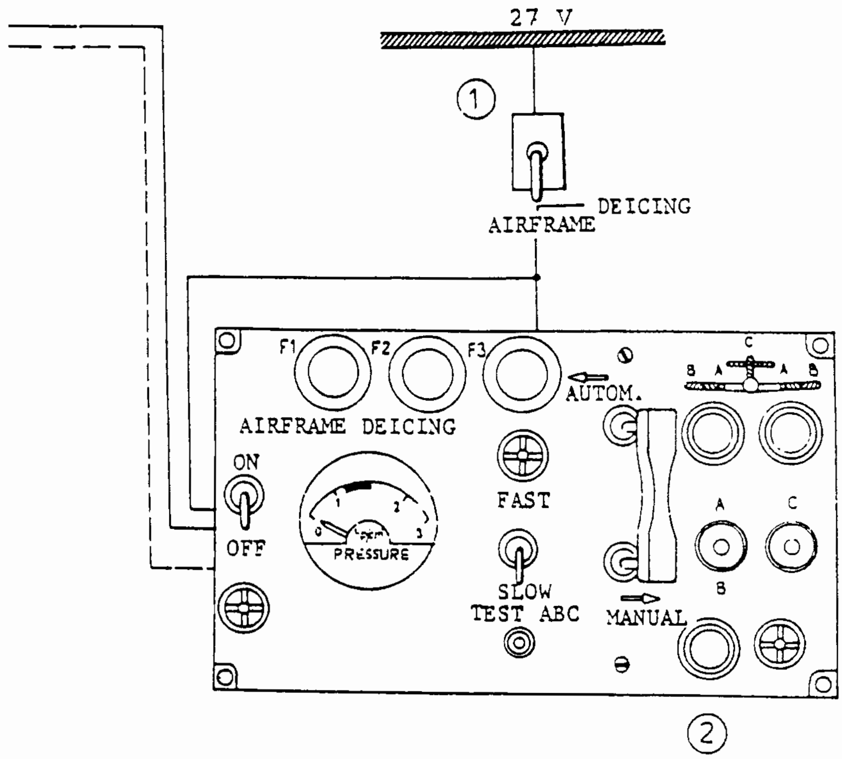
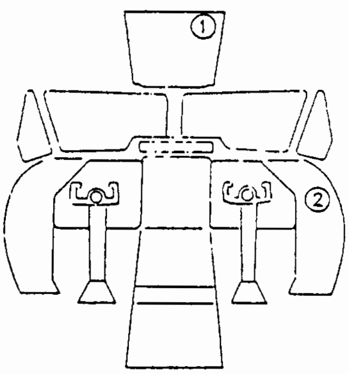


Fig. 7 – 37 Aiframe deicing system


27 V
1
AIRFRAME DEICING
F1
F2
F3
AUTOM.
AIRFRAME DEICING
ON
OFF
PRESSURE
FAST
SLOW
TEST ABC
MANUAL
A
B
C
2


1
2

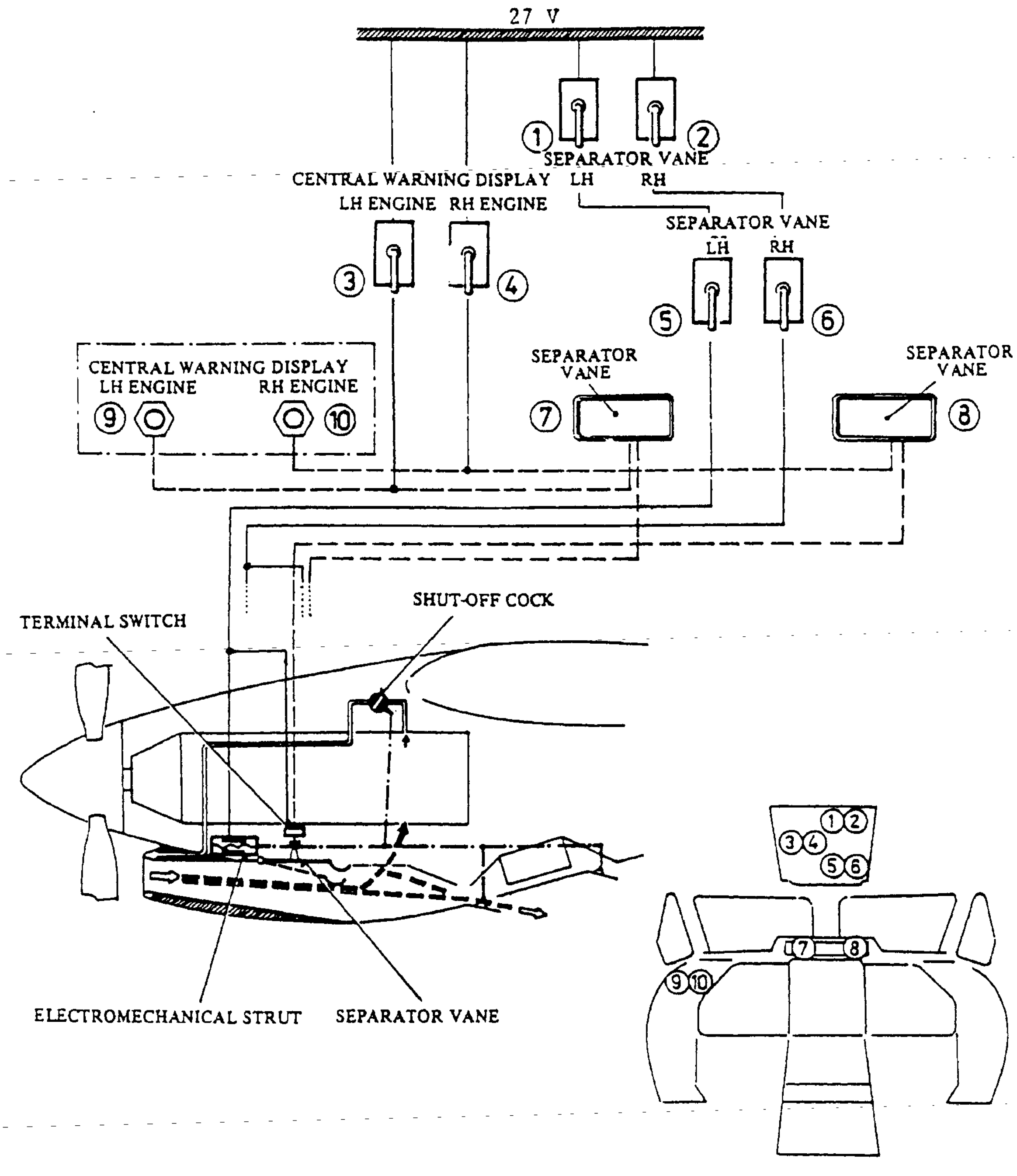


Fig. 7 – 38 Air intakes system

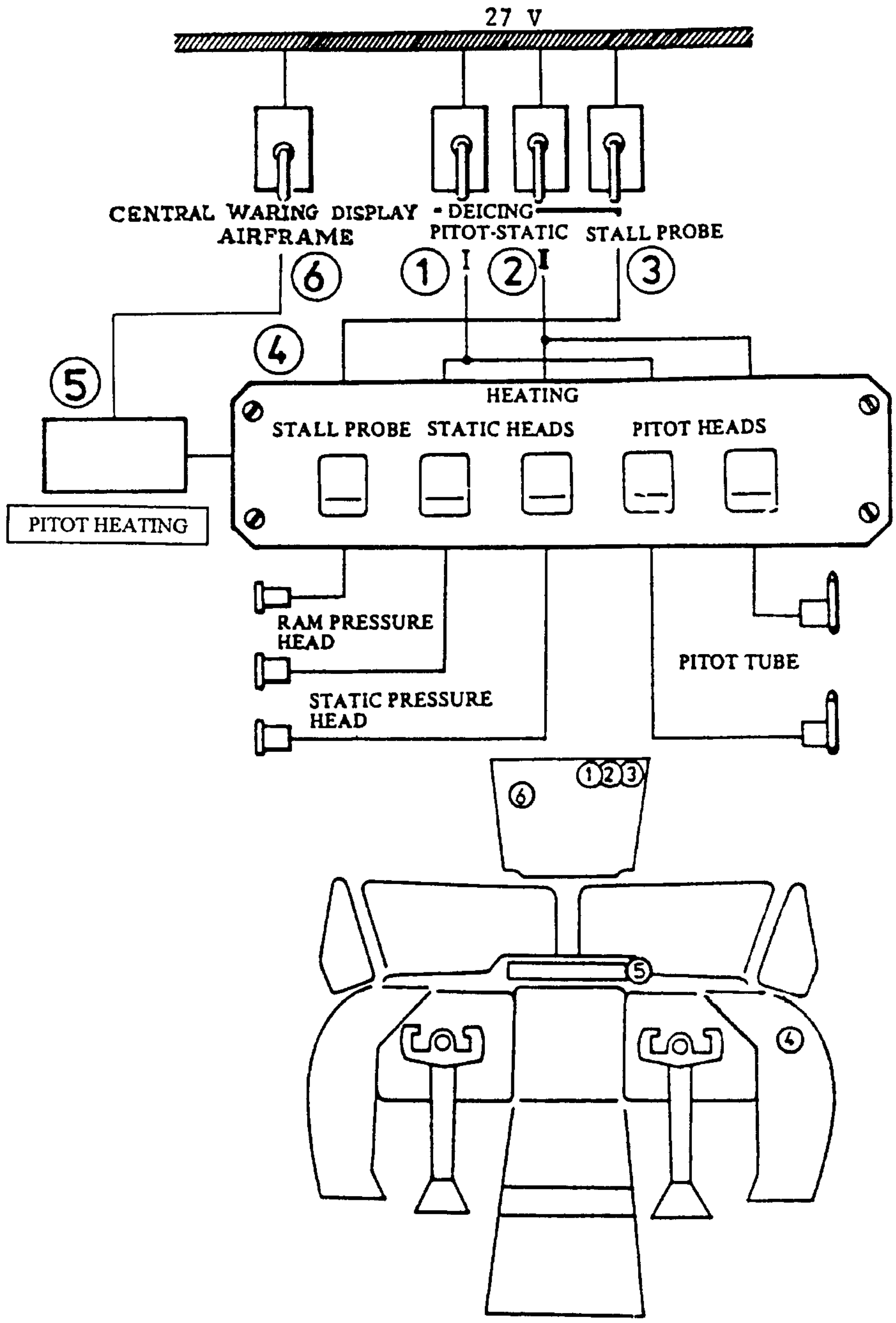
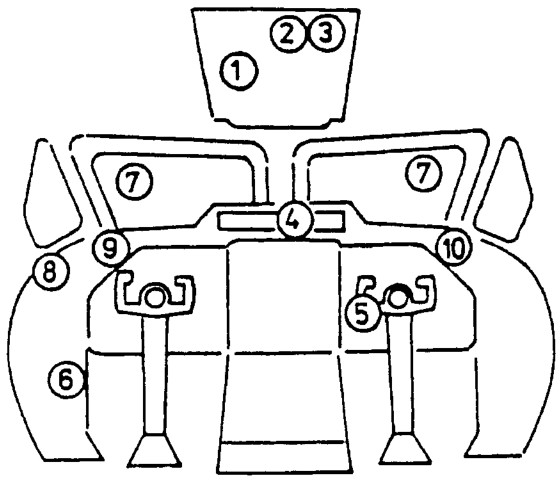


Fig. 7 – 39 Heads pressure deicing



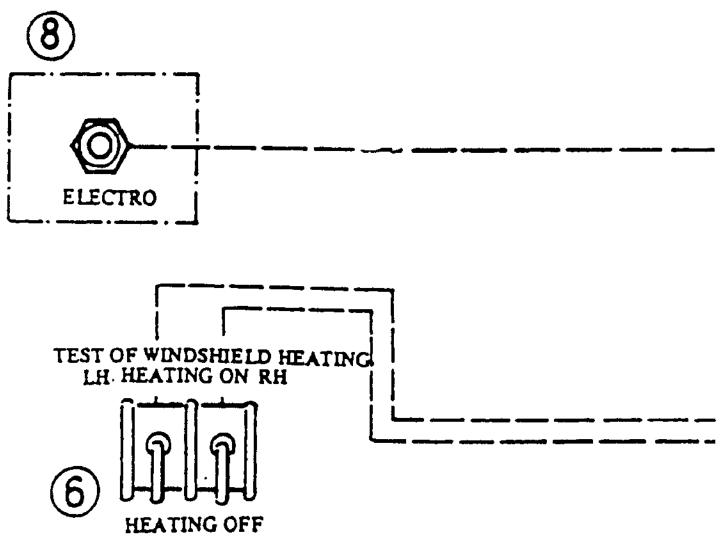
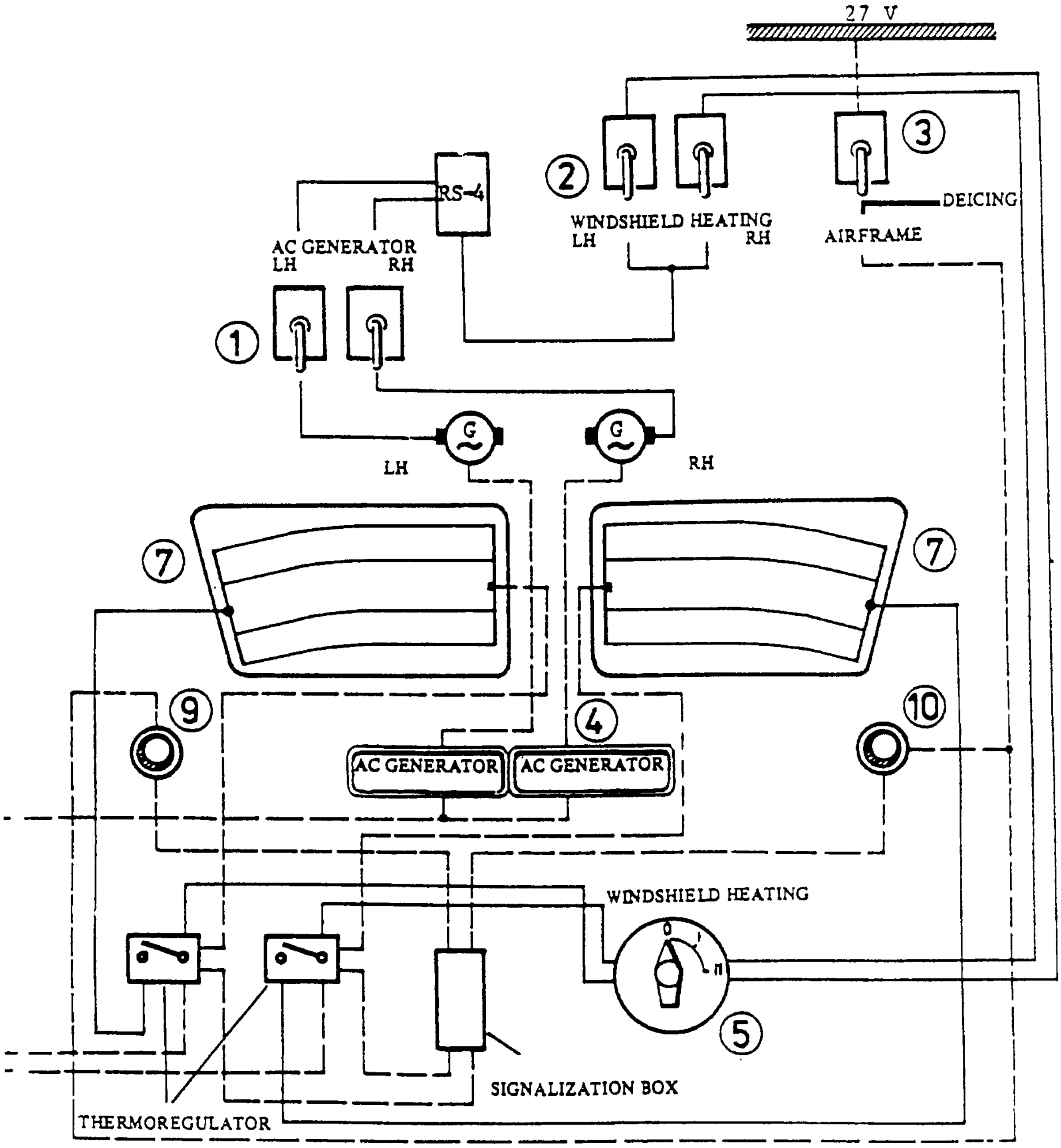


Fig. 7 – 40 Windshield deicing


27 V
DEICING
AIRFRAME
WINDSHIELD HEATING
LH
RH
RS-4
AC GENERATOR
LH
RH
LH
RH
AC GENERATOR
AC GENERATOR
WINDSHIELD HEATING
SIGNALIZATION BOX
THERMOREGULATOR

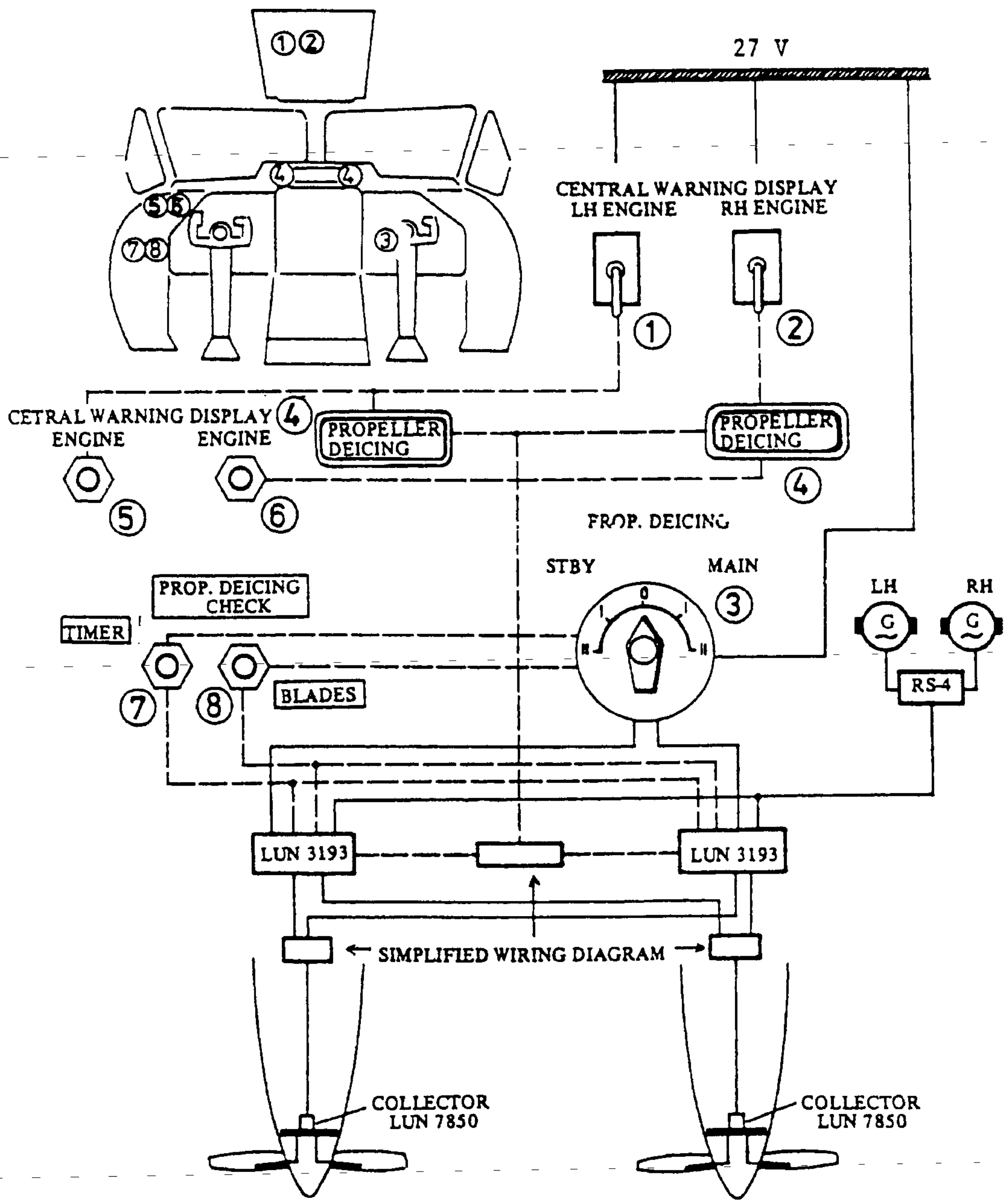


Fig. 7 – 41 Propellers deicing

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FIRE PROTECTION

The airplane fire–fighting equipment consists of three separate and independent systems established for fire extinguishing:

- in engine nacelles;
- in passenger cabin and cockpit;
- in the front baggage compartment.

FIRE EXTINGUISHING IN ENGINE NACELLES (see Fig. 7 – 43, Fig. 7 – 44)

The engine nacelle extinguishing system consist of extinguisher bottles filled by Halon 2402, distribution piping with 5 nozzles in each nacelle and electrical installation. After pushing an appropriate pushbutton on the front control panel in the cockpit an extinguisher bottle pyrocartridge is fired off and extinguishing agent is sprayed through nozzles into the engine nacelles. Part of extinguishing agent is led into the working cylinder of the throttle which will shut air intake into the air intake duct for generators and alternators cooling. The system makes it possible both direct and cross extinguishing. The push button FIRE EXTING. PRIM LH and RH is for direct extinguishing and push button FIRE EXTING. SEC. (LH and RH) for cross extinguishing. In relevant fire sections of engine nacelles 1, 2, 3, 4 are located fire detectors, which when warmed up will send a signal through the control unit for switching sound and light indication (FIRE) on the central warning display. Fire detectors are checked on correct function with the help of ENG. FIRE SIGN. I, II, III push buttons. When the above mentioned push buttons are depress the respective group of detectors is checked simultaneously on both engines. The rotary switch with inscription FIRE EXT. is on the test panel to check the correct function of the squib circuit in extinguisher bottle discharge valve. The left position corresponds to the left hand engine, the right position corresponds to the right hand engine. The faultless operation is indicated by lighting up the green signal lamp located to the right of the rotary switch. The position I on the rotary switch corresponds to the direct extinguishing (PRIM.) and the position II corresponds to the cross extinguishing (SEC).

FRONT BAGGAGE COMPARTMENT (see Fig. 7 – 45, 7 – 46)

Fire is sensed by the smoke sensor. The extinguishing system consist of the extinguishing bottle with the mechanical discharge valve, distribution piping, extinguishing collector and manual control in the cockpit. Halon 2402 is the extinguishing agent.

FIRE EXTINGUISHING IN THE PASSENGER CABIN AND COCKPIT

Fire extinguishing in the passenger cabin and cockpit is performed with two potrable fire extinguishers. One portable fire extinguisher is located on the floor after the LH pilot's seat, second one is located in the passenger cabin on the right side next to entry door (see Fig. 7 – 42)

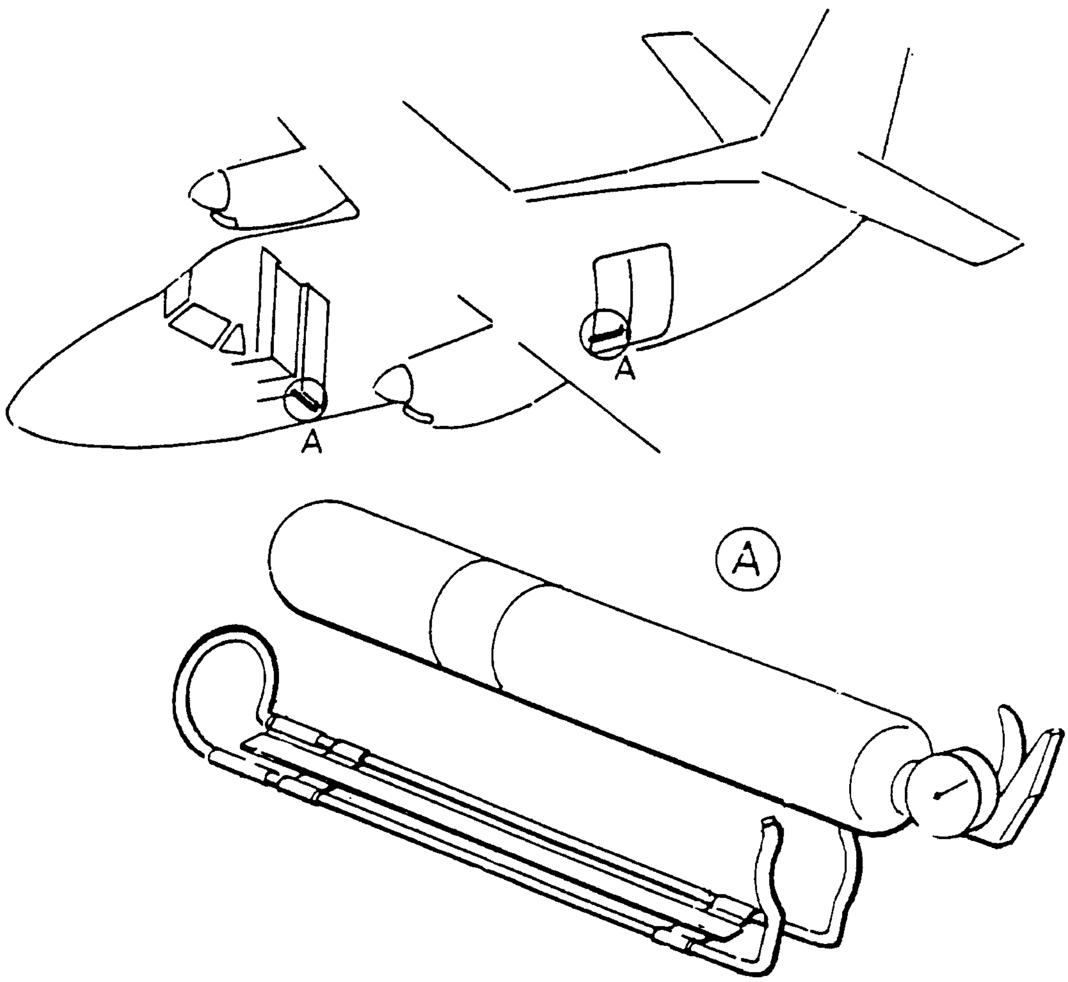


Fig. 7 – 42 Location of portable fire extinguishers

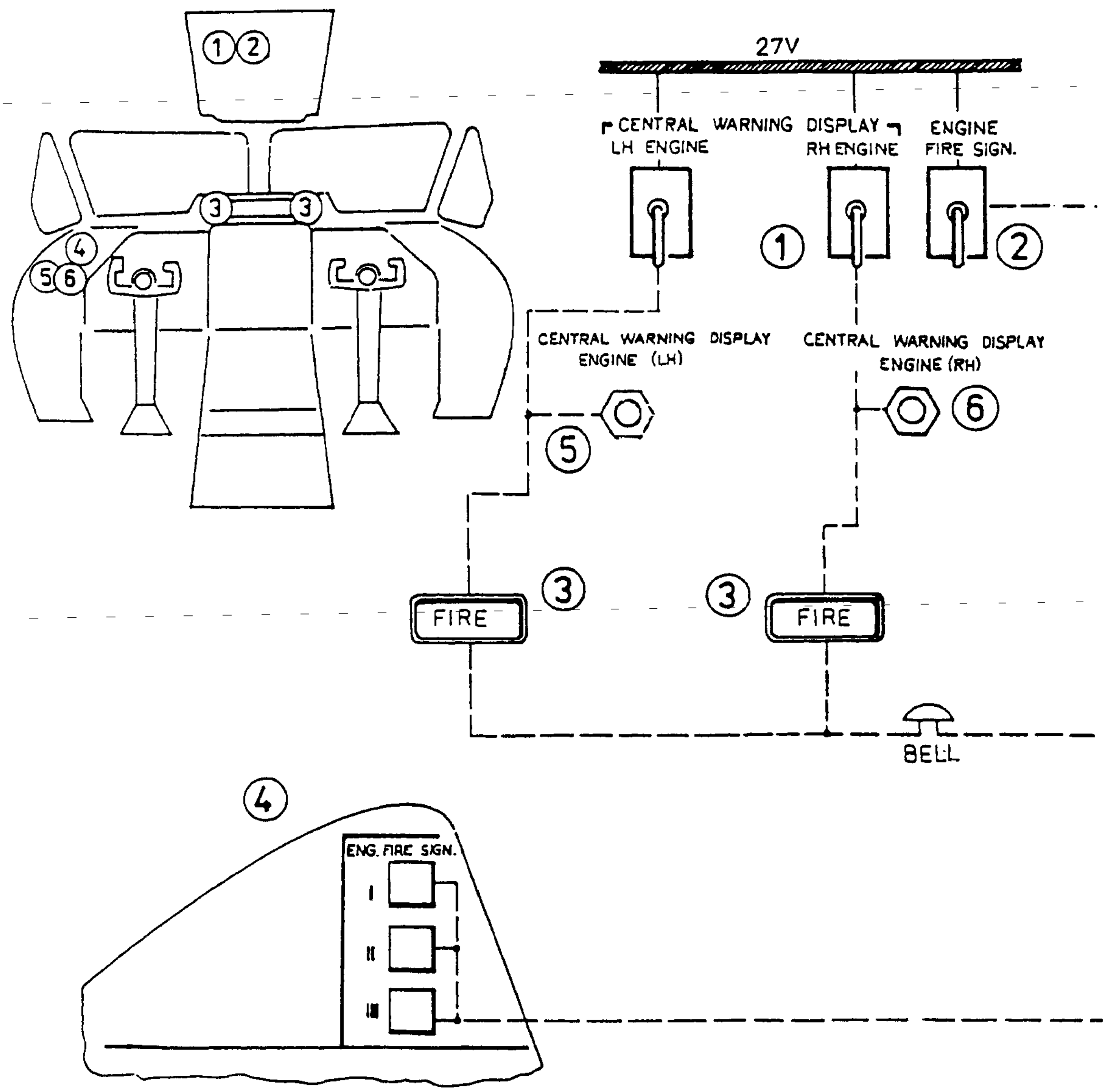
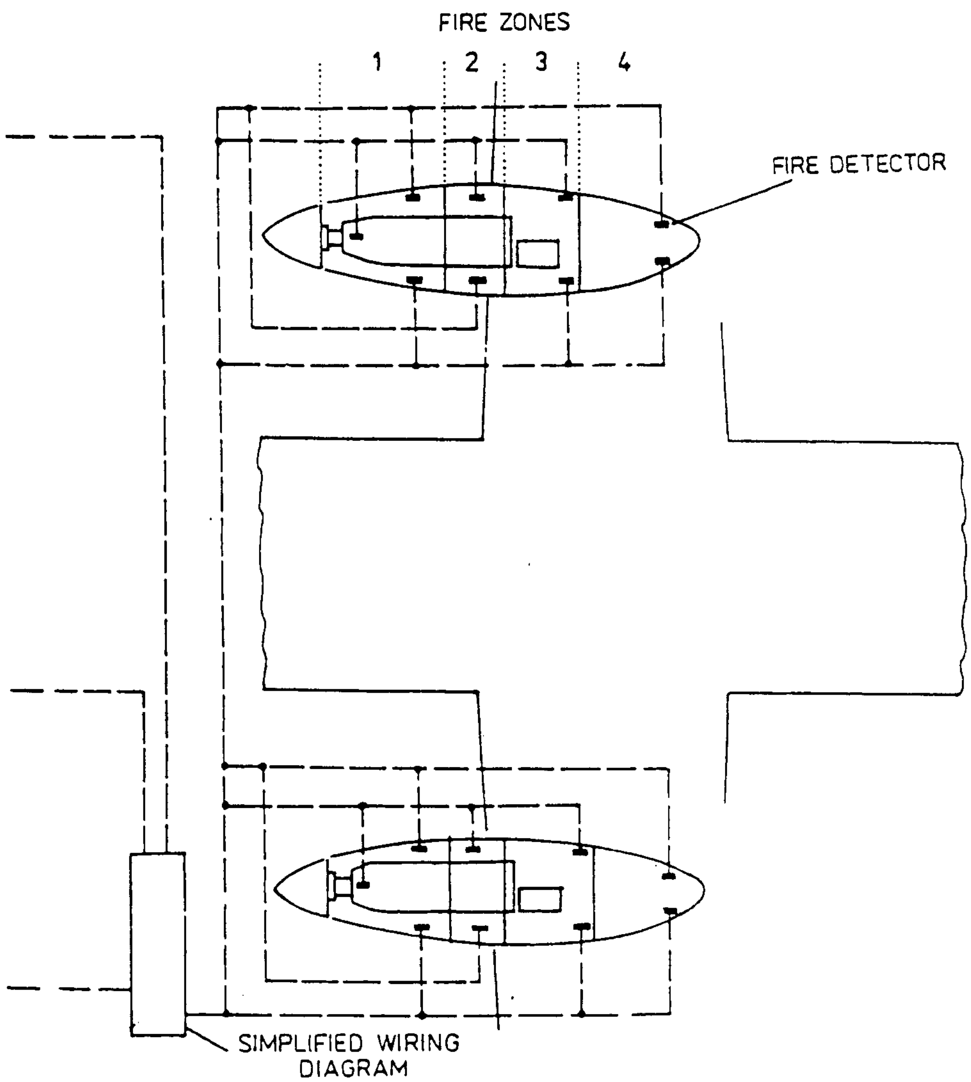


Fig. 7 – 43 Engine nacelle fire detection system


FIRE ZONES
1
2
3
4
FIRE DETECTOR
SIMPLIFIED WIRING
DIAGRAM

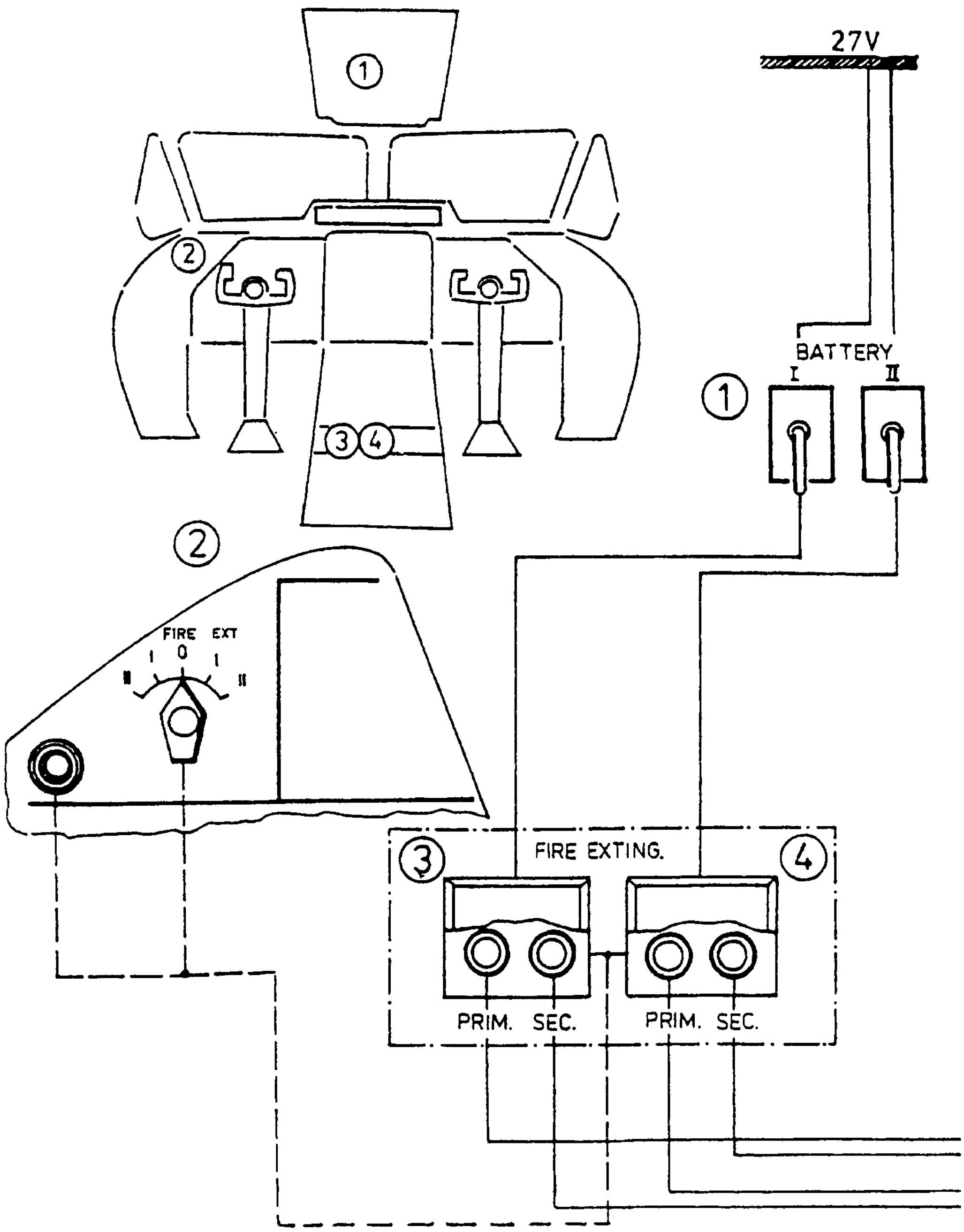
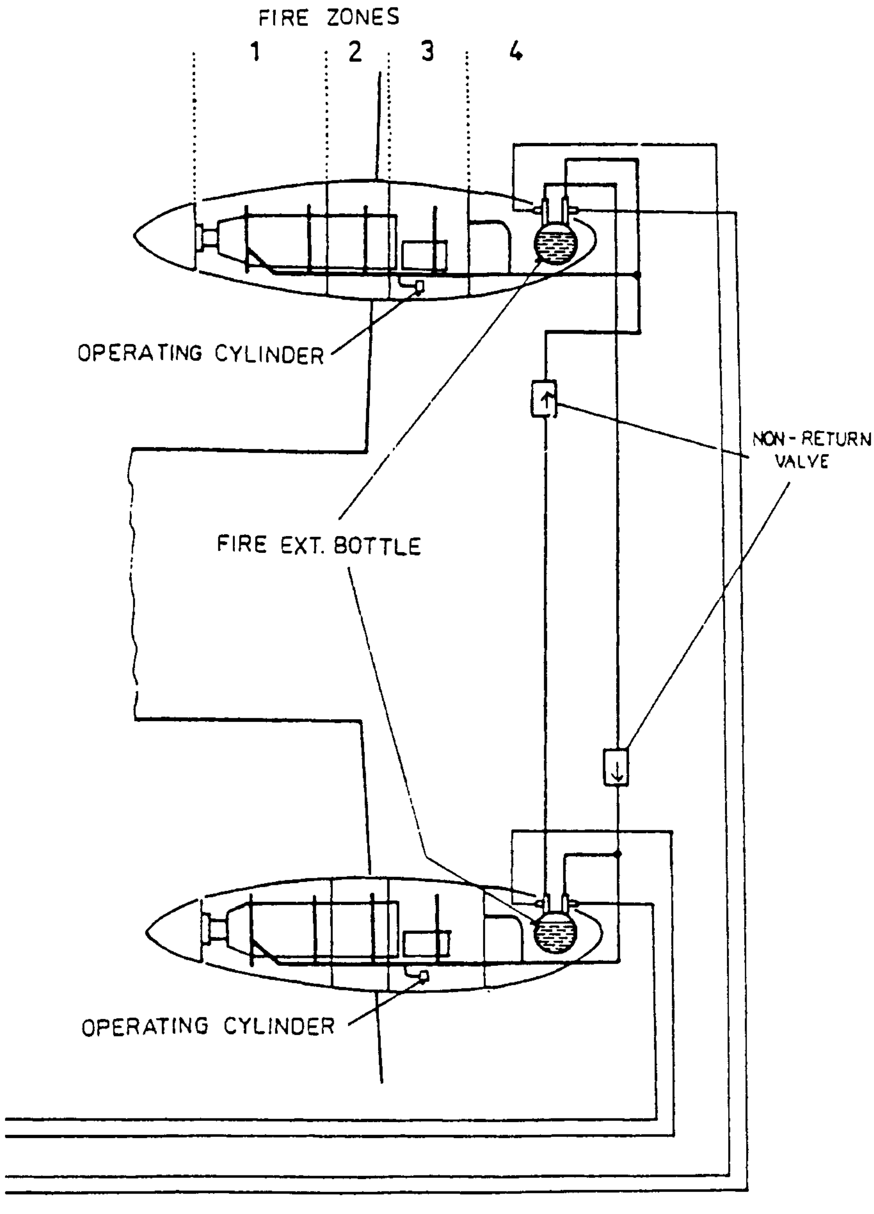


Fig. 7 – 44 Engine fire exextinguishing system


FIRE ZONES
1
2
3
4
OPERATING CYLINDER
NON - RETURN VALVE
FIRE EXT. BOTTLE
OPERATING CYLINDER

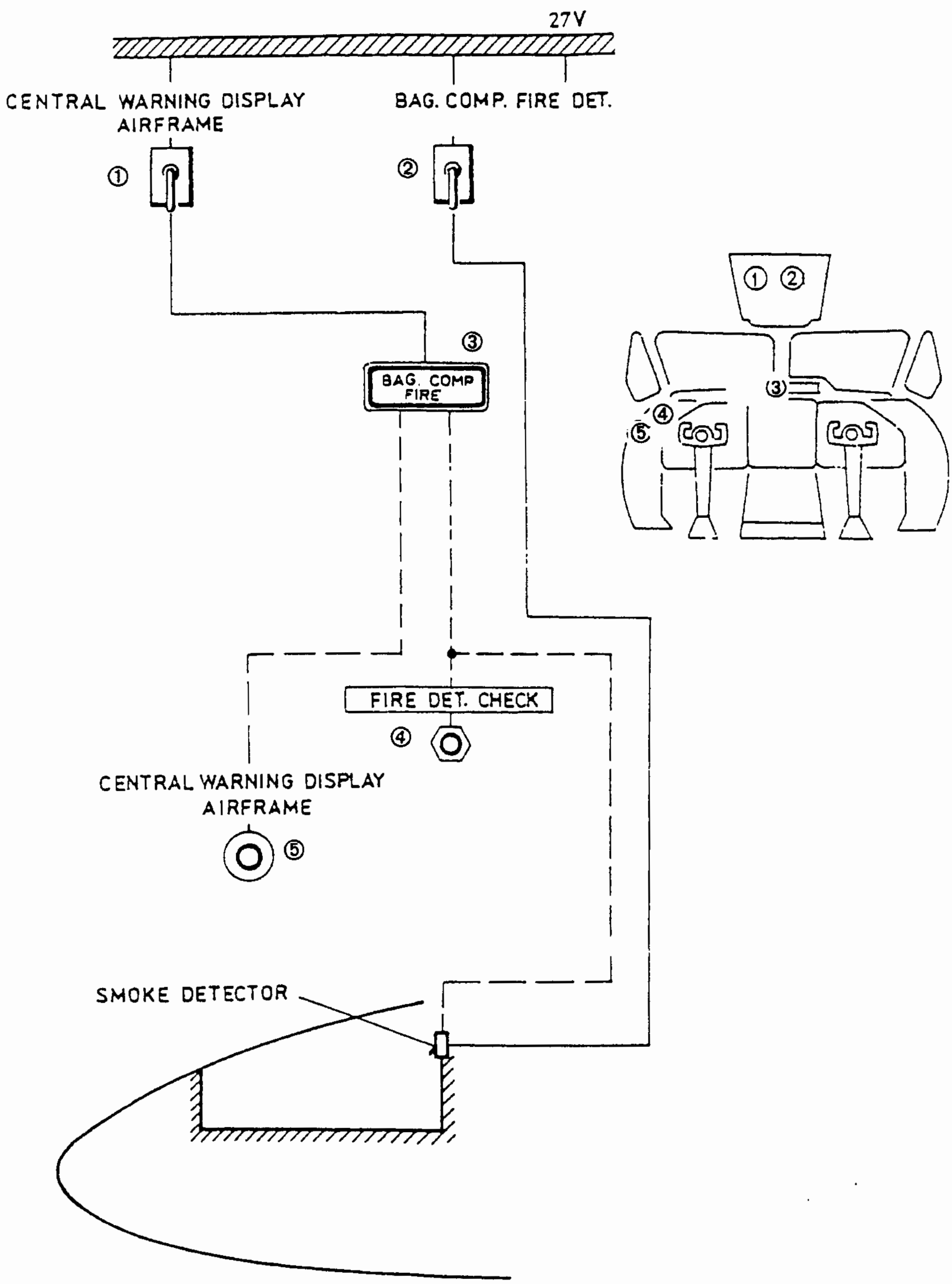


Fig. 7 – 45 Baggage compartment fire detection

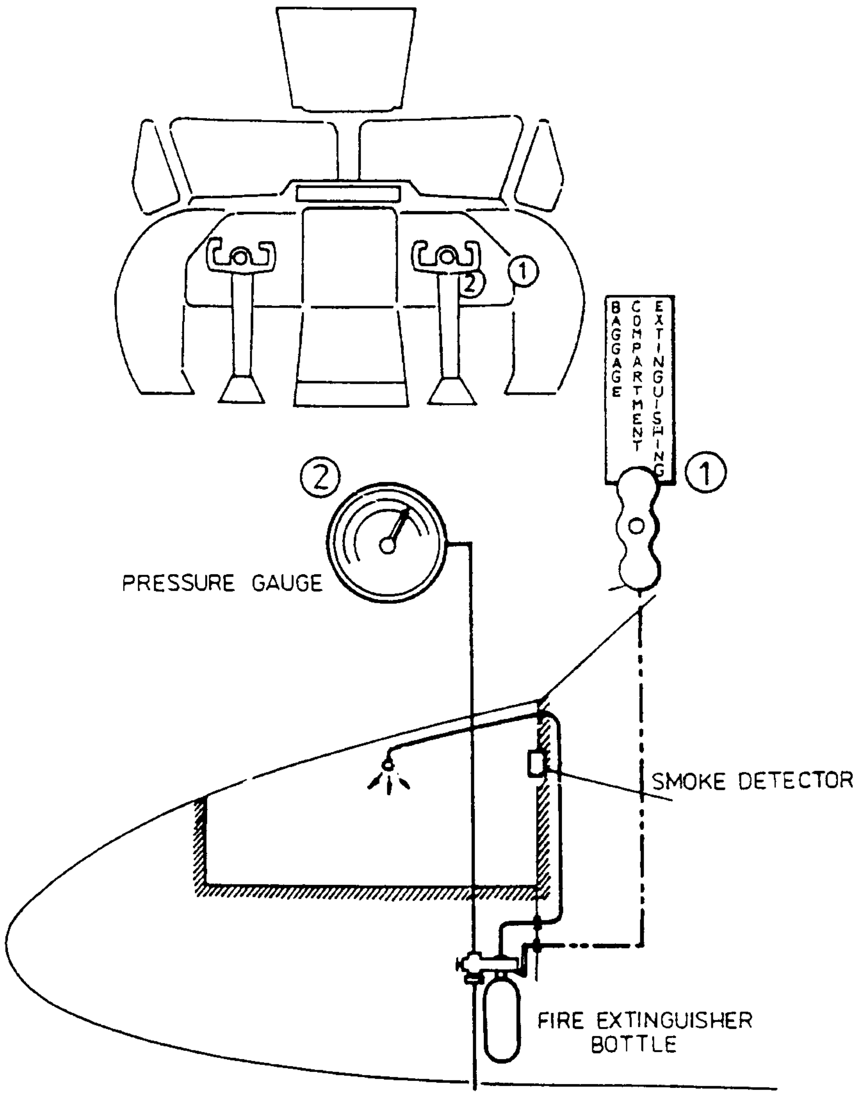


Fig. 7 – 46 Baggage compartment fire extiguishing system

EXTERIOR MARKINGS

Pos.	Inscription reading	Fig. No.
1	TURN TWICE THROUGH 360 DEG TO RELEASE LOCKS	7 – 47A
2	GROUND POWER 28 V DC 500 A	7 – 47A
3	OIL 11 l CHECK OIL FILLER CAP CLOSED	7 – 47A,B
4	WATER INJECTION COMPRESSED WASH	7 – 47A,B
5	GROUND HYDR. SOURCE 14.7 MPa COMPRESSED AIR GROUND SOURCE 0.54 MPa HYDRAULIC TANK GAUGE PRESSURE	7 – 47A
6	Green cross	7 – 47A
7	CUT HERE TO BREAK IN	7 – 47A
8	VHF AERIAL (if installed)	7 – 47A,B
9	SUPPORT HERE	7 – 47A,D
10	1. PUSH AND HOLD	7 – 47A,B
11	2. TURN	7 – 47A,B
12	CLOSED	7 – 47A,B
13	OPEN	7 – 47A,B
14	NITROGEN 1.47 MPa	7 – 47A
15	DO NOT STEP HERE	7 – 47C
16	NITROGEN 4.9 MPa	7 – 47A,D
17	420^{+30} kPa	7 – 47A,B
18	420^{+30} kPa	7 – 47A
19	–	–
20	FUEL DRAIN	7 – 47A,D
21	PRESS FIRE EXTINGUISHING BY GROUND MEANS	7 – 47A,B
22	OPEN	7 – 47B
23	–	–
24	CLOSED	7 – 47B
25	Red circle	7 – 47A,B
26	DISTILLED WATER MAX. 10 l	7 – 47B

(cont.)

Pos.	Inscription reading	Fig. No.
27	AVIATION KEROSENE	7 – 47A,B,C
28	FUEL 200 l MAX. PRESS. 0.39 MPa	7 – 47A,B
29	FUEL 628 l MAX. PRESS. 0.39 MPa	7 – 47C
30	HYDRAULIC FLUID	7 – 47C
31	AIR 0.49 MPa	7 – 47C
32	DO NOT PRESS HERE	7 – 47D
33	OIL DRAIN	7 – 47D
34	HYDRAULIC FLUID DRAINAGE AND FILLING	7 – 47D
35	Airplane production number	7 – 47A
36	1. PUSH AND HOLD	7 – 47A,B
37	2. TURN	7 – 47A,B
38	3. PULL	7 – 47A,B

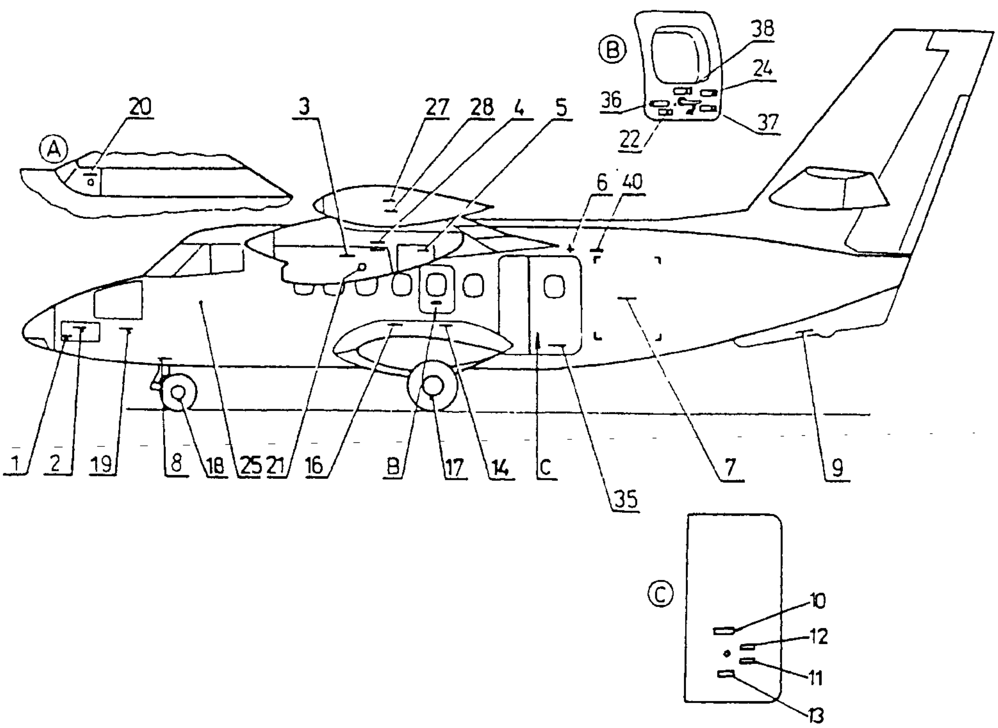


Fig. 7–47A
A – transition skin between the wing and fuselage

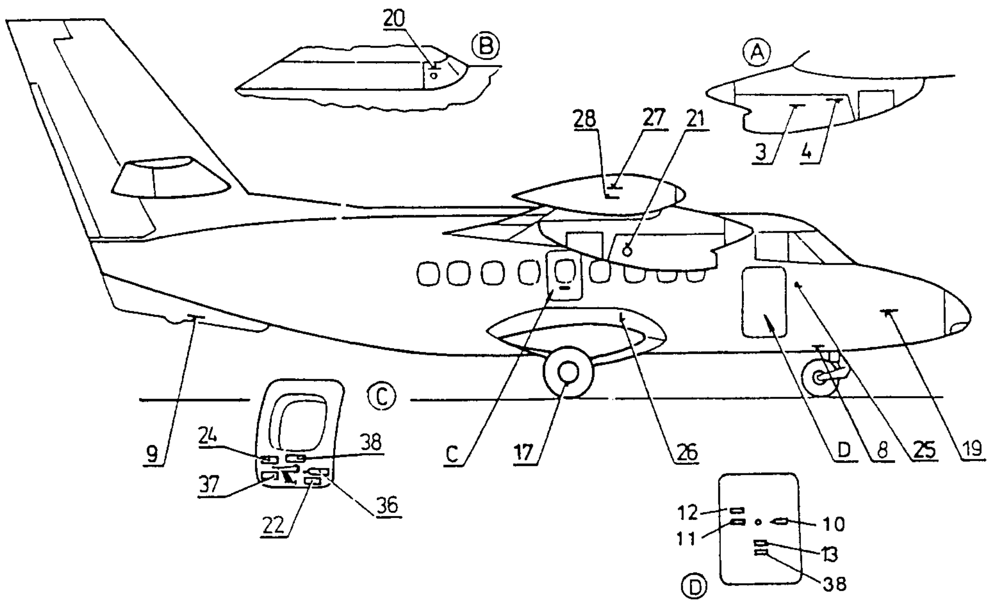


Fig. 7–47B
A – right hand engine nacelle – view from the fuselage side
B – transition skin between the wing and fuselage

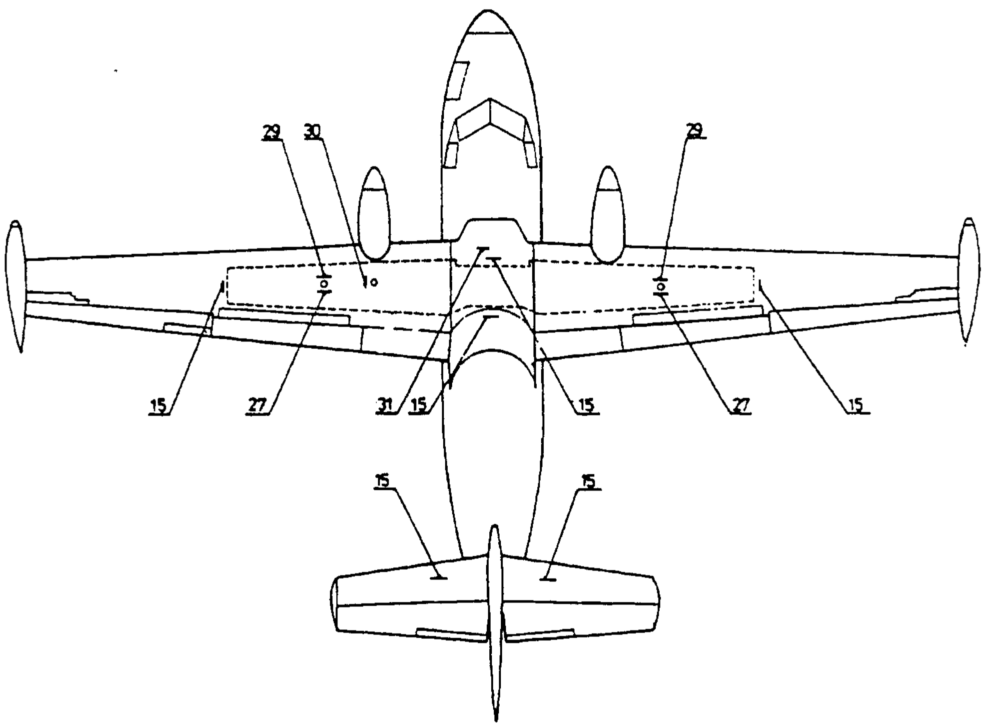


Fig. 7–47C

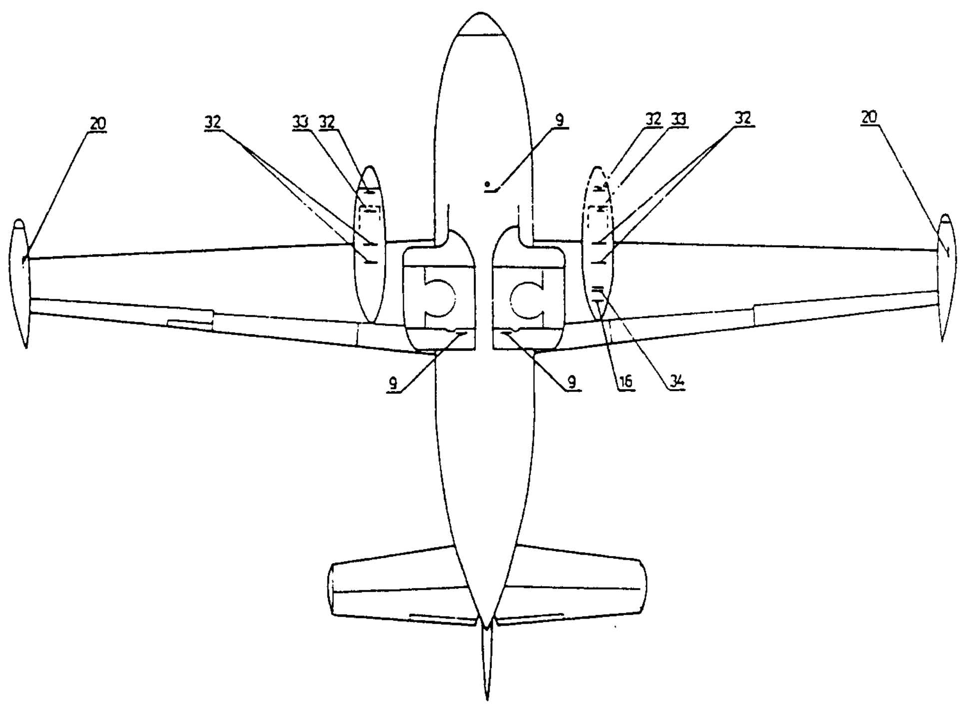


Fig. 7-47D

FLIGHT DATA RECORDER BUR-1-2G

The BUR-1-2G flight recorder equipment is specified for acquistion and recording of flight parameter information during the flight and for storing this information even in case an air crash. The parameters are recorded oonto magnetic tape. The equipment provides record of 25 analog parameters and of 48 discrete commands.

The BUR-1-2G flight recording equipment consist of the followwing functional units:

- flight data gathering unit BSPI-4-2 interconnected with two encoders
- encoders for input signal and for inerrogation frequency programming

The analog input signals of the individual transmitters are converted to a numeric code in binary system. Signal modified in the described way are recorded onto a magnetic tape by means of the ZBN-1-1 recorder. The recording equipment is deposited in a metal container with a high resistance against shock and fire.

The PU-25 control panel consist of two parts, one of these parts is intended for putting the system into operation and for operational data loading and the other one serving for functional supervision issuing signals for the control panel display section.

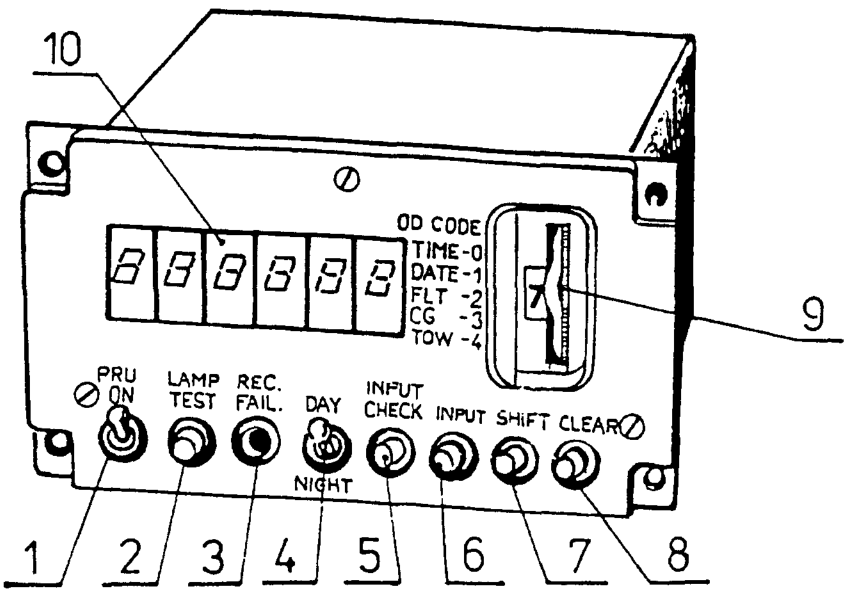


Fig. 7 - 48 Control panel PU 25

(1) PRU ON switch; (2) Switch LAMP TEST; (3) REC FAIL signal lamp; (4) Panel illumination control DAY/NIGHT; (5) Switch INPUT CHECK; (6) Push button INPUT; (7) Push-button SHIFT; (8) Push-button CLEAR; (9) Code disk thumbwheel switch; (10) Indication display.

COCKPIT VOICE RECORDER

Cockpit voice recorder is intended for voices recording in the cockpit.

Cockpit voice recorder consists of:

- Recorder unit located in orange container;
- Control box.

Voice signals are led to recorder from microphone next to the overhead panel (or on the instrument panel, or on the control box of the Cocpit Voice Recorder) and from "audio" control boxes on the rear control panel. Recorder is equiped with a impact switch which interrupt recording in case of the airplane crash.

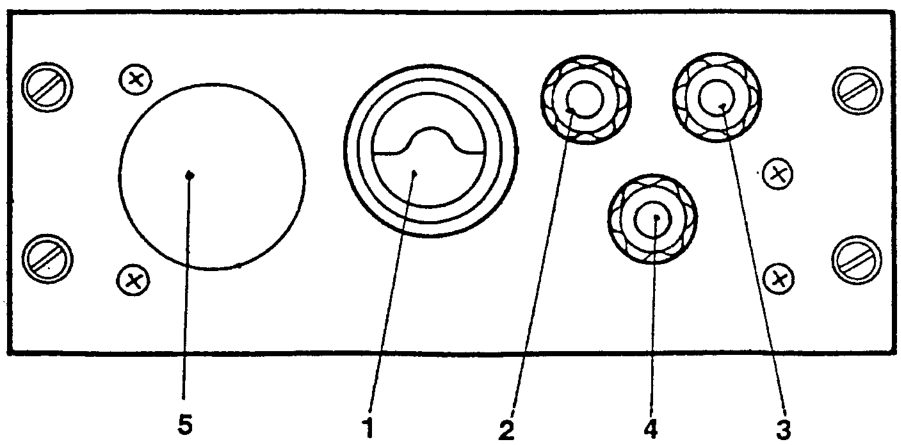


Fig. 7 – 49

(1) Measuring instrument for check of the recorder; (2) TEST push–button; (3) ERASE push–button; (4) HEADSET socket; (5) Microphone or blind flange.

EMERGENCY EQUIPMENT

Airplane emergency equipment consists of the following items:

- first–aid kit
- emergency axe
- crew call signalling
- inflatable life jackets (if installed)
- inflatable life rafts and emergency packages (if installed)
- emergency exits
- Emergency Locator Transmitter (if installed)
- inscriptions explaining the emergency exit opening sequencies and (one for each passenger) and markings of the places where the emergency axe and first–aid kit, as well as cut–out area for an emergency manhole
- hand fire extinuishers
- emergency lighting

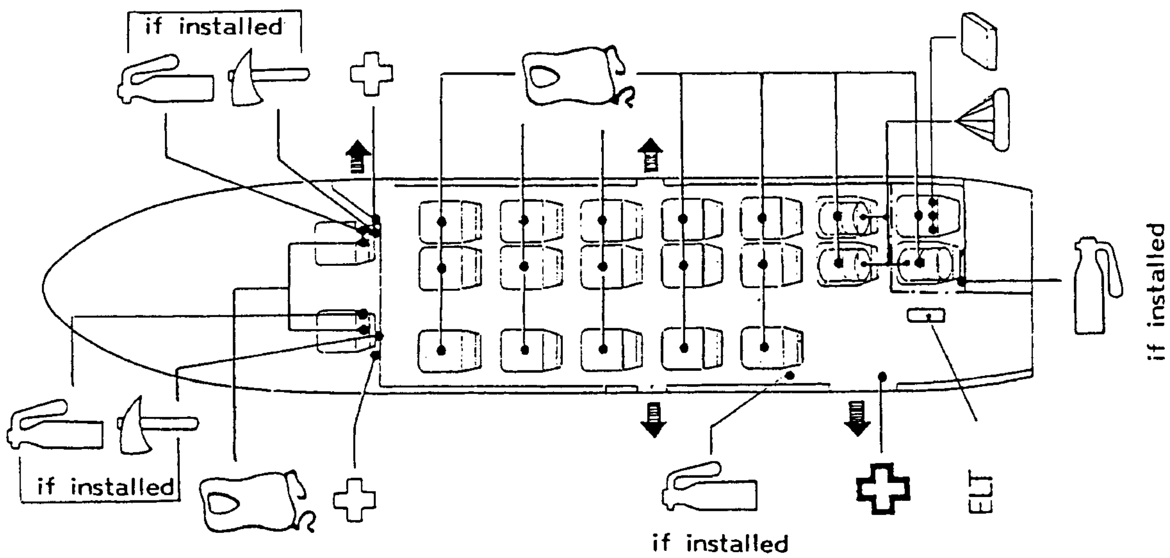


Fig. 7 – 50 Emergency equipment location

NOTE

Location of the life rafts and emergency packages is allways on two doubleseat, independently of airplane version

HANDLING, SERVICING & MAINTENANCE

TABLE OF CONTENTS

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INTRODUCING TO SERVICING AND MAINTENANCE

When doing any type of technical servicing it is necessary to remove every defect and failure which developed during the flight or that was found during maintenance. In cases where the removal of defect(s) would deand too much work or special tools, jigs etc., it is necessary to subject the decision whether the airplane may fly to the Minimum Equipment List.

The scheduled maintenance work of all types must be done using the prescribed ground equipment, mechanical means, marked tools and check and measuring instruments.

NOTE

All work on airplane must be done in accordance with the work procedure charts of the Maintenance Manual for the L 410 UVP–E20 airplane.

Maintenance must be done by engineering personnel trained for the individual specializations, properly acquainted with airplane design, operational regulations, safety regulations, Maintenance Schedule for the L 410 UVP–E20 airplane and the work procedure charts for maintenance.

PUBLICATIONS

List of available documents :

(a) Maintenance Manual for the L 410 UVP–E20 airplane

(b) Maintenance Manual for the M 601 E engine

(c) Maintenance Manual for the V 510 propeller

(d) Flight Manual for the L 410 UVP–E20 airplane

(e) Master Minimum Equipment List of the L 410 UVP–E, E9, E20 airplane

(f) List of Manufacturing operating and Repairing tolerances of the airplane

(g) Structural Repair Manual of the airplane

(h) Illustrated Parts Catalogue for airplane

(i) Maintenance Schedule for the L 410 UVP–E20 airplane

AIRPLANE INSPECTION PERIODS

ROUTINE MAINTENANCE

The routine maintenance consists of:

(a) routine maintenance A – done before every flight unless stated in the remark with the given operation otherwise

(b) routine maintenance B – done after every landing and in case of handing over the airplane for parking

(c) routine maintenance C – done once a day after concluding the flight day or before the first flight after an interval between flights from 1 to 15 days.

The routine maintenance type A and B is allowed to be done by a pilot on condition that he was trained for this work and approved by the manufacturer or else organization having the certification for L 410 UVP–E20 airplane type checks.

In case any defect occurs during the routine maintenance A and B which is done by the pilot, then these defects shall be repaired only by a trained engineer.

NOTE

For more details see Maintenance Schedule and Maintenance Manual of the L 410 UVP–E20 airplane.

PERIODIC MAINTENANCE

The periodic maintenance consists of:

(a) line check 1 – is done periodically after every 10 ± 1 days.

(b) check 2 – is done after every 300 ± 30 flight hours.

(c) check 3 – is done after every 1,200 ± 30 flight hours.

(d) check 4 – is done after every 2,400 ± 30 flight hours.

NOTE

For more details see Maintenance Schedule and Maintenance Manual of the L 410 UVP–E20 airplane.

INSPECTION OF AIRPLANE

The inspection of the airplane is done after 4,800 hours ± 150 hours, however, at least after 10 years from the production date or from the previous inspection.

NOTE

For more details see Maintenance Schedule and Maintenance Manual of the L 410 UVP–E20 airplane.

SEASONAL MAINTENANCE

The seasonal maintenance (seasonal works) is done during the preparation for the winter as well as summer operation. The preparation works for the summer and winter operation are carried out within the scope of the nearest periodic maintenance.

NOTE

For more details see Maintenance Schedule and Maintenance Manual of the L 410 UVP–E20 airplane.

UNSCHEDULED MAINTENANCE

Conditions for doing unscheduled inspections:

Work to be done after a hard landing. A landing is considered hard when the g load in the centre of gravity exceeds 2.5 as well as in case of:

- landing on the nose wheel;
- landing with a great banking angle (more then 10°);
- undershoot (landing short of the runway);
- leaving runway.

Work to be done after a landing at higher than permissible maximum landing weight.

Work to be done after the airplane flew thought storm activity and after the lighting strike.

NOTE

For more details see Maintenance Schedule and Maintenance Manual of the L 410 UVP–E20 airplane.

GROUND HANDLING

TRACTOR TOWING

Towing the airplane by a tractor is carried out by means of towing equipment B 097 581 N see Fig. below.

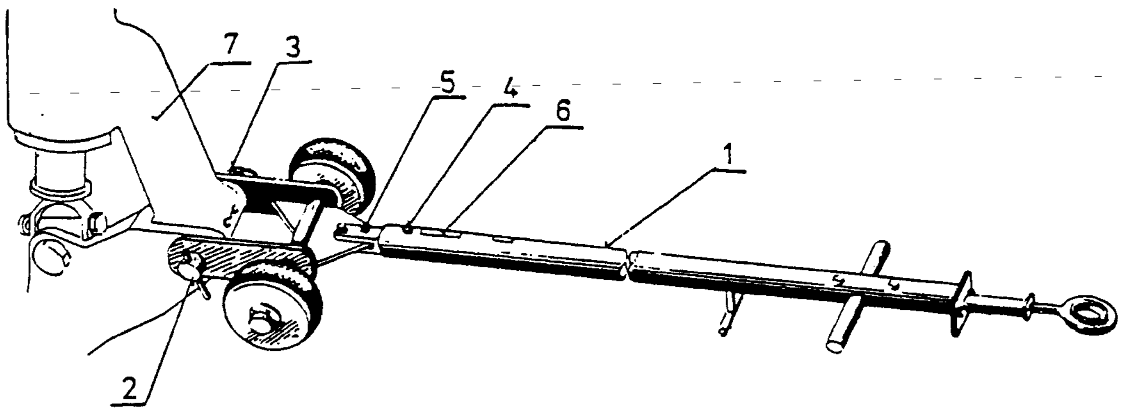

Fig. 8 – 1 Towing equipment B 097 581 N

(1) Towing equipment; (2) Pin; (3) Security plunger; (4) Front security pin; (5) Rear security pin; (6) Label; (7) Nose landing gear leg.

Instructions for towing with a tractor

When towing the airplane by a tractor, the following regulations must be observed:

- in the cockpit cabin a pilot or mechanician must be seated, familiar with the attendance of the airplane brakes;
- the blocking strut of the steering B 596 476 N (see Fig. 8 – 3) must be removed;
- the servo of the nose wheel as well as the nose wheel from the pedals must be shut off, i.e. PEDAL NOSE WHEEL STEERING on the central control panel must be in neutral position;
- the brakes accumulator must have a pressure of at least 100 kp/cm^2 (1,422 psi);

NOTE

The pressure gauge of brakes accumulator indicates only with the 36V inverter on. After checking on the pressure, switch off the convertor immediately. If the pressure in the brakes accumulator is not sufficient, the airplane may be towed exceptionally, but the pilot (mechanical) must bear in mind, that in emergency case, when the situation will require braking the airplane, he will apply the parking brake.

(cont.)

- the maximum turning angle of the airplane nose wheel as the tractor starts its way with the airplane attached, must not acced 25°;

NOTE

During manual towing it is allowed maximum turning angle of the nose wheel of 30° when starting pull.

- before you instruct the tractor driver to start towing check on whether the parking brake is off and the airplane door is closed;

CAUTION

THE AIRPLANE MUST NOT BE MOVED OR TOWED WITH ENTRANCE DOOR OPEN.

- during the towing, the nose wheel may be swivelled to the maximum of 30°;
- when towing the airplane, the tractor driver must avoid rash movements with the steering wheel and sudden braking. It is recommended not to exceed the speed of 10 – 15 km/hr;
- when towing the airplane at limited visibility, switch on the airplane position lights;
- rearward towing (i.e. tail ahead) of the airplane by a tractor is not permitted.

Airplane handling by means of manual tow bar

To manipulate the airplane as it is towed out of the hangar, etc., a manual tow bar B 592 053 N (L410.9521) is used, which is substantially lighter than the towing equipment, used for towing the airplane by a tractor. The bar is attached by means of a pin in the swinging arm of the nose landing gear leg see Fig 8 – 2.

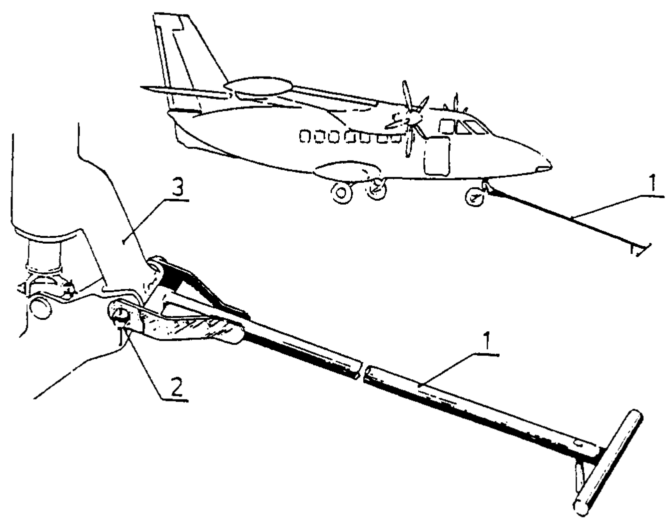

Fig. 8 – 2 Manual bar B 592 053 N (L410.9521)

(1) Manual bar; (2) Pin; (3) Nose landing gear leg.

AIRPLANE PARKING

PARKING EQUIPMENT FOR PARKING DURING A FIGHT DAY

To secure the airplane for parking during a flight day a blocking strut B 596 476 N is used.

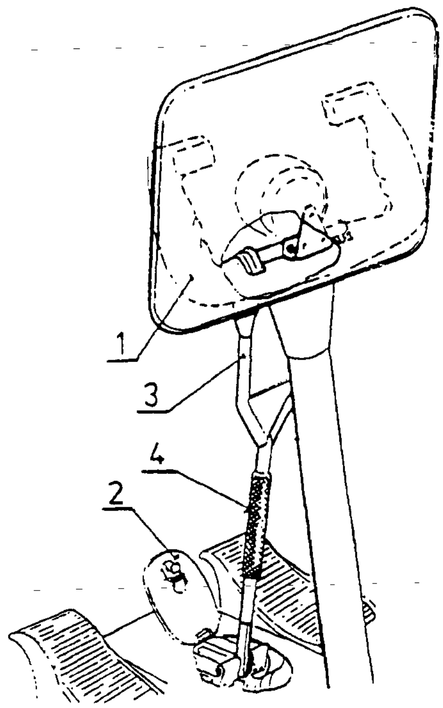

Fig. 8 – 3 Securing of column by blocking strut

(1) Column; (2) Lid in the cover between the pedals; (3) Blocking strut B 596 476 N; (4) Tension nut.

PARKING EQUIPMENT

To secure the airplane parking on the apron, the following parking equipment is used.

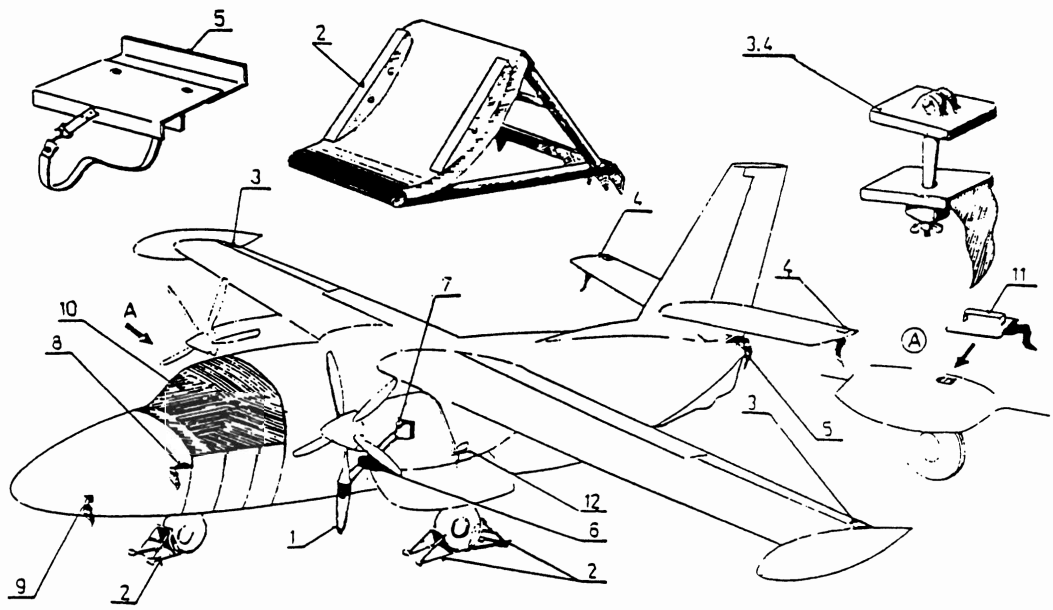

Fig. 8 – 4 Parking equipment for parking on the apron

(1) Propeller blocking B 596 695 N; (2) Wheel chock B 596 028 N (L410.9250) or B 596 895 N;
(3) Aileron security clamp B 922 150 N; (4) Elevator blocking B 922 150 N (XL410.9220);
(5) Rudder blocking B 596 790 N; (6) Cover of engine air inlet B 596 452 N;
(7) Exhaust cover B 096 127 P/L; (8) Pitot nozzle cover B 096 360 N;
(9) Blind flanges for static pressure pickups B 953 322 N (L410M.9537);
(10) Coating for windshield flight compartment B 596 798 N; (11)Toilete ventilation cover B 596 420 N;
(12) Cover of starting generator air inlet B 596 580N.

EARTHING EQUIPMENT

Earthing equipment B 096 432 N is designed for earthing the airplane.

AIRPLANE MOORING

The airplane mooring is to be carried out, when the wind with gusts exceeding 20 m/s (39 kt) are assumed.

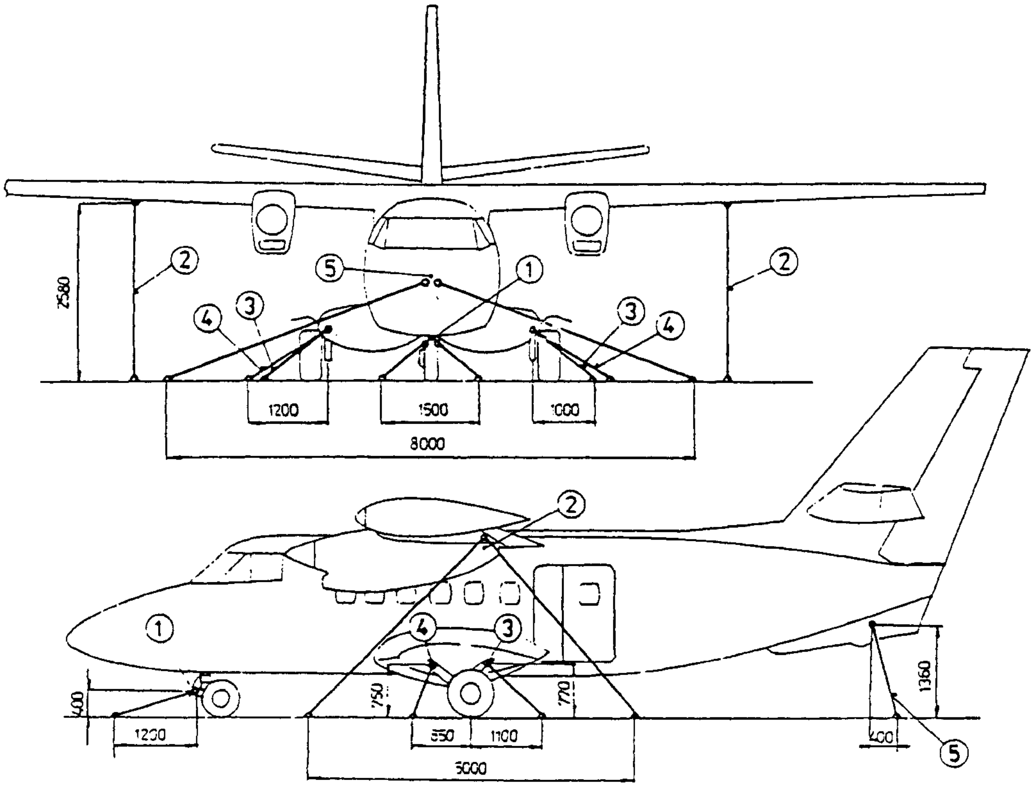

Fig. 8 – 5 Airplane mooring

(1) Mooring device of nose wheel B 596 671 N; (2) Mooring device for the wing B 596 670 N;
(3) Additional rear mooring device B 596 672 N; (4) Additional front mooring device B 596 673N;
(5) Mooring device of tail unit B 596 674 N.

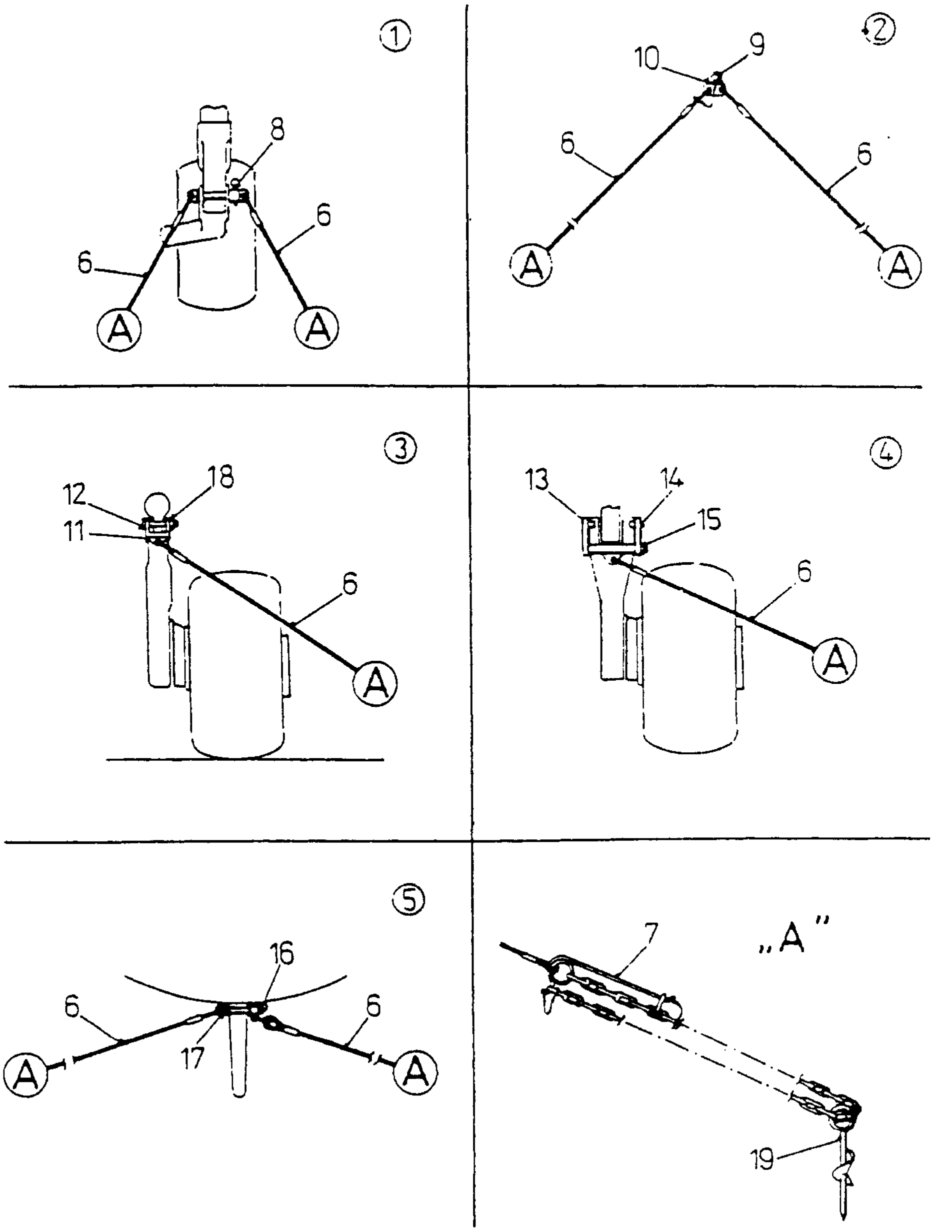

Fig. 8 – 6 Mooring device

(1) Mooring device of nose wheel B 596 671 N; (2) Mooring device for the wing B 596 670 N;
(3) Additional rear mooring device B 596 672 N; (4) Additional front mooring device B 596 673N;
(5) Mooring device of tail unit B 596 974 N; (6) Cable; (7) Turnbuckle with chain; (8) Pin; (9)Pin; (10) Bracket;
(11) Fork; (12) Screw; (13) Fork; (14) Side plate; (15) Nut; (16) Securing pin; (17) Pin; (18) Nut;
(19) 3870 2001 (LDN 6911) mooring peg.

FUEL FILLING

CAUTION

THE OPERATING PERSONS MUST BE PROPERLY TRAINED ABOUT THE WORK SAFETY AND FUEL HANDLING. THE OPERATING PERSONS MUST NOT WEAR THE DRESS MADE OF ARTIFICIAL FIBRES (SILON). OPERATING PERSONS MUST WEAR RUBBER GLOVES. NO OPEN FLAME IS ALLOWED NEAR THE AIRPLANE. IN CASE THE AIRPLANE IS PARKING ON CONCRETE APRON, THEN THE AIRPLANE MUST BE EARTHED. WHEN USING THE LADDER FOR THE ACCESS TO THE WING UPPER SIDE, SPECIAL CARE MUST BE PAID TO PREVENT THE FALL DOWN. RUBBERSOLED SHOES MUST BE USED WHEN MOVING OVER T HE WING. WHEN HANDLING THE FILLING HOSES CARE MUST BE PAID TO AVOID ANY DAMAGE ON THE RUBBER DEICERS OF THE WING LEADING EDGES.

1. **Gravity fuelling**

(a) Bring the ladder B 596 558 N to the airplane wing as well as the ladder B 097 365N to the wing tip fuel tank, if it is installed. Bring the fire extinguisher.

(b) Let the road fuel tanker drive in front of fuselage front section.

CAUTION

BEFORE STARTING THE FUEL FILLING FROM THE ROAD TANKER, MAKE SURE THAT THE TANKER HAS BEEN CHECKED AND CONTAINS NO WATER AND OTHER IMPURITIES.

NOTE

Fuel filling has to be carried out from the tanker which is provided with the fuel filters and corresponds to the requirements of airplane service. When filling the fuel be carefull that no impurities from filling gun surface penetrate in the fuel tank. Max. permissible mechanical impurities in fuel = 20 microns.

(cont.)

For airplane with 8 fuel tanks and wing tip fuel tanks	U.S. gallons (Litres)	lb (kg)
Total kapacity of all 8 tanks and 2 wing tip fuel tanks (after deducting of expansion spaces)	447.7 (1,694.8)	2,896.2 (1,313.7)
Expansion space	24 (91)	–
Fuel remainder that cannot be pumped out	4.4 (16.8)	28 (12.7)
Total usable amount	443.4 (1,678)	2,868.2 (1,301)

2. Fuel filling

NOTE

Fuel density v = 0.775 kg/cu.dm at the temtemperature 68°F (20°C). In the winter time carry out refuelling of the airplane having the fuel with crystalisation initial temperature max. –58°F (–50°C) (T50) at latest 1 hour after landing with the fuel of crystalisation initial temperature max. –76°F (–60°C). If the air ambient temperature on the airfield is below –49°F (–45°C), then the fuel T – 50 must be discharged from the fuel tanks and the fuel system and the fuel of crystalisation initial temperature –76°F (–60°C) must be fill ed into the fuel system.

Used fuel sort

T 1	according to ST SEV 5024–85 or GOST 10227–86
TS 1	according to ST SEV 5024–85 or GOST 10227–86 or CSN 656520
PL 6	according to PND 25005–76
PL 7	according to PND 25005–92
PSM 2	according to PN 86/C – 96026
RT	according to ST SEV 5024–85 or GOST 10227–86 or CSN 656520
JET A	according to ASTMD 1655–89
JET A1	according to ASTMD 1655–89 or DERD 2494

Their mixtures in any ratio.

Fuel admixtures

Anticorosion and lubricity fuel additives as weel as additives in electric conductivity and to bind fuse water may be used in compliance with a regulation of the additive manufactirer, provided that they are approved by the appropriate authority for use in aviation.

3. Following regime is recommended for filling:

Filling speed	Pressure on the road tanker pressure gauge	Cycle: FILLING/DWELL			
U.S. gallons/min (1/min)	psi (kp/cm^2)	Filling sec	Dwell sec	Filling sec	Dwell sec
26.4 – 39.6 (100 – 150)	5.8 – 8.7 (0.4 – 0.6)	60	10	60	10

NOTE

Filling regime provided standard filling gun of dia 1.3 in (38 mm) is used.

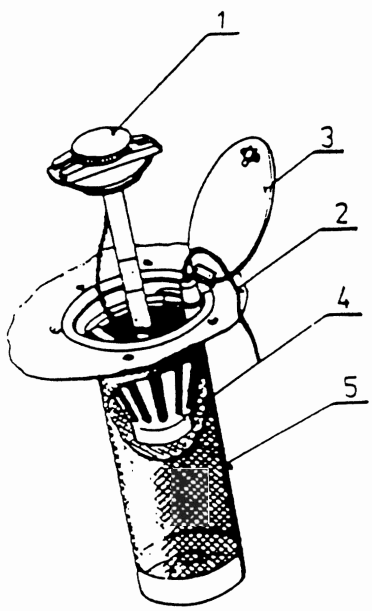

Fig. 8 – 7 Fuel tank neck

(1) Tank closure; (2) Earthing pin; (3) Lid; (4) Protective neck; (5) Mesh sieve.

4. Detail Steps/Work Items.

(a) Open the lid of filling neck on the rib no. 11.

(b) Unscrew the plug of the filling neck and remove the plugs.

(c) Connect the frame of filling gun to the earthing pin of the filling neck on the rib No.11.

(d) Slip the filling gun into the tank hole on the rib no. 11, start the filling until the required amount of fuel is reached. Stop the filling. Remove and disconnect from the earthing pin the filling gun. Screw in the plugs and close the lid.

(cont.)

NOTE

Close the lid of the fuel tank immediately after filling to prevent impurities penetration into the tank

Fuel amout is given by the crew according to the flight duration and the load.

On airplanes with rubber fuel tanks older as 5 years (from the date of production) carry out the inspection according to maintenance schedule 28–00–00 C (routine maintenance).

(e) Close the lid of filling neck. Open the lid of filling neck of wing tip fuel tank.

(f) Unscrew the plug of the filling neck and remove the plug.

(g) Connect the frame of filling gun to the earthing pin of the filling neck.

(h) Slip the filling gun into the tank hole of wing tip fuel tank and fill the required fuel amount.

NOTE

Fuel amount is given by the crew according to the flight duration and the load. In case that the crew will ask to fill the full amout of wing tip fuel tanks, then fill the fuel continuosly at recommended speed up to max. 47.5 U.S. gallons (180l) of fuel. Refuelling up to 52.8 U.S. gallons (200 l) is to be carried out intermittently so that the fuel will not flow out of the wing tip fuel tank.

(i) Stop the fuel filling. Remove and disconnect the filling gun from the earthing pin. Screw in the plug and close the lid.

NOTE

The lid of the fuel wing tip tank has to be closed immediately after filling to prevent penetration of air impurities (dust) into the tank. Close the lid of the filling neck of the wing tip fuel tank.

(j) Repeat the steps according to (a) – (i) on the right wing.

5. Let the road tanker drive away.

6. Remove the ladders and put them on their place.

MUD DISCHARGE FUEL TANKS

CAUTION

OPERATING PERSONNEL MUST BE ACQUAINTED WITH FUEL HANDLING. NO OPEN FLAME IS ALLOWED NEAR THE AIRPLANE.

1. Bring the steps B 097 300 N between engine nacelle and the fuselage and the steps B 097 365 N to the wing tip fuel tank, if installed on the airplane.
2. Prepare the vessel under the fuei discharge tube under the fuselage.
3. Open the lid to discharge valve on the left wing.
4. Unscrew the cap on the discharge valve B 066 095 N (LUN 7350 8) and slip onto the discharge valve the hose neck for fuel discharge B 096 591 N.
5. Discharge such amout 0.13 – 0.26 U.S. gallons (0.5 – 1 l) of fuel into the vessel.

NOTE

To be carried out before filling and min. 15 minutes after airplane filling with fuel.

6. Shift out the hose neck for the fuel discharge for about 0.4 in (1 cm). In this way the discharge valve is closed. After emptying the fuel from the hose for fuel discharging, remove the hose.
7. Screw the cap on the discharge valve B 066 095 N (LUN 7350 8).
8. Close the lid to the discharge valve on the left wing.
9. Slip on the discharge valve B 066 095 N on the left wing tip fuel tank the hose neck B 096 591 N for fuel discharge and continue the operation according to item 5.
10. Repeat the operations as per 4 – 9 on the right wing.
11. Take away the steps and vassel with discharged fuel.

MUD DISCHARGE FROM FUEL CLEANERS

CAUTION

OPERATING PERSONNEL MUST BE ACOUAINTED WITH HANDLING THE FUEL. NO OPEN FLAME MANIPULATION IS ALLOWED NEAR THE AIRPLANE.

1. Bring the steps B 097 300 N to the engine nacelle.
2. Prepare a hose for the fuel removal B 097441 N and vessel.
3. Release and tip down lower engine cowl of left and right engine nacelle.
4. Slip the hose for the fuel discharge B 097 441 N on the mud removing valve of the left fuel cleaner and prepare a vessel for the discharged fuel.
5. Turn partially the closing nut of the mud discharging valve to the right. The fuel will flow out through the centre of the closing nut. After draw off of about 0.26 U.S. gallons (1 l) of fuel, tighten the closing nut.

NOTE

Fuel is to be discharged into a glass bottle, which is supplied together with the hose for the fuel draw off B 097 441 N. After the fuel has been discharged close the bottle with a grounded plug.

6. Remove the hose for the fuel discharge B 097 441 N and take away the bottle.
7. Repeat the operation according to items 4 – 6 on the right wing.
8. Take away the steps B 097 300 N.
9. Close and fasten the lower cover of the engine nacelle.

TANK FILLING OF THE WATER INJECTION

1. Prepare an appropriate amount of water (the water injection tank capacity volume is 2.77 U.S. gallons (10.5 litres) and its useful capacity 2.64 U.S. gallons (10.0 litres) up to the brim of the filling filler). The fluid to be used is destilled water according to CSN 68 4063, IS 1070 1960, BN 71 6191 95, B.S. 3978:1966, GOST 6709 72. For detailed requirements see AFM (section 2) or Maintenance Manual of the M 601 E engine in particular when another sort of water has to be used, e.g. deionised, demineralised water or water steam condensate.

2. Upon a request by the airplane captain, pour the appropriate quantity of water into the water injection tank and set the water injection pump in accordance with the ambient temperature.

3. The filling operation is accomplished by opening the lid (1) see Fig. 8 – 8 on the covering of the RH landing gear nacelles and unscrewing the tank stopper. The amount of water poured into the tank depends on the setting of the water injection pump.

Water injection pump setting	Amount of water filled into the tank U.S. gallons (litres)
Stage I	0.87 (3.3)
Stage II	1.74 (6.6)
Stage III	2.64 (10.0)

4. The water injection pump working stage setting is carried out in accordance with the atmospheric pressure and ambient temperature see SECTION 4, Fig. 4 3 }page 4 – 34], The water injection pump working stage setting handle is accessible after removing the oval shaped lid (2) see Fig. 8 – 8 on the bottom side of the front covering of the right hand undercarriage pod. When setting the pump, it is necessary to press down the circular pushbutton on the handle, thus forcing down the spring locking the handle in any of its three positions. Then it is possible to turn the handle in the required direction (to the right when resetting the pump at a higher stage, to the left resetting it at a lower stage).

5. Water from the water injection system is drained on the groun in the same way as in flight, i.e by way of the solenoid valve by turning on the WATER DRAIN switch on the right hand control panel. At the same time, the BATTERY I and BATTERY II switches must be turned on and the same applies to the WATER INJECTION circuit breaker located on the over head panel. After draining the water off, return the WATER DRAIN switch on the right hand control panel to its initial position. Turn off the BATTERY I and BATTERY II on the overhead panel.

(cont.)

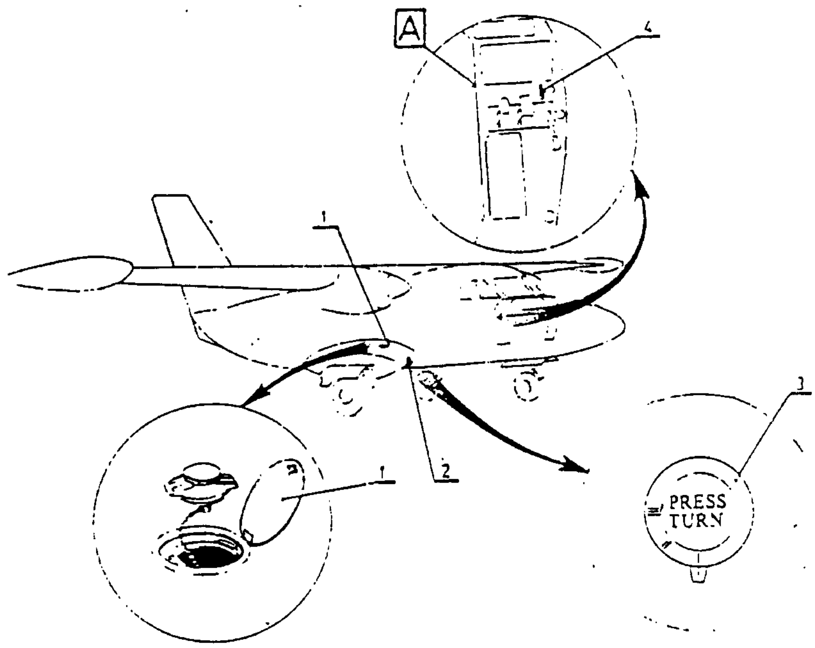

Fig. 8 – 8 Water filling and draining

(1) Tank filling hole lid; (2) Lid for aneasy access to the water injection pump water injection pump working stage setting lid; (3) Water injection pump working stage setting handle; (4) WATER DRAIN switch A – RH control panel.

CHECK OF PRESSURE IN PPL (8) FIRE EXTINGUISHER BOTTLES

1. Pressure in the bottle depends on the ambient air temperature and shall not be lower than the values listed in the table below:

Ambient air temperature °F (°C)	Pressure psi (kp/cm^2)
–76 to –40 (–60 to –40)	853.4 (60)
–40 to –4 (–40 to -20)	995.6 (70)
–4 to +32 (–20 to 0)	1,137.8 (80)
+32 to +50 (0 to +10)	1,351.2 (95)
+50 to +86 (+10 to +30)	1,422.3 (100)
+86 to +104 (+30 to +40)	1,493.4 (105)
+104 to +122 (+40 to +50)	1,564.5 (110)
+122 to +140 (+50 to +60)	1,706.8 (120)
+140 to +176 (+60 to +80)	1,777.9 (125)

2. Check the pressure in fire extinguishers as indicated by the pressure gauge by opening the inspection hole lids on the right hand and left hand engine nacelle.The pressure must correspond to the requirements specified in table above.

CHECK OF THE PRESSURE IN THE FRONT BAGGAGE COMPARTMENT FIRE EXTINGUISHER

1. Check of the pressure in the front baggage compartment fire extinguisher as indicated by the board pressure gauge.
2. Pressure in the fire extinguisher depends upon ambient temperature and shall not drop below the values listed in the following table:

Ambient temperature °F (°C)	Pressure psi (kp/cm^2)
–58 (–50)	120.9 (8.5)
–40 (–40)	128.0 (9.0)
-22 (–30)	135.1 (9.5)
–4 (–20)	142.2 (10.0)
+14 (–10)	149.3 (10.5)
+32 (0)	156.5 (11.0)
+50 (+10)	156.5 (11.0)
+68 (+20)	163.6 (11.5)
+86 (+30)	170.7 (12.0)
+104 (+40)	177.8 (12.5)
+122 (+50)	185.9 (13.0)
+140 (+60)	192.0 (13.5)

CHECK OF AIR PRESSURE IN HYDRAULIC TANK PRESSURIZATION SYSTEM

1. Open the lid on left hand engine nacelle cover.
2. Check of air pressure in hydraulic tank pressurization system.

   Air pressure must be min 7.11 psi (0.5 kp/cm^2) – max. 31.3 psi (2.2 kp/cm^2).

   In case of pressure drop below this value refill pressure from B 096 690 N ground source (refilling for pressure is described in work procedure in Maintenance Manual, section 29, para 029.13.00.A).

NOTE

If there is pressure in hydraulic system, air pressure in main tank is allowed to be increased by stepping on brakes and getting it out. Starting the engine at zero air overpressure in main LH hydraulic tank is permissible exceptionally.

TOILET MAINTENANCE

WASETE DISPOSAL FROM TOILET

1. Open the toilet compartment door.
2. Extend the bellows (5) (see Fig. 8 – 9) for toilet venting. Release the seating plate (3) by relieving two springs put the seating plate away. Release the locking climp (6) securing the toilet body to the floor. Take the toilet handle (1) and bring the bucket with waste out from airplane.
3. Take out the bag from the bucket and dispose the waste. Rinse the toilet with warm water with deodorant and remove the waste remainder with brush from inside the toilet.
4. Clean toilet bucket is to be mounted in the airplane. The bag has to be secured with locking climp and secure strap (13), then filled with (1 liter) of waterwith deodorant liquid in ratio 50:1.
5. Close the toilet door.

(cont.)

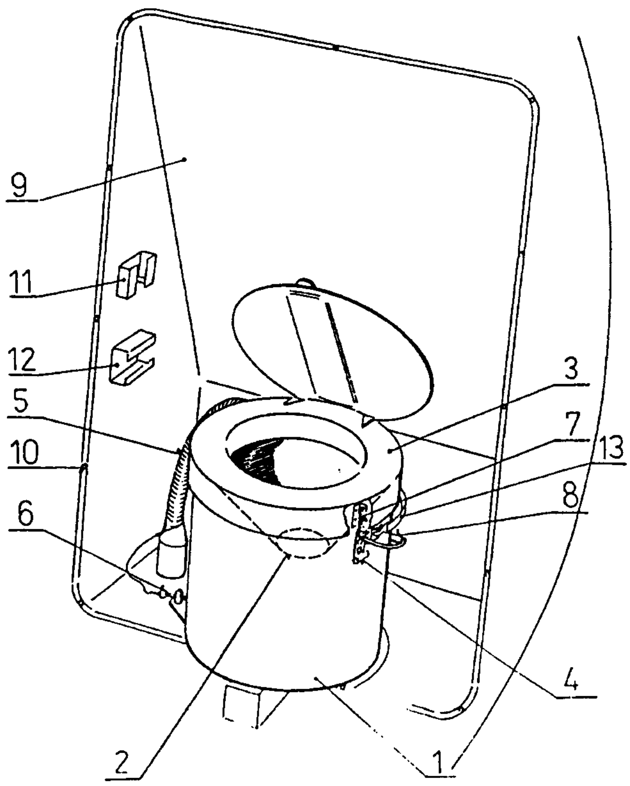

Fig. 8 – 9 Toilet with collecting vessel

(1) Toilet vessel; (2) Collecting vessel dish; (3) Seat; (4) Clamp; (5) Bellows; (6) Locking clamps; (7) Spring; (8) Handle; (9) Cover; (10) Snap locks – 13 pieces; (11) Box for tissues; (12) Box for toilet paper; (13) Secure strap.

CLEANING

WINDOWS CLEANING

Detail steps / work items:

If the windows are dirty, priper a bucket with lukeworm water (max. 104°F [40°C]) with a 5% solution of neutral sooap. Clean the windows with the prepare solution. After cleaning dry the glases with soft cloth (flannel is the best).

INTERIOR CLEANING

Detail steps / work items:

Soiled spot cleaning

The soiled spots on the lining shoul be cleaned with detergent soluted in warm water.

CAUTION

WHEN CLEANING UPHOLSTERY, DO NOT USE EITER PETROL OR ORGANIC SOLVENTS.

Carpet cleaning

Prepare the following solution for carpet cleaning:

- 1 table spoon of detergent
- 0.26 U.S. gallons (1 liter) of water
- 1 table spoon of 8% vinegar

For cleaning of spots of unknown origin use the solution consisting of a mixture of most commonly used cleaning agents, prepared as follows:

- 100 g of petrol
- 25 g of alcohol
- 10 g of ether
- 5 g of ammonia

NOTE

Shake the solution before use thoroughly.

Remove all ducts from whole serface of the floor covering using normal mechanical means (vacuum cleaner or a carpet bruch).

Apply wet method to clean more soiled areas using one of the above mentioned solutions.

SECTION 9
SUPPLEMENTS

INTRODUCTION

Section 9 of this AFM provides supplemental informations for optional equipment which is installed in the airplane and additionally it may contain the supplementary informations on airplane operation.

The information contained in this document supersedes the basic AFM where covered in the sections contained herein. For limitations, procedures and performance not contained in this supplement, consult the basic AFM.

MARK IF INSTALLED

This column is provided to check and to mark supplements for optional equipment with "✓" which is installed in the airplane.

LIST OF SUPPLEMENTS

Number	Title	Note	Mark if installed
1	Supplement for L 410 UVP – E20C airplane		✓
1a	Navigation System VOR/ILS/MKR KNR 634		✓
1b	Navigation System VOR/LOC/GS/RNAV KNS 81–12		✓
1c	Automatic Direction Finder KDF 806		✓
1d	Gyromagnetic Compass KCS 305		✓
1e	VHF Transceiver LUN 3524.11		✓
1f	DME Receiver/Transmitter Unit KDM 706		✓
1g	ATC Transponder KXP 756		✓
1h	Emergency Locator Transmitter POINTER 3000		✓
1i	75 MHz Marker Beacon Receiver KMR 675		✓
1j	Weather Radar RDS 81		
1k	Graphic Block GC 381 A		
1l	HF Transceiver KHF 950		
1m	Instruments Panel		✓
1n	King KFC 325 Flight Control System and KAS 297C Vertical and Altitude Selector		✓

Number	Title	Note	Mark if installed
1o	Oxygen Equipment BKP-2-2-210, BKP-3-2-210 and Oxygen Mask LUN 1807		✓
1p	Steward's seat installation		
1r	Rear Baggage Compartment		
1s	Placards and Markings		✓
2	Installation of the radionavigation and radiocommunication equipment GOLD CROWN BENDIX/KING		
3	King KFC 325 Flight Control System and KAS 297C Vertical and Altitude Selector		
4	Oxygen Equipment SCOTT Mark1 - type 900019-00, SCOTT 5500-B1A-BE20B and oxygen mask Duo-Seal - type 28318-13		
5	Discharging Toilet L 410.1940		
6	Rear Baggage Compartment		
7	Steward's seat installation		
8	Global Position System GARMIN 155		
9	Installation of the radionavigation and radiocommunication equipment GOLD CROWN BENDIX/KING		
10	Global Positioning System KLN 90B		
11	Placards and Markings		
12	Installation of the radionavigation and radiocommunication equipment GOLD CROWN BENDIX/KING		
12j	Cockpit Voice Recorder A100A		✓
13	Supplementary Equipment		
14	R 134 A Airconditioning System		
15	Global Positioning System GARMIN 155		
16	KING KFC 325 Flight Control System and KAS 297C Vertical Speed and Altitude Selector		
17	Installation of the radionavigation and radiocommunication equipment GOLD CROWN BENDIX/KING		
17o	Weight and balance charts (airplane ser. No. 912533)		✓
18	Oxygen equipment BKP-2-2-210, BKP-3-2-210 and oxygen mask LUN 1807		
19	Installation of the radionavigation and radiocommunication equipment SILVER CROWN BENDIX/KING		

Number	Title	Note	Mark if installed
20	Installation of the radionavigation and radiocommunication equipment SILVER CROWN BENDIX/KING		
21	Battery Temperature Measuring System DBTI−2002		
22	Rear Saloon		
23	Fuselage Fuel Tanks Using		
24	GPS Garmin 100 AVD		
25	Kiswahili placards (S/N 871811)		
26	Installation of the radionavigation and radiocommunication equipment SILVER CROWN BENDIX/KING		
27	Special equipment for airplane Serial No. 992736		
28	Installation of the radionavigation and radiocommunication equipment SILVER CROWN BENDIX/KING		
28j	Radio Altimeter KRA 405		✓
29	Global Positioning System GARMIN 155		
30	Placards and Markings		
31	Ground Proximity Warning System AlliedSignal Mark VI (var. 2)		
32	Altitude Selector/Alerter KAS 297A		
33	Installation of the radionavigation and radiocommunication equipment SILVER CROWN BENDIX/KING		
34	Global Positioning System KLN 90B		
35	Airplane without deicing system (a/c with LUN 2460 inverters)		
36	Global Positioning System GARMIN 155XL (airplane w/o autopilot)		
37	ATC Transponder KT 70		
38	Installation of the radionavigation and radiocommunication equipment SILVER CROWN BENDIX/KING		
39	Weather Radar RDR 2000		
40	Oxygen Equipment SCOTT Mark1 − type 900019−00, SCOTT 5500−C1A−Y OE and oxygen mask SCOTT − type 359 61551		
41	Cockpit Voice Recorder FA 2100		
42	Radio Altimeter KRA 405B		
43	Kiswahili placards (S/N 972730)		
44 to 48	Not affected		
49	Front Emergency Exit (with forward hinges)		✓

Number	Title	Note	Mark if installed
51 to 56	Not affected		
57	R 134 A Airconditioning System (var. 1 – STC 013)		
58 to 59	Not affected		
60	Enhanced ground proximity warning system (EGPWS) MARK VI		✓
61 to 65	Not affected		
66	Drift down procedure (airplane with M601E engine)		
67	Drift down procedure (airplane with M601E21 engine)		
68	Standby horizon MCI 4300 Series		
69 to 71	Not affected		
72	GILL G–641S Battery		
73	UI 9551 B turn and bank indicator		
74	ATC transponder Honeywell MST 67A		✓
75	Airborne collision avoidance system (ACAS II) CAS 67A ver. 7.0		✓
76	Emergency Locator Transmitter ELT C406–2		
77	Additional baggage / cargo compartment for 215 kg		
78	VARTA 20FP25H1CT–R Battery		
79 to 80	Not affected		
81	Flight Data Recorder BUR–1–2G with SPEEL FDR 59B–L		✓
82	Weather Radar RDS 82 (with multifunction display KMD 850)		✓
83	Fixed and variable baggage / cargo compartment (S/N 912533)		✓
84	Airplane without deicing system (a/c with PC 250 inverters)		✓

Number	Title	Number of modification	Mark if installed

Number	Title	Number of modification	Mark if installed

SUPPLEMENT No. 1

SUPPLEMENT FOR

L 410 UVP-E20C AIRPLANE

Registration No.	D-CLED
Serial No.	91 2533

This supplement must be attached to the Airplane Flight Manual when the the radionavigation and radiocommunication equipment GOLD CROWN BENDIX/KING and other equipment for the L 410 UVP-E20C airplane are installed. The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

The content of this supplement in original version was approved by CAI letter No. 5287/1566/90/Fi dated November 11, 1990.

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SUPPLEMENT No.1

PART 1a

Navigation system VOR/ILS/MKR
(NAV I)
KNR 634

Registration No.	D-CLFD
Serial No.	91 2533

This supplement must be attached to the Approved Airplane Flight Manual when thenavigation system KNR 634 is installed. The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

LOG OF REVISION

Revision Number	Revised Pages	Description of Revision	CAI approved	Date

SECTION 1 - GENERAL - Not Affected

SECTION 2 - LIMITATIONS - Not Affected

SECTION 3 - EMERGENCY PROCEDURES - Not Affected

SECTION 3A - ABNORMAL PROCEDURES - Not Affected

SECTION 4 - NORMAL PROCEDURES

SWITCHING - ON

On the overhead panel:

- BATTERY I, II; INVERTERS 115 V AC I switches:	CHECK SWITCHING-ON
- NAV I, MKR I, INTERCOM I, II circuit breakers:	SWITCH ON

On the connection box:

- Headphones and microphone plugs:	PLUG IN

On the NAV I control box:

- OFF/VOL knob:	rotate to the right from the locked position to switch on the unit

On the audio switch boxes (rear control panel):

- NAV I switch:	SWITCH ON

The last frequency used before the system switching off will be displayed.

PRE - FLIGHT CHECK

After switching on - on the NAV control box:

- Set (check) the VOR station frequency of the local aerodrome.

If sufficiently reliable VOR signal is received, the NAV warning flags will go out of view on the left hand PNI and on the right hand CDI and the perpendicular bars indicate deviation from selected VOR radial „to" or „from" VOR station.

- OFF/VOL knob : Set the desired volume of an acoustic signal and check identification of the VOR station.

On the left hand PNI and both RMIs:

- Check the switched-on position of VOR indication mode.

On the left hand PNI and right hand CDI:

- Check the „to" and „from" indication for proper function.
- Centre the perpendicular bar when indicating the flight „to" VOR station.
- Compare the radial readout of both indicators.

On the PNI and both RMIs:

- Compare the navigation data of both indicators

On the NAV I control box:

- Set some other active frequency than the VOR station frequency of the local aerodrome.

The NAV warning flag must come into view on the left hand PNI and on the right hand CDI.

On the audio switch box:

- NAV I switch: SWITCH OFF

On the left hand MKR (MKR I) indication display:

- „Test" button: PRESS

All three indicating lamps should light when pressed.

FREQUENCY SELECTION

(1) STANDBY FREQUENCY SELECTION

On NAV I control box:

- The smaller knob for frequency setting : in pushed in position

● The larger knob for frequency setting : rotate to set the frequency to the left hand side from the decimal point (MHz).

Using the larger knob, the frequency may be set in range from 108 to 117 MHz. Rotating the knob further to „out of frequency working range" causes transfer from 117 to 108, and vice versa.

● The smaller knob for frequency setting : rotate to set the frequency to the RH side from the decimal point (kHz).

Using the smaller knob, the frequency may be set in range from 00 to 95 at a step of 5. The transfer occurs from 95 to 00, or from 00 to 95.

(2) NAV I ACTIVE FREQUENCY SELECTION (direct tuning)

On the NAV I control box:

- Smaller frequency selection knob : PULL OUT

In the lower window of the display, dashes „– – -" will be displayed.

Now, the frequency displayed in the upper window may be changed.

- Set the frequency by carrying out the procedures marked „ ● " according to (1) paragraph.

Smaller frequency selection knob: PRESS

In the lower window (SBY) of the display, the former standby frequency will be displayed.

If you want to exchange position of active and standby frequency:

- Frequency transfer button ↕ : PRESS

NAVIGATION IN VOR MODE

On the NAV I control box:

- Set the desired active and standby VOR frequency.

If an airplane is within reach of VOR station, NAV warning flags will be out of view on the left hand PNI and the right hand CDI.

On the LH audio switch box:

- NAV I, MKR switches :	SWITCH ON

On the RH audio switch box:

- NAV I switch :	SWITCH ON

On the NAV I control box:

- OFF/VOL knob :	set the desired volume and identify the VOR station

On the audio switch boxes:

- NAV I switch :	SWITCH OFF

On the left hand PNI:

- COURSE knob :	set the desired VOR radial

On the right hand CDI:

- OBS knob :	set the desired VOR radial

On the left hand PNI and both RMIs:

- Check whether the corresponding indicating channels are in VOR mode.

On the left hand PNI, the right hand CDI and both RMIs:

- Check (compare) the navigation data of all the above mentioned indicators.

On the LH audio switch box:

- HI-LO change-over switch :	HI position

APPROACH IN ILS MODE

On the NAV I control box:

- Set the desired ILS/LOC active frequency of the destination aerodrome.

If an airplane is within reach of ILS/LOC/GS station, the corresponding warning flags will go out of view on the left hand PNI and right hand CDI.

On the audio switch boxes:

- NAV I switch :	SWITCH ON

On the LH audio switch box:

- MKR push button :	check the switched-on position
- HI-LO change-over switch :	switch to LO position

On the NAV control box:

- OFF/VOL knob :	set the desired volume and identify ILS station of the destination aerodrome

On the audio switch boxes, after the ILS station of destination aerodrome has been identified:

- NAV I switch :	SWITCH OFF

NOTE

Although the navigation indicator (PNI) function in the ILS mode does not depend on the course setting, set the navigation indicator to the course of the prolonged axis of the runway in the same way as for the flight by the VOR station.

SECTION 5 - PERFORMANCE - Not Affected

SECTION 6 - WEIGHT AND BALANCE

ITEM	QTY.	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100
NAVIGATION					
KNR 634 Receiver	1	2.95	6.50	-5.723	-4.965
KFS 564 Control box	1	0.50	1.10	0.215	0.186
KI 204 CDI	1	0.77	1.70	-0.453	-0.395
KPI 553A PNI	1	2.50	5.51	-1.475	-1.280
KNI 582 RMI	2	2.72	5.98	-1.620	-1.402
KA 35A MKR indicator	1	0.09	0.20	-0.050	-0.046

SECTION 7 - SYSTEMS OF AIRPLANE

NOTE

The instrument location is shown in the Supplement No. 1m - Imstrument panel.

One VOR/ILS/MKR navigation system is installed in the airplane. The control box is situated on the central instrument panel.

The controls on the control box are (see Fig. 1):

OFF/VOL switch: to switch on and switch off the system power and to regulate the acoustic signal volume

Two concentric frequency selector knobs: for frequency setting. The larger knob for setting the frequency to the LH side from the decimal point, the smaller knob for setting the frequency on the RH side from the decimal point

(continued)

Frequency transfer button ↕ : after depressing the standby frequency will become active and the former active frequency will go into standby. These frequencies will be exchanged in the display windows.

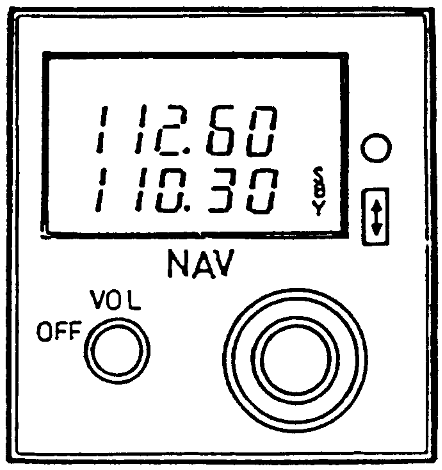

Fig. 1 - Control box of KNR 634

The navigation data are displayed on these indicators:

A. Pictorial navigation indicator (PNI) on the left hand instrument panel. It has a display situated in the upper part of the indicator.

The green arrow indicates VOR radial. Indicating channel of PNI can operate either in the VOR mode or in the ADF mode. The modes are selected by means of ADF/VOR selector under the HDG knob. If the mode is selected, the green flag marked RMI (VOR mode) or ADF appears on the PNI.

Yellow deviation indicator, which rotates together with the course arrow (COURSE select knob) indicates deviation from selected VOR radial or deviation from localizer beam.

Horizontal pointer indicates on the perpendicular scale on the LH side of the PNI deviation from glideslope beam centre.

White TO-FROM indicators indicate flight on the VOR selected radial either „to“ or „from“ VOR station (TO/FROM indication).

(continued)

These data are displayed on the display (from LH side):

- The distance to the VOR/DME station (NM)
- The ground speed to the VOR/DME station (KT) or radar altitude (FT)
- Time to the VOR/DME station (MIN)

The display of LH (RH) PNI is connected to the DME I (II) set and to the radio-altimeter.

B. Course deviation indicator (CDI) on the RH instrument panel.

Perpendicular bar indicates on the horizontal scale deviation from selected VOR radial or deviation from localizer beam.

Horizontal bar indicates on the perpendicular scale deviation from glideslope beam centre.

The CDI is furnished with TO/FROM indicator and OBS knob.

C. Radiomagnetic indicators (RMI) on the LH and RH instrument panel.

The single (green) pointer indicates the course to VOR station of NAV I set. Indicating channel of the single pointer may be switched either to the VOR or ADF mode. These modes are switched over by means of the white LH rectangular button provided in the lower part of the RMI's flange.

Switching of the mode (VOR or ADF) is indicated by means of the green arrow, which is directed to the ADF or VOR sign.

D. MKR indication display on the LH side of the instrument panel cover.

An acoustic signal of NAV I is led both into the LH and RH audio switch box and into the headphones is switched by means of NAV I switch.

An acoustic signal of MKR I is led only into the LH audio switch box and into the headphones is switched by means of MKR switch.

If the malfunction of VOR/LOC receiver is detected or the VOR/LOC signal is unreliable, the NAV red warning flags will come into view on the PNI and CDI.

If the malfunction of GS receiver is detected or the glideslope signal is unreliable, the black shield with GS-OFF sign will cover the GS scale on the PNI, and the red GS warning flag will come into view on the CDI.

Two frequencies, one active (which the system is just tuned to) and another standby, can be set on the NAV I control box. The active frequency is displayed in the upper window while the standby frequency is displayed in the lower window (SBY).

SECTION 8 - HANDLING, SERVICING & MAINTENANCE - Not Affected

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SUPPLEMENT No.1

PART 1c

Automatic Direction Finder

KDF 806

Registration No.	D-CLFD
Serial No.	91 2533

This supplement must be attached to the Approved Airplane Flight Manual when the ADF KDF 806 is installed. The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

LOG OF REVISION

Revision Number	Revised Pages	Description of Revision	CAI approved	Date

SECTION 1 - GENERAL - Not Affected

SECTION 2 - LIMITATIONS - Not Affected

SECTION 3 - EMERGENCY PROCEDURES - Not Affected

SECTION 3A - ABNORMAL PROCEDURES - Not Affected

SECTION 4 - NORMAL PROCEDURES

SWITCHING - ON

On the overhead panel:

- BATTERY I,II; INVERTERS 115 V AC switches: CHECK SWITCHING-ON
- ADF I (II); INTERCOM I (II) circuit breakers: SWITCH ON

On the connection box:

- Headphones and microphone plugs: PLUG IN

On the audio switch box (rear control panel):

- ADF 1 (2) switch: SWITCH ON

On the ADF control box:

- Selector switch: ANT position

Frequency and mode data that were set before the last shut down of the unit will be displayed in the windows.

PRE - FLIGHT OR IN - FLIGHT CHECK

After switching on - on the ADF's control box:

- Selector switch : ANT position (check)

Corresponding pointers on both RMIs and PNIs (ADF indicating mode) must be in 90° position.

- Set (check) the NDB radio beacon frequency as per paragraph frequency selection.
- Rotate the VOL knob to set the desired level of acoustic signal in the headphones.
- Check the NDB radio beacon identification.
- Selector switch: ADF position

The corresponding pointers on both RMI and PNI indicators will move clockwise toward the course position.

NOTE

1. Too slow rotation, oscillation or rotation of the RMI's and PNI's pointer in opposite direction indicates, that the received signal is too weak or that the ADF unit is out of order.
2. The acoustic ADF channel is provided with audio muting. With the ADF unit in ADF mode, the acoustic signal will appear only in case if valid signal is received.

On the audio switch box:

- ADF 1 (2) switch: SWITCH OFF

ADF FREQUENCY SELECTION

(1) Standby frequency selection

On the ADF control box:

- Larger frequency selection knob: rotate to set kHz hundreds

Using the larger frequency selection knob, you can set the kHz hundreds in range from 1 to 17. Rotating the knob further to "out of frequency working range" causes transfer from 17 to 1, and vice versa.

(continued)

- Smaller frequency selection knob: rotate to set kHz tens and units

With smaller knob in pressed position, the frequency is changed in kHZ tens, in pulled out position, the frequency is changed in kHz units. The kHz tens and units can transfer from 9 to 0; or from 0 to 9.

(2) Direct frequency tuning of the ADF

The direct frequency selection is mainly used in the case of searching for a radio beacon whose frequency is unknown.

The audio muting is out of operation in this frequency selection mode.

On the ADF control box:

- Selector switch : ANT position
- Frequency transfer button ↕ : press and hold in pressed position for about 2 sec

The frequency data disappear from the lower window (SBY). Now, the frequency may be chosen in the upper window.

On the audio switch box:

- ADF 1 (2) switch: switch on

On the ADF control box:

- Set the frequency (choose the radio beacon) as per para (1).

Having the radio beacon identified:

- Selector switch: ADF position

The pointers on indicators will move to the course position.

On the audio switch box:

- ADF 1 (2) switch: SWITCH OFF

NOTE

1. If lower frequency than 190 kHz is set, then the display is flashing.
2. If the ADF does not work in direction finding being set in the ADF mode, the "x" sign is displayed after the active frequency.

IN - FLIGHT OPERATION

On the ADF control box:

- Set the active and standby frequency.
- Identify the radio beacon.

If you want to exchange position of active and standby frequency:

- Frequency transfer button ↕: PRESS

SECTION 5 - PERFORMANCE - Not Affected

SECTION 6 - WEIGHT AND BALANCE

ITEM	QTY.	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100
NAVIGATION					
Receiver - KDF 806	1	3.36	7.41	-6.260	-5.426
	1	3.36	7.41	-5.990	-5.193
KFS 586 Control box	2	1.00	2.20	0.510	0.442

SECTION 7 - SYSTEMS OF AIRPLANE

NOTE

The instruments location is shown in the Supplement No. 1m - Imstrument panels.

Two sets of automatic direction finders are installed in the airplane. Their control boxes are situated on the rear control panel.

The controls on the control box are (see Fig. 1 - Control box of KDF 806):

- Selector switch having positions:	OFF, ADF/BFO, ADF, ANT/BFO, ANT
- Small control switch, concentric with selector switch :	for volume regulation
- Two concentric frequency select knobs:	frequency setting. To set kHz hundreds, rotate the larger knob,to set kHz tens and units rotate the smaller knob.
- Frequency transfer button ↕ :	After momentarily depressing the standby frequency will become active, and the former active frequency will go into standby. These frequencies will be exchanged in the display windows. After longer depressing (cca 2 sec), the ADF transfers to "direct frequency tuning" mode.

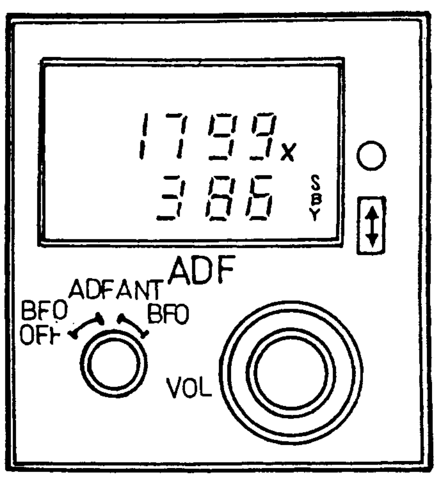

Fig. 1 - Control box of KDF 806

The navigation data are displayed on these indicators:

A. Radiomagnetic indicators (RMI)

These indicators are placed on the LH and RH instrument panel. Course is indicated by means of single (green) and double (yellow) pointers.

Indicating channels of RMI can operate either in the ADF mode or in the VOR mode. The modes are selected with two white rectangular buttons provided in the lower part of the RMIs flange.

The left hand button belongs to the indicating channel of the single pointer, the right hand button belongs to the double pointer indicating channel. Switching on the mode (ADF or VOR) is indicated by an arrow of respective pointer colour, directed to the ADF or VOR signs.

Single (green) pointers indicate course from the ADF I set (LH control box), double pointers indicate course from the ADF II set (RH control box).

B. Pictorial navigation indicators (PNI)

These indicators are situated on the LH and RH instrument panel.

Course is indicated by means of a green arrow, the ground beacon having been preset. Radio course indicating channel can operate either in the ADF mode or in the VOR mode. These modes are selected by the change-over switch under the HDG button. If the mode (ADF or VOR) is selected, the green flag marked ADF or RMI appears on the PNI.

In case of ADF fault, the respective pointer is blocked at 90° position on both the RMI and PNI indicators.

The ADF can operate in two modes:

ADF - This is the ADF's main mode; RMI's and PNI's pointers indicate course (with RMI and PNI indicating channels in the ADF mode, selector switch on the ADF control box in ADF position).

ANT - The ANT mode makes easier the identification of radio beacon acoustic signals operating with the A1, A2 and A3 types of modulation (with the selector switch on the ADF control box in ANT position). The frame antenna is put out of operation, the ADF is not direction finding) and the RMI's and PNI's pointers take up the 90° position until the ADF mode has not been selected.

(continued)

Through the ADF and ANT modes the signal from the beat-frequency oscillator (BFO) of 1 kHz frequency can be superimposed (the selector switch in some of the ADF/BFO or ANT/BFO positions).

The superimposition is used for the reception of radio beacons operating with the A1 type of modulation.

Acoustic signal from ADF I (II) is switched into the headphones by means of ADF 1 (2) switch button on the audio switch box.

Two frequencies, one active (which the ADF is just tuned to) and another standby, can be set on the ADF's control box. The active frequency is displayed in the upper window while the standby frequency is displayed in the lower window (SBY).

SECTION 8 - HANDLING, SERVICING & MAINTENANCE - Not Affected

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SUPPLEMENT No.1

PAT 1d

Gyromagnetic Compass

KCS 305

Registration No.	D-CLFD
Serial No.	91 2533

This supplement must be attached to the Approved Airplane Flight Manual when the Gyromagnetic Compas KCS 305 is installed. The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

LOG OF REVISION

Revision Number	Revised Pages	Description of Revision	CAI approved	Date

SECTION 1 - GENERAL - Not Affected

SECTION 2 - LIMITATIONS - Not Affected

SECTION 3 - EMERGENCY PROCEDURES - Not Affected

SECTION 3A - ABNORMAL PROCEDURES - Not Affected

SECTION 4 - NORMAL PROCEDURES

SWITCHING - ON AND CHECKING

On the compensator unit of the I (II) set on the rear control panel:

- SLAVE/FREE switch I (II): FREE position

On the overhead panel:

- BATTERY I,II
  INVERTERS 115 V AC I,II switches,: CHECK SWITCHING-ON

On the overhead panel:

- GYRO COMPASS I (II) circuit breaker: SWITCH ON

While the gyro starting, the warning flags on the both PNIs and RMIs are visible for about 30 seconds.

After the warning flags disappear (retract):

On the compensator unit of the I (II) set:

- CW/CCW switch: turn to the CW position and then to the CCW position

The compass roses on the both PNIs and RMIs should rotate clockwise and then counterclockwise at a rate of 10°/sec.

(continued)

The warning flags must be visible during the compass roses rotation.

- Set the compass roses for the heading by 90^0 greater than the true heading of an airplane

- SLAVE/FREE switch I (II): SLAVE position

The compass roses of the both PNIs and RMIs should rotate to the aircraft heading till the 2^0 deviation at a rate of 14^0/sec (the warning flags are visible) and after then slowly at a rate of 2.5°/min (the warning flags will retract).

Check the second set by carrying-out the procedures marked " ● ".

IN - FLIGHT OPERATION

NOTE

In general, throughout the whole flight period the gyromagnetic compass is set in (SLAVE) gyro mode.

If the warning flags of the both PNIs and RMIs come into view for a period longer than 70 sec:

On the rear control panel:

- I - GK - II switch: switch over to the second positon (stanby GK)

If the gyros of both gyromagnetic compass sets are inoperative:

- I - GK - II switch: switch I (II)

- SLAVE/FREE switch I (II): FREE position

- Find out on the pointer indicator if the full deflection to the left and to the right is possible by means of the CW/CCW switch.

If the pointer is moving:

- Carry out the manual alignment of the indicator to zero deflection by means of the CW/CCW switch.

The warning flags on the both PNIs and RMIs must retract.

(continued)

If the indicator pointer is not mowing or the warning flags do not retract when using the CW/CCW switch:

- I - GK - II switch: II (I) position

Carry out the procedures marked " ● " on the second set.

NOTE

1. One division deflection on the pointer indicator scale corresponds to approximately instantaneous error of 2 degrees. These indications are valid at middle - north latitudes.

2. The pointer indicator indications are valid only during steady, level airplane attitudes.

SECTION 5 - PERFORMANCE - Not Affected

SECTION 6 - WEIGHT AND BALANCE

ITEM	QTY.	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100
NAVIGATION					
KSG 105 Gyro aggregate	1	2.56	5.64	-4.173	-3.619
	1	2.56	5.64	-3.661	-3.175
KA 51 B Compensator unit	2	0.18	0.40	0.077	0.068
Inductive trasmitter	2	3.00	6.61	6.750	5.855
I-GK-II Change-over switch	1	0.04	0.08	0.006	0.004

SECTION 7 - SYSTEMS OF AIRPLANE

NOTE

The instruments location is shown in the Supplement No. 1m - Imstrument panels.

Two gyromagnetic compasses are installed in the airplane. The gyromagnetic compass operates automatically in the slave gyro mode or in the directional gyro mode. Each gyromagnetic compass has its compensator unit, which is placed on the rear control panel.

Two switches are on the compensator unit (see Fig. 1 - Compensator unit):

- SLAVE/FREE: for gyromagnetic compass mode selection
- CW/CCW: for hand alignment (correction) in the clockwise direction and in the counterclockwise direction.

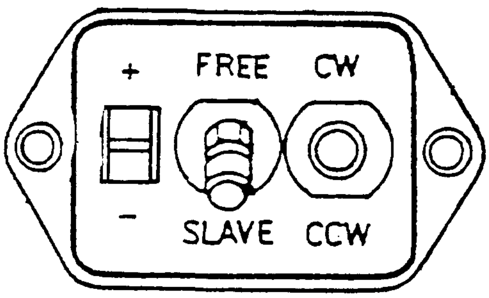

Fig. 1 - Compensator unit

The pointer indicator on the compensator unit indicates instantaneous deviation of magnetic correction between the magnetic azimuth transmitter and the correcting directional gyro.

Gyromagnetic compass data are indicated on two radiomagnetic indicators (RMI) and two pictorial navigation indicators (PNI) on the LH and RH instrument panel, beside this on the weather radar indicator with graphics block switched on in NAV mode.

(continued)

Always only one gyromagnetic compass is a source of heading signal for all instruments. While the second gyromagnetic compass works as a standby source, to which above mentioned instruments may be switched over by means of I - GK - II switch, which is placed on the rear middle panel.

If the power fall-out loss or the fault of gyromagnetic compass is detected, the red warning flags appear on the RMI (HDG) and on the PNI (COMPASS).

SECTION 8 - HANDLING, SERVICING & MAINTENANCE - Not Affected

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SUPPLEMENT No. 1

PART 1f

DME Receiver/Transmitter Unit

KDM 706

Registration No.	D-CLED
Serial No.	91 2533

This supplement must be attached to the Approved Airplane Flight Manual when the DME Receiver/Transmitter Unit KDM 706 is installed. The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

LOG OF REVISION

Revision Number	Revised Pages	Description of Revision	CAI approved	Date

SECTION 1 - GENERAL - Not Affected

SECTION 2 - LIMITATIONS - Not Affected

SECTION 3 - EMERGENCY PROCEDURES - Not Affected

SECTION 3A - ABNORMAL PROCEDURES - Not Affected

SECTION 4 - NORMAL PROCEDURES

SWITCHING - ON

On the overhead panel:

- BATTERY I, II switches:	CHECK SWITCHING-ON
- DME I, II, NAV I, II, INTERCOM I, II circuit breakers:	SWITCH ON

On the NAV I control box:

- OFF/VOL knob:	rotate to the right from the locked position to turn the unit on

On the NAV II control box:

- OFF/ON/IDENT knob:	rotate to the right from the locked position to turn the unit on

On the audio switch boxes:

- DME 1 (2) switch:	SWITCH ON

IN - FLIGHT OPERATION

On the NAV control box:

- Frequency selection knob : set the desired VOR/DME frequency (or DME if independent DME station is involved)

Through the headphones check the DME identification sign.

On the audio switch boxes:

- DME 1 (2) switch: SWITCH OFF

NOTE

If the VOR/LOC I (II) navigation receiver should be used for cooperation with other radio beacons than to which the distance data is being requested, then turn the DME (1) (2) switch from NAV 1 (2) switch from NAV 1 (2) position to HOLD position.

The indicated data will be related to the initially tuned DME, even though VOR/ILS I (II) navigation receiver has been tuned to another VOR station, eventually ILS station.

H1 (H2) sign will appear on DME indicator displays together with indicated data after turning the switch to the HOLD position. The HOLD function will be canceled after turning the DME 1,2 switch from the HOLD position to the NAV 1 (2) position.

SECTION 5 - PERFORMANCE - Not Affected

SECTION 6 - WEIGHT AND BALANCE

ITEM	QTY.	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100
NAVIGATION					
DME KDM 706	1	2.49	5.49	-3.088	-2.789
	1	2.49	5.49	-2.789	-2.421
Indicator KDI 573	2	0.62	1.37	-0.366	-0.318

SECTION 7 - SYSTEMS OF AIRPLANE

NOTE

The instruments location is shown in the Supplement No. 1m - Imstrument panels.

Two DME receiver/transmitter units are installed in the airplane.
DME I navigation data are displayed on the left hand PNI and on the right hand DME indicator. DME II navigation data are displayed on the right hand PNI, on the left hand DME indicator and on the display of the VOR/LOC/GS/RNAV navigation system in DST window (distance).

DME frequency channels are assigned to the VOR channels and are selected simultaneously with the corresponding VOR frequency on the NAV control box. DME I frequency selection is controlled via the NAV I set, DME II frequency selection is controlled via the NAV II set.

DME I (II) unit way be switched over to the HOLD mode via the DME 1 (2) switch situated adjacent to the left hand (right hand) PNI. When the airplane location is outside the DME range, the DME unit will transfer to the search mode and the displays of the DME indicators will be blanked.

The airplane speed towards the ground DME and the estimated time-to the DME station are measured correctly only with the direct heading "to" or "from" the ground DME.
An acoustic signal from the DME I, DME II set is led into the LH and RH audio switch box. Into the headphones they are switched via the DME 1 (2) switch on the audio switch box.

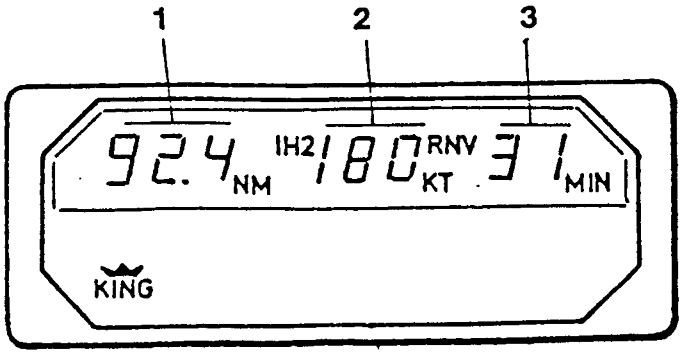

Fig. 1 DME indicator KDI 573

1 - Distance; 2 - Ground speed; 3 - Flight time.

SECTION 8 - HANDLING, SERVICING & MAINTENANCE

- Not Affected

SUPPLEMENT No.1

PART 1g

ATC Transponder

KXP 756

Registration No.	D-CLED
Serial No.	91 2533

This supplement must be attached to the Approved Airplane Flight Manual when the ATC Transponder KXP 756 is installed. The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

LOG OF REVISION

Revision Number	Revised Pages	Description of Revision	CAI approved	Date

SECTION 1 - GENERAL - Not Affected

SECTION 2 - LIMITATIONS

(1) The transponder must be switched off during the engine start-up.

(2) The transponder must never be switched-on with the codes set at 7500, 7600, 7700.

(3) The codes must be set according to the valid regulations for the air traffic or to the ATC instruction.

SECTION 3 - EMERGENCY PROCEDURES - Not Affected

SECTION 3A - ABNORMAL PROCEDURES - Not Affected

SECTION 4 - NORMAL PROCEDURES

SWITCHING - ON

On the overhead panel:

- BATTERY I,II switches:	CHECK SWITCHING-ON
- SSR I,II circuit breakers:	SWITCH ON

On the transponder control box (rear control panel):

- Function selector knob (the larger one of two concentric knobs):	SBY

The SBY indicator will light up on the lower part of the display and the digit select caret will light up under the first digit.

CODE SETTING

- Rotate the code selector knob (the smaller one of two concentric knobs) to the right (left) and dial in the first digit.
- Press momentarily the code selector knob. The digit select caret is moved to second digit to the right.
- Dial in further digits following the above mentioned procedures.
- Press IDT and code select knob simultaneously.

The selected code is stored into the memory, the display will be blank, and whenever after pressing the code selector knob the code will come into view.

- Function selector knob: TST

On the display, the letter R will flash or steadily light, the letters FL and numerical flight level readout (in 100 ft increments) will light up. (A readout of 005 corresponds to a flight altitude of 500 feet).

NOTE

1. If the letter R is not displayed, the transponder is not able to operate. Report the failure to the ATC and follow its instructions.
2. If the numerical flight level readout of -002 is displayed, the altimeter is not encoding the altitude.

On the transponder control box:

- Function selector knob: SBY

The SBY indicator will light up on the lower part of the display.

On the encoding altimeter:

- Altitude selector : set QNE, QFE or QNH according to ATC instructions

On the transponder control box:

- Function selector knob: ALT (see NOTE)

The ALT indicator will light up on the lower part of the display.

(continued)

NOTE

1. Some aerodromes may have other instructions issued through NOTAM, ATIS or ATC orders.
2. After switching on the ALT position, the reply code will be transmitted automatically and indicated by flashing or lighting of the letter R in the left upper corner of the transponder control box.

IN - FLIGHT OPERATION

Over the transition altitude

On the encoding altimeter:

- Altitude selector: SET QNE (1013, 2 hPa)

Below the transition altitude

On the encoding altimeter

- Altitude selector: set QNE, QFE or QNH as per ATC controller instruction

The encoding altimeter always encodes the standard altitude regardless of the pressure set on the altimeter. When the ATC requests switching off the automatic altitude report (the C mode):

- Function selector knob on the transponder control box: ON

The ON indicator will light up on the lower part of the display.

When the ATC requests transmission of special identification signal:

- IDT button on the transponder control box: PRESS

After pressing and releasing the button the transponder transmits the identification signal for approximately 25 seconds. The transmission of identification signal is indicated by lighted IDT indicator in the lower part of display.

SECTION 5 - PERFORMANCE - Not Affected

SECTION 6 - WEIGHT AND BALANCE

ITEM	QTY.	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100
NAVIGATION					
Transporder KXP 756	1	2.13	4.70	-2.710	-2.350
	1	2.13	4.70	-2.490	-2.165
Control box KFS 576	2	0.90	2.00	0.162	0.142
Encoding altimeter KEA 130	2	1.72	3.80	-1.039	-0.898
Change-over switch I-SSR-II	1	0.04	0.08	0.003	0.002

SECTION 7 - SYSTEMS OF AIRPLANE

Two ATC transponder sets are installed in the airplane. Their control boxes are situated on the rear control panel. One set only is operated at a time. The selection is performed by the I-SSR-II switch located on the rear control panel.

NOTE

The instruments location is shown in the Supplement No. 1m - Imstrument panels.

(continued)

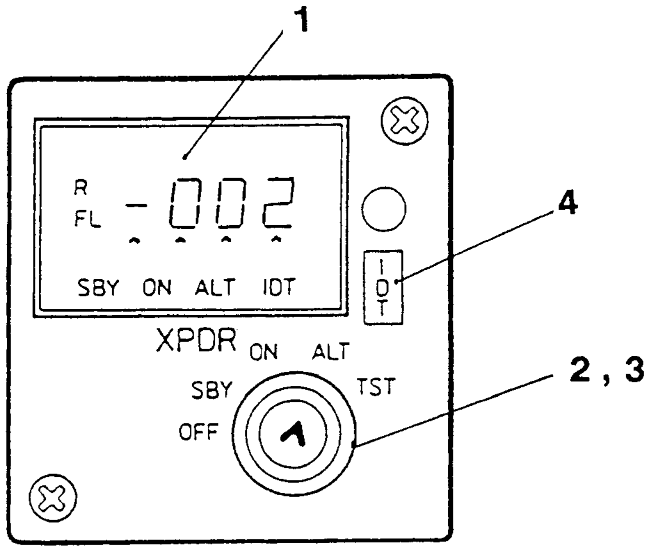

Fig. 1 - Control box of KXP 756

(1) Display; (2) Function selector knob; (3) Code selector;
(4) Push button for transmitting the identification signal.

SECTION 8 - HANDLING, SERVICING & MAINTENANCE
- Not Affected

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SUPPLEMENT No.1

PART 1i

75 MHz Marker Beacon Receiver

KMR 675

Registration No.	
Serial No.	91 2533

This supplement must be attached to the Approved Airplane Flight Manual when the 75 MHz Marker Beacon Receiver is installed. The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

LOG OF REVISION

Revision Number	Revised Pages	Description of Revision	CAI approved	Date

SECTION 1 - GENERAL - Not Affected

SECTION 2 - LIMITATIONS - Not Affected

SECTION 3 - EMERGENCY PROCEDURES - Not Affected

SECTION 3A - ABNORMAL PROCEDURES - Not Affected

SECTION 4 - NORMAL PROCEDURES

SWITCHING-ON AND PRE-FLIGHT CHECK

On the overhead panel:

- BATTERY I,II switches: CHECK SWITCHING-ON
- MKR II circuit breaker: SWITCH ON

On the MKR's indicator (on the right side of the glareshield of the instrument panel):

- TEST push-button: PRESS

All three indicating lamps should light when the TEST push-button is pressed.

NOTE

The sensitivity of 75 MHz marker beacon receiver is switched over via HI/LO switch on the copilot's audio box.

USE IN FLIGHT

On copilot's audio box:

- HI-LO change-over switch: HI position

WHEN APROACHING TO LAND

On the copilot's audio box:

- HI-LO change-over switch: LO position
- MKR switch: SWITCH ON position

AFTER LANDING

- MKR II circuit breaker: SWITCH OFF

SECTION 5 - PERFORMANCE - Not Affected

SECTION 6 - WEIGHT AND BALANCE

ITEM	QTY.	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100
NAVIGATION					
KMR 675 Receiver	1	0.34	0.75	-0.360	-0.310
KA 35 A Indicator	1	0.09	0.20	-0.050	-0.046
KA 26 Antenna	1	0.25	0.55	0.070	0.067

SECTION 7 - SYSTEMS OF AIRPLANE

NOTE

The instruments location is shown in the Supplement No. 1m - Imstrument panels.

One independent 75 MHz marker beacon receiver is installed in the airplane.

Passage over the marker beacon is indicated by light indication on the RH side of the instrument panel cover and by sound in the earphones of the copilot when the MKR switch on the RH audio switch box is in switched-on position.

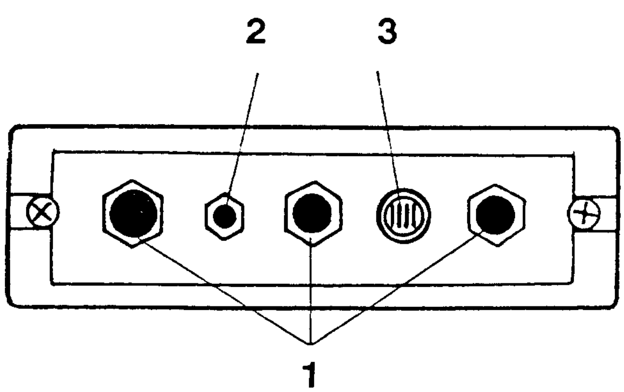

Fig. 1 - KMR 675 Marker Beacon Receiver and lights
(1) MKR light (signalling fly over MKR beacon); (2) TEST push-button;
(3) Automatic dimming system sensor.

SECTION 8 - HANDLING, SERVICING & MAINTENANCE - Not Affected

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SUPPLEMENT No.1

PART 1k

Graphics block

GC 381 A

Registration No.	D-CLED
Serial No.	91 2533

This supplement must be attached to the Approved Airplane Flight Manual when the Graphics block GC 381 A is installed. The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

LOG OF REVISION

Revision Number	Revised Pages	Description of Revision	CAI approved	Date

SECTION 1 - GENERAL - Not Affected

SECTION 2 - LIMITATIONS - Not Affected

SECTION 3 - EMERGENCY PROCEDURES - Not Affected

SECTION 3A - ABNORMAL PROCEDURES - Not Affected

SECTION 4 - NORMAL PROCEDURES

SWITCH-ON

After weather radar switch-on:

- Changeover-switch of modes on graphics block (central instrument panel):	position EMER, LST, RTE, SBY or NAV as needed

If the graphics block is switched-on and operates in whichever selected modes except of SBY mode and radar operates in mode SBY or ON, following unwanted text appears on radar indicator:

THE NAVIGATION DATA
PRESENTED ON THIS
SCREEN IS NOT TO
BE USED FOR PRIMARY
NAVIGATION.
CONTENTS OF THE
CHECKLISTS ARE THE
RESPONSIBILITY OF
THE USER/INSTALLER.

This "unwanted" text disappears automatically from the screen after approx. 20 sec. It can be cleared out from the screen before expiration of display period by overswitching the graphics block to the emergency mode (SBY), or pressing the button CANCEL. If you will presently switch-over the graphics block from SBY mode to some other mode without using the button CANCEL, you will call the "unwanted" text to the screen again for the rest of its display period of 20 sec. Again you may use the button CANCEL.

(continued)

NOTE

If you want to use at graphics block some of modes EMER, LST or RTE, then radar must operate in SBY mode. Until radar operates in ON mode and the graphics block is in some of EMER, LST or RTE modes, symbol SELECT SBY displays on the indicator in the vicinity of operation modes overswitch.

APPLICATION DURING THE FLIGHT

(1) Utilization of the function "waypoint 0"

In case that the aeroplane heading must be changed, for example during the flight around hazardous weather formations or according to instructions of station ATC:

On radar indicator:

- Modes overswitch: ON (to be checked)

On graphics block:

- Modes overswitch: NAV (to be checked)
- Joystick: to be displaced in any direction for a moment

In the middle of radar CRT the white cursor of the waypoint 0 will be displayed. When the waypoint 0 is already displayed on the CRT, the white cursor will be displayed next to this waypoint 0 Now is the symhol CURSOR indicated in right hand bottom corner instead of active waypoint data, instantaneous cursor radial of waypoint 0 and the displacement distance from reference radio-beacon.

- With the help of joystick locate the cursor according to required position.

During cursor resetting its displacement data changes continuously.

On the graphics block:

- Button CRS: PRESS

As soon as the waypoint 0 register of equipment KNS 81 will accept the coordinates of the waypoint 0, cursor white symbol will be changed to the light-blue symbol of the waypoint, and at the same time in CRT right hand bottom corner identification symbol of active radio-beacon and direction finder and the waypoint 0 distance from reference radio-beacon shall be indicated instead of symbol CURSOR and data of cursor displacement of waypoint 0.

(continued)

On control and indication panelboard of equipment KNS 81 (NAV II):

- Set (check) the numher of waypoint 0 in window WPT

- Button USE: PRESS

On right hand PNI:

- Revise the flight route heading by heading deviation, found out according to paragraph (2).

(2) Deviation of flight route investigation

- Modes overswitch on radar indicator: ON (check)

- Modes overswitch on graphics block: NAV (check)

- Left hand (right hand) button MAP TRK on graphics block: PRESS

White, adjustable line of flight route heading deviation will he displayed on radar CRT, in the left (right) site of 10° from the heading line. In the CRT left upper corner displays the deviation from the flight route heading on the left hand (L) or right hand (R) side in white colour, instead of data of aeroplane magnetic course.

- Press continuously relevant button MAP TRK and reset the deviation line to the required position (e.g. such, that the line will pass through the new created waypoint 0). The deviation line could be deflected up to $\pm$ 45° from displayed heading line.

- Subtract the deviation figure, indicated in CRT left upper corner. The line and deviation figure disappears from the screen in about 10 sec. after pressing the button MAP TRK.

(3) Waypoint indicator out of displayed sector

If programmed active waypoint is not within radar displayed sector (greater distance and/ or greater relative direction finder), then the radar screen will display white number of the waypoint with the arrow, giving approximate direction towards this active waypoint. Eight positions of this indicator may be displayed. The accuracy of direction indication is $\pm$ 22.5°. This function is automatic, therefore it cannot be influenced by the pilot.

(4) Display of waypoint extended range

The graphics block enables to display on radar screen the navigation situation even at radar max. range (240 nautical miles) up to the distance of 320 n.m. For the activation of "extended range":

(continued)

On radar indicator:

- Operation modes overswitch: SBY
- Select the max. range of 240 n.m.

On graphics block:

- Operation modes overswitch: NAV (check)
- Button for cursor position reset ⇑ (up): PRESS

Radar screen will display all waypoints in sector 90° up to the distance of 320 n.m.

NOTE

The mode of "extended range" display cannot be activated within the radar mode ON.

For deactivation of "extended range" mode:

On graphics block:

- Button for cursor position eset ⇓ (down): PRESS

or:

On radar indicator:

- Select lower range.

UTILIZATION OF GRAPHICS BLOK MEMORY

The graphics block is provided with 252 line programmable memory, which may be utilized for programming of complete, most often utilized flight routes and checklists of obligatory and emergency acts. Each flight route occupies 4 lines in the memory. One flight route may include up 10 waypoints.

As waypoint may be considered:

- navigation system VOR/DME;
- waypoint, displaced with respect to radio-beacons VOR/DME (general waypoint);
- radio-beacon ILS/LOC.

(continued)

To be able to generate the navigation graphics, the graphics block must have at disposal applicable signal DME, as well as VOR at the same time. In case, that some of above mentioned signal is missing, this navigation system cannot be used as reference one for displaced (general) waypoint.

I case, that the radio-beacon ILS/LOC shall be used as a waypoint, the graphics block does not generate the graphics of the flight route heading, no symbols of the radio-beacon or waypoint, beside that, in the CRT right bottom corner only the radio-beacon ILS/LOC frequency shall be indicated (which in case, that radio-beacon ILS/DME is concerned, shall be replaced with identification symbol DME) and when the station is equipped with DME equipment, the distance will be indicated.

NOTE

If the equipment KNS 81 operates within the mode ILS, it does not take-over the direction finder informations and distances of waypoint displacement (if programmed).

(1) Loading of the flight route into graphics block memory:

To be carried out in three steps:

- Parameters of individual waypoint will be loaded into the memory of KNS 81 equipment, which will create one complete block - flight route;
- Select the identificator for programmed flight route;
- Flight route will he re-loaded from the memory of KNS 81 equipment into the graphics block memory.

WARNING

IF NOT INEVITABLE, DURING PROGRAMMING OF KNS 81 EQUIPMENT DO NOT OCCUPY THE WAYPOINT 0 REGISTER WITH THE WAYPOINT, WHICH IS ESSENTIAL FOR THE PROGRAMMED FLIGHT, BECAUSE IN CASE OF FUNCTION "WAYPOINT 0" APPLICATION, IN THIS REGISTER THE ORIGINAL INFORMATION SHALL BE REPLACED WITH INFORMATIONS OF NEW CREATED WAYPOINT 0.

(continued)

For the selection of flight route identificator:

- Mode overswitch on radar indicator: SBY
- Mode overswitch on graphics block: RTE

Indicator screen will display the page of indexes of flight routes with yellow cursor on level 1. of the flight route in the sequence.

NOTE

10 identificators (index) of flight routes (ROUTE 1, ROUTE 2, ... ROUTE 10) are programmed in graphics block (by the manufacturer). Individually programmed flight routes can be loaded under this identificators. Other identificators may be created (or cancel the existing ones together with their content) by means of internal pocket terminal KA 68.

For loading of designed flight route under existing identificator:

- Buttons on ⇓ ⇑ graphics block: reset the yellow cursor to required identificator
- Button CRS on graphics block: PRESS

The indicator screen will display the page of waypoints of selected flight route: the waypoints correspond to the last waypoints, which have been loaded under identificator of this flight route. This is the graphics block ready to take-over the informations of waypoints (waypoints parameters) from the equipment KNS 81 and to load them into own memory under the selected identificator:

- Button SAVE on the graphics block: PRESS

Each line on indicator screen will change the colour from purple to the green colour, as soon as the graphics block will take-over its content. When all lines green, the screen will display the indexes page of flight routes in such a manner, that the cursor will make expressive (higher illumination) the flight route index, just loaded into the memory of graphics block.

For check of new programmed page (flight route):

- Button CRS on the graphics block: PRESS

After checking of page content:

- Button IDX on the graphics block: PRESS

(continued)

Such will be displayed the page of flight route indexes on the screen again (anytime during the flight).

(2) Flight route selection

- check, if the equipment KNS 81 (mode RNV) is on

- Mode overswitch on the indicator of radar: SBY

- Mode overswitch on the graphics block: RTE

Indicator screen displays the page of flight route indexes, loaded in the graphics block memory. The yellow cursor will be displayed in the level of Ist flight route.

If it is necessary to select other route, as shown by the cursor:

●Button for position reset of the cursor ⇑ ⇓ : press gradually and set the cursor next to the index of required flight route

●Button CRS on the graphics block: PRESS

Indicator screen will display the data page of corresponding waypoints; identificator (index) of the flight route is displayed in white colour and waypoints data in purple colour. In case you will decide not to program the equipment KNS 81 with displayed parameters and new flight route will be selected:

- Button IDX on the graphics block: PRESS

- Select the required flight route by repeating the advance points, indicated " ● ".

If you will utilize the graphics block for the operation in other mode as RTE, but displayed parameters use for programming of the equipment KNS 81 later on, changeover the switch of graphics block modes to the required position without pressing firstly the button IDX; after repeated overswitching the switch of modes to the position RTE, original page of the flight route will be displayed on the indicator.

WARNING

PRIOR INTRODUCTION OF SELECTED FLIGHT ROUTE INTO EQUIPMENT KNS 81 CHECK ALWAYS THE WAYPOINT PARAMETERS, DISPLAYED ON THE INDICATOR SCREEN.

(continued)

If you will decide for programming of KNS 81 equipment:

- Button CRS on the graphics block: PRESS

Each line on the indicator screen will change the colour from green to purple colour, as soon as the equipment KNS 81 will take-over its content. When all lines will be green, the screen will display the page of flight routes indexes such, that the cursor will make expressive (higher illumination) the flight route index, just loaded into the memory of KNS 81 equipment.

To check the introduced waypoints, which will be utilized to navigation:

- Button CRS on the graphics block: PRESS

After checking:

- Button IDX on the graphics block: PRESS

- Function overswitch on the graphics block: to be used according to the need

NOTE

1. Any flight route remains in the graphics block memory, unless cancelled with external pocket terminal KA 68.

2. It is not recommendable to return back into the memory of graphics block after its application during the flight.

(3) Introduction of new flight route

The introduction of new flight route (its identificator) into the graphics block memory shall be carried out with external pocket terminal KA 68.

To introduce new identificator (index) on the page of flight route index:

- Modes overswitch on radar indicator: SBY

- Mode overswitch on the graphics block: RTE

- By means of buttons ⇓ ⇑ on the graphics block, reset the cursor to the level of flight route index, which will be directly before the line, which will be occupied with the new index.

(continued)

NOTE

To give the new index to the top line of indexes page (up), reset the cursor to the position "out of the screen" such, that the cursor will make more expressive the Ist line and then press the button ⇑ (upward).

- Connect the pocket terminal KA 68 to the graphics block
- Introduce the new index following the procedure, specified in para (g), point (2) - Posting of the identificator.

The index of this new flight route shall be made more expressive with the cursor.

To check the "informations" of new page of waypoints:

- Button CRS on the graphics block: PRESS

The indicator will display the new page of "informations" of waypoints with its identificator at the top.

All frequencies shall be of value "100.00", the radials and displacement distances shall be of value "0,0".

The graphics block memory is such prepared to accept the waypoint parameters from navigation equipment KNS 81, see para (e), point (1) - Loading of the flight route into graphics block memory.

(4) Flight route cancellation

- Mode overswitch on radar indicator: SBY
- Mode overswitch on graphics block: RTE

The screen will display the page of flight route indexes.

- With the help of buttons ⇓ ⇑ on the graphics block, reset the cursor to the level of flight route index, which you intend to cancel.
- Connect the pocket terminal KA 68 to the graphics block.

On the pocket terminal:

- Button SHIFT: PRESS
- Button DEL (common with "5"): PRESS

(continued)

Pertaining identificator disappears from the indexes page, which is displayed on the screen and the cursor will be shifted to the level of following flight route.

NOTE

Cancelling of flight route identificator results in cancelling in the graphics block memory of the complete page, which has been identified with this identificator, i. e. all waypoints specified in here.

(5) The change of flight route content

- Introduce the flight route into the navigation system KNS 81, parameters of which you intend to change according to the procedure, specified in point (2) - Flight route selection.

As soon as the equipment KNS 81 will accept the selected page of waypoints (flight route):

- Carry out required change (over-programming) in the memory of equipment KNS 81 with utilization of procedures, specified in SUPPLEMENT No 1, section 1.2.

After programming completion on the equipment KNS 81:

- Transfer the revised flight route parameters from the memory of equipment KNS 81 to the memory of graphics block.

NOTE

1. If you intend to store the revised flight route parameters under original identificator or under other identificator from the flight route indexes page, use the procedure, mentioned in this paragraph point (1) - Loading of the flight route into graphics block memory.

2. If you intend to store the revised flight route parameters under new identificator, use the procedure, mentioned in this paragraph point (3) - Introduction of new flight route.

CHECKLIST OF OBLIGATORY AND EMERGENCY ACTS

(1) Text colour distinguishing

Colour distinguishing in purple, yellow and green colour will be changed according to application of button CRS and buttons for cursor position reset, which are placed on the graphics block.

The lines, which appear in white or light-blue colour, represent always the system text groups of graphics block informations (reports).

Pressing the button CRS or some other of buttons results in "cursor expressing", i. e. intensity increase. Pressing the button CRS results also to the colour change of "not-checked" line from purple to green colour, which informs, that the line item has been just checked.

(2) Checklists activation

- Overswitch of radar modes:	SBY (to be checked)
- Overswitch of graphics block modes:	LST or EMER as per need

Indicator CRT will display the page of indexes of checklist of obligatory acts (position LST) or checklist of emergency acts (position EMER). Page of indexes could be displayed anytime when pressing the button IDX on graphics block.

Pressing the button IDX in the course of operation with the checklist results in renewing of this checklist to its not-checked state (initial).

This page of indexes will be displayed firstly such, that the expressed cursor will appear at the Ist level of the checklist of given page of indexes.

If you want to use this 1st checklist:

- Button CRS on the graphics block:	PRESS

If you want to use other checklist:

- Buttons ⇓ ⇑ on the graphics block :	select the required checklist by continuous pressing
- Button CRS on the graphics block:	PRESS

Indicator CRT will display under headline white line pertaining checklist with expression by means of the cursor at the level of Ist item, which is to be checked. All other items lining are displayed in purple colour, this indicating their not checked state.

(continued)

After checking of Ist item of the checklist:

- Button CRS on the graphics block: PRESS

Checked Ist line item will change the colour from purple to the green colour and the cursor will express the 2nd line item.

In this way it is possible to check the entire content of the checklist.

The page of the checklist could be checked (in any sequence) without carry out the "check" by means of button CRS, or to "delete" some line item by application of buttons, proposed for cursor position reset ⇓ ⇑ . After reaching the end of such "checked" checklist, the cursor will reset to the level of not checked line item.

If you want to check this line item and continue with other, not checked line:

- Button CRS on the graphics block: PRESS

When all line items of given checklist are checked, the indicator screen will display the page of checklist indexes of arbitrary (emergency) acts with expressed cursor at the level of following checklist index in the sequence.

To activate this checklist:

- Button CRS on the graphics block: PRESS

or reset the cursor to another index.

The check of checklist of obligatory (emergency) acts could be stopped anytime, if the graphics block should be used to other functions (EMER (LST), RTE, SBY, NAV) or radar for TST or ON functions.

Return to the mode LST (EMER):

- Overswitch of graphics block modes: LST (EMER)

- Overswitch of radar modes: SBY

In case, that the overswitch of graphics block modes has been switched-over to initial position, set prior to interruption (LST, EMER), indicator CRT will display the original checklist in actualized feature (the last position prior to interruption).

NOTE

If you will press the button IDX in this position, all line items will return to "not checked" state (displayed in purple colour).

USING OF POCKET TERMINAL KA 68

(1) Posting of the identificator:

- connect the pocket terminal KA 68 to the graphics block
- Mode overswitch on radar indicator: SBY
- Mode overswitch on the graphics block: RTE

Indicator screen will display the page of flight route indexes.

- Reset the yellow cursor to the level of flight route identificator by means of buttons on the graphics block, which will be in front of new introduced identificator.

If it is requested, that the new flight route will be as first on the index page, reset yellow cursor to the position "out of screen" (up or down).

● Record the new identificator with help of corresponding buttons on the keyboard.

As soon as the identificator is completed, activate the function "Carriage Return" as follows:

● Button "Shift" in left upper corner of the keyboard: PRESS

● Button "Cr" in left bottom corner of the keyboard "cross-hatched" function of the button "V" : PRESS

Yellow cursor will express the identificator, just introduced.

In case of consideration to continue in introduction new identificators:

- Following identificator to be introduced with repeating the procedures, indicated as " ● ".

If you will decide to introduce the waypoint parameters from the equipment KNS 81 to the graphics block:

- Button CRS on the graphics block: PRESS

The indicator screen will display the page of new introduced flight route, which will start with white identificator.

(continued)

After waypoint parameters checking:

- Button SAVE on the graphics block: PRESS

The indicator screen will display the page of flight route indexes such, that the yellow cursor will be at the level of next identificator.

The page of flight route indexes could be displayed on the indicator screen again, when pressing the button IDX on the graphics block, or when pressing the button "Control" and afterwards the button "I" on pocket terminal KA 68 - see para (4) - Special functions.

(2) Compilation of checklist of obligatory and emergency acts

WARNING

THE CONTENT OF PROGRAMMED CHECKLIST OF OBLIGATORY AND EMERGENCY ACTS MUST BE IDENTICAL WITH THE CONTENT OF CHECKLIST OF OBLIGATORY AND EMERGENCY ACTS, SPECIFIED IN SECTION 4 AND SECTION 3 OF THIS FLIGHT MANUAL.

The procedure of compilation of checklist is similar to the procedure "Posting of the identificator" see para (1):

- Connect the pocket terminal KA 68 to the graphics block

- Mode overswitch on radar indicator: SBY

- Mode overswitch on the graphics block: LST (EMER)

As soon as the indicator screen displays the page of indexes of obligatory and emergency acts of checklist:

- With the help of buttons ⇓ ⇑ on the graphics block reset the yellow cursor to the level of the line (place), directly preceding the line, where the name of checklist should be located.

● Record the new identificator by means of corresponding buttons on the pocket terminal KA 68.

As soon as the identificator is complete, activate the function "Carriage return" as follows:

● The button "Shift" in left upper corner of the keyboard: PRESS

(continued)

● The button "Cr" in left bottom corner of the keyboard (cross-hatched function of the button "V"): PRESS

The yellow cursor will express the name of checklist (identificator), just introduced.

In case of decision to introduce the next identificators of checklist of obligatory (emergency) acts:

- Introduce the next identificator with repeating the procedures, indicated as " ● ".

In case of decision to program the content of checklist of obligatory (emergency) acts:

- Button CRS on the graphics block: PRESS

The indicator screen will display the "empty" page of checklist, starting with the name (identificator) in white colour. The graphics block is ready to program the content of checklist by means of pocket terminal KA 68.

- Program the content of checklist (obligatory or emergency) acts by means of buttons of pocket terminal KA 68.

After completion of each item:

- Activate the function "Carriage return" with pressing the button "Shift" and button "Cr"

If a checklist item is longer than one line,you can make it more readable by indenting subsequent lines two spaces each, by pressing Shift and then the Sp key, collocated with the Z key in the keyboard's lower right corner.

NOTE

The function "Carriage return" to be activated after completion of checklist item.

In case you will find out, that something has been deleted in the course of programming, use the buttons (⇓ ⇑) for cursor positioning on the graphics block in order to post a new line. This procedure is the same as on recording the new identificator on indexes page of checklist of obligatory (emergency) acts:

- By means of buttons ⇓ ⇑ on the graphics block reset the yellow cursor to the line level, which directly precedes the line to be inserted.

- By means of buttons on pocket terminal program the text of the new line.

In case of typist's error or erasing the text from the checklists - see following para (3).

(continued)

After completion of text programming of checklists of obligatory (emergency) acts (or due to the return to indexes page whenever):

- Button IDX on the graphics block: PRESS

or:

- Press the button "Control" and then button "I" on the pocket terminal KA 68 - see para (4) - Special functions.

The indicator screen will display the indexes page (names) of checklists of obligatory (emergency) acts with expressed cursor at identificator level of new checklist of obligatory (emergency) acts.

If you want to return to the Ist page of the checklists of obligatory (emergency) acts:

- Button CRS on the graphics block: PRESS

In order to continue in programming of next (new) checklists of obligatory (emergency) acts:

- Button IDX on the graphic block : press
- Introduce new identificator of checklist of obligatory (emergency) act with the procedure, specified in para (1)

or:

- Reset the yellow cursor to the level of existing identificator
- Press the button CRS on graphics block to get the access to the checklist of obligatory (emergency) acts.

(3) Text cancelling

The function "Delete" (Del) on the pocket terminal KA 68 keyboard is on the same button as figure "5".

In case of deleting of one symbol:

- Press gradually the buttons "Shift" and "Del" and afterwards activate the function "Carriage return" on pocket terminal KA 68.

In case of deleting of one line item of the check-list of obligatory (emergency) acts:

- With help of buttons ⇓ ⇑ on the graphics block reset the yellow cursor such, that the pertaining line item shall be expressed.

(continued)

- Press gradually the buttons "Shift" and "Del" on the pocket terminal KA 68.

But if you want to delete the line item, which was just recorded, it is necessary to activate the function "Carriage return" prior to activation of the function "Del" .

If you want to delete the complete text of one checklist of obligatory (emergency) acts, or a flight route:

With help of buttons ⇓ ⇑ on the graphics block reset the yellow cursor to the level of corresponding identificator page (checklists of obligatory or emergency acts, or flight routes).

- Press gradually buttons "Shift" and "Del" on pocket terminal KA 68.

For error correction on index pages of checklists of obligatory (emergency) acts, or for supplementing the new text, use buttons ⇓ ⇑ for cursor position on the graphics block in combination with function for text cancelling (see above) and with procedures of checklist compilation of obligatory (emergency) acts, see para (3).

It is important to keep in mind, that the new line item begins directly behind the line item, which is expressed with the yellow cursor.

(4) Special functions

Cursor check-off:

As alternative application of button CRS on the graphics block. The function of button CRS may be doubled with pressing the button "Control" and then button "C" on pocket terminal KA 68.

Index Recall:

As alternative application of button IDX on the graphics block. Gradually pressing of button "Control" and then "I" on the pocket terminal you recall pertaining index page on the radar screen.

Memory Erase:

You can erase all 252 memory lines, which is common for operation modes EMER, LST and RTE, when pressing firstly the button "Control" and then "X" . Radar screen will display "Suggestion system inquiry" to assure, that no error has been made. When you will answer the inquiry with pressing the button "Y", entire system will be erased. If you will decide to keep the content of the memory, press the button "N" .

Route Save:

The function of button SAVE on the graphics block could be doubled, when pressing the button "Control" on the pocket terminal KA 68.

SECTION 5 - PERFORMANCE - Not Affected

SECTION 6 - WEIGHT AND BALANCE

ITEM	QTY.	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100
NAVIGATION					
Graphics block GC 381 A	1	1.90	44.19	-1.130	-0.973

SECTION 7 - SYSTEMS OF AIRPLANE

NOTE

The instruments location is shown in the Supplement No. 1m - Imstrument panels.

The graphics block makes interface between weather radar and cooperating navigation systems (gyrocompass, KNS 81 equipment and DME equipment). It generates the navigation graphics, symbols, information and notice, which together with display of weather configurations create so called movable map, giving immediate position of the aeroplane with the respect to reference radio-beacons VOR/DME and to shifted (general) waypoints. The graphics unit is provided with usable programmable memory, which allows programming of waypoint parameters of most used flight routes and allows to incorporate the selected flight route into navigation system KNS 81. This memory could be utilized to programming of control sheets of obligatory and emergency acts. The memory is accesible from navigation equipment KNS 81 (programming of waypoint parameters) and from external pocket terminal KA 68) programming of waypoint identificators and control sheets of obligatory and emergency acts.

CONTROL ELEMENTS FUNCTION ON THE GRAPHICS BLOCK
(see Fig. 1 - Control box of GC 381 A)

(1) Change - over switch of operation mode selection with positions (OFF/EMER/LST/RTE/SBY/NAV):

OFF - graphics block switched-off. Radar indicator displayes weather radar functions only, as described in para 5-10.

(continued)

EMER, LST - radar indicator (radar operates in mode SBY) displays pertaining page of control sheets indexes of emergency or obligatory acts /if programmed/ and the graphics block adds the functions to all push-buttons on the left hand side from mode overswitches, except of button SAVE. No other buttons are used on graphics block within the modes EMER and LST.

RTE - used for conversion of waypoint parameters from the memory of KNS 81 (NAV II) equipment to the memory of graphics block or vise versa. The buttons on the left hand side of the mode overswitches have the same function as in EMER and /LST modes and in this case the button SAVE is functional as well.

SBY - all symbols of navigation graphics, generated with the graphics block, disappear of radar indicator. It is used in the case, when navigation graphics collides with displayed weather configurations.

NAV - "Movable map" is created on radar indicator. Beside of weather configurations also the instantaneous aeroplane position towards the reference radio-beacons (VOR/DME beacons), general waypoints and set course on PNI is displayed. Graphics block secures also the indication of alphanumeric data of magnetic course, flight way course, identification mark of reference radio-beacon VOR/DME, direction finders and waypoint distance from the radio-beacon VOR/DME.

(2) Check Button CRS

Check button CRS has two functions in NAV mode: when recording the flight route course, removes intermittent the flight route line from the visual field and replace it with a new line on radar indicator. In case of creation of a new waypoint (0) by means of a joystick, pressing this button results in introduction of waypoint (0) parameters into the equipment KNS 81. The information of cursor shifting size will be displayed in right hand corner of radar indicator CRT instead of course da ta.

Check button CRS has also two functions in modes EMER, LST and RTE. If radar indicator displays the indexes page of flight routes or check sheet and the yellow cursor is at the level of pertinent identificator, then pressing of check button CRS displays on radar CRT corresponding page of waypoints or the check sheet.

If check sheet of acts (emergency or obligatory) is indicated, then pressing the check button CRS will cause the "item check" on the line, marked with yellow cursor such, that the colour of "checked" line (item) will change to the green colour and the cursor will move to the next, not yet checked line (item). If the page of waypoints is indicated, then pressing the check button CRS will result in conversion of parameters, indicated in the line, marked with cursor, from the graphics bloc k memory to the memory of system KNS 81 (NAV II). Each line item will change after conversion its colour from purple to green colour.

(3) Two buttons ⇑ ⇓ for cursor position shifting

This buttons shift the yellow cursor upward or downward in modes EMER, LST or RTE, without changing the colour distinguishing of line items. This cursor could be used for the selection of check sheets acts (emergency or obligatory), or flight routes for inspection or for passage-through of line items of check acts, without checking with check button CRS.

The cursor movement is "circular" with position out of the screen. After reaching of given page bottom, next pressing the button ⇓ (downward) removes the yellow cursor of radar CRT. When pressing this button again, the cursor will appear on the top of first page of acts check sheet, which is just applied. Sometimes it is suitable to shift the cursor upward.

The button ⇑ (upward) in the NAV mode increases the displayed range from 240 nautical miles to 320 NM (for navigation purposes only), at the same time radar must operate in SBY mode with selected range of 240 NM. Extended range will be cancelled, when pressing the button ⇓ (downward) .

(4) Button IDX (index)

After pressing the button IDX, the check sheet of act will be renewed, which was just applied, to its origin, not checked state. Use the modes EMER or LST or RTE for displaying relevant index page on the indicator. The button IDX has no function with connection to navigation.

(5) Button SAVE (loading into memory)

This button serves for conversion of waypoint parameters from navigation system KNS 81 into graphics blok memory.

Pressing the button SAVE results in loading of entire content of displayed information page of radio-beacons and (or) waypoints into graphics block; therefore it is not necessary to use the button SAVE, unless complete flight route is programmed. The button SAVE is inoperative in all modes, except of RTE mode.

(6) Buttons MAP TRK

This buttons make possible to measure the course deviation for realization of flight around the area of hazardous weather formations, or when it is necessary to change the course. After pressing either left hand or right hand button MAP TRK, the indicator will display white line of the deviation, which is deflected of 10° either to the left or to the right side of actual course, whilst the beginning of such line is in the point of aeroplane instantaneous position. Following pressing of buttons MAP TRK results in white line deflection to the left or to the right up to max. deflection of $\pm 45^{\circ}$ from instantaneous course. The deviation value from instantaneous course is indicated in the left upper CRT corner instead of course indication. The white line and deflection indication of instantaneous course disappears automatically after about 10 sec. after last pressing of some MAP TRK buttons, or it can be whenever cleared with button CANCEL.

(7) Button CANCEL

This button is used, if unwanted report on the indicator CRT should be cancelled (cleared), or to remove the graphics in navigation modes, relating to the deflection line of the course or waypoint 0 cursor (if some of this both function have been used).

(8) Joystick

With the help of the joystick the movable waypoint (waypoint 0) is created, which could be used for creation of revised flight route, passing around hazardous weather formations, or for the revision of the flight route according to ATC requirements. When displacing the joystick for a moment, CRT displays the cursor of the waypoint 0 displaced (in the direction of joystick displacement) from active radio-beacon, whose identification symbol and parameters are displayed in CRT right bottom corner.
With the help of the joystick it is possible to locate the waypoint 0 wherever in radar displayed sector.

Waypoint 0 parameters will be introduced into the KNS 81 system when pressing the button CRS.

In order to accept the waypoint 0 parameters by the navigation system KNS 81, the distance of waypoint 0 from active radio-beacon must be 399,9 nautical mile as maximum.

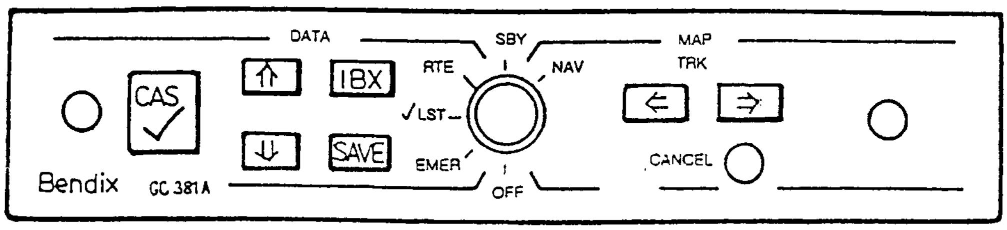

Fig. 1 - Control box of GC 381 A

TYPES OF NAVIGATION GRAPHICS

(1) Symbol of radio-beacons and waypoint

 - Radio-beacon VORTAC, VOR/DME;

 - General waypoint (displaced).

Both symbols are displayed in light blue colour. The graphics block provides for displaying of all waypoints and all reference navigation radio-beacons on radar CRT, which are within the radar displayed sector. Number of waypoints are displayed left from symbols; active waypoint is displayed in white colour, otherwise the numbers are in light blue colour.

(2) Graphics of flight way heading

Flight way headings, which are set on navigation indicator (PNI) are displayed on radar CRT as white lines, insetted with active radio-beacon or general (displaced) waypoint.

Nominal value of instantaneous flight route will be displayed in the right lower corner of CRT with white alphanumeric symbols.

WARNING

DO NOT SET THE HEADING OF FLIGHT ROUTE ON PNI ACCORDING TO HEADING NUMERIC DATA ON RADAR CRT.

Heading line and alphanumeric heading indication of the flight route is possible to clear out from the CRT with pressing the check button CRS on graphics block. After pressing this button again, the graphics of the flight route appears on the CRT again.

(3) Airplane heading

Instantaneous value of aeroplane heading, measured with gyromagnetic compass is indicated on CRT left upper corner in yellow numbers. If the heading signal is missing or is unacceptable, then dashes are indicated instead of heading data and no navigation graphic will be indicated on the CRT.

(4) Operation mode signalization

In CRT left bottom corner are displayed three groups of blue alphanumeric symbols of operation mode signalization, namely of radar, graphics block and KNS 81 (NAV II) equipment. The first group relates to the radar and symbols WX, WXA, MAP or STBY may be displayed.

The second group, on the right hand side from the first one, relates to the graphics block. When the graphics block operates in NAV mode, then the NAV symbol is indicated, when the graphics block operates in SBY mode, the symbol NO NAV will be indicated in yellow letters under the first group, relating to the radar.

The third group (in second line) relates to navigation equipment KNS 81. When KNS 81 equipment operates in RNAV or ILS mode and the graphics block in NAV mode, the symbol RNAV will be indicated. When the KNS 81 equipment operates in VOR mode, no symbol will be displayed in this place.

(5) Radar antenna incline

Alphanumeric data of antenna incline and magnitude is indicated in yellow colour in right hand upper corner of radar CRT, if radar operates in ON mode. If the antenna is inclined upward (downward), the letter U(D) will be displayed in front of incline numeric indication. The incline magnitude is indicated up to $\pm$ 15° with the step after 1°.

(6) Radio-beacons and waypoint informations

The graphics block will decode automatically the identification symbol of active DME, conveyed from acoustic outlet of receiver DME II and displays this symbol in blue colour in CRT right hand bottom corner.

After radio-beacon activation (waypoint) with button USE on KNS 81 equipment the frequency of active radio-beacon VOR will be displayed firstly in this place of CRT, and instead of direction finder and radio-beacon VOR/DME distance dashes will be displayed temporary under the frequency data. As soon as the navigation equipment KNS 81 completes the calculations according to VOR/DME/RNAV signals, instead of radiobeacon VOR frequency its identification symbol shall be indicated and instead of dashes, the direction finder and radio-beacon VOR/DME shall be indicated; all in blue colour.

NOTE

Identification symbol and direction finder and distances may be displayed also after 2 minutes after radio-beacon (waypoint) activation.

EXTERNAL POCKET TERMINAL KA 68

External pocket terminal KA 68 enables:

- programming of new identificators of flight routes and checklist text of arbitrary and emergency acts;

- to cancel not used flight routes, informations and text of arbitrary and emergency acts;

(continued)

- to repair and supplement the checklists of arbitrary and emergency acts.

It is not possible to use the pocket terminal KA 68 as substitution of programming functions of waypoint equipment KNS 81 (NAV II).

It is possible to store up 252 information lines in the programmable memory of graphics block, split during the programming into 3 groups: EMER, LST, RTE.

Each line of checklist text (obligatory or emergency) of acts may be of length up to 20 symbols and basic (input blocks) may he of length up to 10 lines.

Checklist identificators and flight routes identificators, which are displayed on index pages are considered as I complete line of system memory; beside that, the memory does not differentiate complete and uncompleted line and for each of this lines, the place for 1 complete line will be assigned.

The headline lines on checklist pages and on flight routes pages as well as text groups END at the end of the gage are not considered as memory lines.

Each page of the flight route, programmed in RTE mode, occupies 4 lines of system memory.

When all 252 memory lines are occupied, following text appears on the indicator screen:

AVAILABLE MEMORY EXCEEDED

and the graphics block will not take-over any informations, unless a place in the memory is free.

FUNCTION OF BUTTONS

The buttons of pocket terminal KA 68 have two function, visible from indications on individual buttons:

- for alphanumeric symbols introduction, indicated in the black field,

- for introduction of symbols, indicated in cross-hatched fields.

To introduce the symbols, indicated in cross-hatched fields, press first of all the button "SHIFT", which is in keyboard left upper corner and then the button with identified symbol.

Except of above mentioned functions, the pocket terminal is equipped with 4 special functions, described in following text.

(continued)

Following buttons on the pocket terminal KA 68 keyboard are not utilizable:

[ ], ←, ↑, \

as well as no function are assigned to following buttons:

SL4, SR4, Rpt, Clr, Cu, Cu , LF, L Home, R Home, Nul.

Pressing of some of above-specified buttons will result in no effect, as far as the checklist of obligatory and emergency acts is concerned.

SECTION 8 - HANDLING, SERVICING & MAINTENANCE - Not Affected

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SUPLEMENT No. 1
PART 1m

INSTRUMENT PANELS

Registration No.	D-CLED
Serial No.	91 2533

This supplement must be attached to the Approved Airplane Flight Manual when the GOLD CROWN Bendix/King aviation equipment is installed. The informations contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

LOG OF REVISION

Revision No.	Revised Pages	Description of Revision	CAI Approved	Date

SECTION 1 – GENERAL – Not Affected

SECTION 2 – LIMITATIONS – Not Affected

SECTION 3 – EMERGENCY PROCEDURES – Not Affected

SECTION 3A – ABNORMAL PROCEDURES – Not Affected

SECTION 4 – NORMAL PROCEDURES – Not Affected

SECTION 5 – PERFORMANCE – Not Affected

SECTION 6 – WEIGHT & BALANCE – Not Affected

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SECTION 7 - SYSTEMS OF AIRPLANE

PANELS

Legend for Fig. 1

No.	Name
1.	Reserved
2.	Individual ventilation nozzle
3.	Throttle valve **WINDSHIELD WIPER**
4.	Change–over switch **IGNITION** **I II**
5.	Change–over switch **IGNITION** **I II**
6.	Push–button **PROP. FEATHERING MANUAL**
7.	Push–button **PROP. FEATHERING MANUAL**
8.	Push–button **PROP. FEATHERING AUTO**
9.	Push–button **PROP. FEATHERING MANUAL**
10.	Push–button **PROP. FEATHERING MANUAL**
11.	Dual air temperature indicator (in the passenger cabin and the heating ducts)
12.	Push–button **PROP. DEICING CHECK** **TIMER** **BLADES**
13.	Stop
14.	Control lever of the hot air supply **HEATING**
15.	Control lever of the cold air supply **VENTILATION**
16.	Change–over switch **WINDSHIELD HEATING TEST LH RH** **HEATING OFF**
17.	Change–over switch **EMERGENCY LIGHTING**
18.	Switch **OIL LEVEL CHECK**
19.	Change–over switch **EMERG. STATIC PRESS.** **SHUT** **OPEN**
20.	Change–over switch **PITOT PRESSURE I II**
21.	Air distribution control lever **WINDSHIELD**
22.	Air supply control lever to the pilot's cabin **COCKPIT AIR CONTROL**

(cont.)

Legend for Fig. 1 – continued

No.	Name
23.	Amber signal lamp **OIL**
24.	Airspeed indicator
25.	Push–button **IELU**
26.	Push–button **IELU**
27.	Push–button (engine RH) **CENTRAL WARNING DISPLAY ENGINE**
28.	Push–button **CENTRAL WARNING DISPLAY ELECTRO**
29.	Push–button **CENTRAL WARNING DISPLAY AIRFRAME**
30.	Push–button (engine LH) **CENTRAL WARNING DISPLAY ENGINE**
31.	Push–button **SIGN.** (check of signalling cells not included in the Central Warning Display)
32.	Green signal lamp for pyrocartridge circuit check
33.	Switch **FIRE EXT.** **II I 0 I II**
34.	Push–button switch **ENG. FIRE SIGN. I**
35.	Push–button switch **ENG. FIRE SIGN. II**
36.	Push–button switch **ENG. FIRE SIGN. III**
37.	Push–button **FIRE DET. CHECK**

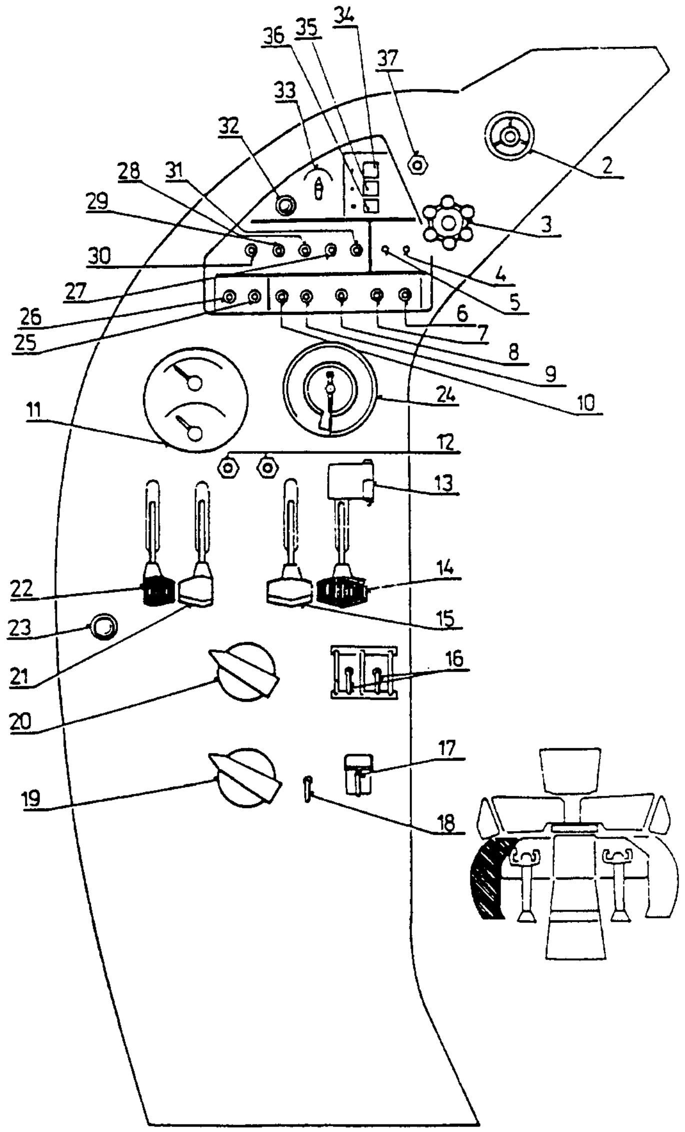

Fig. 1 LH control panel

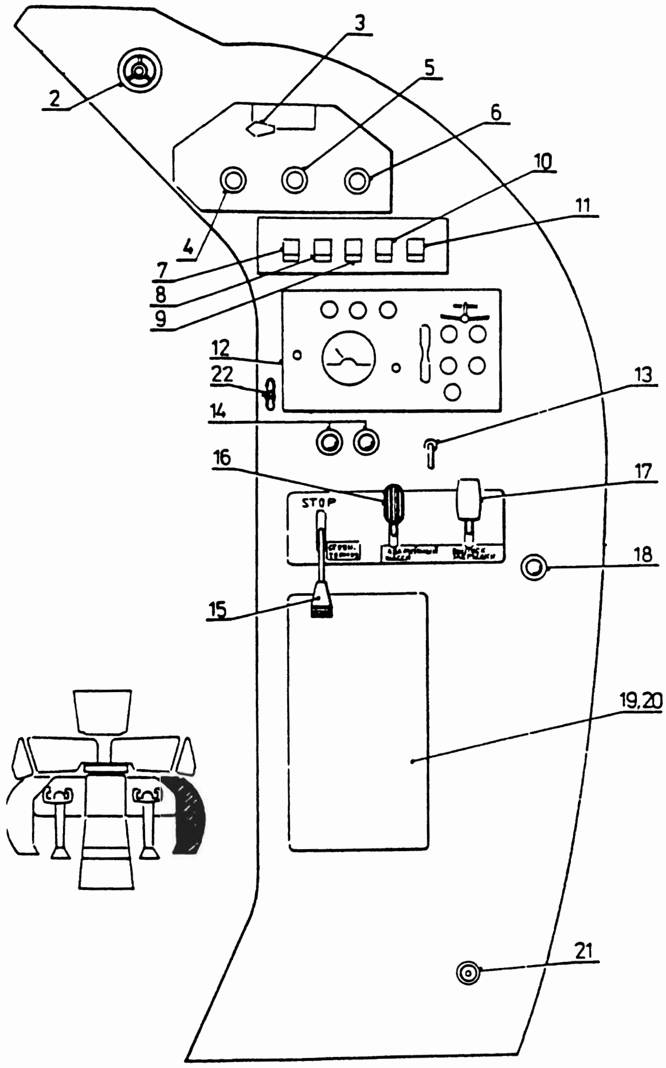

Fig. 2 RH control panel

Legend for Fig. 2

No.	Name
1.	Reserved
2.	Individual ventilation nozzle
3.	Switch INV. SELECT 115 V
4.	Switch VA METER
5.	Voltmeter switch INVERT. 36 V
6.	Voltmeter switch LH BUS-BAR, RH BUS-BAR, INVERT. 115V
7.	Push-button switch for heating STALL PROBE
8.	Push-button switch for heating STATIC HEADS I
9.	Push-button switch for heating STATIC HEADS II
10.	Push-button switch for heating PITOT HEADS I
11.	Push-button switch for heating PITOT HEADS II
12.	Control box of the airframe deicing
13.	Switch WATER DRAIN
14.	Green signal lamps IELU OPERATIVE LH RH
15.	Control lever of the parking brake PARKING BRAKE
16.	Control lever of the landing gear emergency extension (sealed) EMERG. EXTENSION LAND. GEAR
17.	Control lever of the wing flaps emergency extension (sealed) EMERG. EXTENSION WING FLAPS
18.	Amber signal lamp OIL
19.	Distribution box cover
20.	Distribution box
21.	Socket 27 V DC
22.	Pull rod with handle for fire extinguishing system of the front baggage compartment

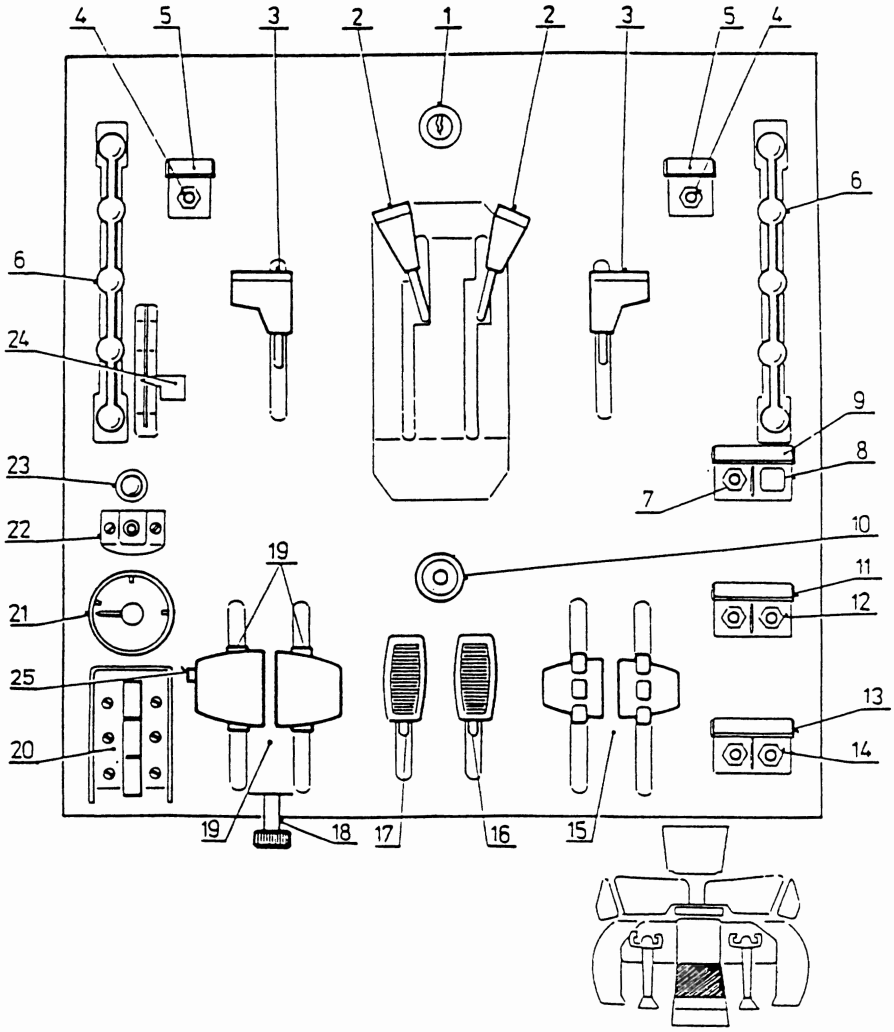

Fig. 3 Front control panel

Legend for Fig. 3

No.	Name
1.	Locking of fuel stop cock/Emergency throttle levers
2.	Fuel stop cock/Emergency throttle levers FUEL STOP COCK EMERGENCY THROTTLE LEVER
3.	Fuel fire cocks OPEN - FUEL - SHUT SHUT - FUEL - OPEN
4.	Manual feather push–button
5.	Cover MANUAL FEATHER
6.	Elevator trim tab control NOSE - HEAVY - TAIL
7.	Water injection push–button ON
8.	Water injection push–button OFF
9.	Double cover WATER INJECTION
10.	Mechanical indicator of nose landing gear leg position
11.	Double cover DRY MOTORING RUN
12.	Dry motoring run push–button
13.	Double cover (grey) ENGINE STARTING
14.	Engine starting push–button
15.	Propeller control levers (PCL)
16.	Friction lever of the propeller control levers FRICTION PROP.
17.	Friction lever of the throttle control levers POWER FRICTION
18.	Adjustable stop of the maximum take–off power n_G ADJUSTMENT
19.	Throttle control levers (TCL)
20.	Rudder trim tab change–over switch TURN
21.	Rudder trim tab position indicator
22.	Aileron trim tab control change–over switch BANK LEFT - RIGHT
23.	Green aileron trim tab position signal lamp
24.	Elevator trim tab position indicator
25.	GA push–button (GO–AROUND)

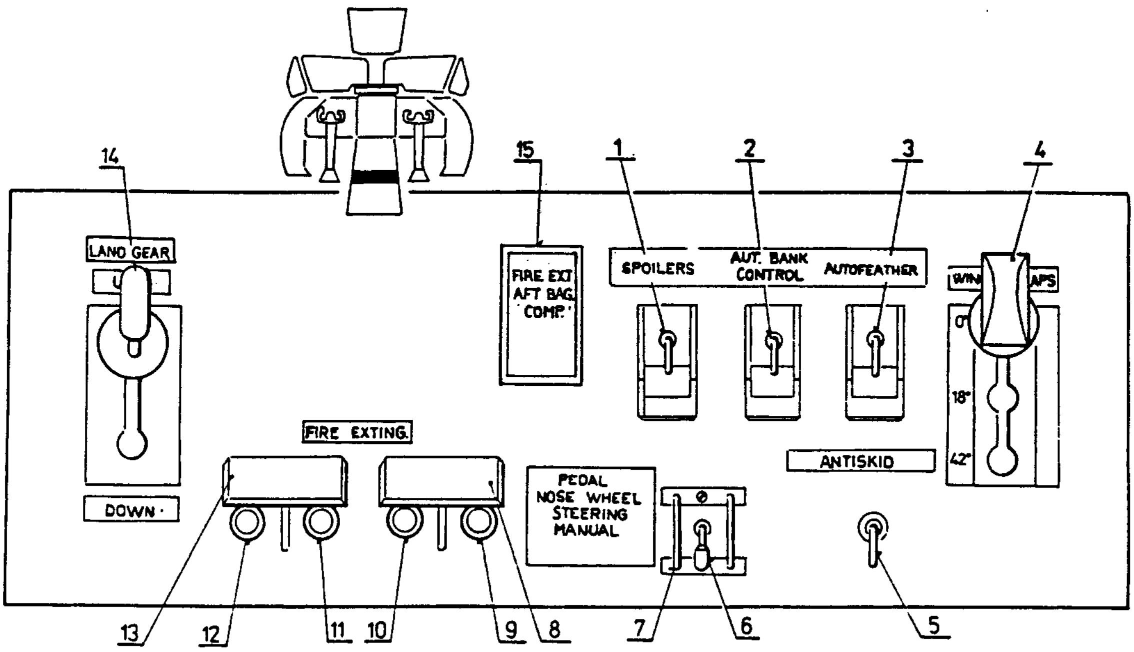

Fig. 4 Central control panel

Legend for Fig. 4

No.	Name
1.	Switch SPOILERS
2.	Switch AUT. BANK CONTROL
3.	Switch AUTOFEATHER
4.	Actuator WING FLAPS 0° 18° 42°
5.	Switch ANTISKID
6.	Switch PEDAL NOSE WHEEL STEERING MANUAL
7.	Fence
8.	Double cover (sealed) PRIM. SEC.
9.	Fire exting. push–button SEC.
10.	Fire exting. push–button PRIM.
11.	Fire exting. push–button SEC.
12.	Fire exting. push–button PRIM.
13.	Double cover (sealed) PRIM. SEC.
14.	Landing gear actuator LAND. GEAR UP DOWN
15.	Cover for fire extinguisher of rear baggage compartment FIRE EXT AFT BAG. COMP.

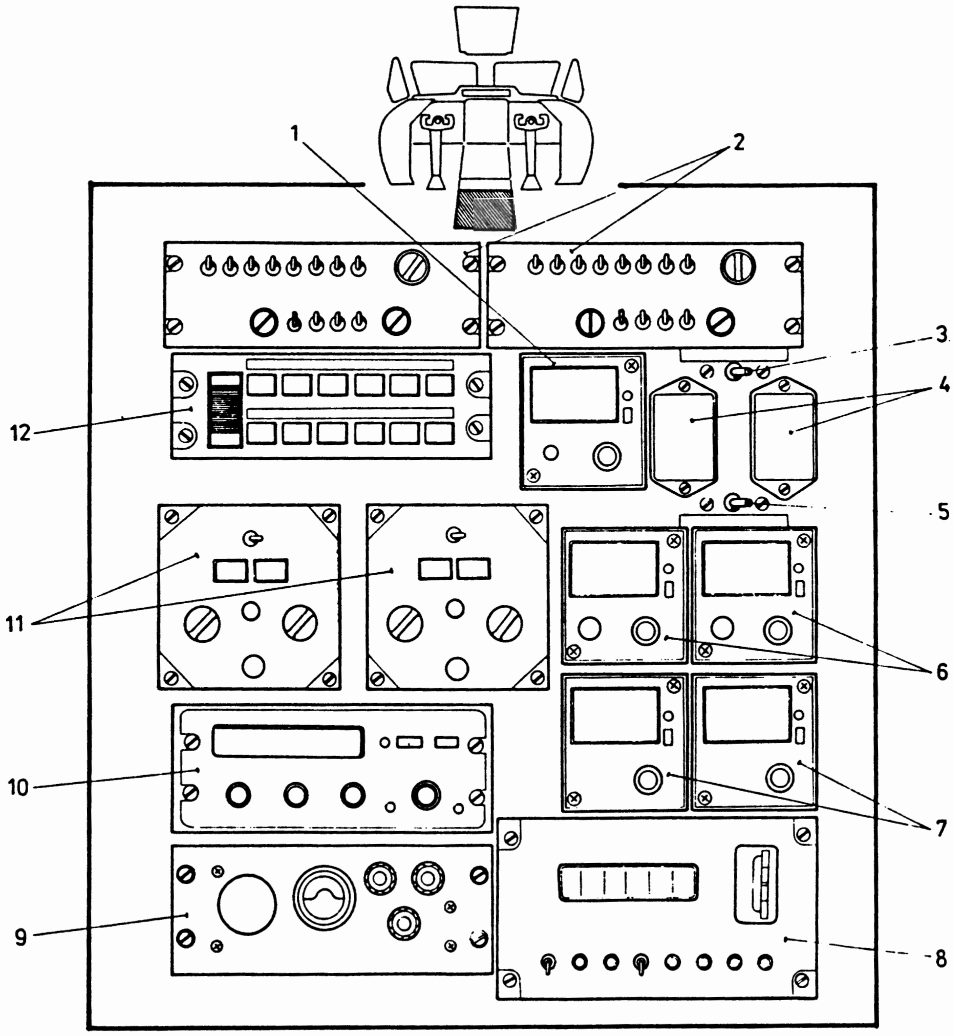

Fig. 5 Rear control panel

Legend for Fig. 5

No.	Name
1.	Control box of NAV I
2.	Audio switch box
3.	Switch **I - SSR - II**
4.	Control box of the gyrocompasses
5.	Switch **I - GK - II**
6.	Control box of the ADF
7.	Control box of the SSR
8.	Control box of the flight data recorder
9.	Control box of the voice recorder
10.	Control box of the HF radiostation
11.	Control box of the VHF
12.	Control box of the autopilot

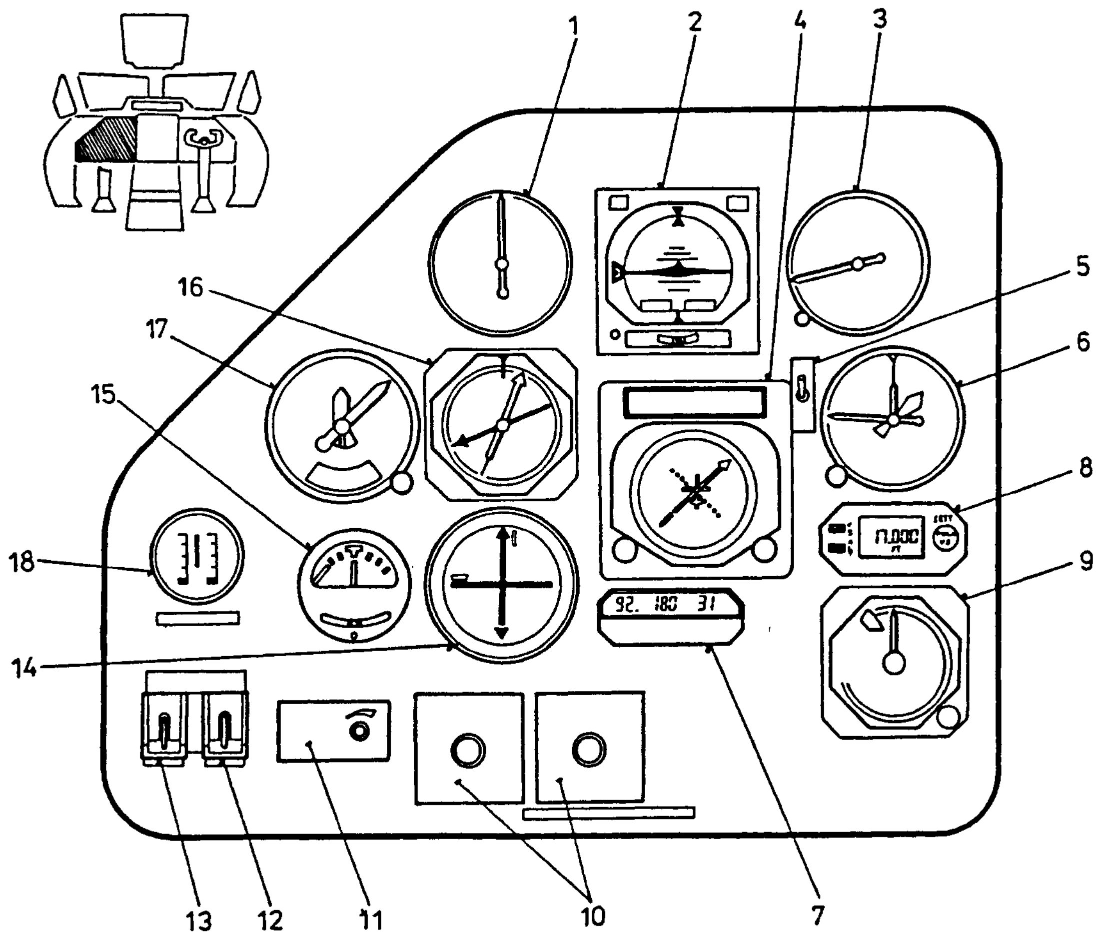

Fig. 6 LH instrument panel

Legend for Fig. 6

No.	Name
1.	Airspeed indicator
2.	Flight command indicator (Gyro horizon)
3.	Vertical speed indicator
4.	Pictorial navigation indicator (PNI)
5.	Switch DME I / NAV I / HOLD
6.	Encoding altimeter
7.	DME indicator
8.	Altitude/vertical speed selector
9.	Radar altimeter indicator
10.	Rheostat II. circuit and rheostat I. circuit LIGHTING CIRCUIT II / LIGHTING CIRCUIT I
11.	Instrument panel lighting LIGHTING CIRCUIT I
12.	Gyro horizon switch GYRO HORIZON
13.	Turn/bank indicator switch TURN/BANK IND.
14.	Course deviation indicator (CDI)
15.	Turn and bank indicator with correction cut-off switch
16.	Radio magnetic indicator (RMI)
17.	Altimeter
18.	Dual battery temperature indicator

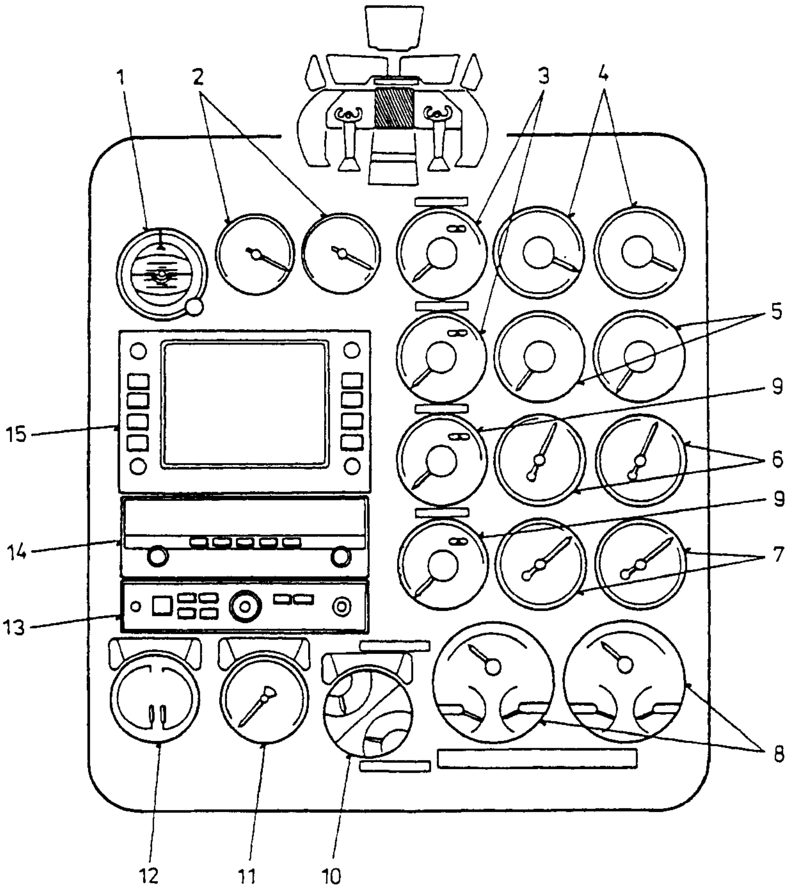

Fig. 7 Central instrument panel

Legend for Fig. 7

No.	Name
1.	Gyro horizon
2.	Fuel flow indicator
3.	Fuel gauge indicator LH MAIN TANKS RH MAIN TANKS
4.	Torque indicator
5.	Inter–turbine temperature indicator
6.	Gas generator speed indicator
7.	Propeller RPM indicator
8.	Three–pointer indicator (oil temperature, oil pressure, fuel pressure)
9.	Wing tip tank fuel quantity indicator LH TIP TANKS RH TIP TANKS
10.	Dual pressure gauge (Hydraulic system/Brake accumulator) POWER SOURCE BRAKE ACCUM.
11.	Pressure gauge (hand brake)
12.	Dual pressure gauge (feet operated brake)
13.	Graphic unit
14.	Receiver VOR/ILS
15.	Weather radar display

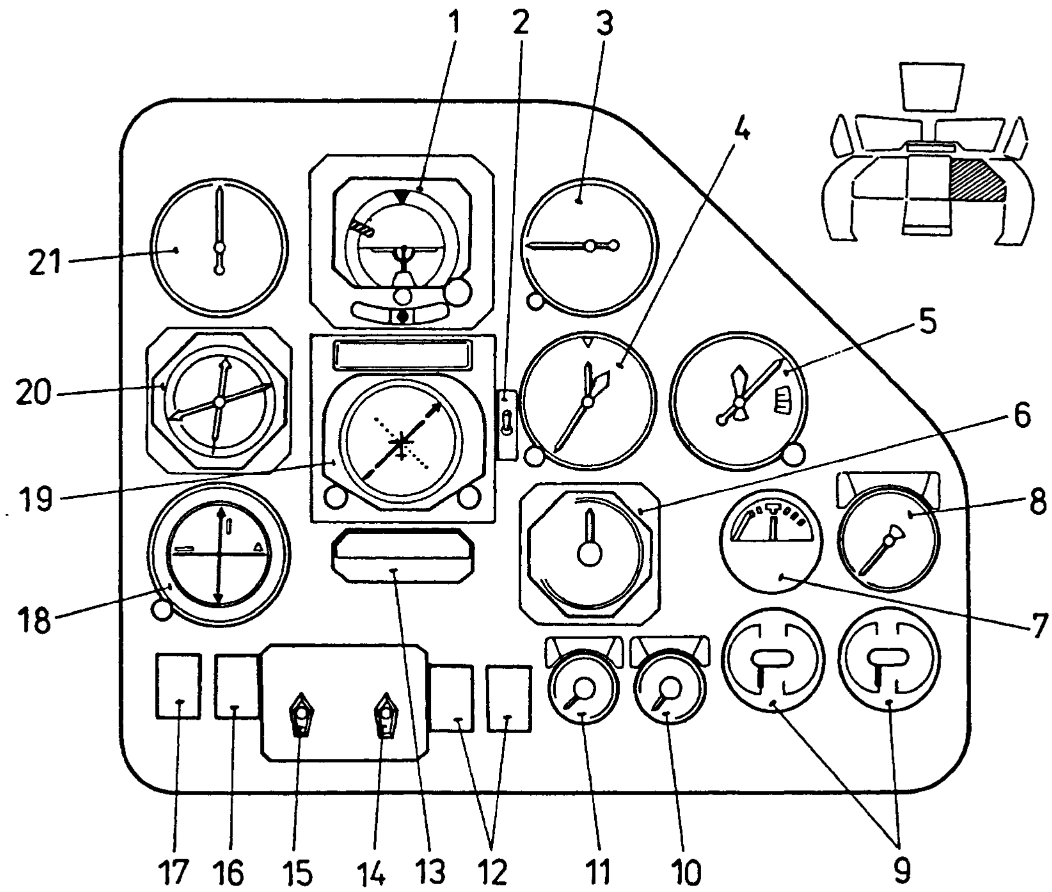

Fig. 8 RH instrument panel

Legend for Fig. 8

No.	Name
1.	Gyro horizon
2.	Switch DME II NAV II HOLD
3.	Vertical speed indicator
4.	Encoding altimeter
5.	Altimeter
6.	Radar altimeter indicator
7.	Turn and bank indicator with correction cut–off–switch
8.	Manometer of front baggage compartment fire extinguisher
9.	Voltampermeter
10.	Voltmeter 115 V
11.	Voltmeter 36 V
12.	Switch WING TIP TANK FUEL TRANSFER
13.	DME indicator
14.	Switch PROP. DEICING - STBY MAIN
15.	Switch WINDSHIELD HEATING - 0 I II
16.	Switch GYRO HORIZON
17.	Switch TURN/BANK IND.
18.	Course deviation indicator (CDI)
19.	Pictorial navigation indicator (PNI)
20.	Radio magnetic indicator (RMI)
21.	Airspeed indicator

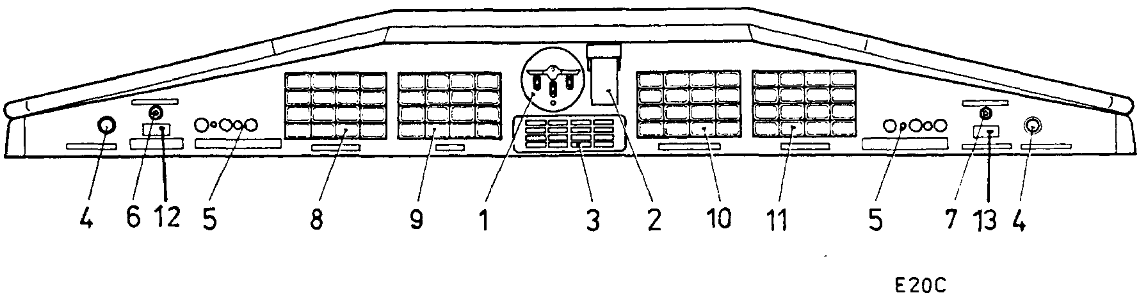

Fig. 9 Glareshield of the instrument panel

Legend for Fig. 9

1. Landing gear position indicator
2. Signalling cell of the wing flaps
3. Autopilot control box
4. Green signal lamp WINDSHIELD HEAT.
5. MKR indicator
6. Push–button DET. CHECK
7. Switch FAST ERECT
8. Central warning display LH ENGINE
9. Central warning display AIRFRAME
10. Central warning display ELECTRO
11. Central warning display RH ENGINE
12. Amber signal lamp PITOT HEATING
13. Red signal lamp FIRE AFT BAG. COMP

⁂ - mark if installed

● - mark for circuit breaker (the others are switches)

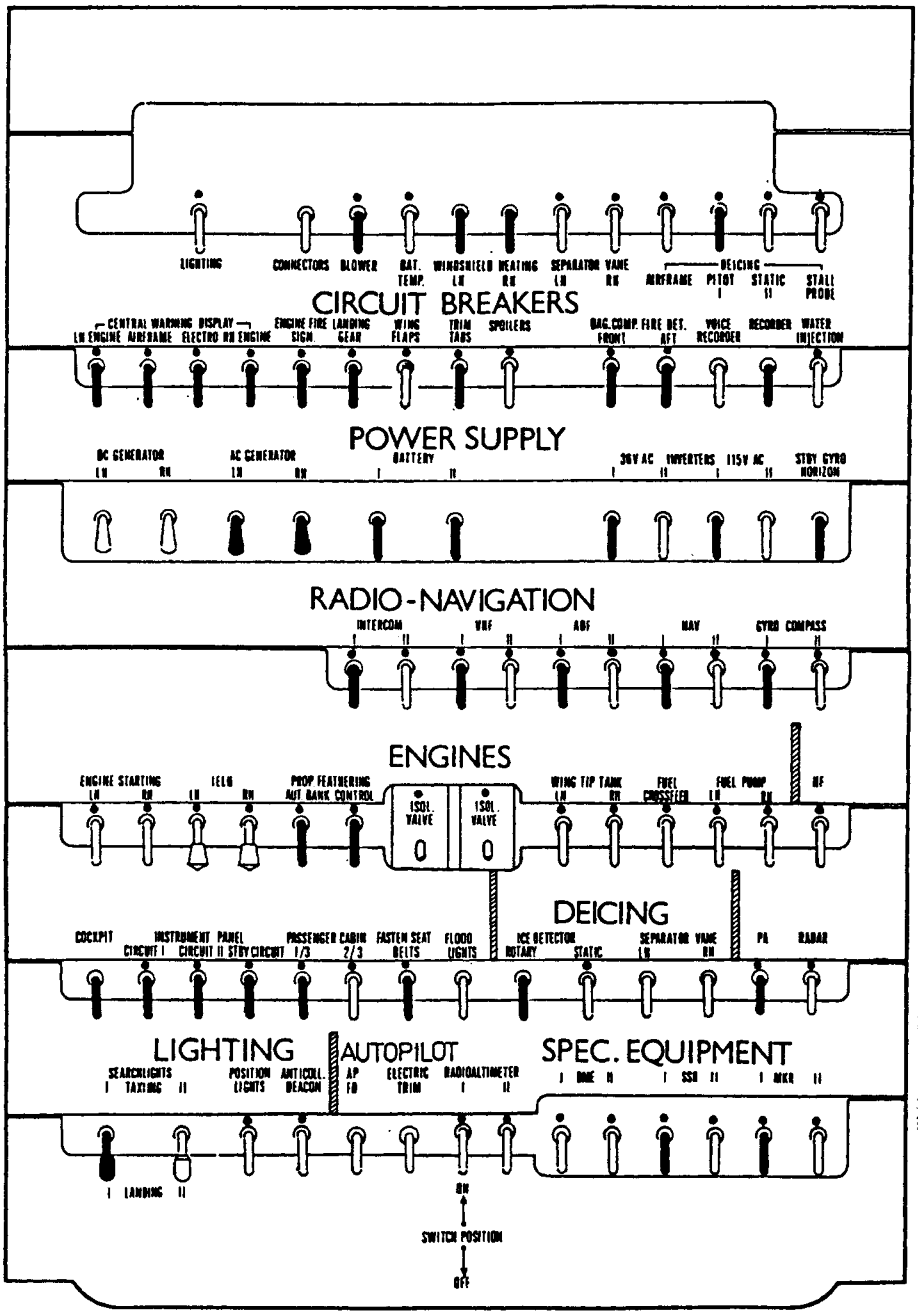

Fig. 10 Overhead panel

NOTE

The circuit breakers/switches shown in black color are actually marked with a amber strip in the airplane.

SECTION 8 – HANDLING, SERVICING & MAINTENANCE – Not Affected

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SUPPLEMENT No. 1

PART 1n

KING KFC 325 FLIGHT CONTROL SYSTEM

AND

KAS 297C VERTICAL SPEED AND ALTITUDE SELECTOR

Registration No.	D-CLFD
Serial No.	91 2533

This supplement must be attached to the Approved Airplane Flight Manual when the KING KFC 325 Autopilot and KAS 297C Vertical Speed and Altitude Selector are installed. The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

LOG OF REVISION

Revision Number	Revised Pages	Description of Revision	CAI approved	Date

KFC 325 AUTOMATIC PILOT

INTRODUCTION

This manual is provided to acquaint the pilot with the limitations as well as normal and emergency operating procedures of the King KFC 325 Digital Automatic Flight Control System. The limitations presented are pertinent to the operation of the KFC 325 System as installed in the L 410 UVP-E20 . The Flight Control System must be operated within the limitations herein specified.

SECTION 1 - GENERAL - Not Affected

SECTION 2 - LIMITATIONS

A. During autopilot operation, a pilot with seat belt fastened must be seated at the left pilot position.

B. The autopilot and yaw damper must be OFF during take off and landing.

C. Maximum speed for autopilot operation is V_{MO}

D. The system is approved for Category I operation only (Approach mode selected).

E. Autopilot Flap limitation: Maximum Flap extension 18°.

F. Autopilot engagement prohibited with the TRIM circuit breaker pulled.

G. The autopilot must be turned OFF at 180' AGL if Coupled to ILS Approach.

H. Autopilot is not approved for coupling to RNAV enrote and approach.

NOTE

It is recommended, to use "basic pitch attitude hold" mode during operation is severe turbulence.

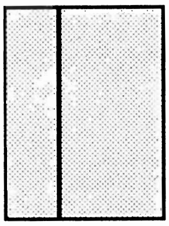
(continued)

PLACARDS AND MARKINGS

A/P DISC Located on LH and RH control wheel.

CWS Located on LH control wheel.

TRIM
DN



TRIM
UP

Located on LH control wheel.

SECTION 3 - EMERGENCY PROCEDURES

A. In case of Autopilot malfunction (accomplish Items 1 and 2 simultaneously):

1. Airplane Control Wheel - GRASP FIRMLY and regain aircraft control.
2. A/P DISC/TRIM INTER (A/P DISC) Switch - PRESS to disengage the autopilot.
3. Airplane - Resume normal manual flight operations.

B. In case of Electric Trim Malfunction (either manual electric or autotrim):

1. A/P DISC/TRIM INTER (A/P DISC) Switch - PRESS and HOLD throughout recovery.
2. TRIM Circuit Breaker - PULL.
3. Airplane - RETRIM manually.

CAUTION

WHEN DISCONNECTING THE AUTOPILOT AFTER A TRIM MALFUNCTION, HOLD THE CONTROL WHEEL FIRMLY, UP TO 50 POUNDS OF FORCE ON THE CONTROL WHEEL MAY BE NECESSARY TO HOLD THE AIRPLANE LEVEL.

(continued)

NOTE

With the ELECTRIC TRIM circuit breaker pulled, the flight director may still be used but the autopilot must not be used (see LIMITATIONS).

Maximum Altitude losses due to autopilot malfunction:

Configuration	Alt Loss
Cruise, Climb, Descent	400 ft (122m)
APR	90 ft (28m)
SE APR	90 ft (28m)

SECTION 3A - ABNORMAL PROCEDURES

ENGINE FAILURE (AUTOPILOT COUPLED)

1. Disengage AP.
2. Follow the basic Airplane Flight Manual engine inoperative procedures.
3. Airplane rudder and aileron axes must be manually trimmed prior to engaging the autopilot for engine inoperative operations.

CAUTION

IF RUDDER TRIM CANNOT BE MAINTAINED WHEN POWER IS CHANGED DURING AN ENGINE INOPERATIVE COUPLED APPROACH, DISENGAGE AUTOPILOT AND CONTINUE APPROACH MANUALLY.

(continued)

SECTION 4 - NORMAL PROCEDURES

A. PREFLIGHT (Perform prior to each flight)

1.	BATTERY I, II	ON
	INVERTERS 115V AC I,II	ON
	INVERTERS 36V AC I,II	ON
	GYRO COMPAS I	ON
	NAV I	ON
	MKR I	ON
	RADIOALTIMETER I	ON
	INTERCOM I, II	ON
	SSR I	ON
	DME I	ON
2.	GYRO HORIZON	ON
3.	Flight director attitude gyro	No ATTITUDE or COMPUTER flags
4.	ELECTRIC TRIM AP/FD	ON
5.	PREFLIGHT TEST Button	PRESS momentarily and WATCH:

(a) All annunciator lights on (TRIM annunciator flashing).

(b) After approximately 5 seconds, all annunciator lights off except AP which will flash approximately 12 times prior to extinguishing and be accompanied by the aural disconnect tone.

NOTE

If TRIM warning light stays on then the autotrim did not pass preflight tests. The ELECTRIC TRIM circuit breaker should be pulled. The flight director may be used but the manual electric trim will be inoperative and the autopilot must not be engaged (see LIMITATIONS).

(continued)

6. MANUAL ELECTRIC TRIM — TEST as follows:

   (a) Actuate left side of split switch unit to the fore and aft positions. The trim wheel should not move on its own. Rotate the trim wheel manually against the engaged clutch to check the pilot's trim overpower capability.

   (b) Actuate right side of split switch unit to the fore and aft positions. Trim wheel should not move on its own and normal trim wheel force is required to move it manually.

   (c) Press the A/P DISC/TRIM INTER (A/P DISC) switch down and hold. Manual Electric Trim should not operate either nose up or nose down when both halves of the split switch are actuated to the fore and aft positions.

7. AP Button — PRESS to engage autopilot.

8. CONTROL WHEEL - MOVE fore, aft , left , right to verify that the autopilot can be overpowered.

9. A/P DISC/TRIM INTER (A/P DISC) Switch — PRESS.
   Verify that the autopilot disconnects and all flight director modes are canceled.

10. TRIM — SET to take off position.

B. AUTOPILOT OPERATION

1. **Before take off**

   A/P DISC/TRIM INTER (A/P DISC) Switch — PRESS.

2. **Inflight Autopilot Engagement**

   The airplane must be trimmed before inflight autopilot engagement.

   AP Button — PRESS.

   Note AP and FD annunciators ON. If no other flight director modes are selected at the time of autopilot engagement the mode of operation will be flight director wings level and pitch attitude hold.

CAUTION

MANUAL TRIMMING OF AILERON AND ELEVATOR IS PROHIBITED DURING FLIGHT IF AUTOPILOT IS ENGAGED.

DO NOT HELP THE AUTOPILOT AS THE AUTOPILOT WILL RUN THE PITCH TRIM TO OPPOSE YOUR HELP.

(continued)

3. **Climb or Descent**

(a) Using CWS

- CWS Button - PRESS and MOVE airplane nose to the desired attitude.

- CWS Button - RELEASE. Autopilot will maintain airplane pitch attitude up to the pitch limits of $+15^{\circ}$, or -10°.

(b) Using Vertical Trim

- VERTICAL TRIM Control - PRESS either up or down to modify airplane attitude at a rate of 0.7 deg/sec up to the pitch limits of $+15^{\circ}$ or -10°.

- VERTICAL TRIM Control - RELEASE when desired airplane attitude is reached. The autopilot will maintain the desired pitch attitude.

4. **Altitude Hold**

(a) ALT Mode Selector Button - PRESS. Note ALT mode annunciator ON. Autopilot will maintain the selected pressure altitude.

(b) Change selected altitudes

(1) Using CWS (recommended for altitude changes greater than 100 ft.)

- CWS Button - PRESS and fly aircraft to desired pressure altitude.

- CWS Button - RELEASE when desired pressure altitude is reached.

The autopilot will maintain the desired pressure altitude.

(2) Using Vertical Trim (Recommended for altitude changes less than 100 ft.)

- VERTICAL TRIM Control - PRESS either up or down. Vertical Trim will seek an altitude rate of change of about 500 fpm (2.5 m/s).

- VERTICAL TRIM Control - RELEASE when desired pressure altitude is reached.

The autopilot will maintain the desired pressure altitude.

(continued)

5. **Indicated Airspeed Hold**

(a) IAS Mode Selector Button - PRESS. Note the IAS mode annunciators ON. The autopilot will maintain the current indicated airspeed.

(b) Change selected Indicated Airspeed

(1) Using CWS (recommended for airspeed changes of 10 KIAS (19 km/h) or greater)

- CWS Button - PRESS and fly airplane to desired airspeed.

- CWS Button - RELEASE when desired airspeed is reached.

The autopilot will maintain the desired airspeed.

(2) Using Vertical Trim (recommended for airspeed changes less than 10 KIAS (19 km/h))

- VERTICAL TRIM control - PRESS either up or down. Vertical Trim will seek a new airspeed at a rate of about 0.75 knot (1.4 km/h) per second.

- VERTICAL TRIM Control - RELEASE when desired airspeed is reached.

The autopilot will maintain the desired airspeed.

6. **Heading Changes**

(a) Manual Heading Changes

- CWS Button - PRESS and MANEUVER airplane to the desired heading.

- CWS Button - RELEASE.

Autopilot will maintain airplane in wings level attitude.

NOTE

Airplane heading may change in the wings level mode due to an airplane out of trim condition.

(b) Heading Hold

- Heading Selector Knob - SET BUG to desired heading.

- HDG Mode Selector Button - PRESS, Note HDG mode annunciator ON.

Autopilot will automatically turn the airplane to the selected heading.

(contiinued)

(c) Command Turns (Heading Hold mode ON)

- Heading Selector Knob - MOVE BUG to the desired heading.

Autopilot will automatically turn the airplane to the new selected heading.

7. **Reduced Bank Angle**

HALF BANK (1/2 BK) Mode Button	PRESS.

The commanded bank angle will be reduced to 1/2 the normal value. This mode is functional during HDG and NAV mode operations but will be automatically deselected and inhibited during APR and BC coupled operations.

8. **Soft Ride**

SOFT RIDE (SR) Mode Button	PRESS.

This mode softens the autopilots commands to provide a smoother ride during operations in turbulence. The normal autopilot performance (maintaining heading, maintaining wings level, maintaining attitude, maintaining airspeed and/or maintaining altitude) will be degraded by use of the Soft Ride mode.

9. **NAV Coupling**

(a) Course Bearing Pointer on PNI	SET to desired course.
(b) Heading Selector Knob	SET BUG to provide desired intercept angle.
(c) NAV Mode Selector Button	PRESS.

(1) If the Course Deviation Bar is greater than 2 to 3 dots: the airplane will continue in HDG mode (or wings level if HDG not selected) with the NAV ARM annunciated; when the computed capture point is reached HDG will disengage, ARM will extinguish and the selected course will be automatically captured and tracked.

(2) If the D-Bar is less than 2 to 3 dots: the HDG mode will disengage upon selecting NAV mode; the NAV annunciator will illuminate and the capture/ track sequence will automatically begin.

(continued)

10. **Approach (APR) Coupling**

(a) Course Bearing Pointer on PNI	SET to desired Course.
(b) Heading Selector Knob	SET BUG to provide desired intercept angle.
(c) APR Mode Selector Button	PRESS.

(1) If the Course Deviation Bar is greater than 2 to 3 dots: the airplane will continue in HDG mode (or wings level if HDG not selected) with the APR ARM annunciated, when the computed capture point is reached the HDG will disengage, ARM will extinguish and the selected course will be automatically captured and tracked.

(2) If the D-Bar is less than 2 to 3 dots: the HDG mode will disengage upon selecting APR mode; the APR annunciator will illuminate steady and the capture/ track sequence will automatically begin.

11. **BC Approach Coupling**

(a) Course Bearing Pointer on PNI	SET to the ILS front course inbound heading.
(b) Heading Selector Knob	SET BUG to provide desired intercept angle.
(c) BC Mode Selector Button	PRESS.

(1) If the Course Deviation Bar is greater than 2 to 3 dots: the airplane will continue in HDG mode (or wings level if HDG not selected) with APR ARM BC annunciated, when the computed capture point is reached HDG will disengage, ARM will extinguish and the selected course will be automatically captured and tracked.

(2) If the D-Bar is less than 2 to 3 dots: the HDG mode will disengage upon selecting BC mode; the APR BC annunciators will illuminate and the capture/track sequence will automatically begin.

12. **Glideslope Coupling**

NOTE

Glideslope coupling is inhibited when operating in NAV or APR BC modes. Glideslope coupling occurs automatically in the APR mode.

(continued)

(a) APR Mode ENGAGED.

(b) At glideslope centering NOTE GS annunciator ON.

NOTE

1. Autopilot can capture glideslope from above or below the beam while operating in either pitch attitude hold, IAS hold, VS hold or ALT hold modes.

2. If after glideslope coupling the glideslope signal becomes inadequate (GS pointers will not in view on KPI 553A and KCI 310), the GS annunciator will flash at least six times before extinguishing and the system will transfer to pitch attitude hold. If a valid glideslope signal returns within six seconds the system will automatically recouple.

3. If a valid glideslope signal does not return within six seconds, the aircraft must once again pass through the glideslope beam achieve glideslope coupling.

13. **Missed Approach**

(a) Power Lever GA Switch - PRESS to disengage the autopilot (if engaged) and engage the flight director (if not engaged) in a wings level, pitch up command. Note GA mode annunciator ON.

(b) MISSED APPROACH EXECUTE.

(c) Airplane Trim ESTABLISH.

(d) Lateral Guidance (Select one)

(1) Heading ModeSET HEADING and PRESS HDG.

(2) NAV ModePRESS NAV.

14. **Before Landing**

A/P DISC/TRIM INTER
(A/P DISC) Switch PRESS to disengage AP and YD.

C. FLIGHT DIRECTOR OPERATION

NOTE

The flight director modes of operation are the same as those used for autopilot operations except the autopilot is not engaged and the pilot must maneuver the airplane to satisfy the flight director commands.

SECTION 5 - PERFORMANCE - Not Affected

SECTION 6 - WEIGHT AND BALANCE

ITEM	QTY.	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100
Flight computer KCP 220	1	1.63	3.60	-3.456	-3.005
Mode controoller KMC 321	1	0.40	0.88	0.004	0.003
Annunciator panel KAP 315A	1	0.40	0.88	-0.256	-0.222
Air data computer KDC 222	1	0.44	0.97	-0.497	-0.432
Directional gyro KRG 331	1	0.34	0.75	-0.721	-0.626
Alerter KAA 15	1	0.34	0.75	-0.680	-0.591
ROLL servo KSA 372X	1	3.31	7.30	0.894	0.776
PITCH servo KSA 372X	1	3.31	7.30	30.618	26.584
YAW servo KSA 372	1	3.31	7.30	27.539	23.912
PITCH TRIM servo KSA 272A	1	2.14	4.72	16.842	14.624
Blower KA 33	1	0.57	1.26	-1.083	-0.943

(continued)

SECTION 7 - SYSTEMS OF AIRPLANE

NOTE

The instruments location is shown in the Supplement No. 1m - Instrument panels

AUTOMATIC PILOT KCF 325

The KFC 325 Digital AFCS is certified in this airplane with 3 axis control, pitch, roll and yaw. The various instruments and the controls for the operation of the KFC 325 System are described in Figures 1, 2, 3, 4, 5, 6.
The KFC 325 Digital AFCS has an electric pitch trim system which provides autotrim during autopilot operation and manual electric trim for the pilot when the autopilot is not engaged. The trim system is designed to with stand any single inflight malfunction. Trim faults are visually and aurally annunciated.

A lockout device prevents autopilot engagement until the system has been successfully preflight tested.

The following conditions will cause the Autopilot to automatically disengage:

A. Power failure

B. Internal Flight Control System failure.

C. Roll rates in excess of 16° per second will cause the autopilot to disengage except when the CWS switch is held depressed.

D. Pitch rates in excess of 6° per second will cause the autopilot to disengage except when the CWS switch is held depressed.

E. Accelerations outside of a 0.3g to 1.7g envelope (1.0 g's being normal for straight and level flight) will cause the autopilot to disengage. Disengagement will take place regardless of whether or not the CWS switch is activated.

F. The presence of a ATTITUDE and/or COMPUTER flag will cause the autopilot and flight director to disengage.

LEGEND FOR FIGURES 1, 2, 3, 4, 5, 6

1. KMC 321 AUTOPILOT MODE CONTROLLER - This mode controller consists of nine Flight Director mode select buttons (Push on - Push off), mode annunciators, the vertical trim control, the yaw damper engage(disengage button, the autopilot engage) disengage button and the preflight test button.

(continued)

2. HEADING (HDG) MODE SELECTOR Button - When pushed will select the Heading mode which commands the airplane to turn to and maintain the heading selected by the heading bug on the PNI. A new heading may be selected at any time and will result in the airplane turning to the new heading with a maximum bank angle of about 25°. Selecting HDG mode will cancel NAV, APR or BC track modes.

3. NAVIGATION (NAV) MODE SELECTOR Button - When pushed will select the Navigation mode. The mode provides all angle intercept, automatic beam capture and tracking of VOR, RNAV or LOC signals. The NAV annunciators located above this button will annunciate NAV ARM until the automatic capture sequence is initiated, then NAV will be annunciated. The KAP 315A Mode Annunciator will annunciate the same sequence.

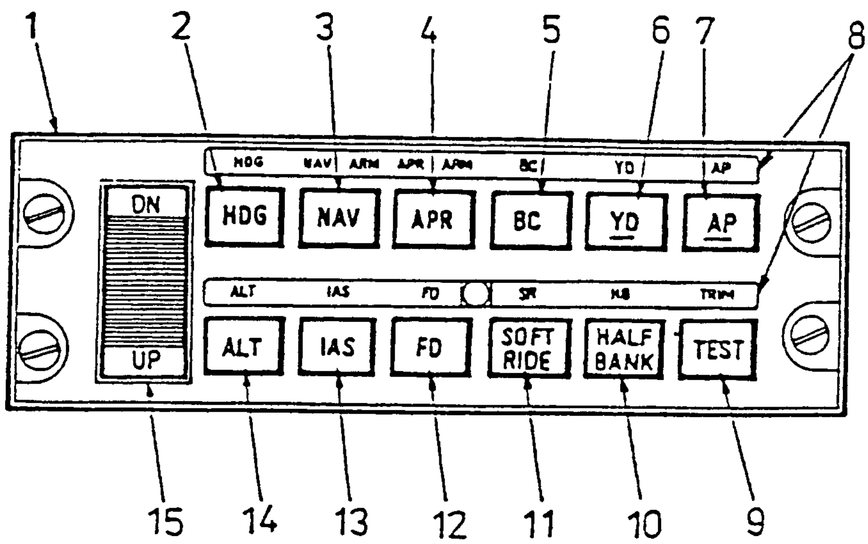


Fig. 1 KMC 321 AUTOPILOT MODE CONTROLLER

4. APPROACH (APR) MODE SELECTOR Button - When pushed, will select the Approach mode. This mode provides all angle intercept, automatic beam capture and tracking of VOR, RNAV or LOC signals plus glideslope coupling in the case of an ILS. The tracking gain of the APR mode is greater than the gain in the NAV mode. The APR annunciator located above this button will annunciate APR ARM until the automatic capture sequence is initiated, then APR will be annunciated. The KAP 315A Mode Annunciator will annunciate the same sequence.

(continued)

5. BACK COURSE APPROACH (BC) MODE SELECTOR Button - When pushed will select the Back Course Approach mode. This mode functions identically to the Approach mode except that response to LOC signals is reversed. Glideslope coupling is inhibited in the Back Course Approach mode. The BC annunciators (both this unit and the KAP 315A) will illuminate when this mode is activated plus the Approach Mode annunciators will function as described in Item 4.

6. YAW DAMPER ENGAGE (YD) Button - When pushed, engages the yaw damper independent of the autopilot. When pushed with the yaw damper engaged, disengages the yaw damper.

7. AUTOPILOT ENGAGE (AP) Button - When pushed, engages autopilot and yaw damper if all logic conditions are met. When pushed again, disengages autopilot but does not disengage the yaw damper.

8. MODE ANNUNCIATORS - The mode symbol located above each mode button will illuminate when the mode is engaged except for the NAV and APR modes. When either the NAV, APR or BC mode button is pressed the appropriate ARM annunciator above either the NAV or APR mode button will illuminate until the automatic beam capture sequence is initiated. At beam capture NAV or APR will be annunciated above either the NAV or APR mode button. Normally the NAV or APR coupled conditions follows an ARM condition but the coupled condition may be entered into directly if the beam capture criteria are met when NAV, APR or BC is selected.

9. PREFLIGHT TEST (TEST) Button - When momentarily pushed, initiates preflight test sequence which automatically turns on all annunciator lights, tests the roll and pitch rate monitors, tests the autotrim fault monitor, checks the manual trim drive voltage and tests all autopilot valid and dump logic. If the preflight test is successfully passed, the AP annunciator light will flash for approximately 6 seconds (an aural tone will also sound for 2 seconds while the annunciator flashes). The autopilot can not be engaged until the autopilot preflight tests are successfully passed.

10. HALF BANK (HB) MODE SELECTOR Button - When pushed, engages the HALF Bank mode which reduces the certified autopilot commanded maximum bank angle to one half the normal value. This mode is automatically disengaged when the APR or BC APR mode is activated.

11. SOFT RIDE (SR) MODE SELECTOR Button - When pushed, engages the Soft Ride mode which reduces the autopilot gains. This reduced gain reduces the autopilot aggressiveness which results in a more comfortable ride in turbulent air conditions. This mode is only intended to be used during turbulent air conditions. Routine use of this mode during all flight conditions will result in less than optimum autopilot performance. This mode is automatically disengaged when the APR or BC APR mode is activated.

(continued)

12. FLIGHT DIRECTOR (FD) MODE SELECTOR Button - When pushed will select the Flight Director mode bringing the Command Bar in view on the KCI 310 Attitude Indicator and will command wings level and pitch attitude hold.

13. INDICATED AIRSPEED HOLD (IAS) MODE SELECTOR Button - When pushed, engages the Indicated Airspeed Hold mode. The autopilot varies the aircraft pitch attitude in order to maintain the selected airspeed during changing air conditions, power changes and/or aircraft configuration changes.

14. ALTITUDE HOLD (ALT) MODE SELECTOR Button - When pushed will select the Altitude Hold mode, which commands the airplane to maintain the pressure altitude existing at the moment of selection. Engagement may be accomplished in climb, descent, or level flight. In the APR mode, altitude hold will automatically disengage when the glideslope is captured.

15. VERTICAL TRIM CONTROL - A spring loaded to center rocker switch which will provide up or down pitch command changes:

    - While in Pitch Attitude Hold mode will adjust the pitch attitude at a rate of 0.7 deg/sec.

    - While in Altitude Hold mode will adjust the altitude at a rate of 500 fpm (2.5 m/s).

    - While in Indicated Airspeed Hold mode will adjust the airspeed at a rate of 0.75 kt/sec (1.4 km/h per sec).

    - While in the Vertical Speed Hold mode will adjust the vertical speed at a rate of 100 fpm/sec (0.5 m/s per sec).

16. NOT USED

17. GO AROUND (GA) MODE SELECTOR Button (not shown)

    - The button located on the left throttle lever, when pressed, disengages the autopilot and NAV or APR modes, if engaged, while commanding a fixed pitch up attitude of six degrees.
      GA will annunciate on the annunciator panel. The autopilot and any lateral mode may be re-engaged after the GO AROUND attitude has been manually established. Initiation of any other vertical mode cancels GO AROUND.

18. KAP 315A MODE ANNUNCIATOR - Provides mode annunciation in the pilot's primary scan area.

19. MODE ANNUNCIATORS - Illuminate when a mode is selected by the corresponding mode selector button.

(continued)

20. AUTOPILOT (AP) ANNUNCIATOR - Illuminates continuously whenever the autopilot is engaged. Flashes for a short time whenever the autopilot is disengaged (an aural alert will also sound for 2 seconds).

21. YAW DAMPER (YD) ANNUNCIATOR - Illuminates continuously whenever the yaw damper is engaged. Flashes for a short time whenever the yaw damper is disengaged.

22. TRIM WARNING LIGHT (TRIM) - Illuminates continuously whenever trim power is not on or the system has not been preflight tested. The TRIM warning light illuminates and is accompanied by an audible warning whenever a manual trim fault is detected. The Manual Trim System is monitored for the Trim Servo running without a command. The TRIM warning light will illuminate and be accompanied by an audible warning tone whenever an autotrim failure occurs. The autotrim system is monitored for the following failures: trim servo running without a command; trim servo not running when commanded to run; trim servo running in the wrong direction.

23. GLIDESLOPE (GS) ANNUNCIATOR - illuminates continuously whenever the autopilot is coupled to the glideslope signal. The GS annunciator will flash if the glideslope signal is lost (GS pointers will not be in view on KPI 553A and KCI 310). The autopilot reverts to pitch attitude hold operation. If a valid glideslope signal returns within six seconds, the autopilot will automatically recouple in the GS mode. If the valid signal does not return within six seconds, the autopilot will remain in pitch attitude hold mode until such time that a valid glideslope returns and the aircraft passes through the glideslope. At that point GS couple will re-occur.

24. NOT USED

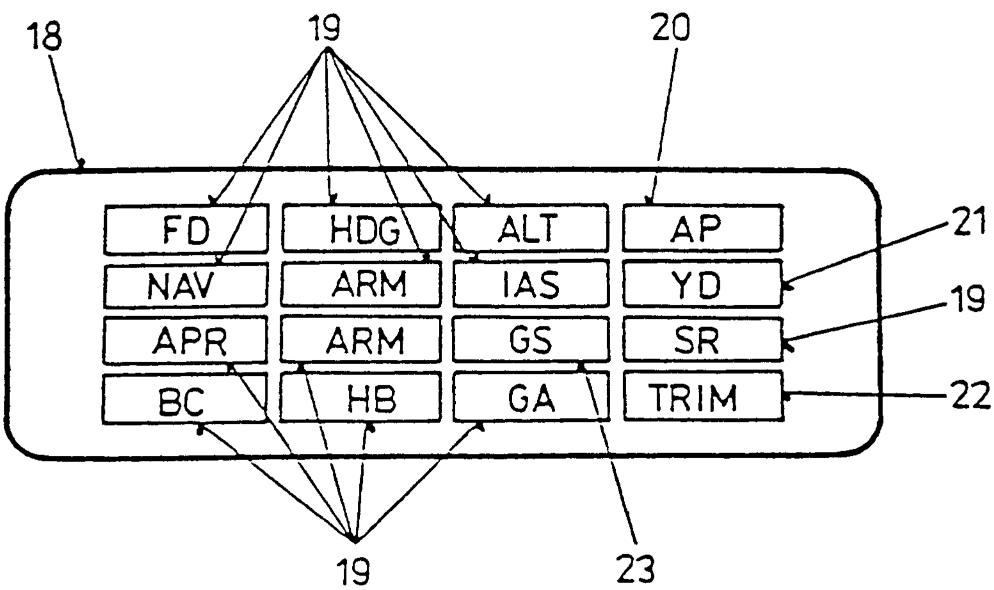


Fig. 2 KAP 315A MODE ANNUNCIATOR
(continued)

25. KCI 310 FLIGHT DIRECTOR ATTITUDE GYRO - Displays airplane attitude as a conventional attitude gyro and displays commands for flight director operation. The vertical gyro is electrically driven and remotely located.

26. ROLL ATTITUDE INDEX - Displays airplane roll attitude with respect to the roll attitude scale.

27. ROLL ATTITUDE SCALE - Scale marked at 0, ± 10, 20, 30, 60 and 90 degrees.

28. PITCH ATTITUDE SCALE - Moves with respect to the symbolic airplane to present pitch attitude. Scale graduated at 0, ± 5, 10, 15 and 20 degrees.

29. DECISION HEIGHT (DH) ANNUNCIATOR - illuminates when the radar altimeter DH altitude is reached.

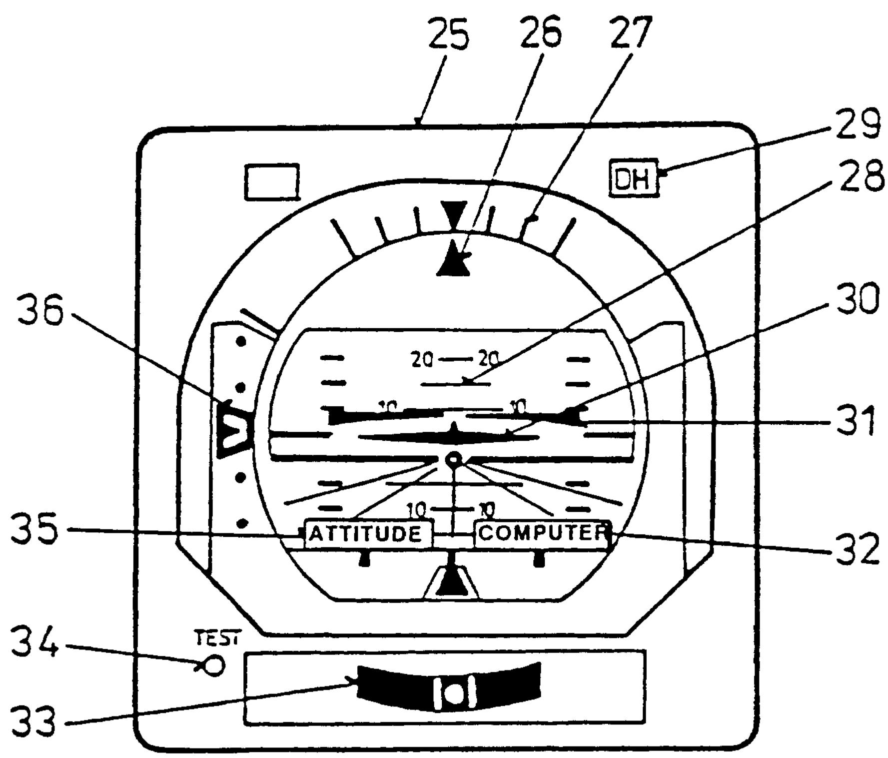


Fig. 3 KCI 310 FLIGHT DIRECTOR ATTITUDE GYRO

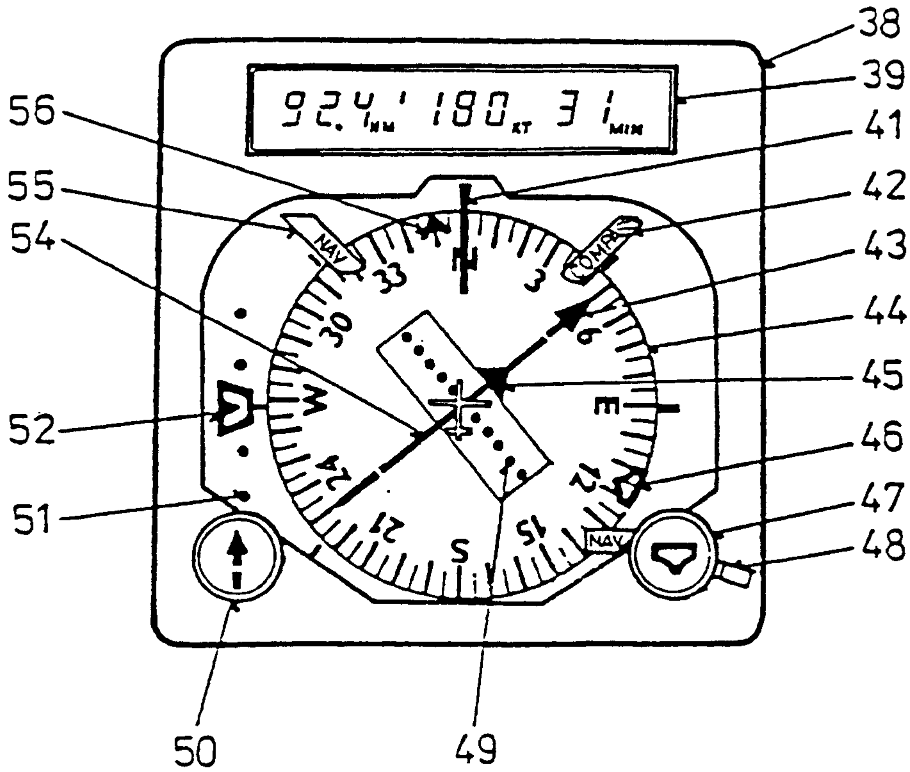


Fig. 4 PICTORIAL NAVIGATION INDICATOR

30. SYMBOLIC AIRPLANE - Serves as a stationary symbol of the aircraft. Airplane pitch and roll attitude is displayed by the relationship between the fixed symbolic airplane and the movable background. During flight director operation, the airplane is flown to align the symbolic airplane with the command bar to satisfy the flight director commands.

31. COMMAND BAR - Displays computed steering commands referenced to the symbolic airplane. The command bar is visible only when FD mode is selected. The command bar will be biased out of view whenever the system is invalid or a flight director mode is not engaged.

32. COMPUTER FLAG (COMPUTER) - Will be in view whenever any of the following conditions are not met: KCI 310 internal command bar power supply and command bar drive valid, KCP 220 computer valid. With the flag in view, autopilot engagement is inhibited.

33. INCLINOMETER - Indicates slip to the left or right by displacement of the ball.

34. TEST BUTTON - When pressed, causes the indicator to display 10° nose up and 10° right bank attitude. The ATTITUDE and COMPASS flags will also come into view.

35. ATTITUDE FLAG (ATTITUDE) - Will be in view whenever any of the following conditions are not met: KCI 310 internal attitude power supply and servo loop valid; remote vertical gyro valid. With the flag in view, autopilot engagement is inhibited.

(continued)

36. GLIDESLOPE DEVIATION - Pointer corresponds to position of glideslope beam. Markings spaced at ± 0.35° of glideslope error. The pointer will retract from view with an invalid glideslope signal.

37. NOT USED

38. KPI 553A PICTORIAL NAVIGATION INDICATOR (PNI) - Provides a pictorial presentation of the aircraft deviation relative to VOR radials or localizer beams. It also displays glideslope deviation, slaved gyro heading referenced with respect to magnetic north, DME distance, groundspeed, time to station and RMI/NAV pointer which indicates bearing to an ADF station or VOR station.

39. DME DISPLAY - Simultaneously displays distance to VOR/DME station, groundspeed and time to VOR/DME station.

40. NOT USED

41. LUBBER LINE - Indicates aircraft magnetic heading or, compass card.

42. COMPASS WARNING FLAG (COMPASS) - Will be in view whenever the compass system internal power supply, heading servo loop, or remote directional gyro are invalid. The COMPASS flag will also be in view when the compass system is manually slewed.

NOTE

If the COMPASS flag comes into view with either NAV, APR, or HDG selected, the lateral mode will default to wings level and the disengaged mode annunciators will flash until the applicable mode selector button is pushed to cancel the flashing. None of the lateral modes may be selected as long as the COMPASS flag is present.

43. SELECTED COURSE POINTER - Indicates selected VOR course or localizer course on the compass card. The selected VOR radial or localizer bearing remains set on the compass card when the compass card rotates.

44. COMPASS CARD - Rotates to display heading of airplane with reference to lubber line.

45. TO/FROM INDICATOR FLAG - Indicates direction of VOR station relative to the selected course.

46. HEADING BUG - Moved by the heading selector knob to select the desired heading.

47. HEADING SELECTOR KNOB - Rotates to position the heading bug on the compass card. The bug rotates with the compass card after being positioned by the selector knob.

(continued)

48. ADF/NAV SELECT SWITCH - Selects either ADF or NAV information to drive the RMI pointer (56). The ADF/NAV flag adjacent to the heading selector knob indicates which information source is currently selected.

49. COURSE DEVIATION SCALE - A course deviation bar displacement of 5 dots represents full scale (VOR = $\pm$ 10°, LOC = $\pm$ 2.5°) deviation from beam center- line.

50. COURSE SELECTOR KNOB - Positions the course bearing pointer on the compass card by rotating the course selector knob.

51. GLIDESLOPE SCALE - Indicates displacement from glideslope beam center. A glideslope deviation bar displacement of 2 dots, represents full scale (0.7°) deviation above or below glideslope beam centerline.

52. GLIDESLOPE POINTER - Indicates on the glideslope scale aircraft displacement from glideslope beam center.

53. GLIDESLOPE /GS OFF/ FLAG (Not shown) - Flag is in view covering the glideslope pointer when the GS receiver signal is inadequate.

54. COURSE DEVIATION BAR (D-BAR) - The center portion of the course bearing pointer moves laterally to pictorially indicate the relationship of the aircraft to the selected course. It indicates degrees of angular displacement from VOR radials and localizer beams, or displacement in nautical miles from RNAV course.

55. NAV FLAG - Flag is in view when the NAV receiver signal is inadequate. When a NAV flag is present, autopilot operation is not affected. The pilot must monitor the navigation indicators for NAV flags to insure that the autopilot and/or flight director are tracking valid navigation information.

56. ADF/NAV RMI POINTER - Indicates the magnetic bearing to the selected ADF or NAV facility.

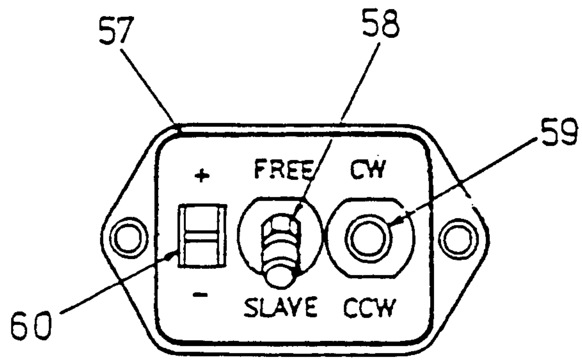


Fig. 5 KA 51B SLAVING ACCESSORY AND COMPENSATOR UNIT

(continued)

57. KA 51B SLAVING ACCESSORY AND COMPENSATOR UNIT - Controls the KCS 305A Compass System.

58. FREE/SLAVE COMPASS SLAVE SWITCH - Selects either the manual (FREE) or automatic slaving (SLAVE) mode for the compass system.

59. CW/CCW COMPASS MANUAL SLAVE SWITCH - With the FREE/SLAVE compass slave switch in the FREE position, allows manual compass card slaving in either the clockwise or counterclockwise direction. The switch is spring loaded to the center position.

60. SLAVING METER - Indicates the difference between the displayed heading and the magnetic heading. Up deflection indicates a clockwise error of the compass card. Down deflection indicates a counterclockwise error of the compass card.

61. NOT USED

62. AUTOPILOT DISCONNECT/TRIM INTERRUPT (A/P DISC) SWITCH - When depressed will disengage the autopilot and cancel all operating flight director modes. When depressed and held will interrupt all electric trim power (stop trim motion), disengage the autopilot, cancel all operating flight director modes and disable the aural A/P disconnect tone.

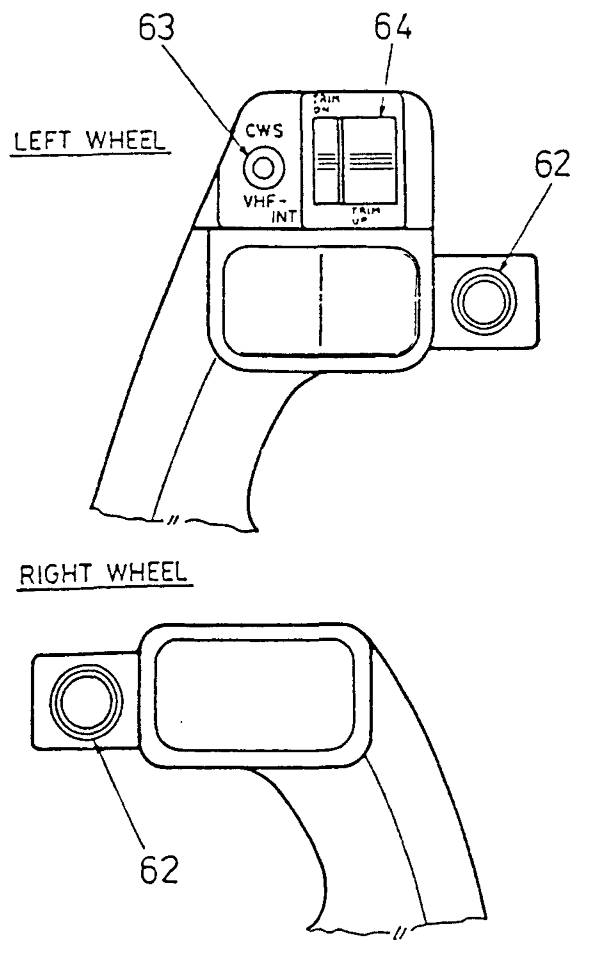


Fig. 6 AUTOPILOT CONTROL WHEELS SWITCH CAP
(continued)

63. CONTROL WHEEL STEERING (CWS) BUTTON - When depressed, allows pilot to manually control the aircraft (disengages the pitch, roll and trim servos) without cancellation of any of the selected modes. Will engage the flight director mode if not previously engaged. Automatically synchronizes the flight director/autopilot to the pitch attitude present when the CWS switch is released, to the present pressure altitude when operating in the Altitude hold mode, to the present vertical speed when operating in the Vertical Speed Hold mode or to the present indicated airspeed when operating in the Indicated Airspeed Hold mode.

64. MANUAL ELECTRIC TRIM CONTROL SWITCHES - A split switch unit in which the left half provides power to engage the trim servo clutch and the right half to control the direction of motion of the trim servo motor. Both halves of the split trim switch must be actuated in order for the manual electric trim to operate in the desired direction. When the autopilot is engaged, operation of the manual electric trim will automatically disconnect the autopilot. (The flight director will remain engaged and the yaw damper will remain engaged if already engaged).

The following circuit breakers and switches are used to protect the following elements of the King KFC 325 Autopilot:

LABEL	FUNCTION
AP/FD	Supplies power to the KCP 220, KDC 222, KMC 321, KAP 315A, the autopilot pitch, roll and yaw servos, and the ELECTRIC TRIM Circuit Breaker.
ELECTRIC TRIM	Supplies power to the autotrim and manual electric pitch trim systems.
GYRO COMPASS	Supplies electrical power to the KCS 305A Compass System.
GYRO HORIZON (left)	Supplies 27 V DC power to the KCI 310 Flight Director Attitude Gyro.
NAV I	Supplies 27 V DC power to the KNR 634 NAV System.
INVERTERS 115 V AC I,II	Supplies 115 V AC power to the 115 V/26 V transformer.
INVERTERS 36 V AC I,II	Supplies 36 V AC power to the GYRO COMPASS I circuit breaker.
RADIOALTIMETER I	Supplies 27 V AC power to the Radioaltimeter I.
INTERCOM I, II	Supplies 27 V DC power to the "audio" control boxes.

(continued)

MKR I	Supplies 27 V DC power to the NAV/MKR System.
DME I	Supplies 27 V DC power to the DME I System.

SECTION 8 - HANDLING, SERVICING & MAINTENANCE

- Not Affected

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KAS 297C VERTICAL SPEED AND ALTITUDE SELECTOR

INTRODUCTION

This manual is provided to acquaint the pilot with the limitations as well as the normal and emergency operating procedures of the Bendix/King KAS 297C Vertical Speed and Altitude Selector when added to a KFC 325 Flight Control System.

SECTION 1 - GENERAL - Not Affected

SECTION 2 - LIMITATIONS

A. Altitude Select captures below 800 feet AGL are prohibited.

SECTION 3 - EMERGENCY PROCEDURES - Not Affected

SECTION 3A - ABNORMAL PROCEDURES - Not Affected

SECTION 4 - NORMAL PROCEDURES

A. PREFLIGHT

PREFLIGHT TEST BUTTON (KMC 321) - PRESS momentarily and NOTE:

All legends and digits are displayed on the KAS 297C.

(continued)

B. VERTICAL SPEED AND ALTITUDE SELECTOR OPERATION

(1) Vertical Speed Select

(a) VERTICAL SPEED SELECT knob - PULL small knob to the "OUT" position.

(b) VERTICAL SPEED SELECT knob - ROTATE until desired vertical speed is displayed.

(c) VERTICAL SPEED MODE /ENG/ button - PUSH to engage the Vertical Speed Hold mode.

(2) Changing Vertical Speed

(a) Using CWS

- CWS Button - PRESS and HOLD.

- Airplane - Establish desired vertical speed.

- CWS Button - RELEASE.

(b) Using Vertical Trim Control

- VERTICAL TRIM CONTROL - PRESS either up or down to increase or decrease the vertical speed. Displayed vertical speed changes 100 fpm (0.5 m/s) for every second the control is held down.

CAUTION

1. WHEN OPERATING AT OR NEAR THE BEST RATE OF CLIMB AIRSPEED AND USING VERTICAL SPEED HOLD, IT IS EASY TO DECELERATE TO AN AIRSPEED ON THE BACK SIDE OF THE POWER CURVE (A DECREASE IN AIRSPEED RESULTS IN A REDUCED RATE OF CLIMB). CONTINUED OPERATION ON THE BACK SIDE OF THE POWER CURVE IN VERTICAL SPEED HOLD MODE WILL RESULT IN A STALL.

2. WHEN OPERATING AT OR NEAR THE MAXIMUM AUTOPILOT SPEED, IT WILL BE NECESSARY TO REDUCE POWER IN ORDER TO MAINTAIN THE DESIRED RATE OF DESCENT AND NOT EXCEED THE MAXIMUM AUTOPILOT SPEED.

(continued)

C. ALTITUDE PRESELECT

1. ALTITUDE SELECT knob - PUSH small knob to the "IN" position.
2. ALTITUDE SELECT knob - ROTATE until the desired altitude is displayed.
3. ALTITUDE SELECT MODE (ARM) button - PUSH to arm the Altitude Select Mode.
4. Airplane - ESTABLISH ATTITUDE necessary to intercept the selected altitude.

SECTION 5 - PERFORMANCE - Not Affected

SECTION 6 - WEIGHT AND BALANCE

ITEM	QTY.	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100
Vertical speed and altitude selector KAS 297C	1	0.54	1.19	-0.329	-0.286

SECTION 7 - SYSTEMS OF AEROPLANE

NOTE

The instrument location is shown in the Supplement No. 1m - Instrument panels

VERTICAL SPEED AND ALTITUDE SELECTOR KAS 297C

The KAS 297C provides the pilot with the following features: ability to select vertical speed hold, ability to select, arm and, upon approaching the selected altitude, automatically transfer into Altitude Hold, altitude alerting as specified by FAR 91.51. The KAS 297C controls and display are further described in Figure 7.

(continued)

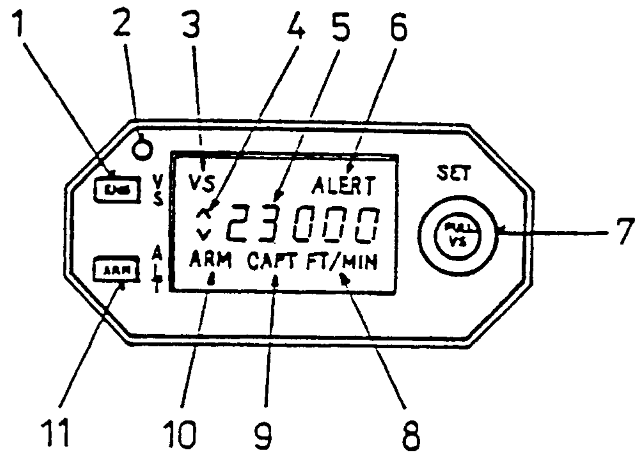

Fig. 7 KAS 297C VERTICAL SPEED AND ALTITUDE SELECTOR

LEGEND FOR FIGURE 7:

1. VERTICAL SPEED MODE (ENG) Button - When pressed will engage the Vertical Speed Hold mode. When pressed a second time will disengage the Vertical Speed Hold mode. When pressed with altitude displayed, will engage the Vertical Speed Hold mode and re-sync the Vertical Speed Hold mode to the current vertical speed of the airplane.

2. PHOTOCELL - Automatically dims display according to the cockpit ambient light.

3. VERTICAL SPEED (VS) ANNUNCIATOR - Illuminates when the Vertical Speed Hold mode is engaged.

4. VERTICAL SPEED UP/DOWN CARETS - Indicates whether the selected vertical speed is up or down.

5. GAS DISCHARGE DISPLAY - Displays selected altitude from 100 to 35,000 feet or the selected vertical speed from 0 to 3,000 feet per minute up or down.

(continued)

6. ALTITUDE ALERT (ALERT) ANNUNCIATOR - The ALERT annunciator is illuminated 1,000 ft (300 m)prior to the selected altitude, goes out 300 ft (90 m) prior to the selected altitude and illuminates momentarily when the selected altitude is reached. Once the selected altitude is reached a flashing light signifies that the 300 ft (90 m) "safe band" has been exceeded. The light will continue to flash until 1,000 ft (300 m) from the selected altitude where it will go out. The alert light is accompanied by a 2 second aural tone anytime the light initially comes on except when the selected altitude is reached.

7. VERTICAL SPEED/ALTITUDE SELECT KNOB - Concentric knobs which allow easy setting of altitude or vertical speed. The small knob (inner) has an in and out position.

   Altitude is displayed and selected when the small knob is in the "IN" position. When rotated the small knob selects altitude in 100 foot increments with roll over into the 1,000 digits. The larger knob (outer) selects altitude in 1,000 foot increments with roll over into the 10,000 digits.

   Vertical speed is displayed and selected when the small knob is in the "out" position. When rotated the small knob selects vertical speed in 100 fpm increments. The larger knob selects vertical speed in 1,000 fpm increments up to a maximum of 3,000 fpm.

8. MODE /FT or FT/MIN/ ANNUNCIATOR - Indicates FT/MIN when in the Vertical Speed Hold mode and FT when in the Altitude Select mode.

9. ALTITUDE CAPTURE (CAPT) ANNUNCIATOR - Indicates the KAS 297C has switched the autopilot from Pitch Attitude Hold or Vertical Speed Hold mode into the pitch roundout mode (CAPT). The point, just prior to transfer into Altitude Hold, at which the CAPT mode becomes active varies with the vertical speed, i.e. the higher the rate of climb, the sooner the CAPT mode becomes active, at low rates of climb the activation of the CAPT mode and transfer to altitude hold occur almost simultaneously.

10. ALTITUDE SELECT ARM (ARM) ANNUNCIATOR - Indicates that the Altitude Select mode is armed to capture the selected altitude.

11. ALTITUDE SELECT MODE (ARM) Button - When pressed and the selected altitude is displayed, will arm the Altitude Select mode. The Altitude Select (ARM) mode will cancel altitude hold (ALT) if ALT is already engaged. If Altitude Select (ARM) mode is present when GS couple occurs, the GS mode will cancel Altitude Select (ARM) mode. The engagement of ALT by the pilot's use of the ALT switch will cancel the Altitude Select (ARM) mode. Reselection of a new altitude will not cancel the Altitude Select (ARM) mode.

12. CONTROL WHEEL STEERING (CWS) Button (Not shown) - When pressed, in addition to the normal autopilot functions the CWS also interfaces with the KAS 297C. When operating in the Vertical Speed Hold mode, the CWS will re-sync the Vertical Speed Hold mode to the current vertical speed of the airplane. If altitude is displayed when the CWS is pressed, the display will automatically display vertical speed as long as the CWS is depressed. CWS does not effect the Altitude Select mode.

(continued)

13. VERTICAL TRIM CONTROL (Not shown) - When in the Vertical Speed Hold mode this control can be used to slew the vertical speed up or down at 100 fpm for every second the rocker switch is held down. If altitude is being displayed at the time the rocker switch is depressed, vertical speed will be displayed until 1-2 seconds after the rocker switch is released.

14. KEA 130A ENCODING ALTIMETER (Not shown) - A power loss to the KEA 130A Encoding Altimeter will also cause the KAS 297C to display dashed lines and be inoperative, however, the altitude presented on the KEA 130A will continue to be valid.

The following circuit breakers are used to protect the following elements of the King KAS 297C:

LABEL	FUNCTION
AP/FD	Supplies power to the KCP 220, KDC 222, KMC 321 , KAP 315A, the autopilot pitch, roll and yaw servos, and the pitch trim Circuit Breaker.
SSR I	Supplies 27V DC power to the KAS 297C and the KEA 130A Altimeter.

SECTION 8 - HANDLING, SERVICING & MAINTENANCE

- Not Affected

SUPPLEMENT No.1

PART 1p

Steward's seat installation

Registration No.	D-CLFW
Serial No.	91 2533

This supplement must be attached to the Approved Airplane Flight Manual when the steward's seat is installed.
The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

LOG OF REVISION

Revision Number	Revised Pages	Description of Revision	CAI approved	Date

SECTION 1 - GENERAL - Not Affected

SECTION 2 - LIMITATIONS

MAXIMUM NUMBER OF OCCUPANTS

If installed steward's seat:

FOR 17 PASSENGERS VERSION

The maximum permissible number of occupants including the crew and steward is 20.

The maximum permissible number of occupants including the crew and steward for cargo version is 4.

CAUTION

THE MAXIMUM PERMISSIBLE STEWARD'S WEIGHT IS 170 lb (77 kg).

SECTION 3 - EMERGENCY PROCEDURES - Not Affected

SECTION 3A - ABNORMAL PROCEDURES - Not Affected

SECTION 4 - NORMAL PROCEDURES - Not Affected

SECTION 5 - PERFORMANCE - Not Affected

SECTION 6 - WEIGHT AND BALANCE

WEIGHT AND BALANCE LOADING FORM

Following row is added:

		Payload lb (kg)	Moment lb.in/100 (kg.m)
F.S.	252 in (6.40 m) Steward		

CAUTION

STEWARD'S WEIGHT AND MOMENT MUST BE ADDED TO TOTAL PAYLOAD AND MOMENT IN WEIGHT AND BALANCE LOADING FORM OF APPROPRIATE VERSION (SEE BASIC AFM - SECTION 6).

PAYLOAD AND FUEL MOMENT

Moments listed are lbin/100 for weights located as shown

Following row is added:

Payload weight (lbs)	40	80	120	160	170
F.S. 252.0 in Steward	100.8	201.6	302.4	403.2	428.8

Moments listed are kgm for weights located as shown

Following row is added:

Payload weight (kg)	20	40	60	77
F.S. 6.40 m Steward	128	256	384	492.8

ITEM	QTY.	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100
Steward's seat	1	7.42	16.36	47.488	41.227

SECTION 7 - SYSTEMS OF AIRPLANE

The steward's seat with seat belts is installed on the front wall of the rear baggage compartment. The intercom connection box with push button and socket 27 V is installed next to the steward's seat.

SECTION 8 - HANDLING, SERVICING & MAINTENANCE - Not Affected

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SUPPLEMENT No.1

PART 1r

Rear Baggage Compartment

Registration No.	
Serial No.	91 2533

This supplement must be attached to the Approved Airplane Flight Manual when the Rear baggage compartment accessible from outside is installed.
The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

LOG OF REVISION

Revision Number	Revised Pages	Description of Revision	CAI approved	Date

SECTION 1 - GENERAL

Dimension of doors and heights of door frames above the ground

REAR CARGO DOOR

Dimension .... 22.05 x 44.09 in (560 x 1,120 mm)
Sill height above ground .... 37.87 in (962 mm)

SECTION 2 - LIMITATIONS - Not Affected

SECTION 3 - EMERGENCY PROCEDURES

REAR BAGGAGE COMPARTMENT FIRE

Note

When the FIRE AFT BAG. COMP. signal on the instrument panel cover lights up, first make sure that this is not a false alarm. If signs such as smoke or an abnormally warm front wall of the rear baggage compartment confirm that there is a fire, proceed according to procedure mentioned below.

1. Depress the FIRE EXT. AFT BAG. COMP. push button on the central control panel.
2. Switch on the FASTEN SEAT BELTS circuit breaker.
3. Descent quickly to a flight level that is safe with respect to the weather and terrain profile.
4. If necessary open one or both of the clear view windows.

SECTION 3A - ABNORMAL PROCEDURES - Not Affected

SECTION 4 - NORMAL PROCEDURES

EXTERNAL INSPECTION

RH SIDE OF FUSELAGE

Rear cargo door...Check if closed

CHECK OF FIRE SIGNALLING SYSTEM OF THE REAR BAGGAGE COMPARTMENT

Before starting the engines:

CENTRAL WARNING DISPLAY (CWD),
FIRE DET. AFT,
BATTERY I,II circuit breakers and switches.........................Checked ON

DET. CHECK push button
on the instrument panel cover...Depress

The FIRE AFT BAG. COMP. lamp on the instrument panel cover must light up.

SECTION 5 - PERFORMANCE - Not Affected

SECTION 6 - WEIGHT AND BALANCE

WEIGHT AND BALANCE LOADING FORM

The row for Aft Baggage is changed as follows:

		Payload lb (kg)	Moment lb.in/100 (kg.m)
F.S.	**261 in (6.650 m) Aft Baggage**		

PAYLOAD AND FUEL MOMENT

Moments listed are lbin/100 for weights located as shown

The row for Aft Baggage Compartment is changed as follows:

Payload weight (lbs)	40	80	120	160	200	240	280	330
F.S. 261.8 in Aft Baggage	104.7	209.4	314.2	418.9	523.6	628.3	733.1	863.9

Moments listed are kgm for weights located as shown

The row for Aft Baggage Compartment is changed as follows:

Payload weight (kg)	20	40	60	80	100	120	140	150
F.S. 6.650 m Aft Baggage	133.0	266.0	399.0	532.0	665.0	798.0	931.0	997.5

SECTION 7 - SYSTEMS OF AIRPLANE

The rear baggage compartment is carried out through whole fuselage section and is located between frames Nos. 19 and 21. The compartment is accessible only from outside through the door with lever and lock. Closed door position is signalled to the pilots by means of cell DOOR on the central warning display. The rear baggage compartment is fitted with lighting system, fire detection system and fire extinguishing system.

SECTION 8 - HANDLING, SERVICING & MAINTENANCE - Not Affected

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SUPPLEMENT No.1s

Placards and Markings

Registration No.	OY-TCL D-CLFD
Serial No.	912533

This supplement must be attached to the Approved Flight Manual when the placards and markings in Spanish language are used on the airplane. The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Approved Flight Manual.

LOG OF REVISION

Revision Number	Revised Pages	Description of Revision	CAI approved	Date

SECTION 1 - GENERAL - Not Affected

SECTION 2 - LIMITATIONS

Following placards are located in the passenger's compartment and rear baggage compartment:

CARGA MÁXIMA 150 kg CARGA MÁXIMA ESPECÍFACA 400 kg/m^2	Located in the rear baggage compartment.
CHALECO SALVAVIDAS DEBAJO DE SU ASIENTO LIFE–VEST UNDER YOUR SEAT	Located on 7th frame on control cover and on LH, RH side before the first seat row.
AVISO A TRIPULACIÓN PUSH TO CALL CREW	Located on the RH and LH side above passenger's seats.
ABROCHARSE EL CINTURON FASTEN SEAT BELTS	Located on 7th frame of controls cover.
EXTINTOR DE INCENDIO FIRE EXTINGUISHER	Located on LH side next to the entry door.
NO FUMAR NO SMOKING	Located in the toilet room and on 7th frame on controls cover.
TIRE PULL	Located above the entry door.

(cont.)

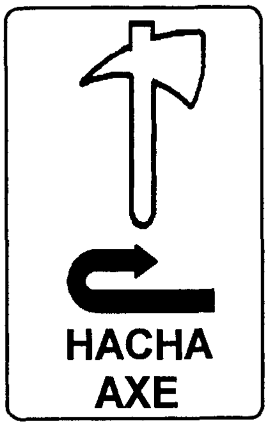
CUIDADO – LA HÉLICE
DESPUÉS DE SALIR GIRE A LA IZQUIERDA
DANGER – PROPELLER
AFTER THE EXIT TURN TO THE LEFT

PROHIBIDO DESCENDER
MIENTRAS ESTÉ GIRANDO LA HELICE
DO NOT EXIT
IF PROPELLER IS ROTATING

Located next to the front emergency exit.

OXIGENO
OXYGEN

Located above oxygen set for passengers.

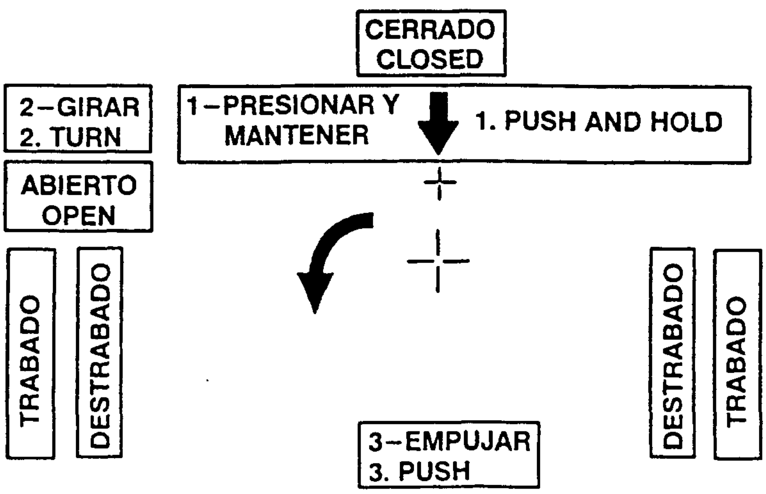


Located on 7th frame on controls cover.

ESCALERA
AIRSTEPS

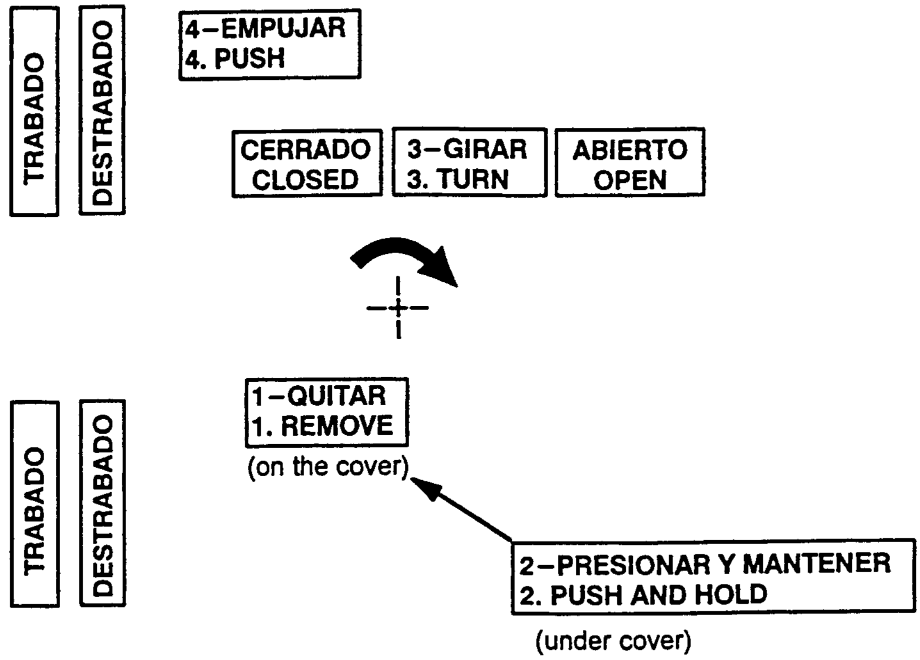
Located on cover of airsteps (18th frame).

Placards on the entry door:



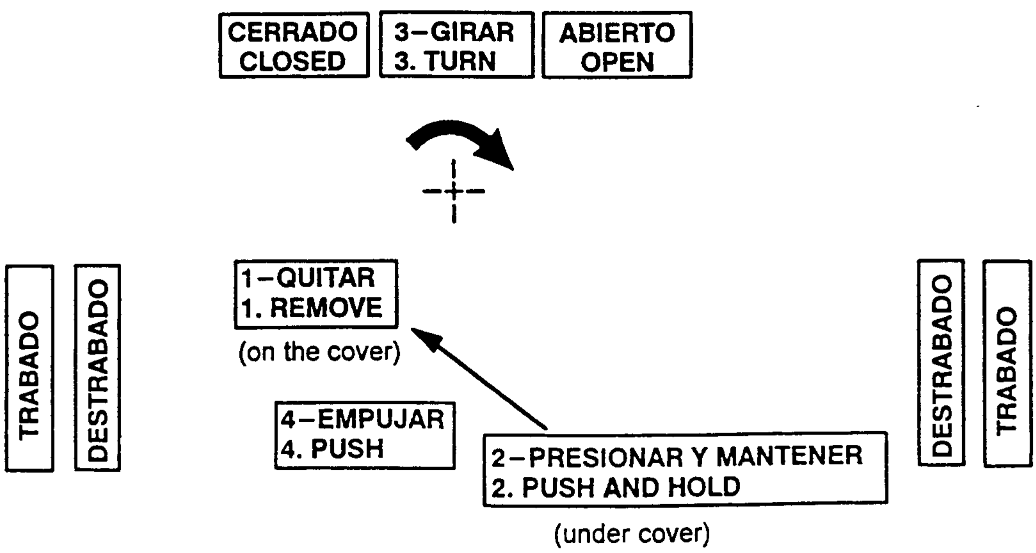
(cont.)

Placards on the front emergency exit:



Placards on the side emergency exits:

RH EMERGENCYEXIT



(cont.)

LH EMERGENCYEXIT

ABIERTO
OPEN

3-GIRAR
3. TURN

CERRADO
CLOSED

2-PRESIONAR Y MANTENER
2. PUSH AND HOLD
(under cover)

TRABADO

DESTRABADO

1-QUITAR
1. REMOVE
(on the cover)

4-EMPUJAR
4. PUSH

DESTRABADO

TRABADO

SALIDA
EXIT

Located above the entry door and emergency exits.

SALIDA DE EMERGENCIA
EMERGENCY EXIT

Located on the emergency exits.

NO SOLOQUE EQUIPASE SOBRE ASIENTOS DELANTEROS
Y SOBRE EL PISO DELANTE DE LOS MISMOS
DO NOT PUT THE BAGGAGE ON THE FIRST ROW SEATS
AND THE LEG ROOM BEFORE THEM

Located on the 7th frame on controls cover.

TOILET LAVATORY

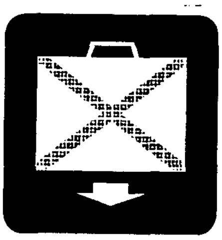
Located on the rear wall of passengers cabin.

TOILET LAVATORY

Located on the toilet room door .

REGRESE A SU ASIENTO
RETURN TO YOUR PLACE

Located in the toilet room.



Located under the emergency exits in center part of passengers cabin.

(cont.)

EXTERIOR PLACARDS AND MARKINGS

CORTAR AQUI PARA INGRESAR CUT HERE TO BRAK IN	Located on the right side next to the entry door.
NO PISAR AQUI	Located on the wing and on the horizontal tail.
NO EMPUJAR AQUI	Located on the engine nacelles.
EMPLEAR MEDIO EXTERIORES PARA EXTINCION DE INCENDIO	Located on the outer side of the engine nacelles.
COMBUSTIBLE 628 L (166 U.S. gal) T-1, TS-1, RT, PL-6, PL-7, JET A, JET A-1, PSM2 PRESION MAXIMA 4 kp/cm^2 (0,39 MPa) (56 psi)	Located on the upper side of the wing next to the filling neck.
COMBUSTIBLE 200 L (53 U.S. gal) T-1, TS-1, RT, PL-6, PL-7, JET A, JET A-1, PSM2 PRESION MAXIMA 4 kp/cm^2 (0,39 MPa) (56 psi)	Located on the wing tip fuel tank.
LIQUIDO HIDRAULICO	Located on the upper side of the wing above the engine nacelles.
AGUA DESTILADA MAX 10 LITROS (2,6 U.S. gal)	Located on the RH landing gear nacelle.
AIRE 5 kp/cm^2 (0,49 MPa) (71 psi)	Located on the upper side of the wing.
NITROGENO 15 kp/cm^2 (1,47 MPa) (213 psi) NITROGENO 50 kp/cm^2 (4,9 MPa) (710 psi)	Located on the LH landing gear nacelle.
FUENTE HIDRAULICA EN TIERRA 150 kp/cm^2 (14,7 MPa) (2.123 psi) FUENTE DE AIRE COMPRIMIDO EN TIERRA 5,5 kp/cm^2 (0,54 MPa) (78 psi)	Located in the back of the outer side of the LH engine nacelle.
28 V 500 A	Located on the LH side of the front part of fuselage.
PELIGRO HÉLICE DANGER PROPELLER	Located on the LH side of the front part of fuselage and on the front emergency exit.

(cont.)

SECTION 3 - EMERGENCY PROCEDURES - Not Affected

SECTION 3A - ABNORMAL PROCEDURES - Not Affected

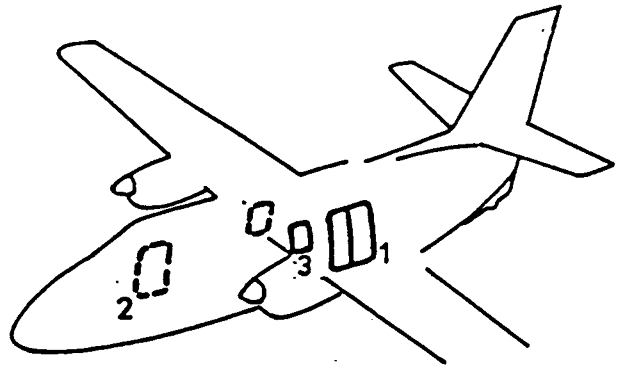
SECTION 4 - NORMAL PROCEDURES - Not Affected

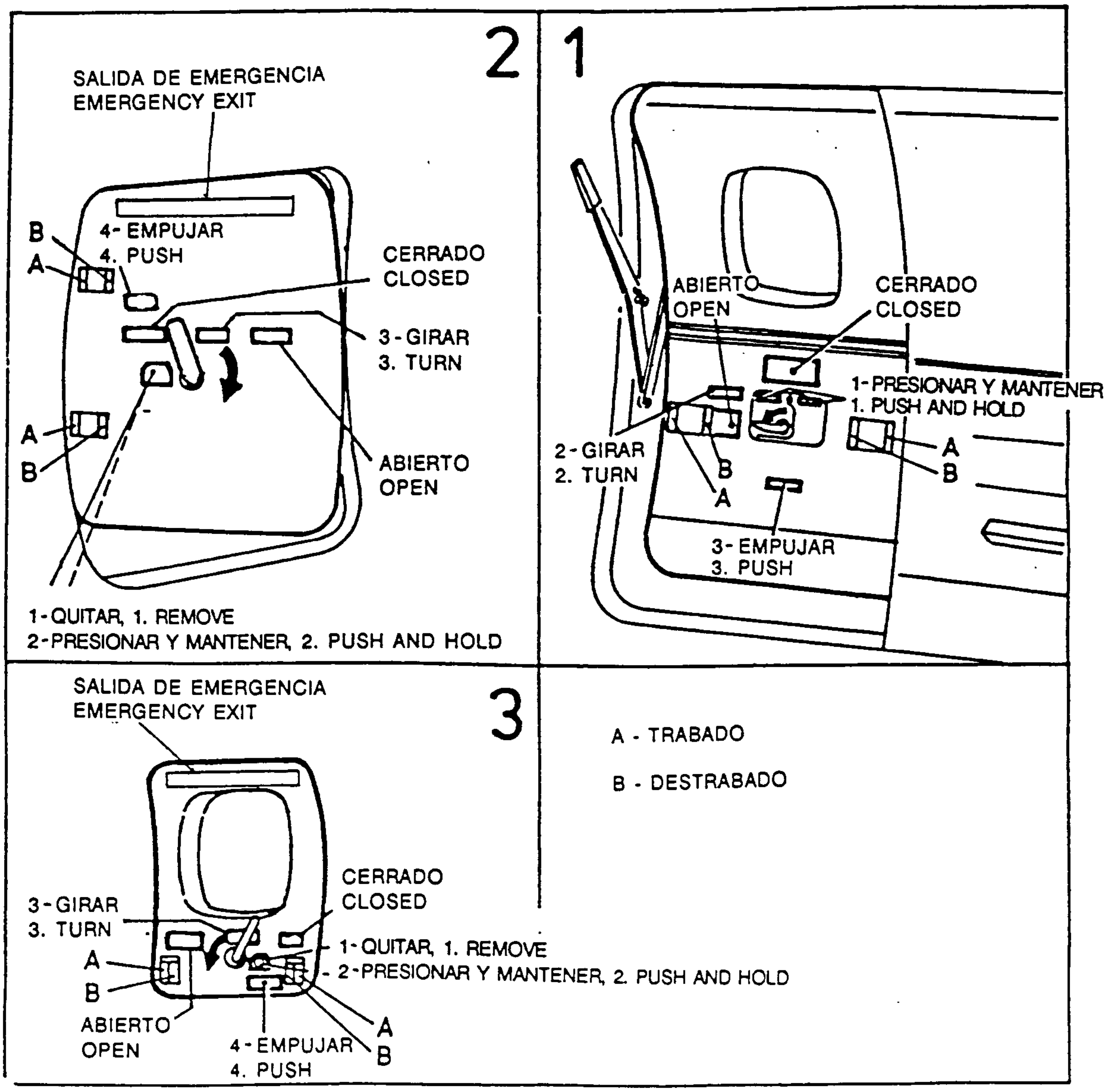
SECTION 5 - PERFORMANCE - Not Affected

SECTION 6 - WEIGHT AND BALANCE - Not Affected

SECTION 7 - SYSTEMS OF AIRPLANE

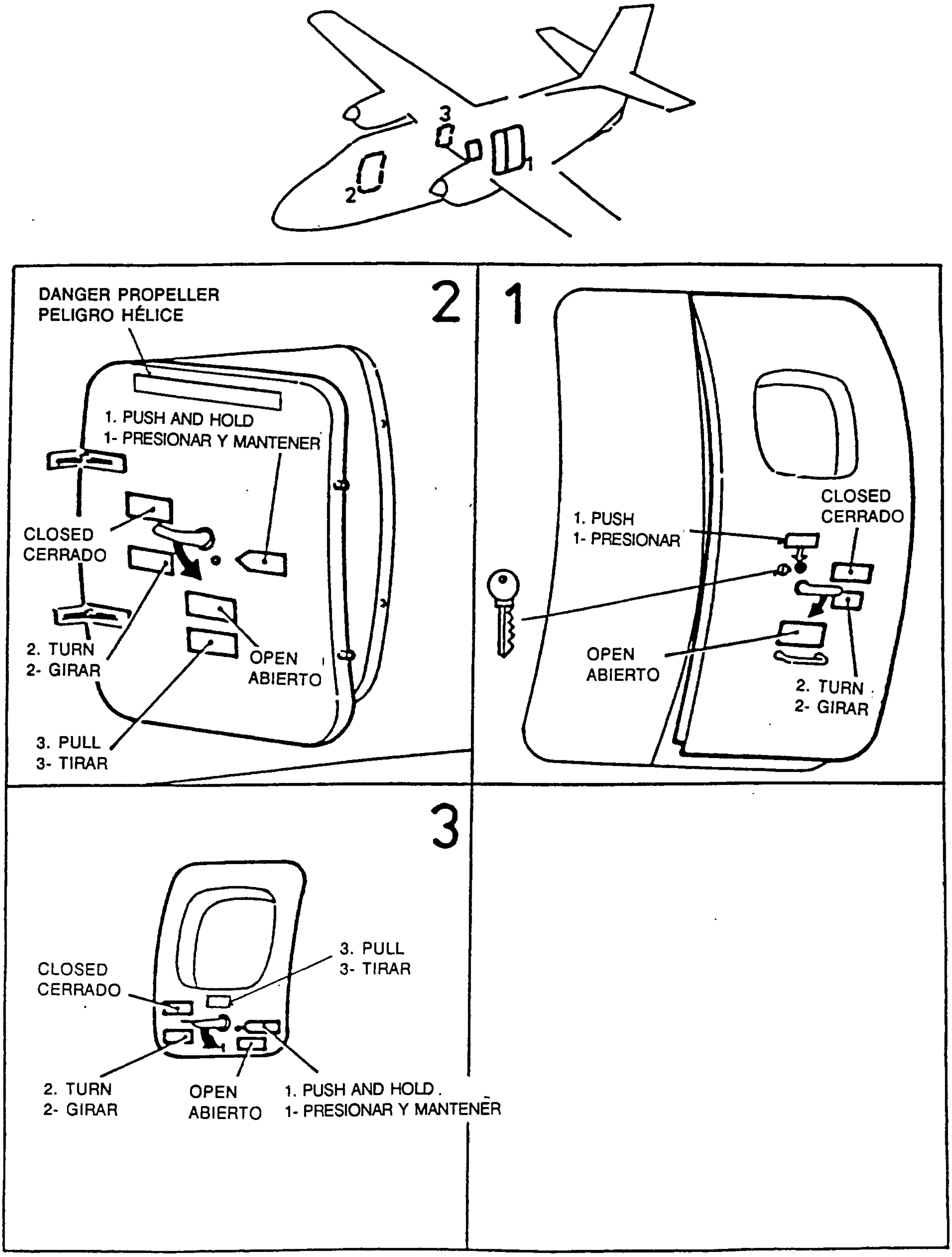
Scheme of opening the main door and emergency exits **FROM INSIDE**





(cont.)

Scheme of opening the main door and emergency exits **FROM OUTSIDE**



SECTION 8 - HANDLING, SERVICING & MAINTENANCE

- Not Affected

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SUPPLEMENT No.4

(M-091)

Oxygen equipment

SCOTT Mark1 - type 900019-00,

SCOTT 5500-B1A-BE20B and

oxygen mask Duo-Seal - type 28318-13

Registration No.	D-CLED
Serial No.	912533

This supplement must be attached to the Airplane Flight Manual when the Oxygen equipment SCOTT Mark1 - type 900019-00, SCOTT 5500-B1A-BE20B and oxygen mask Duo-Seal - type 28318-13 is installed.
The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

This Airplane Flight Manual Supplement was approved by the Civil Aviation Inspectorate of the Czech Republic in Czech language version.
The text of this document has been translated into English with the utmost diligence and to the best knowledge of the applicant.

LOG OF REVISION

Revision Number	Revised Pages	Description of Revision	CAA Approved	Date
1	2, 3	Caution is supplied into section 3.	Appr. in Czech language version.	Jan 25/00

SECTION 1 - GENERAL - Not Affected

SECTION 2 - LIMITATIONS

WARNING

NEVER RELEASE OXYGEN INTO THE COCKPIT THROUGH THE PILOT'S OXYGEN MASK.
PRECLUDE FROM CONTACTING THE GREASE WITH OXYGEN.

SECTION 3 - EMERGENCY PROCEDURES

COCKPIT OR CABIN FIRE

CAUTION

THIS OXYGEN EQUIPMENT (MASK) IS NOT PROTECTION AGAINST SMOKE.

SECTION 3A - ABNORMAL PROCEDURES - Not Affected

SECTION 4 - NORMAL PROCEDURES

PREFLIGHT CHECK

Second pilot must check:

The pressure in the portable oxygen set

- for passengers (2 pcs)

- for pilots (4 pcs)

(cont.)

Check the pressure on pressure gauge depending on the flight time according to following table:

- passenger's cylinders

Flight time (min)	Min. pressure in the cylinder (psi)
60	365
90	655
120	945
150	1235
180	1525
210	1800

- pilot's cylinders

Flight time (min)	Min. pressure in the cylinder (psi)		
	Cylinder No.1	Cylinder No.2	
60	800	may be empty	Outlet 3 LPM.
90	1800	may be empty	
120	1800	1000	
150	1800	1100	Outlet 2 LPM
180	1800	1800	

Check whether each passenger oxygen set has oxygen mask and check for no oxygen leakage from cylinder.

(cont.)

1st and 2nd pilot:

Switch on the pilot portable oxygen sets

Put on the oxygen mask and connect the microphone plug to the hesdphones.

Put on the head phones.

Check the oxygen flow on the oxygen flow indicator situated on the connection hose.

NOTE

After the passengers have embarked, the 2nd pilot will demonstrate the correct application of the passenger oxygen sets.

USE IN FLIGHT

In flight at high altitudes (for fatigue decrease) use the oxygen mask and switch on oxygen set.

SECTION 5 - PERFORMANCE - Not Affected

SECTION 6 - WEIGHT AND BALANCE

ITEM	QTY	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100
Cylinder SCOTT 5500-B1A-BE20B	4	13.04	28.75	5.086	4.414
Duo-Seal mask type 28318-13	2	0.30	0.66	0.117	0.101
Set SCOTT Mark 1 type 900019-00 (for airplane in 19 passenger version)	2	7.48	16.49	41.536	36.050
Set SCOTT Mark 1 type 900019-00 (for airplane in 17 passenger version)	2	7.48	16.49	38.709	33.600
Goggles MXP 202	2	0.20	0.44	0.078	0.068

SECTION 7 - SYSTEMS OF AIRPLANE

Portable oxygen equipment is determined for oxygen supply for crew and passengers.

Oxygen equipment contains pilot's equipment and passenger's equipment.

OXYGEN EQUIPMENT FOR PILOTS

Oxygen equipment for pilot contains four oxygen cylinders 5500-B1A-BE20B (see Fig.1) and two oxygen masks Duo-Seal - type 28318-13 (see Fig.2). Oxygen equipment is located on the back of pilot's seat.

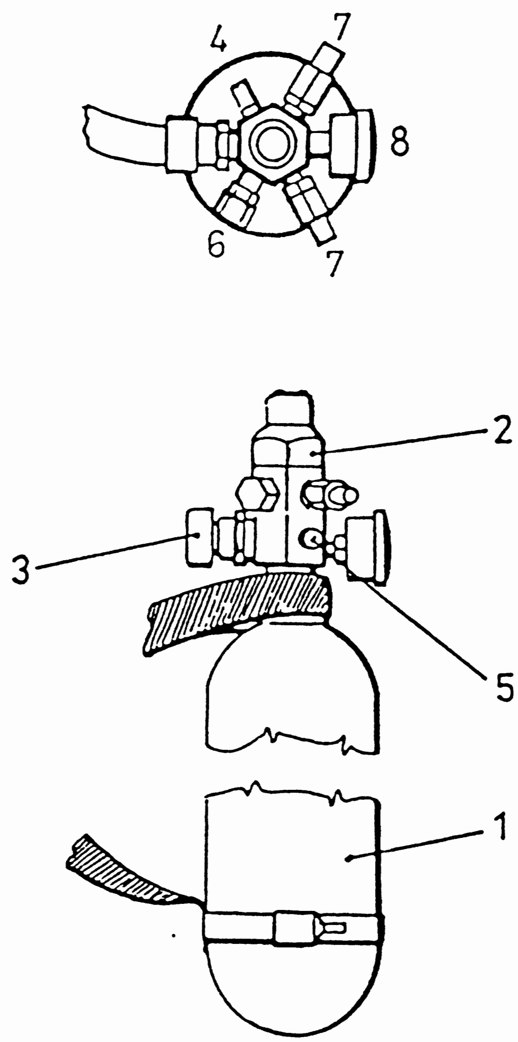

Fig.1 - Oxygen cylinder 5500-B1A-BE20B
1 - cylinder, 2 - press regulator, 3 - ON-OFF valve, 4 - relief valve (low press),
5 - safety plug, 6 - charging valve, 7 - outlet assembly, 8 - pressure gauge

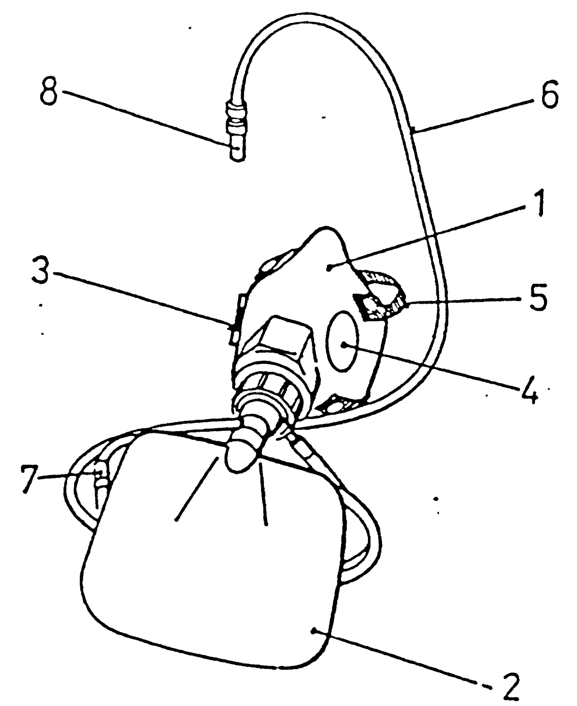

Fig.2 - Oxygen mask Duo-Seal - type 28318-13
1 - Mold of mask, 2 - mixing bag, 3 - expiration valve, 4 - microphone, 5 - strap, 6 - hose, 7 - flow indicator, 8 - conector

PASSENGER'S OXYGEN EQUIPMENT

Passengers oxygen equipment contains two oxygen cylinders MARK 1 - type 900019-00 with oxygen masks (see Fig.3). Oxygen sets are located on the front side of the rear baggage compartment.

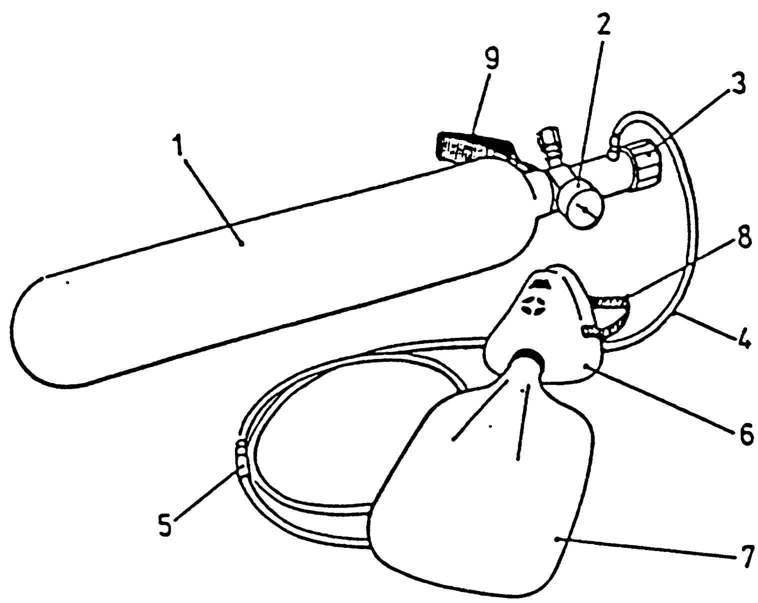

Fig.3 - Passenger's oxygen set MARK 1 - type 900019-00
1 - cylinder, 2 - pressure gauge, 3 - ON-OFF valve, 4 - hose, 5 - flow indicator, 6 - oxigen mask, 7 - mixing bag, 8,9 - strap.

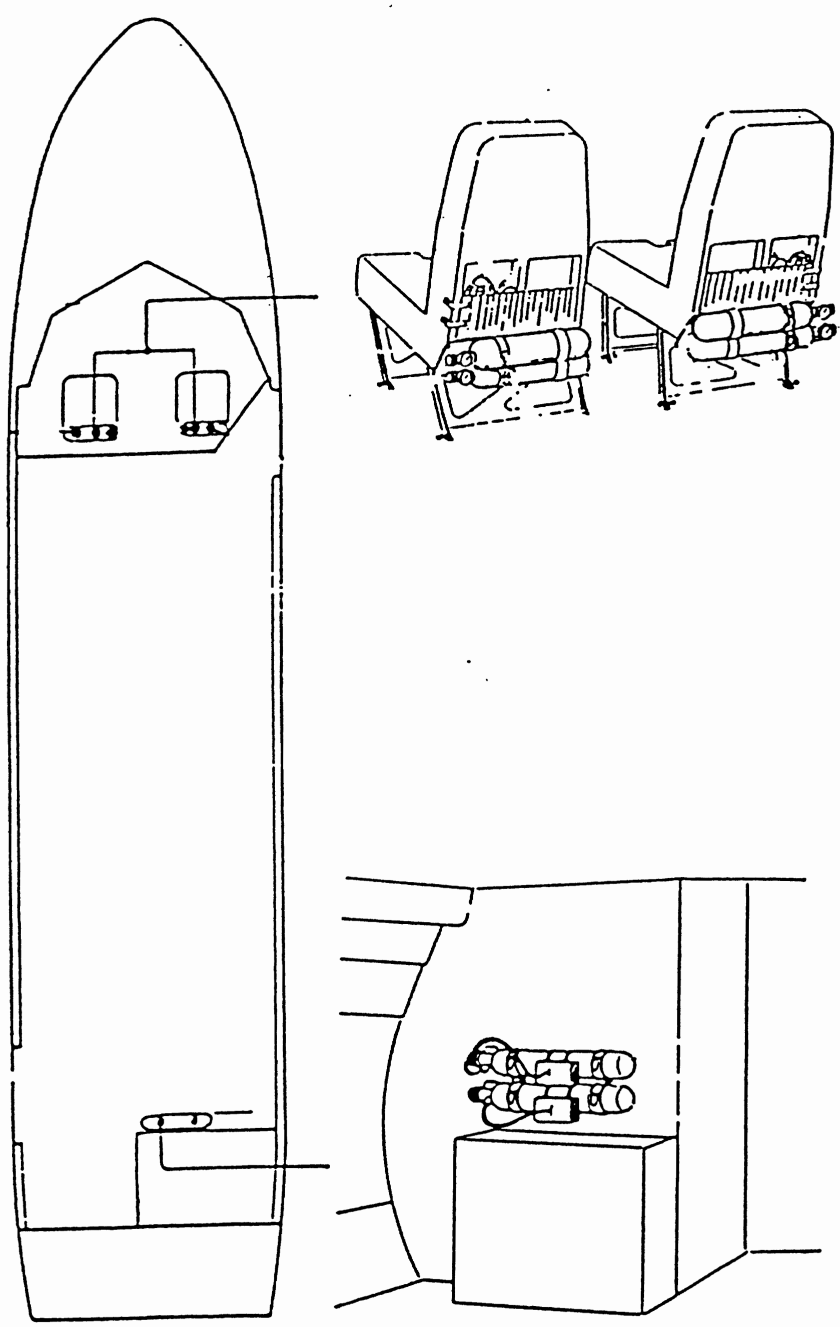

Fig.4 - Location of the oxygen equipment

SECTION 8 - HANDLING, SERVICING & MAINTENANCE

Not Affected

SUPPLEMENT No. 19

PART 19a

Navigation system NAV/COMM

KX 165

Registration No.	D-CLED
Serial No.	912533

This supplement must be attached to the Airplane Flight Manual when the Navigation system NAV/COMM KX 165 is installed. The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

LOG OF REVISIONS

Revision No.	Revised Pages	Description of Revision	CAA Approved	Date

SECTION 1	-	**GENERAL**	-	**Not Affected**
SECTION 2	-	**LIMITATIONS**	-	**Not Affected**
SECTION 3	-	**EMERGENCY PROCEDURES**	-	**Not Affected**
SECTION 3A	-	**ABNORMAL PROCEDURES**	-	**Not Affected**
SECTION 4	-	**NORMAL PROCEDURES**	-	**Not Affected**

SWITCHING-ON

On the overhead panel:

- BATTERY I, II ; INVERTERS 115V AC I, II; INVERTERS 36V AC I, II switches	CHECK SWITCHING - ON
- COM/NAV I; COM/NAV II; INTERCOM I, II; GYRO COMPASS I, II circuit breakers	SWITCH - ON

Connector panels beside the overhead panel:

- Plugs for the earphones and the microphone	PLUG IN

On the NAV/COMM unit's control panel:

(rear control panel):

- ON/OFF/VOL knob	rotate to the right from the extreme locked position to switch on the unit

The frequencies set before the last shutdown of the unit will be displayed.

(cont.)

On the “audio” control box:
(rear control panel)

- NAV 1 (2), VHF 1 (2) push-button — SWITCH - ON

PREFLIGHT CHECK OF THE VHF TRANSCEIVER

After switching-on, on the control panel (COMM I, II):

- ON/OFF/VOL knob — pull out, rotate from the left hand extreme position to the extreme right hand position and check that noise in the earphones changes smoothly

On the "audio" control box:

- Selector mode switch — position 1 (2) (VHF I / II))

On the control panel (COMM I, II):

- Set the ATC frequency and mutual connection

When pressing the key switch on the wheel to the side indicated by sinusoid (= transmission) the noise in the earphones must disappear. In the left hand display between the STBY and USE windows “T" will appear during the transmission.

- Check that side tone occurs in the earphones during the transmission.
- ON/OFF/VOL knob — PUSH - IN

PREFLIGHT CHECK OF THE NAV SYSTEM

After switching-on, on the control panel (NAV I, II):

- Set (check) the VOR radio beacon frequency for the local aerodrome
- VOL/IDENT knob — pull out and check identification of the VOR radio beacon

On the left hand RMI:

- Check switching-on the VOR indication mode (the single pointer)

(cont.)

NAV warning flags on the left (right) hand PNI and right (left) hand CDI will disappear and the perpendicular bars will indicate deviations from the established flight path "to" or "from" the VOR radio beacon. The single pointer of the left hand RMI indicates VOR radio beacon radial.

On left (right) PNI and right (left) hand CDI:

- Check correct function of the "to" and "from" flags
- Centre the D-bar of the side deviation for the flight indication "to" the VOR radio beacon
- Compare the navigation data of both indicator.

On the left hand PNI and left hand RMI (single pointer):

- Compare the navigation data of both indicator.

On the control panel (NAV I, II):

- Select another frequency than that of local aerodrome VOR beacon

  NAV warning flags must appear on the left (right) PNI and right (left) CDI.

- VOL/IDENT knob PUSH - IN

FREQUENCY SELECTION

1) Frequency selection on the VHF transceiver on the control panel (COMM I, II):

   - Larger frequency selector knobrotate to set the frequency to the left from decimal (MHz)
   - Smaller frequency selector knob rotate to set the frequency to the right from decimal (kHz)

   Rotating the knobs clockwise increases the frequency while rotating counter clockwise decreases the frequency.

   After reaching the frequency band edge (either 118.00 MHz or 135.975 MHz), further rotating the knobs will wrap the display around to the other (opposite edge of the frequency band (i.e. 135.000 MHz advances to 118.000 MHz).

   With the smaller knob pushed-in the frequency changes in 50 kHz steps and in 25 kHz steps when pulled out.

(cont.)

The new frequency will be displayed in the STBY window.

- COMM frequency transfer button ↔ on the left hand side of the control panel — PRESS

The new frequency will become active and is now displayed in the USE window. The STBY window now displays the initially active frequency.

By pressing the COMM button - the active and standby frequencies may be now interchanged at any time.

2) Selection of the NAV frequency

On the control panel (NAV I,II):

- Larger frequency selector knob	rotate to set the frequency to the left from decimal (MHz)
- Smaller frequency selector knob	rotate to set the frequency to the right from decimal (kHz) in 50 kHz steps

Rotating the knobs clockwise increases the frequency while rotating counter clockwise decreases the frequency.

After reaching the frequency band edge (108.00 MHz or 117.95 MHz), further rotating the knobs will wrap the display around to the other (opposite) edge of the frequency band (117.00 MHz to 108.00 MHz).

With the smaller frequency selector knob pulled out the new frequency will be displayed in the USE window (direct tuning).

With the smaller frequency selector knob pushed-in the new frequency will be displayed in the STBY window (standby frequency selection).

To flip-flop the active and standby frequencies:

- NAV frequency transfer button ↔ on the right hand side of the control panel — PRESS

NAVIGATION IN THE VOR SYSTEM

On the control panel (NAV I,II):

- NAV frequency selector knobs	set the frequency of desired VOR radio beacon
- NAV frequency transfer button -	PRESS

(cont.)

When the aircraft is within the reach of the VOR radio beacon, the NAV warning flags in the left (right) PNI and the right (left) CDI will disappear.

On the "audio" control box:

- NAV 1 (2) push-button	CHECK SWITCHING - ON

On the NAV control panel:

- VOL/IDENT knob	pull out, rotate to set the desired volume of NF signal in earphones and Identify the VOR radio beacon
- VOL/IDENT knob	PUSH - IN

On the left (right) hand PNI:

- Course selector knob (marked with arrow)	set the desired VOR Radial

On the right (left) hand CDI:

- OBS knob:	set the desired VOR Radial

On the left hand RMI:

- Check the indication of the single pointer is the VOR mode

On the left (right) hand PNI, right (left) hand CDI and left hand RMI:

- Check (compare) the navigation data of all above mentioned indicators.

NOTE

If the VOR received signal is either unusable for the indication or it is not available at all then the NAV warning flag become visible on the left (right) PNI and on the right (left) CDI, also the bar indicating VOR bearing deviation will be parked in the middle of the scale.

(cont.)

APPROACH IN THE ILS SYSTEM

On the NAV I/II control panel:

- Frequency selector knob (smaller knob pushed in)	set the ILS/LOC frequency of the landing aerodrome
- NAV frequency transfer button ↔	PRESS

When the aircraft is within the reach of the ILS/LOG/GS radio beacons, the respective warning flag on the left hand PNI and right hand CDI will disappear.

On the "audio" control box:

- NAV 1 push-button switch	CHECK SWITCHING - ON

On the NAV I control panel:

- VOL/IDENT knob	pull out and rotate to set the required NF signal volume in earphones and identify the LOC radio beacon of the landing aerodrome

If no ATIS instructions are passed on the acoustic channel:

- VOL/IDENT knob	PUSH-IN

NOTE

1. Although the navigation indicator function in the ILS mode does not depend on the course setting, set the navigation indicator to the course of the prolonged axis of the runway in the same way as for the flight by the VOR radio beacon.
2. If the ILS/LOC/GS signals are either unusable for the indication or are not available at all then the NAV warning flags become visible on the left hand PNI and right hand CDI. Further the chartreuse triangular pointer indicating the deviation from the glide slope will go out of view o i n the left hand PNI and the GS warning flags become visible on the right hand CDI.

SECTION 5 – PERFORMANCE - Not Affected

SECTION 6 - WEIGHT AND BALANCE

ITEM	QTY	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	1b.in/100
NAVIGATION					
NAV (NAV/ILS/COMM) KX 165	2	4.80	10.60	2.064	1.794
PNI KI 525A	2	3.56	7.88	-2.120	1.846
CDI KI 206	2	0.76	1.70	-0.454	-0.396

SECTION 7 - SYSTEMS OF AIRPLANE

NOTE

The instruments location is shown in the Supplement No. 19j - Instrument panels.

Two NAV/COMM navigation systems with VHF transceiver are installed on the airplane.

The units consists of two functionally independent systems:
- systems navigation receivers VOR/ILS
- communication transceiver VHF

Power supply for both the system is turned on from common elements.

The controls and display for the COMM system are in the left hand half of the control panel while those for the NAV system are in the right hand half of the unit's control panel.

The navigation data from NAV I set are displayed on the left hand PNI, right hand CDI and on the left hand RMI (single pointer in the VOR indication mode). The navigation data from NAV II set are displayed on the right hand PNI, left hand CDI.

(cont.)

The indication modes of the RMI single pointer (ADF or VOR) are switched over with the rectangular push-buttons on the RMI lower part of the flange. The switching over operation is indicated with the coloured arrow directed to the ADF or VOR signs. If the VOR indication mode has been selected and VOR received signal is not unusable for the indication or if the navigation system is in ILS mode the RMI single pointers will be parked at 90°.

The magnetic heading selection knob on the PNI shifting the movable heading symbol (so called "bug") is not being used.

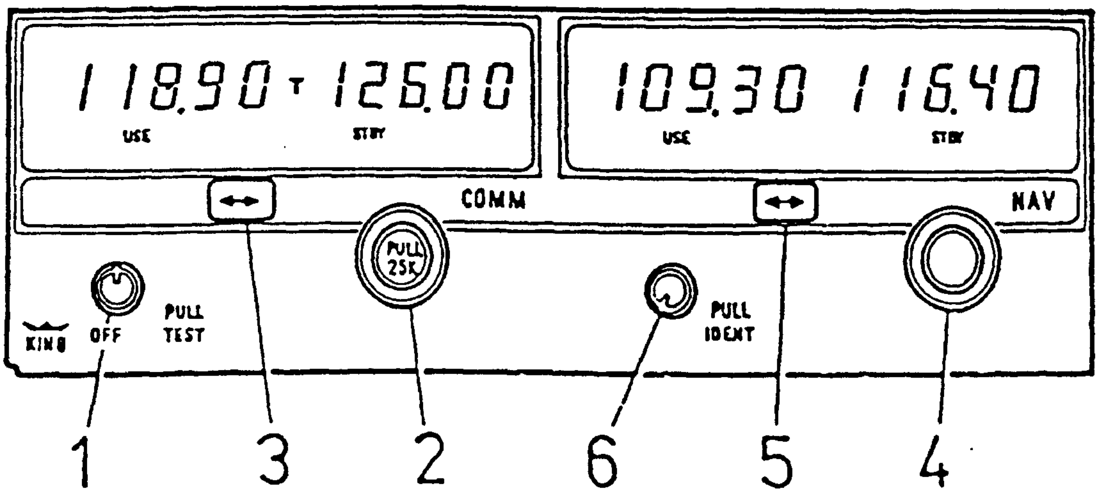

Fig. 1 Control box of the KX 165

1 – VOL/OFF and SQUELCH control knob

2 - Frequency selector COMM

3 - Frequency transfer (flip-flop) button COMM

4 - Frequency selector NAV

5 - Frequency transfer (flip-flop) button NAV

6 - Volume of the identification signal control knob

SECTION 8 - HANDLING, SERVICING & MAINTENANCE

Not Affected

SUPPLEMENT No. 20

PART 20i

Emergency Locator Transmitter
ELT 110-406

Registration No.	D-CLED
Serial No.	912533

This supplement must be attached to the Airplane Flight Manual when the ELT 110-406 is installed. The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

Airplane Flight Manual Supplement for the ELT 110-406 was approved by the Civil Aviation Authority of the Czech Republic in Czech language version.
The text of this document has been translated into English with the utmost diligence and to the best knowledge of the applicant.

LOG OF REVISION

Revision Number	Revised Pages	Description of Revision	CAA Approved	Date

SECTION 1 - GENERAL - Not Affected

SECTION 2 - LIMITATIONS - Not Affected

SECTION 3 - EMERGENCY PROCEDURES

PROCEDURE AFTER FORCED LANDING

After landing:

On the ELT's control panel:

- ON-OFF change-over switch: ON position

or

On the remote switch panel in the cockpit (if installed):

- ON-ARM change-over switch ON position

NOTE

If conditions for switching-on the G-switch have been fulfilled, ELT was automatically activated just on the touch-down. In this case, red light blinks on the remote switch panel (if installed). Furthermore, warning buzzer (if installed) runs.
If the remote switch panel and warning buzzer are not installed it is possible to verify ELT transmission by means of VHF transceiver tunned on frequency of 121.5 MHz.

SECTION 3A - ABNORMAL PROCEDURES - Not Affected

SECTION 4 - NORMAL PROCEDURES

POSTFLIGHT CHECK (only for airplanes without the remote switch panel and warning buzzer)

After engine shut down on the overhead panel:

- BATTERY I, II; VHF II; INTERCOM I,II switches and circuit breakers : CHECK SWITCHING-ON

On the transceiver VHF II control panel:

- Check switching-on, turn the volume controller to about one half and set the distress frequency 121.5 MHz.

On the audio control box:

- COM 2 push-button : CHECK SWITCHING-ON

If the ELT's tone cannot be heard, your ELT has not been activated

If the ELT's tone can be heard - **on the ELT's control panel:**

- ON-OFF change-over switch : CHECK SWITCHING to the OFF position

  ON-OFF change-over switch : SWITCH to ON position and then to OFF position

If the ELT's tone disappeared your ELT may have been automatically activated by the G-switch.

If the ELT's tone can still be heard, ELT in another airplane may be transmitting.

WARNING

CASES WHERE THE ELT'S TRANSMISSION LASTED MORE THAN ONE HOUR OR ELT WAS UNINTENTIONALLY ACTIVATED AND THE PERIOD OF TRANSMISSION CANNOT BE ESTABLISHED, ADVISE THE GROUND PERSONNEL.

SECTION 5 - PERFORMANCE - Not Affected

SECTION 6 - WEIGHT AND BALANCE

ITEM	QTY.	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100
NAVIGATION					
ELT 110-406	1	1.71	3.80	11.901	10.413

SECTION 7 - SYSTEMS OF AIRPLANE

The ELT emergency locator transmitter is fixed in the ceiling area of the passenger compartment rear part. ELT is accessible after unlocking fire quick-acting latches and tilting the ceiling panel. Besides the remote switch panel with ON-ARM change-over switch and red light (if installed) is placed in cockpit. Furthermore the warning buzzer (if installed) is located on the 7th frame (on controls cover).

ON-ARM change-over switch (under a cover with a seal) on the remote switch panel operates in the same way as ON-OFF change-over switch on the ELT unit. ON position serves for the unit activation. OFF (or ARM) position is used under normal operation - ELT is in stand-by mode without transmision.

ELT may be intentionally activated by means of the ON-OFF (or ON-ARM) change-over switch or automatically by the G-switch, which is activated with a change of velocity of 3.5 fps ±0.5 fps both under normal conditions and while being subjected to 30 G's of cross axis forces. If activated, the ELT transmits on 121.5 MHz, 243 MHz and 406.025 MHz. The 406.025 MHz transmission contains a encoded digital message for the satellite. The information sent to the satellite is programmed at the factory and contains a unique number that can be used to identify the ELT (and consequently airplane). The red light on the remote switch panel blinks and the warning buzzer runs during ELT's transmision.

If the ELT is activated accidentally, it is necessary to reset it. Switch-over the ON-OFF (or ON-ARM) change-over switch to ON position and then to OFF (or ARM) position.

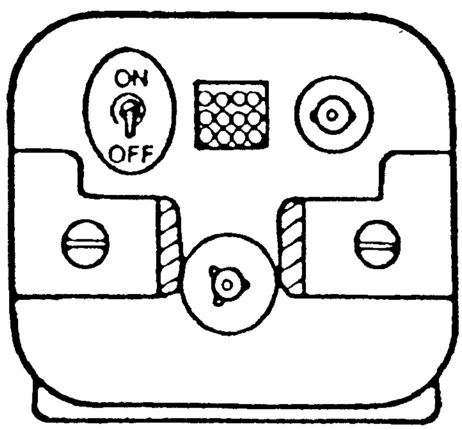

Fig. 1 ELT's Front Panel

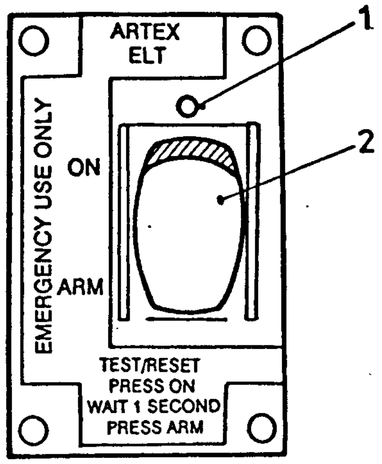

Fig. 2 ELT's Remote Switch Panel

(1) Red light; (2) ON-ARM change-over switch

SECTION 8 - HANDLING, SERVICING & MAINTENANCE

- Not Affected

SUPPLEMENT No. 34

GLOBAL POSITIONING SYSTEM
KLN 90B

Registration No.	D-CLED
Serial No.	912533

This supplement must be attached to the Approved Airplane Flight Manual if the KLN 90B Global Positioning System is installed. The informations contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement consult the basic Airplane Flight Manual.

The Airplane Flight Manual Supplement for KLN 90B Global Positioning System was approved by the Civil Aviation Authority of the Czech Republic in Czech language version.
The text of this document has been translated into English with the utmost diligency and to the best knowledge of the applicant.

LOG OF REVISION

Revision No.	Revised pages	Description of revision	CAA Approved	Date

SECTION 1 – GENERAL

The GPS KLN 90B/B–RNAV meets requirements of TSO C 129 and serves as a supplementary navigation system for VFR/IFR. GPS installation meets JAA TGL No. 2, Rev. 1 and FAA AC 20–138 and requirements for European B–RNAV. Fulfilment of the above mentioned requirements does not make operation approving/authorization for B–RNAV. Airplane user has to require that approving/authorization of respective aviation authority. Only KLN 90B with P/N 066–04031–1122 is approved for B–RNAV. Connection with a flight director system or autopilot was not proved.

SECTION 2 – LIMITATIONS

1. The KLN 90B GPS Pilot's Guide, P/N 006–08773–0000, dated December, 1994 (or later applicable revision) must be immediately available to the flight crew whenever navigation is predicated on the use of the system. The Operational Revision Status (ORS) of the Pilot's Guide must match the ORS level annunciated on the Self Test page.
2. IFR Navigation is restricted as follows:
   2.1. The system must utilize ORS level 20 or later FAA approved revision.
   2.2. The data on the self test page must be verified prior to use. Verify valid altitude data is available to the KLN 90B prior to flight.
   2.3. IFR en route and terminal navigation is prohibited unless the pilot verifies the currency of the data base or verifies each selected waypoint for accuracy by reference to current approved data.
   2.4 Instrument approaches must be accomplished in accordance with approved instrument approach procedures that are retrieved from the KLN 90B data base. The KLN 90B data base must incorporate the current update cycle.
   - The KLN 90B Memory Jogger, P/N 006–08785–0000, dated 12/94 (or later applicable revision) must be immediately available to the flight crew during instrument approach operations.
   - Instrument approaches must be conducted in the approach mode and RAIM must be available at the Final Approach Fix.
   - APR ACTV mode must be annunciated at the Final Approach Fix.
   - Accomplishment of ILS, LOC, LOC BC, LDA, SDF, and MLS approaches are not authorized.
   - When an alternate airport is required by the applicable operating rules, it must be served by an approach based on other than GPS or Loran–C navigation.
   - The KLN 90B can only be used for approach guidance if the reference coordinate datum system for the instrument approach is WGS–84 or NAD–83. (All approaches in the KLN 90B data base use the WGS–84 or the NAD–83 geodetic datums).

   2.5. The airplane must have other approved navigation equipment appropriate to the route of flight installed and operational.
3. Before take–off perform the RAIM prediction for a flight path. If the predicted continuous loss of RAIM is more than 5 minutes, then the GPS KLN 90B should not be used as equipment B–RNAV navigation.

SECTION 3 – EMERGENCY PROCEDURES – Not Affected

SECTION 3A – ABNORMAL PROCEDURES

1. If the KLN 90B GPS information is not available or invalid, utilize remaining operational navigation equipment as required.
2. If a "RAIM NOT AVAILABLE" message is displayed while conducting an instrument approach, terminate the approach. Execute a missed approach if required.
3. If a "RAIM NOT AVAILABLE" message is displayed in the en route or terminal phase of flight, continue to navigate using the KLN 90B or revert to an alternate means of navigation appropriate to the route and phase of flight. When continuing to use GPS navigation, position must be verified every 15 minutes using another IFR approved navigation system.
4. Refer to the KLN 90B Pilot's Guide, Appendices B and C, for appropriate pilot actions to be accomplished in response to annunciated messages.

SECTION 4 – NORMAL PROCEDURES

WARNING

FAMILIARITY WITH THE EN ROUTE OPERATION OF THE KLN 90B DOES NOT CONSTITUTE PROFICIENCY IN APPROACH OPERATIONS. DO NOT ATTEMPT APPROACH OPERATIONS IN IMC PRIOR TO ATTAINING PROFICIENCY IN THE USE OF THE KLN 90B.

OPERATION

GPS annunciation control units (MD–41) test before taxiing.
On the annunciation control units (on the left and right hand instrument panel).

– LAMP TEST button .... PRESS AND HOLD

All annunciators should come on. After covering the photocell window, all annunciators should dim.

– LAMP TEST button .... RELEASE

Normal operating procedures are outlined in the KLN 90B GPS Pilot's Guide, P/N 006–08773–0000, dated December, 1994, (or later applicable revisions). A KLN 90B Memory Jogger, P/N 006–08785–0000 dated 12/94 (or later applicable revision) containing an approach sequence, operating tips and approach related messages is intended for cockpit use by the KLN 90B familiar pilot when conducting instrument approaches.

(cont.)

WARNING

TO PREVENT THE POSSIBILITY OF TURN ANTICIPATION CAUSING POTENTIALLY MISLEADING NAVIGATION WHEN THE AIRPLANE IS NOT ON COURSE:
– VERIFY THE PNI COURSE AND D–BAR PRESENTATION IS PROPER PRIOR TO TAKE–OFF.
–DO NOT SWITCH FROM OBS TO LEG WITH GREATER THAN 1 MM CROSS TRACK ERROR (XTK).

IF MISLEADING DATA IS SUSPECTED, A DIRECT–TO OPERATION TO YOUR DESIRED WAYPOINT WILL CLEAR ANY PREVIOUS OBS COURSE, AND CANCEL TURN ANTICIPATION.

NOTE

After the above Direct–To operation, further reorientation to the nearest leg of the active flight plan may be accomplished by pressing DIRECT–TO, CLR, ENT buttons.

Refer to the Pilot's Guide section 4.2.2 for an explanation of turn anticipation, and Appendix A - Navigation Terms for the definition of cross track error (XTK).

SYSTEM ANNUNCIATORS/SWITCHES/CONTROLS

PNI NAV presentation **(NAV/GPS)** switch and annunciator - May be used to select data for presentation on the PNI: either NAV data from the navigation system or GPS data from the KLN 90B GPS. NAV is white. GPS is green.

NOTE

If GPS presentation is selected and NAV I (II) system is tuned to an active ILS frequency then ILS information will be displayed on the left (right) hand PNI instead of GPS information.

If an active ILS frequency is tuned in the NAV I (II) system then it is not possible to overswitch from NAV to GPS mode in left (right) hand GPS annunciation control unit.

(cont.)

GPS approach (**GPS APR**) switch – Used to manually select or deselect approach ARM (or deselect approach ACTV). Sequential button pushes if in ACTV would first result in approach ARM and then approach arm cancelled. Subsequent button pushes will cycle between the armed state (if an approach is in the flight plan) and approach arm cancelled. Approach ACTV cannot be selected manually.

GPS approach (**ARM/ACTV**) annunciator – Used to annunciate the stage of approach operation either armed (ARM) or activated (ACTV). ARM is white, ACTV is green

GPS omni bearing or leg (**OBS/LEG**) course switch and annunciator – Used to select the basic modes of KLN 90B operation, either a) single waypoint with omni–bearing course (OBS) selection through that waypoint (like a VOR) or b) automatic leg sequencing (LEG) between waypoints. OBS is white, LEG is green.

Message (**MSG**) annunciator – Will flash to alert the pilot of a situation that requires attention. Press the MSG button on the KLN 90B GPS to view the message. (Appendix B of the KLN 90B Pilot's Guide contains a list of all of the message page messages and their meanings). MSG is amber.

Waypoint (**WPT**) annunciator – Prior to reaching a waypoint in the active flight plan, the KLN 90B GPS will provide navigation along a curved path segment to ensure a smooth transition between two adjacent legs in the flight plan. This feature is called turn anticipation. Approximately 20 seconds prior to the beginning of turn anticipation the WPT annunciator will flash, going solid upon initialization of the turn, and extinguishing upon turn completion. WPT is amber

WARNING

TURN ANTICIPATION IS AUTOMATICALLY DISABLED FOR FAF WAYPOINTS AND THOSE USED EXCLUSIVELY IN SID/STARS WHERE OVERFLIGHT IS REQUIRED. FOR WAYPOINTS SHARED BETWEEN SID/STARS AND PUBLISHED EN ROUTE SEGMENTS (REQUIRING OVERFLIGHT IN THE SID/STARS). PROPER SELECTION ON THE PRESENTED WAYPOINT PAGE IS NECESSARY TO PROVIDE ADEQUATE ROUTE PROTECTION ON THE SID/STARS.

PNI course control knob – Provides analog course input to the KLN 90B in OBS when the NAV/GPS switch/annunciator is in GPS. When the NAV/GPS switch annunciator is in NAV, GPS course selection in OBS mode is digital through the use of the controls and display at the KLN 90B.

WARNING

WHEN GPS AND OBS ARE SELECTED IN THE LEFT HAND GPS ANNUNCIATION CONTROL UNIT THEN ANALOG COURSE INPUT TO THE KLN 90B IS ALWAYS CONTROLLED BY THE COURSE CONTROL KNOB ON THE LEFT HAND PNI (IT IS INDEPENDENT FROM CHOICE OF NAV/GPS AND OBS/LEG IN THE RIGHT HAND GPS ANNUNCIATION CONTROL UNIT).

(cont)

WHEN GPS AND OBS ARE SELECTED IN THE RIGHT HAND GPS ANNUNCIATION CONTROL UNIT THEN ANALOG COURSE INPUT TO THE KLN 90B IS CONTROLLED BY THE COURSE CONTROL KNOB ON THE RIGHT HAND PNI (IT IS ONLY VALID IN CASE OF NAV SELECTION IN THE LEFT HAND GPS ANNUNCIATION CONTROL UNIT).

NOTE

Manual PNI course centering in OBS using the control knob can be difficult, especially at long distances. Centering the dbar can best be accomplished by pressing DIRECT- TO button and then manually setting the PNI pointer to the course value prescribed in the KLN 90B displayed message.

PROCEDURES FOR B-RNAV OPERATION

PREFLIGHT PREPARATION

1. Perform RAIM availability prediction for a flight path. If the predicted continuous loss of RAIM is more than 5 minutes, then the KLN 90B should not be used as equipment for B-RNAV navigation.
2. The crew must take in consideration the limitations of B-RNAV operation and the limitations published in AIP or NOTAM.

IN FLIGHT PROCEDURES

1. The crew must perform RAIM operation check during flight
2. If the GPS KLN 90B does not able to keep the accuracy level of navigation data (RAIM NOT AVAILABLE or RAIM POSITION ERROR message is displayed) then:
   - The crew must report this failure to the ATC. The crew follows the ATC instructions for change of flight path.
   - The crew must perform the check of the airplane position accuracy using another navigation system (VOR/DME, NDB and so on).

APPROACH MODE SEQUENCING AND RAIM PREDICTION

NOTE

The special use airspace alert will automatically be disabled prior to flying an instrument approach to reduce the potential for message congestion.

(cont.)

1. Prior to arrival, select a STAR if appropriate from the APT 7 page. Select an approach and an initial approach fix (IAF) from the APT 8 page

NOTE

Using the right hand outer knob, select the ACT (Active Flight Plan Waypoints) pages. Pull the right hand inner knob out and scroll to the destination airport, then push the inner knob in and select the ACT 7 or ACT 8 page.

To delete or replace a SID, STAR or approach, select FPL 0 page. Place the cursor over the name of the procedure, press ENT to change it, or CLR then ENT to delete in.

Approaches, SID or STAR can only be entered into FPL 0 active flight plan. If the KLN 90B is turned off for more than 5 minutes, then the approach, SID or STAR are deleted from FPL 0 when power is turned back on.

2. En route, check for RAIM availability at the destination airport ETA on the STA 5 page

NOTE

RAIM must be available at the FAF in order to fly an instrument approach Be prepared to terminate the approach upon loss of RAIM

3. At 30 NM from the FAF:
   - Verify automatic annunciation of APR ARM
   - Note automatic dbar scaling change from ± 5.0 NM to ± 1.0 NM over the next 30 seconds.
   - Update the KLN 90B altimeter baro setting as required.
   - Internally the KLN 90B will transition from en route to terminal integrity monitoring
4. Select Super NAV 5 page to fly the approach procedure.
   - If receiving radar vectors, or need to fly a procedure turn or holding pattern, fly in OBS until inbound to the FAF.

WARNING

TO PREVENT THE POSSIBILITY OF TURN ANTICIPATION CAUSING POTENTIALLY MISLEADING NAVIGATION WHEN THE AIRPLANE IS NOT ON COURSE, DO NOT SWITCH FROM OBS TO LEG WITH GREATER THAN 1 NM CROSS TRACK ERROR (XTK).

(cont.)

NOTE

OBS navigation is TO-FROM (like a VOR) without waypoint sequencing.

- NoPT routes including DME arc's are flown in LEG. LEG is mandatory from the FAF to the MAP

WARNING

FLYING FINAL OUTBOUND FROM AN OFF-AIRPORT VORTAC ON AN OVERLAY APPROACH; BEWARE OF THE DME DISTANCE INCREASING ON FINAL APPROACH, AND THE GPS DISTANCE-TO-WAYPOINT DECREASING, AND NOT MATCHING THE NUMBERS ON THE APPROACH PLATE!

NOTE

Select HDG mode for DME arc intercepts. NAV or APR coupled DME arc intercepts can result in excessive overshoots (aggravated by high ground speeds and/or intercepts from inside the arc.

5. At or before 2 NM from the FAF inbound.

   Select the FAF as the active waypoint, if not accomplished already.

   - Select LEG operation.

6. Approaching the FAF inbound (within 2 NM).

   - Verify APR ACTV.
   - Note automatic dbar scaling change from ±1.0 NM to ±0.3 NM over the 2 NM inbound to the FAF.

   Internally the KLN 90B will transition from terminal to approach integrity monitoring.

7. Crossing the FAF and APR ACTV is not annunciated:

   - Do not descend.
   - Initiate the missed approach.
   - Climb
   - Navigate to the MAP (in APR ARM if APR ACTV is not available)

NOTE

There is no automatic LEG sequencing at the MAP

- After climbing in accordance with the published missed approach procedure, press DIRECT-TO button, verify or change the desired holding fix and press ENT.

SECTION 5 – PERFORMANCE – Not Affected

SECTION 6 – WEIGHT & BALANCE

ITEM	QTY	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100
GPS KLN 90B	1	3.13	6.90	-1.862	-1.616
Annunciation control unit MD-41	2	0.68	1.50	-0.405	-0.351

SECTION 7 – SYSTEMS OF AIRPLANE

NOTE

The instruments location is shown in the Supplement "Instrument panels".

The KLN 90 B GPS and the place for connection of the data loader jack are located on the central instrument panel. GPS annunciation control units are located on the left and right hand instrument panel. Left (right) hand GPS annunciator control unit is connected with NAV I (II) system and with PNI on the left (right) hand instrument panel.

The KLN 90B GPS panel mounted unit contains the GPS sensor, the navigation computer, a CRT display, and all controls required to operate the unit. It also houses the data base cartridge which plugs directly into the back of the unit.

The data base cartridge is an electronic memory containing information on airports, navaids, intersections, SID's, STAR's, instrument approaches, special use airspace, and other items of value to the pilot.

Every 28 days, Bendix/King receives new data base information from Jeppesen Sanderson. This information is processed and downloaded onto both diskettes and the data base cartridges. Bendix/King makes these two types of update services available to KLN 90B GPS users. KLN 90B user must have valid database for IFR navigation.

(cont.)

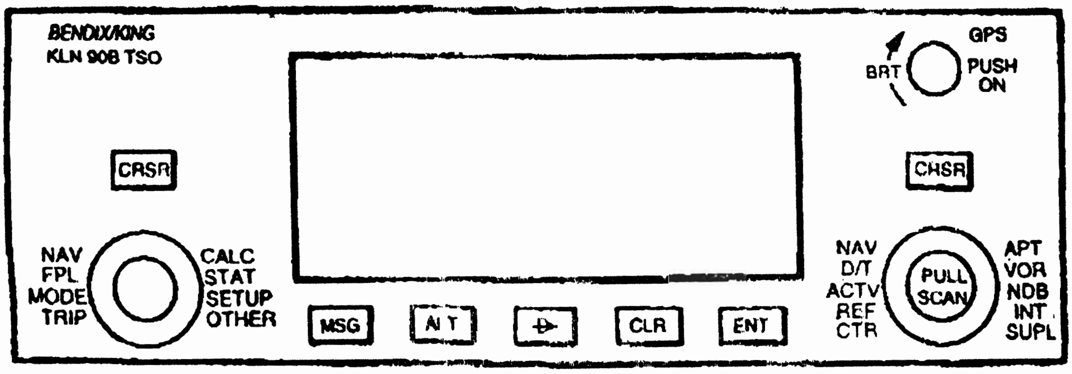

Fig. 1 KLN 90B Control panel

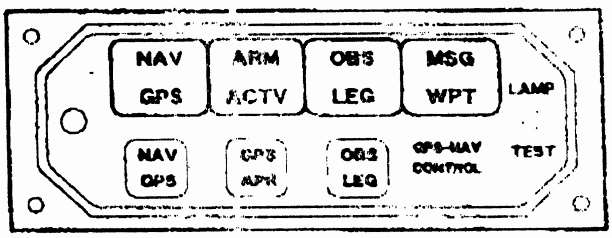

Fig. 2 MD-41 GPS Annunciation control unit

SECTION 8 – HANDLING, SERVICING & MAINTENANCE – Not Affected

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SUPPLEMENT No. 49

FRONT EMERGENCY EXIT

Registration No.	**D4 - CBR**
Serial No.	**912533**

This supplement must be attached to the Airplane Flight Manual when the front emergency exit opened in the flight direction is installed.
The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

This Supplement is the translation of the CAA CZ approved Supplement printed in Czech.

LOG OF REVISIONS

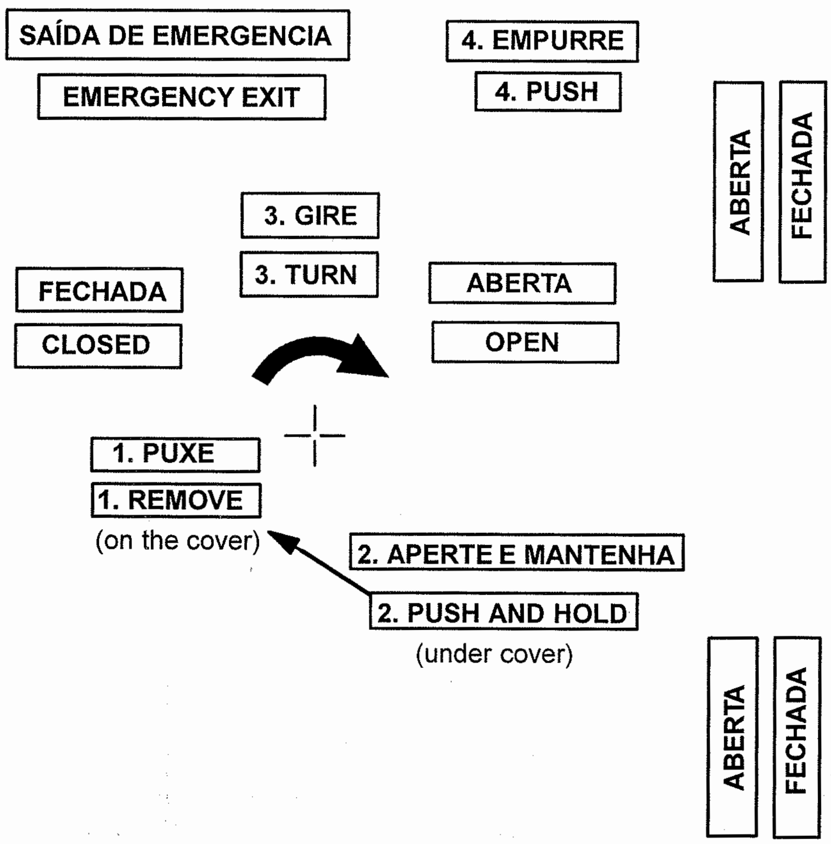
Revision No.	Revised pages	Description of revision	CAA Approved	Date

SECTION 1 – GENERAL – NOT AFFECTED

SECTION 2 – LIMITATIONS

PLACARDS

The original placards located on the front emergency exit is changed thus:



SECTION 3 – EMERGENCY PROCEDURES – NOT AFFECTED

SECTION 3A – ABNORMAL PROCEDURES – NOT AFFECTED

SECTION 4 – NORMAL PROCEDURES – NOT AFFECTED

SECTION 5 – PERFORMANCE – NOT AFFECTED

SECTION 6 – WEIGHT AND BALANCE – NOT AFFECTED

SECTION 7 – SYSTEMS OF AIRPLANE

DOOR, EMERGENCY EXIT AND WINDOWS

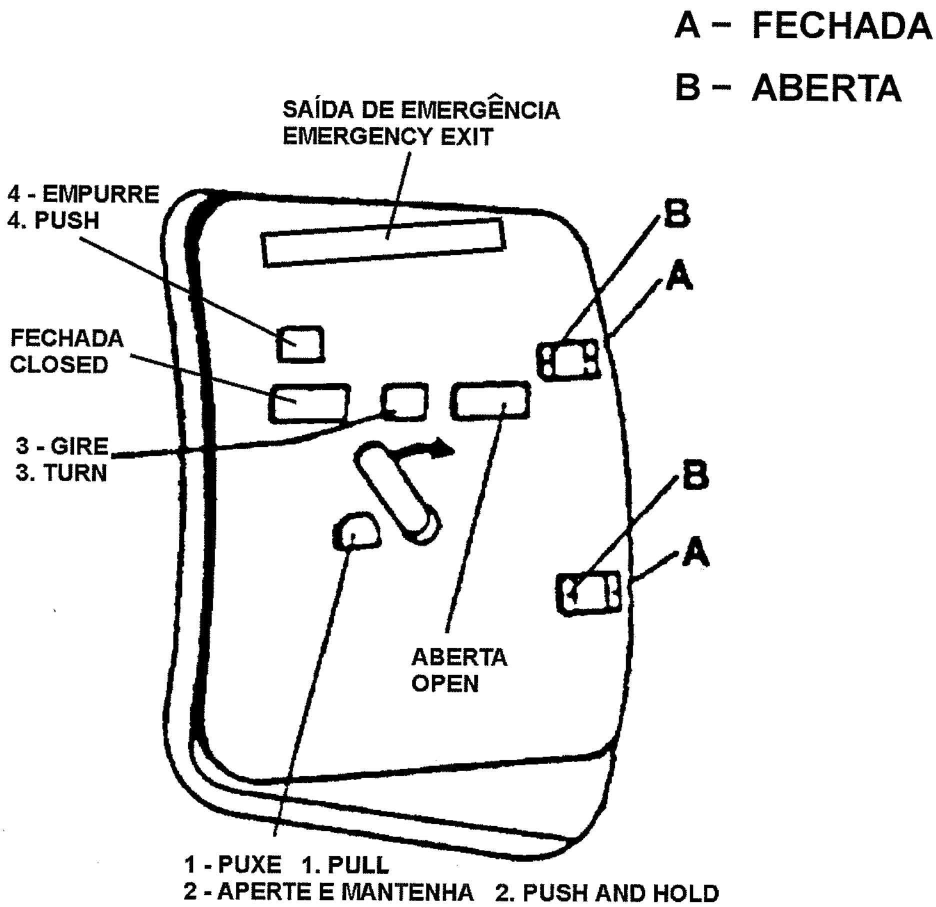
EMERGENCY EXIT

The following text is added:

Emergency exit in the front part of the passenger compartment is opened in the flight direction.

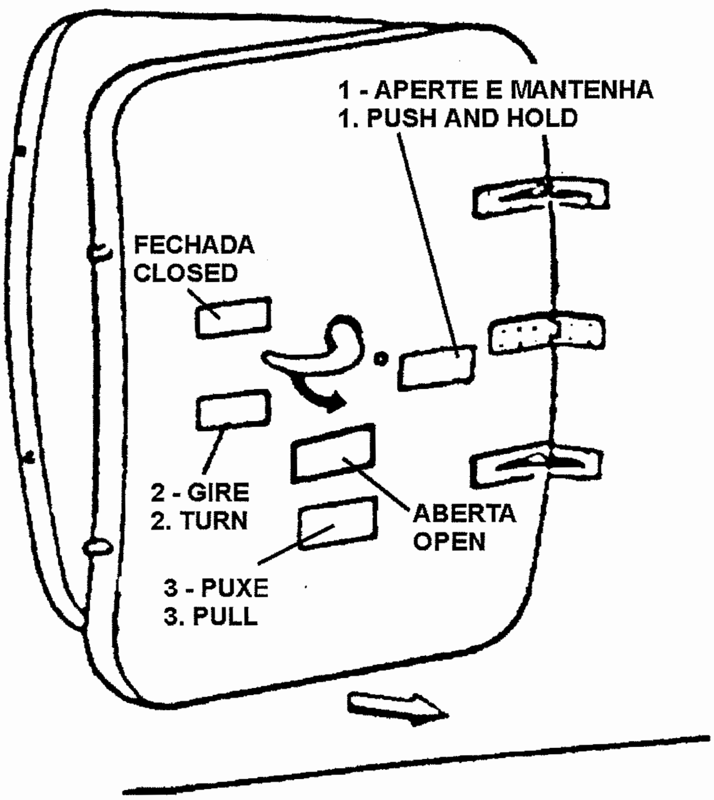
(cont.)

Fig. 7–20 Scheme of opening the main door and emergency exit FROM INSIDE
Item 2 is replaced thus:



(cont.)

Fig. 7−21 Scheme of opening the main door and emergency exit FROM OUTSIDE
Item 2 is replaced thus:



SUPPLEMENT No. 60

ENHANCED GROUND PROXIMITY WARNING SYSTEM

(EGPWS)

Honeywell MARK VI (MK VI)

Registration No.	**D4 – CBR**
Serial No.	**912533**

This supplement must be attached to the Airplane Flight Manual when the enhanced ground proximity warning system MK VI is installed.
Information stated in this supplement complete or replace the data of basic Aircraft Flight Manual only in the areas that are stated here.
Considering the limitations, procedures and information about performances not stated in this supplement, the basic Aircraft Flight Manual is effective.

This Flight Manual Supplement was approved by the Civil Aviation Authority of the Czech Republic in English language version on

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LOG OF REVISION

Revision number	Revised pages	Description of Revision	CAA Approved	Date

SECTION 1 - GENERAL - Not Affected

SECTION 2 - LIMITATIONS

1. The EGPWS Pilots Guide, P/N 060-4314-000, dated April 2000 or later, must be immediately available to the flight crew when operating the Enhanced Ground Proximity Warning System

2. Pilot is authorized to deviate from its current ATC clearance to the extent necessary to comply with an EGPWS warning.

3. If terrain data is unavailable for a particular area (within the region for a regional database), then Terrain and Obstacle alerting is not available for that area and the affected display area is colored magenta. If outside the regional database, the display is blank or turned off with a corresponding Terrain Fail indication.

4. The display of terrain and obstacle information is intended to serve as a situational awareness tool. It does not provide the accuracy and/or fidelity to be the sole source for deciding terrain or obstacle avoidance. Navigation must not be predicated upon the use of the EGPWS terrain/obstacle display.

5. If there is no source of aircraft position data meeting the accuracy requirements for the Terrain Alerting and Display (TAD) and Terrain Clearance Floor (TCF) functions, then these enhanced functions are automatically inhibited with a resultant Terrain Fail indication.

6. TAD/TCF functions should be manually inhibited by TERR INHIBIT switch when within 15 NM and on approach to an airport that is not in the airport database to avoid unwanted alerts. (Refer to Honeywell document P/N 060-4326-000 for airports contained in the installed EGPWS terrain database.

7. When the TAD/TCF functions are inhibited and the EGPWS is otherwise functional, the EGPWS reverts to providing basic GPWS functions (Modes 1 to 6). In this state, the EGPWS may give little or no advance warning time for flight into precipitous terrain where there are few or no preceding obstructions. This particularly applies if:

   - The aircraft is in the landing configuration,
   - The aircraft is in a stabilized descent at a normal approach descent rate,
   - There is no ILS Glideslope signal being received by the EGPWS (not tuned, not available, or inoperative)

8. Terrain clearance or descent rates that are not compatible with required minimum regulatory standards for Ground Proximity Warning equipment may cause unwanted alerts.

9. The EGPWS terrain/obstacle database includes cataloged human-made obstructions greater than 100 feet high within North America and portions of the Caribbean (expanding). The database is not all-inclusive and newer, smaller, or unknown obstructions could be encountered.

10. Notification of a database update is accomplished by Honeywell Service Bulletin. Database updates are distributed on PCMCIA data cards and downloaded via an external PCMCIA interface unit called a SmartCable that connects to a test connector on the front panel of EGPWS.

SECTION 3 - EMERGENCY PROCEDURES

RECOMMENDED PROCEDURES FOR EGPWS ALERTS IN FLIGHT

EGPWS caution

Any of the following conditions is regarded as an EGPWS cautionary alert:

- Activation of the EGPWS “CAUTION TERRAIN”, “CAUTION OBSTACLE”, “TOO LOW TERRAIN”, “SINKRATE”, “DONT SINK”, “GLIDESLOPE”, “TOO LOW FLAPS” or “TOO LOW GEAR” voice alert.
- Activation of the red annunciator or amber GPWS G/S P/CANCEL annunciator.

Procedure for caution alerts:

1. Stop any descent and climb as necessary to eliminate the alert. Analyze all available instruments and information to determine best course of action.
2. Advise ATC of situation as necessary.

EGPWS warning

Any of the following conditions is regarded as an EGPWS warning:

- Activation of the voice warning “PULL UP”, “TERRAIN, TERRAIN, PULL UP” or “OBSTACLE, OBSTACLE, PULL UP”.
- Activation of the red PULL UP annunciator

Procedure for warning alerts:

1. Apply maximum continuous power as determined by emergency need.
2. If engaged, disengage the autopilot and smoothly but aggressively increase pitch to obtain maximum climb performance (V_X = 100 KIAS (185 km/hr IAS))
3. Continue climbing until the warning is eliminated and safe flight is assured.
   Only vertical maneuvers are recommended, unless either operating in visual meteorological conditions (VMC), or the pilot determines, based on all available information, that turning in addition to the vertical escape maneuver is the safest course of action, or both.
4. Advise ATC of situation.

NOTE

Climbing is the only recommended response unless operating in visual conditions and/or pilot determines, based on all available information, that turning in addition to the climbing is the safest course of action. Follow established operating procedures.
Navigation must not be based on the use of the Terrain Awareness and Alerting Display (TAD).

Procedure for glideslope alerts:

Below glideslope alerts consist of “soft” and “hard” alerts based on the degree of glideslope deviation and altitude. Respond to these alerts as necessary to correct the aircraft flight path back to the glideslope centerline or perform a missed approach. To inhibit nuisance messages(e.g. on backcourse approaches), the GPWS G/S P/CANCEL switch can be pressed when the aircraft is below 2000 ft AGL.

Other emergencies

For ditching, or other off airport landings, the TAD and TCF functions should be inhibited by selecting the TERR INHIBIT ON switch.

The EGPWS circuit breaker may be used to deactivate the EGPWS when landing with gear up

SECTION 3A - ABNORMAL PROCEDURES

Partial system deactivation or compensation can be accomplished for abnormal procedures as follows:

Mode 1 - Excessive descent rate

Mode 1 can be desensitized by selecting the GPWS FLP OVRD / ON switch. This permits potentially higher descent rates resulting from flaps not being set to the landing position during approaches. This bias is -300 FPM and is automatically deselected below 50 feet AGL.

Mode 3 – Altitude loss after take off

Selecting Flap Override increases the allowable altitude loss after take off. Mode 3 alerts are desensitized (as a function of altitude) when the GPWS FLP OVRD / ON switch is activated. This is used to eliminate unwanted Mode 3 alerts if operating at low altitude after takeoff. Flap Override is automatically deselected below 50 feet AGL.

Mode 5 – Descent below glideslope

Mode 5 Glideslope alerts can be manually canceled when below 2000 feet Radio Altitude by pressing the GPWS G/S P/CANCEL switch. This is typically selected when an unreliable glideslope is expected or when maneuvering is required during ILS final approach. The G/S Cancel is automatically reset following landing or if the aircraft climbs above the 2000 feet.

Terrain alerting and clearance floor

Pressing the TERR. INHIBIT / ON switch inhibits TAD and TCF alerting and display, including Obstacles and Peaks when enabled. This is typically used when operating at an airport not in the terrain database. Selection of Terrain Inhibit does not cause the Terrain Inoperative or unavailable annunciation. Terrain Inhibit requires manual deactivation.

SECTION 4 - NORMAL PROCEDURES

BEFORE TAXI

SWITCHING ON AND CHECKING

On the overhead panel

– BATTERY I,II switch CENTRAL WARNING DISPLAY – ELECTRO, INTERCOM I, II, PA, VHF/NAV I, GYROCOMP.I RADAR, MFD, RADIO ALTIMETER, SSR circuit breakers:	check switching-on
– EGPWS, ADM circuit breakers:	switch on

On the central instrument panel:

- On the radar control box	
Function change-over switch	TST
RNG buttons for 40 nm range setting	press
TERR button	press
- TERR N/A annunciator	check off

NOTE

The GPS requires current almanac to locate GPS satellite positions. This almanac can take several minutes to load. When an accurate GPS position is acquired and the rest of the EGPWS system is available, the TERR N/A annunciator will extinguish.

- GPWS G/S, GPWS FLP OVRD, TERR INHIBIT switches	check off
- GPWS P.TEST button to initiate self-test	press
- GPWS INOP and TERR N/A annunciators illuminate	check
- GPWS FLP OVRD annunciator turns on momentarily	check
- amber GPWS G/S turn on	check
- the voice callout "GLIDESLOPE" is heard	check
- amber GPWS G/S turn off	check
- red warning GPWS annunciatur turn on	check
- the voice callout "PULL UP" is heard	check
- the voice callout "TERRAIN, TERRAIN, PULL UP" is heard	check
- EGPWS Terrain Display shows the Test Pattern	check
- red warning GPWS annunciator turn off	check
- terrain Test Pattern is turned off (after 6 to 8 sec.)	check
- GPWS INOP and TERR N/A annunciators turn off	check

A successful test is accomplished if all expected indications are observed and no inoperative functions or display anomalies are indicated or observed.

The GPWS INOP annunciation signifies a failure of the basic GPWS (Modes 1-6), the TERR N/A annunciation signifies TAD and TCF are not available.

In the event the radio altimeter is not functioning the basic GPWS modes and TCF will not be available. However, TAD will be available.

If the EGPWS TAD or TCF features become inoperative because of a system fault or inaccurate position information, the basic GPWS function modes 1 - 6 will still be available.

CAUTION

IF THE EGPWS HAS DETECTED A FAILURE DO NOT USE IT IN FLIGHT.

On the radar indicator:

- TERR button — as required

USE IN FLIGHT

For weather radar operation see appropriate supplement in Section 9 of this AFM.

On the central instrument panel:

- On the radar control box
  Function change-over switch — TST or ON (terrain can be displayed)
  RNG buttons (range setting) — as required
- TERR button — press as required

Monitor EGPWS alerts/warnings and proceed as shown in this supplement – see Section 3.

Procedure for advisory callouts

Advisory callouts being advisory in nature are used to announce an event or condition (e.g., “Minimums, Minimums”). Response to these callouts should be in accordance with standard operating procedures.

SWITCHING - OFF

On the overhead panel

– EGPWS, ADM circuit breakers: — switch off

SECTION 5 - PERFORMANCE - Not affected

SECTION 6 - WEIGHT AND BALANCE

ITEM	QTY	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100
EGPWS Mark VI installation	1 set	6.04	13.32	- 8.794	- 7.633

SECTION 7 - SYSTEMS OF AIRPLANE

NOTE

The instrument location is shown in the Supplement - Instrument panels

The Honeywell MK VI Enhanced Ground Proximity Warning System (EGPWS) is installed in the airplane.

The system uses information from GPS receiver, GS receiver, vertical gyro, gyrocompass, and radio altimeter. The other input is uncorrected barometric pressure from the altitude encoding altimeter and additional input of Outside Air Temperature (OAT) probe. The EGPWS contains internal database. It contains all the terrain data, known obstacles data (where available), and runway data containing information on all runways 2000 feet or longer in length.

Outputs generated by the system are:

- Terrain / Obstacle Display ;
- Voice alerts / Warnings / Call outs
- Visual alerts l Warnings

The EGPWS is interfaced to radar indicator (terrain display), which displays terrain data or weather radar data. Indication is over switched by TERR button on the radar indicator. Indication range is selected with radar control elements (RNG buttons).

Terrain display

With Terrain Display selected on, digital values representing the highest terrain/obstacle elevation and the elevation for the bottom of the lowest color band are displayed, based on the range selected (terrain in view).

NOTE

Differences may exist between the highest terrain/obstacle being displayed and the digital elevation value/color of the „Peaks“ number at or near the top and sides of the display.

Elevations are expressed in hundreds of feet above sea level (e.g., 125 is 12,500 feet MSL) with the highest elevation on top and the lowest on the bottom. However, in the event that there is no appreciable difference in the terrain/obstacle elevations (flat terrain), only the highest value is displayed. Additionally, the color of the elevation value is presented the same as the color of the terrain display containing that elevation. In other words, if the highest displayed terrain/ obstacle is red and the lowest is green, then the top numeric is red and the bottom numeric is green.

When the aircraft is greater than 500 feet (250 with gear down) above the terrain in view (no yellow or red displayed), additional (green) color bands are presented. These added bands are computed and displayed as a function of the highest and lowest elevations in view.

The following table indicates the TAD colors and elevations.

Color	Indication
Solid red	Terrain/Obstacle Threat Area - Warning
Solid Yellow	Terrain/Obstacle Threat Area - Caution
50% Red Fill	Terrain/Obstacle that is more than 2,000 ft above airplane altitude.
50% Yellow Fill	Terrain/Obstacle that is between 1,000 and 2,000 ft above airplane altitude.
25% Yellow Fill	Terrain/Obstacle that is 500 ft (250 ft with gear down) below to 1,000 ft above airplane altitude.
Solid Green	Shown only when no Red or Yellow Terrain/Obstacle areas are within range on the display. Highest Terrain/Obstacle not within 500 ft (250 ft with gear down) of airplane altitude.
50% Green Fill	Terrain/Obstacle that is 500 ft (250 ft with gear down) below to 1,000 ft below airplane altitude
	Terrain/Obstacle that is the middle elevation band when there is no Red or Yellow Terrain areas within range on the display.
15% Green Dots	Terrain/Obstacle that is 1,000 to 2,000 ft below airplane altitude.
	Terrain/Obstacle that is the lower elevation band when there is no Red or Yellow Terrain areas within range on the display.
Black	No significant Terrain/Obstacle.
15% Cyan Fill	Areas having sea level elevation (0 ft MSL)
Magenta Fill	Unknown terrain. No terrain data in the database for the magenta area shown.

BASIC FUNCTION

MODE 1 - Excessive Descent Rate

Mode 1 provides alerts for excessive descent rates with respect to altitude AGL and is active for all phases of the flight. This mode has inner and outer alert boundaries. Penetration of the outer boundary activates the EGPWS caution lights and **"SINKRATE, SINKRAT**E" alert enunciation. Additional **"SINKRATE, SINKRATE**" messages will occur for each 20% reduction in time to impact.
Penetration of the inner boundary activates the EGPWS warning lights and changes the audio message to **"PULL UP"** which repeats continuously until the inner warning boundary is exited.

Glideslope deviation bias

If a valid ILS Glideslope front course is received and the aircraft is above the glideslope centerline, the outer (sinkrate) boundary is adjusted to desensitize the sinkrate alerting. This is to prevent unwanted alerts when the aircraft is safely capturing the glideslope (or repositioning to the centerline) from above the beam.

MODE 2 – Excessive closure to terrain

Mode 2 provides alerts to help protect the aircraft from impacting the ground when rapidly rising terrain with respect to the aircraft is detected. Mode 2 is based on Radio Altitude and on how rapidly Radio Altitude is decreasing (closure rate). Mode 2 exists in two forms, 2A and 2B.

MODE 2A

Mode 2A is active during climbout, cruise, and initial approach (flaps not in the landing configuration and the aircraft not on glideslope centerline). If the aircraft penetrates the Mode 2A caution envelope, the aural message **"TERRAIN, TERRAIN"** is generated and cockpit EGPWS caution lights will illuminate. If the aircraft continues to penetrate the envelope, the EGPWS warning lights will illuminate and the aural warning message **"PULL UP"** is repeated continuously until the warning envelope is exited.
Upon exiting the warning envelope, if terrain clearance continues to decrease, the aural message **"TERRAIN"** will be given until the terrain clearance stops decreasing. In addition, the visual alert will remain on until the aircraft has gained 300 feet of altitude, 45 seconds has elapsed, or landing flaps or the flap override switch is activated.
The upper boundary of the Mode 2 alert envelope varies as a function of the aircraft speed. The boundary expansion provides increased alert times at the higher airspeeds.
The Mode 2A upper limit is reduced to 1250 feet for all airspeeds when the Terrain Alerting and Display (TAD) function is enabled and available. This is due to the enhanced alerting capability provided with TAD, resulting from high integrity GPS Altitude and Geometric Altitude data. The Mode 2A envelope is lowered in order to reduce the potential for nuisance alerts during an approach.

MODE 2B

Mode 2B provides a desensitized alerting envelope to permit normal landing approach maneuvers close to terrain without unwanted alerts. Mode 2B is automatically selected with flaps in the landing configuration (landing flaps or flap Override selected) or when making an ILS approach with Glideslope and Localizer deviation less than 2 dots. It is also active during the first 60 seconds after takeoff.
Mode 2B is selected when the aircraft is within 5 nm and 3500 feet of the destination airport (independent of configuration) and the Terrain Alerting and Display (TAD) function is enabled and available. This is due to the enhanced alerting capability provided with TAD, resulting from high integrity GPS Altitude and Geometric Altitude data. The Mode 2B envelope is selected in order to reduce the potential for nuisance alerts during an approach.

During an approach, if the aircraft penetrates the Mode 2B envelope with either the gear or flaps not in the landing configuration, the aural message **"TERRAIN, TERRAIN"** is generated and the EGPWS caution lights illuminate. If the aircraft continues to penetrate the envelope, the EGPWS warning lights illuminate and the aural message **"PULL UP"** is repeated continuously until the warning envelope is exited. If the aircraft penetrates the Mode 2B envelope with both gear and flaps in the landing configuration, the aural **"PULL UP"** messages are suppressed and the aural message **"TERRAIN"** is repeated until the envelope is exited.

MODE 3 – Altitude loss after take off

Mode 3 provides alerts for significant altitude loss after takeoff or low altitude go-around (less than 170 feet AGL) with gear or flaps not in the landing configuration. The amount of altitude loss that is permitted before

an alert is given is a function of the height of the aircraft above the terrain. This protection is available until the EGPWS determines that the aircraft has gained sufficient altitude that it is no longer in the takeoff phase of flight. Significant altitude loss after takeoff or during a low altitude go-around activates the aural message **"DON'T SINK, DON'T SINK"**.
The aural message is only enunciated twice unless altitude loss continues. Upon establishing a positive rate of climb, the EGPWS caution lights extinguish and the aural alert will cease.

MODE 4 - Unsafe terrain clearance

Mode 4 provides alerts for insufficient terrain clearance with respect to phase of flight, configuration, and speed. Mode 4 exists in three forms, 4A, 4B, and 4C.

- Mode 4A is active during cruise and approach with the gear not in the landing configuration.
- Mode 4B is active during cruise and approach with the gear in the landing configuration and flaps not in the landing configuration.
- Mode 4C is active during the takeoff phase of flight with either the gear or flaps not in the landing configuration.

An airspeed expansion function provides alerts at higher airspeeds for advanced indication of proximity to terrain. Mode 4 alerts activate EGPWS aural messages.

MODE 4A

Mode 4A is active during cruise and approach with gear up. This provides alerting during cruise for inadvertent flight into terrain where terrain is not rising significantly, or the aircraft is not descending excessively. It also provides alerting for protection against an unintentional gear-up landing.

The boundary for Mode 4A is at 500 feet AGL. Penetration of this altitude below an airspeed of 148 knots will produce an aural alert of **"TOO LOW GEAR".** Above 148 knots, the boundary increases linearly with airspeed to a maximum of 750 feet AGL at 170 knots to produce a **"TOO LOW TERRAIN"** aural alert.
For any Mode 4A alert, subsequent aural messages occur only if penetration of the envelope increases by 20%. EGPWS alert lights extinguish and aural messages cease when the Mode 4A alert envelope is exited.

MODE 4B

Mode 4B is active during cruise and approach with gear down and flaps not in the landing configuration. The boundary for Mode 4B is at 170 feet AGL. Penetration of this altitude below an airspeed of 148 knots will produce an aural alert of **"TOO LOW FLAPS".** Above 148 knots, the boundary increases linearly with airspeed to a maximum of 1000 feet AGL at 200 knots to produce a **"TOO LOW TERRAIN"** aural alert.

If the aircraft radio altitude decreases to the value of the Minimum Terrain Clearance (MTC), the aural message **"TOO LOW TERRAIN"** is enunciated.

If desired, the pilot may disable the **"TOO LOW FLAPS"** alert by engaging the GPWS FLP OVRD switch. This precludes or silences the Mode 4B flap alert until reset by the pilot. For any Mode 4B alert, subsequent aural messages occur only if penetration of the envelope increases by 20%. Aural messages cease when the Mode 4B alert envelope is exited.

MODE 4C

The Mode 4C alert is intended to prevent inadvertent controlled flight into the ground during take off climb into terrain that produces insufficient closure rate for a Mode 2 alert. After takeoff, Mode 4A and 4B provide this protection.

Mode 4C is based on an EGPWS computed Minimum terrain clearance (MTC) floor, that increases with Radio Altitude. It is active after take off when the gear or flaps are not in the landing configuration. It is also active during a low altitude go around if the aircraft has descended below 170 feet AGL.

At takeoff, the MTC is zero feet. As the aircraft ascends, the MTC is increased to 75% of the aircraft's Radio Altitude (averaged over the previous 15 seconds). This value is not allowed to decrease and is limited to the same values as the Mode 4A curve. If the aircraft radio altitude decreases to the value of the MTC the aural message **„TOO LOW TERRAIN“** is enunciated. Aural messages cease when the Mode 4C alert envelope is exited.

MODE 5 – Excessive deviation below glideslope

Mode 5 provides two levels of alerting for when the aircraft descends below glideslope, resulting in activation of EGPWS alert lights and aural messages.

The first level alert occurs when below 1000 feet Radio Altitude and the aircraft is 1.3 dots or greater below the beam. This turns on alert lights and is called a "soft" alert because the audio message **"GLIDESLOPE"** is enunciated at half volume. Twenty percent increases in the glideslope deviation cause additional **"GLIDESLOPE"** messages to be enunciated. The second level alert occurs when below 300 feet Radio Altitude with 2 dots or greater glideslope deviation. This is called a "hard" alert because a louder **"GLIDESLOPE, GLIDESLOPE"** message is enunciated every 4 seconds continuing until the "hard" envelope is exited. The alert lights remain on until a glideslope deviation less than 1.3 dots is achieved. To avoid unwanted GPWS G/S alerts when capturing the localizer between 500 and 1000 feet AGL, alerting is varied in the following ways:

a) GPWS G/S alerts are enabled only if:

- Localizer is within ± 2 dots, if available
- Landing gear and flaps are selected,
- Glideslope Cancel is not active,
- A front course approach is determined

b) The upper altitude limit for the alert is modulated with vertical speed. For descent rates above 500 FPM, the upper limit is set to the normal 1000 feet AGL. For descent rates lower than 500 FPM, the upper limit is desensitized (reduced) to a minimum of 500 feet AGL.

Additionally, both alert levels are desensitized below 150 feet AGL, to allow for normal beam variations nearer the ground, and reduce the possibility of nuisance alerts. Mode 5 alerts can be canceled by pressing the GPWS G/S P/CANCEL switch any time below 2000 feet AGL. This is automatically reset when the aircraft descends below 30 feet or climbs above 2000 feet AGL. The MK VI can do this, by changing the ILS frequency.

NOTE

GPWS G/S P/CANCEL can not be deselected (reset) by again pressing the GPWS G/S P/CANCEL switch.

EGPWS Mode 5 alerts may be inhibited during backcourse approaches to prevent nuisance alerts due to false fly up lobes from the Glideslope. The EGPWS determines a backcourse approach if a glideslope inhibit discrete is set.

MODE 6 – Advisory callout

Mode 6 provides EGPWS advisory callouts based on the menu selected option established at installation. These callouts consist of predefined Radio Altitude based altitude and excessive bank angle voice callouts. There is no visual alerting provided with these callouts.

Altitude callouts

Decision Height (DH) based callout ("Minimums - Minimums") require the landing gear to be down, and occur when descending through the altitude corresponding to the selected DH. These also have priority over other altitude callouts when overlapping. For example, if DH is set to 200 and both "TWO HUNDRED" and "MINIMUMS - MINIMUMS" are valid callouts, then only the "MINIMUMS - MINIMUMS" will be issued at 200 feet AGL.

Following is a list of the altitude callouts:

CALLOUT	Occurs at (feet AGL)
„MINIMUMS-MINIMUMS“	DH
„FIVE HUNDRED“	500
„TWO HUNDRED“	200
"ONE HUNDRED"	100
"FIFTY"	50
"FORTY"	40
"THIRTY"	30
"TWENTY"	20
"TEN"	10

Each selected callout is only enunciated once per approach.
The EGPWS determines a non-precision approach when Glideslope is greater than 2 dots deviation (valid or not) or a back-course approach is detected. The "500 Above Field " callout will be annunciated once during each approach when the aircraft flies below 500 ft above the landing field. It compares the GPS-based geometric altitude with the closest runway. The callout annunciates "FIVE HUNDRED".

Bank angle callout

The callout **"BANK ANGLE, BANK ANGLE"** advises of an excessive roll angle. The EGPWS provides excessive bank angle limits based on the aircraft altitude above the ground (Radio Altitude) and if the autopilot is engaged.

Below are the bank angle advisories:

Without the autopilot engaged, roll angles exceeding:

- $\pm$15 to $\pm$50 degrees between 10 and 210 feet AGL
- $\pm$50 degrees above 210 feet AGL

produce the bank angle advisory.

With the autopilot engaged, bank angles exceeding:

- $\pm$15 to $\pm$33 degrees between 10 and 156 feet AGL,
- $\pm$33 degrees above 156 feet AGL,

produce the bank angle advisory.

Bank angle advisories are inhibited below 10 feet.

Once the initial roll limit is exceeded, the **"BANK ANGLE, BANK ANGLE"** callout is given once. Another callout is not given until either:

- a 20% increase in roll is detected, or
- the aircraft rolls below the initial roll limit (resetting the process) and initial roll limit is exceeded again.

If the 20% increase in roll is exceeded (causing the second bank angle alert), another callout is not given until either:

- another 20% increase in roll is detected, or
- the aircraft rolls below the initial roll limit and another (resetting the process) and the initial roll is exceeded again

Above the second 20% increase in roll, the callout is continuous until roll is reduced below this second 20% limit. If roll rate exceeds the audio callout time, then the bypassed limit is not indicated (e.g., if a 20% increase is exceeded before the initial roll limit callout can be completed). Another consideration is the banking affect on Radio Altitude data during lower altitude turning operations. Higher bank angles will increase the effective Radio Altitude height (and rate of change) resulting in some biasing of the actual callout altitude and bank angle limit. When the Autopilot is engaged, the 20% increases and process reset principles are applied to the reduced limit in the same manner.

ENHANCED FUNCTIONS

Envelope Modulation

Due to terrain features at or near certain specific airports around the world, normal operations have resulted in nuisance or missed alerts at these locations in the past. With the introduction of accurate position information and a terrain and airport database, it is possible to identify these areas and adjust the normal alerting process to compensate for the condition. The EGPWS Envelope Modulation feature provides improved alert protection and expanded alerting margins at identified locations throughout the world. This feature is automatic and requires no flight crew action.

Modes 4, 5, and 6 are expanded at certain locations to provide alerting protection consistent with normal approaches. Modes 1, 2, and 4 are desensitized at other locations to prevent nuisance alerts that result from unusual terrain or approach procedures. In all cases, very specific information is used to correlate the aircraft position and phase of flight prior to modulating the envelopes.

Terrain Clearance Floor

The Terrain Clearance Floor (TCF) function (enabled with TAD) enhances the basic GPWS Modes by alerting the pilot of descent below a defined "Terrain Clearance Floor" regardless of the aircraft configuration. The TCF alert is a function of the aircraft's Radio Altitude and distance (calculated from latitude/longitude position) relative to the center of the nearest or destination runway included in the database (all runways greater than 2000 feet in length). The TCF envelope is defined for all runways and extends to infinity, or until

it meets the envelope of another runway. The alert envelope is limited to a minimum of 245 feet AGL adjacent to the runway. The Envelope Bias Factor is reduced (moved closer to the runway) when higher accuracy aircraft position and runway position information is available. This is typically 1/3 to 1 nm, varying as a function of position accuracy, providing protection against landing short events.
Runway selection logic incorporates comprehensive aircraft position and navigation information to evaluate proximity runways and determine the most likely destination runway for all alerting purposes.

Runway Field Clearance Floor

A Runway Field Clearance Floor feature is similar to the TCF feature except that RFCF is based on the current aircraft position and height above the destination runway, using Geometric Altitude (in lieu of Radio Altitude). This provides improved protection at locations where the runway is significantly higher than the surrounding terrain. TCF and RFCF alerts result in illumination of the EGPWS alert lights and the aural message **"TOO LOW TERRAIN**". The audio message is provided once when initial envelope penetration occurs and again only for additional 20% decreases in Radio or Geometric Altitude. The EGPWS alert lights remain on until the TCF/RFCF envelope is exited.

Terrain alerting and display (TAD)

Another enhancement provided by the internal terrain database, is the ability to look ahead of the aircraft and detect terrain or obstacle conflicts with greater alerting time. This is accomplished (when enabled) based on aircraft position, flight path angle, track, and speed relative to the terrain database image forward the aircraft.

Through sophisticated look ahead algorithms, both caution and warning alerts are generated if terrain or an obstacle conflict with "ribbons" projected forward of the aircraft. These ribbons project down, forward, then up from the aircraft with a width starting at 1/4 nm and extending out at 3 degrees laterally, more if turning. The look down and up angles are a function of the aircraft flight path angle, and the look down distance a function of the aircraft's altitude with respect to the nearest or destination runway. This relationship prevents undesired alerts when taking off or landing. The look-ahead distance is a function of the aircraft's speed, and distance to the nearest runway.

A terrain conflict intruding into the caution ribbon activates the aural message **"CAUTION TERRAIN, CAUTION TERRAIN".** An obstacle conflict provides a **"CAUTION OBSTACLE, CAUTION OBSTACLE"** message. The caution alert is given typically 40-60 seconds ahead of the terrain/obstacle conflict and is repeated every seven seconds as long as the conflict remains within the caution area.

When the warning ribbon is intruded (typically 30 seconds prior to the terrain/obstacle conflict), EGPWS warning lights activate and the aural message **"TERRAIN, TERRAIN, PULL UP"** or **"OBSTACLE, OBSTACLE, PULL UP"** is enunciated with **"PULL UP"** repeating continuously while the conflict is within the warning area.

The EGPWS Terrain Alerting and Display (TAD) feature can provide an image of the surrounding terrain represented in various colors and intensities. TAD display called "Peaks" enhances the display characteristics to provide a high degree of terrain awareness independent of the aircraft altitude. In either case, terrain and obstacles forward of the aircraft and within the range selected are displayed. Obstacles are presented on the cockpit display as terrain, employing the same display-coloring scheme.

On the terrain display, an indication of MSL altitude will appear. This altitude is the reference altitude for the display and the terrain awareness algorithm. This reference altitude is based on internally calculated Geometric Altitude and NOT corrected barometric altitude. It represents the aircraft's calculated true height above sea level (MSL) and serves as the reference altitude for color coding of the terrain display and the altitude input to the look-ahead algorithm. Because it is primarily comprised of GPS altitude, this reference altitude will often differ from cockpit displayed corrected barometric altitude. This altitude is not to be used for navigation. It is presented to provide the crew with additional situational awareness of true height above sea level, upon which terrain alerting and display is based.

Pop-Up and Auto-Range

Automatic display of terrain on the cockpit display (TAD “Pop-Up”).

This feature occurs when a caution or warning alert is triggered as described in Terrain Alerting and Display. In some cases, an active display mode must be selected first.

“Auto-range” when Pop-up occurs.

This provides for the automatic range presentation for terrain as defined for the display system configuration (typically 10 nm). In this case, if the terrain auto-range is different than the display system selected range, the displayed range value on the cockpit display is flashed or changed color until the range is manually re-selected or terrain display is deselected.

TCF/TAD INOP and INHIBIT

The EGPWS TCF and TAD functions are available when all required data is present and acceptable. Aircraft position and numerous other parameters are monitored and verified for adequacy in order to perform these functions. If determined invalid or unavailable, the system will display Terrain inoperative or unavailable annunciation and discontinue the terrain display if active.

TAD/TCF functions may be inhibited by manual selection of a cockpit TERR INHIBIT switch. Neither loss nor inhibiting TAD/ TCF affects the basic GPWS functions (modes 1–6). If Terrain display is not enabled and TAD becomes unavailable due to position error; terrain inoperative or unavailable is not indicated when the aircraft is greater than 8000 feet above the highest terrain or obstacle within the loaded terrain database (area in use). If indicated below the 8000 foot threshold, it is extinguished when the aircraft climbs above, and is again displayed once the aircraft descends below the 8000 foot threshold. This eliminates potentially long-term illumination of terrain inoperative or not available during the high enroute phase of flight.

GEOMETRIC ALTITUDE

Based on GPS Altitude, Geometric Altitude is a computed pseudo-barometric altitude Above Sea Level (ASL) designed to reduce or eliminate errors potentially induced in Corrected Barometric Altitude by temperature extremes, nonstandard pressure altitude conditions, and altimeter miss-sets. This ensures an optimal EGPWS Terrain display and alerting capability. Geometric Altitude also allows continuous EGPWS operations in QFE environments without custom inputs or special operational procedures. Geometric Altitude requires a MSL based GPS Altitude input with its associated Vertical Figure Of Merit (VFOM) and Receiver Autonomous Integrity Monitoring (RAIM) failure indication, standard (uncorrected) altitude, Radio Altitude, Ground Speed, Roll Angle, and aircraft position (Latitude and Longitude). Additionally, corrected Barometric Altitude, Static Air Temperature (SAT), GPS mode, and the number of satellites tracked are used if available.

The Geometric Altitude is computed by blending a calculated Non-Standard Altitude, Runway Calibrated Altitude (determined during takeoff), GPS Calibrated Altitude, Radio Altitude Calibrated Altitude (determined during approach), and Barometric Altitude (if available). Estimates of the VFOM for each of these are determined and applied in order to determine its weight in the final altitude. The blending algorithm gives the most weight to altitudes with a higher estimated accuracy, reducing the effect of less accurate altitudes. Each component altitude is also checked for reasonableness using a window monitor computed from GPS Altitude and its VFOM. Altitudes that are invalid, not available, or fall outside the reasonableness window are not included in the final Geometric Altitude value.

The Geometric Altitude algorithm is designed to allow continued operation when one or more of the altitude components are not available. If all component altitudes are invalid or unreasonable, the GPS Altitude is used directly.

The Geometric Altitude function is fully automatic and requires no pilot action.

Aural Message Priority

Two or more alerts may be activated simultaneously, so a message priority is established. The following table reflects the priority for these message callouts. Messages at the top of the list will start before or immediately override a lower priority message even if it is already in progress.

MESSAGE	MODE
“Pull Up”	1, 2, TA
“Terrain, Terrain”	2, TA
“Obstacle, Obstacle	TA
“Terrain”	2
“Minimums, Minimums”	6
“Caution Terrain, Caution Terrain”	TA
“Caution Obstacle, Caution Obstacle”	TA
“Too Low Terrain”	4, TCF
Altitude Callouts	6
“Too Low Gear”	4A
“Too Low Flaps”	4B
“Sink rate, Sink rate”	1
“Don’t Sink, Don’t Sink”	3
“Glideslope”	5
“Bank Angle, Bank Angle”	6

TA = Terrain Look-Ahead Alerting

TCF = Terrain Clearance Floor

EGPWS Switches and Annunciators

PULL UP GPWS P/TEST switch/annunciator – red annunciator is associated with EGPWS warnings described above, EGPWS Self-test is initiated by pressing this switch.

GPWS G/S P/CANCEL switch/annunciator – this amber annunciator indicates descending below glideslope in accordance with Mode 5, GPWS G/S alerts can be cancelled by pressing this switch.

GPWS INOP / TERR N/A annunciator - this amber annunciator indicates that EGPWS / GPS is not operating.

TERR INHIBIT / ON switch/annunciator - this switch/annunciator inhibit all visual and aural alerts and warnings associated with the EGPWS. Also a message will be displayed indicating "Warnings Inhibited". The terrain display remains operational.
The purpose of the "TERR INHIBIT" switch is to allow airplane to operate without nuisance or unwanted warnings at airports that are not in the system database. Examples might be private airports or those with runways shorter than 2000 feet. Additionally, there may be some "VFR only" airports where unique terrain features are in close proximity to the runway, and the "TERR INHIBIT" may be used when operating in good VFR conditions. The "TERR INHIBIT" switch must be not engaged for normal operations.

G/S CANCLD annunciator **–** this annunciator provides visual indication that the EGPWS Mode 5 function is inhibited by pressing GPRWS G/S P/CANCEL switch.

GPWS FLP OVRD annunciator – this annunciator provides visual indication that the EGPWS Flap Override function is activated. The GPWS FLP OVRD annunciators also has a switch that is used to manually activate the Flap Override function.

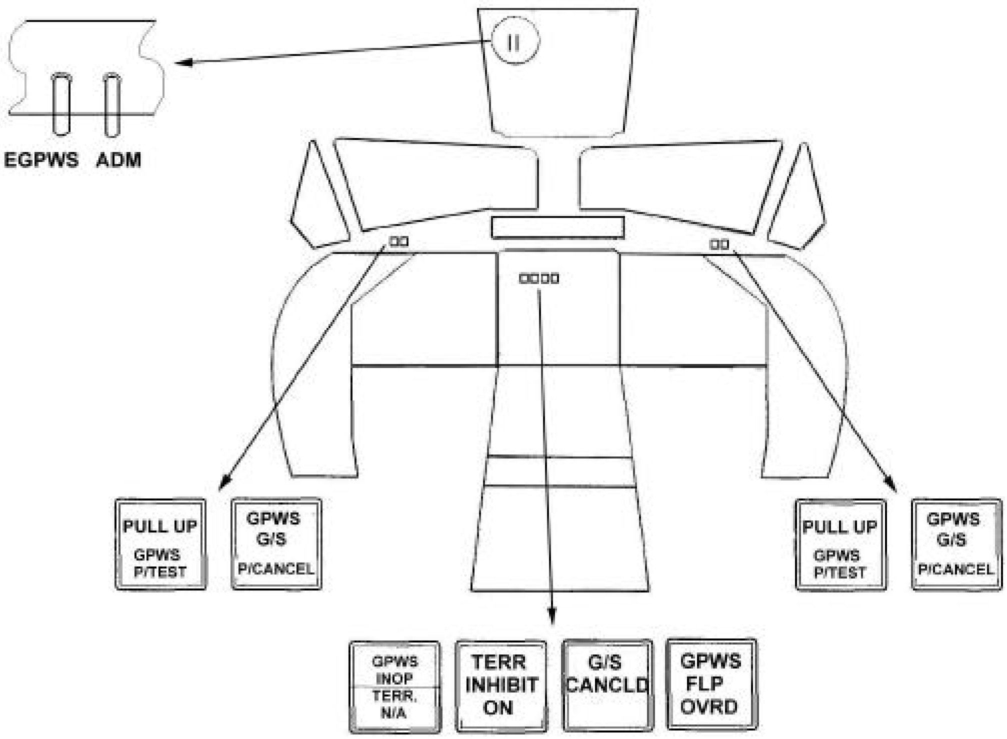

Fig. 1: EGPWS switches and annunciators

NOTE

For more detail information than is mentioned in this supplement see MK VI & MK VIII EGPWS Pilot Guide P/N 060-4314-000 • Rev. B - February 2002 or later applicable version.

SECTION 8 - HANDLING, SERVICING & MAINTENANCE - Not Affected

SUPPLEMENT No. 74

ATC TRANSPONDER

Honeywell MST 67A

Registration No.	D4 – CBR
Serial No.	912533

This supplement must be attached to the Airplane Flight Manual when the ATC transponder type MST 67A is installed.
Information stated in this supplement complete or replace the data of basic Aircraft Flight Manual only in the areas that are stated here.
Considering the limitations, procedures and information about performances not stated in this supplement, the basic Aircraft Flight Manual is effective.

This Flight Manual Supplement was approved by the Civil Aviation Authority of the Czech Republic in English language version on

02 05 2006
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ÚŘAD PRO CIVILNÍ LETECTVÍ 97

RECORD OF REVISION

Revision Number	Revised Pages	Description of Revision	Approved on	Date

SECTION 1 – GENERAL

The Honeywell MST 67A is a remote mounted general aviation transponder designed to fulfill the role of the airborne beacon equipment. The transponder is designed to meet FAA TSO-C112 and European ETSO 2C112a specifications for the ATC RBS/Mode Select Airborne Transponder System (Mode S Elementary Surveillance). The transponder is compliant RTCA DO-181A.

SECTION 2 – LIMITATIONS

1. The transponder must be switched off during the engine start-up.
2. The codes must be set according to the valid regulations for the air traffic or to the ATC instruction.
3. Without distress the transponder must never be switched on to the modes ON or ALT with the codes set at 7500, 7600, 7700.
4. This transponder installation meets requirements for Mode S Elementary Surveillance area.

SECTION 3 – EMERGENCY PROCEDURES – Not affected

SECTION 3A – ABNORMAL PROCEDURES

ALT COMPARISON cell turn on

Altitude encoders code differ altitudes.

Determine correct altitude encoder – switch transponder to TST, read FL value and compare it with altitude displayed on both altimeters. This comparison perform for both I and II position of the ALT SOURCE SEL switch.

On the instrument panel cover:

-ALT SOURCE SEL switch:	switch to correct operating altitude encoder

ALT COMPARISON cell will remain on to indicate altitude encoder failure.

For ALT COMPARISON cell extinguishing:

ALT COMPARISON switch:	OFF

SECTION 4 – NORMAL PROCEDURES

BEFORE TAXI

SWITCHING ON AND CHECKING

On the overhead panel:

-	BATTERY I, II switch:	check switching on
-	SSR CIRCUIT breaker:	switch on

On the instrument panel cover:

- ALT SOURCE SEL switch: switch I or II position
- ALT COMPARISON switch: check on
- ALT COMPARISON cell: check off

On the rear control panel:

On the transponder's control unit

- Transponder "1"-"2" Pushbutton: press to set 1 on the display
- Function Select Rotary Switch: rotate to TST position

All segments light for two seconds on the code display. FL is annunciated and the flight level is displayed in units of one hundred feet on the code display for four seconds, then unit returns to standby. A "FAIL" annunciation indicates failure of the transponder, antenna or control data.

- Function Select Rotary Switch: rotate to SBY position

SETTING THE CODE

The ID code is selected by the Code Adjust Rotary Switch/ Flight Level FL Pushbutton. A momentary press (less than 3 seconds) will cause the most significant digit (first digit) of the display to flash. This flashing (the digit cursor) indicates the first digit of the ID code is ready to be selected. The digit maybe changed by rotating the Code Adjust Rotary Switch/ Flight Level FL Pushbutton clockwise or counter-clockwise to change the numeric value of the digit. Each momentary press of the Code Adjust Rotary Switch/ Flight Level FL Pushbutton will step the digit cursor one digit to the right from the first digit to the fourth digit.

The VFR code can be programmed to be any code by the following technique:

a. Place the Function Select Rotary Switch to VFR position.

b. Select the VFR code as required.

c. Push the Ident "IDT" Pushbutton Key, or wait 3 seconds, or rotate the Function Select Rotary Switch to the desired mode.

USE IN FLIGHT

NOTE

The altitude encoder always encodes standard altitude 1013,25 hPa (29,92 in Hg) regardless of the pressure set on altimeter.

On the transponder's control unit:

- Function Select Rotary Switch: rotate to ALT position

ALT will appear on the display. The unit is able to replay to all valid Mode A, Mode C, Mode S interrogations. The altitude information will be sent in Mode C and the altitude field of Mode S replies. The ID code will be displayed on the control unit display. The transmission is automatic and is indicated by flashing "RPLY" annunciator.

When the ATC requests switching off the automatic altitude report:

On the transponder's control unit:

- Function Select Rotary Switch — rotate to ON position

ON will appear in the display. The unit is able to replay to all valid Mode, Mode C, Mode S interrogations, however the altitude information of Mode C and the altitude fields of Mode S replies are suppressed.

When the ATC requests sending special position identification pulse:

On the transponder's control unit:

- Ident "IDT" Pushbutton Key — press

After pressing and releasing the Ident "IDT" Pushbutton Key the transponder transmits the identification signal. During transmission the transponder will annunciate the "RPLY" on the display.

SWITCHING - OFF

On the overhead panel:

- SSR CIRCUIT breaker — switch off

SECTION 5 – PERFORMANCE – Not Affected

SECTION 6 – WEIGHT BALANCE

ITEM	QTY	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100
Mode S transponder MST 67A	1	4,63	10,20	- 9,347	- 8,113
Control unit PS 578A	1	0,45	0,99	0,088	0,077
Altitude encoder AK 350 or KEA 130A or 5035 PB or SAE 5-35	2 or 1+1	0,36	0,79	- 0,294	- 0,254
Antenna KA 60 or DMNI 50-2-2	2	0,18	0,40	- 0,217	- 0,189
Cables	-	1,30	2,87	- 1,235	- 1,072

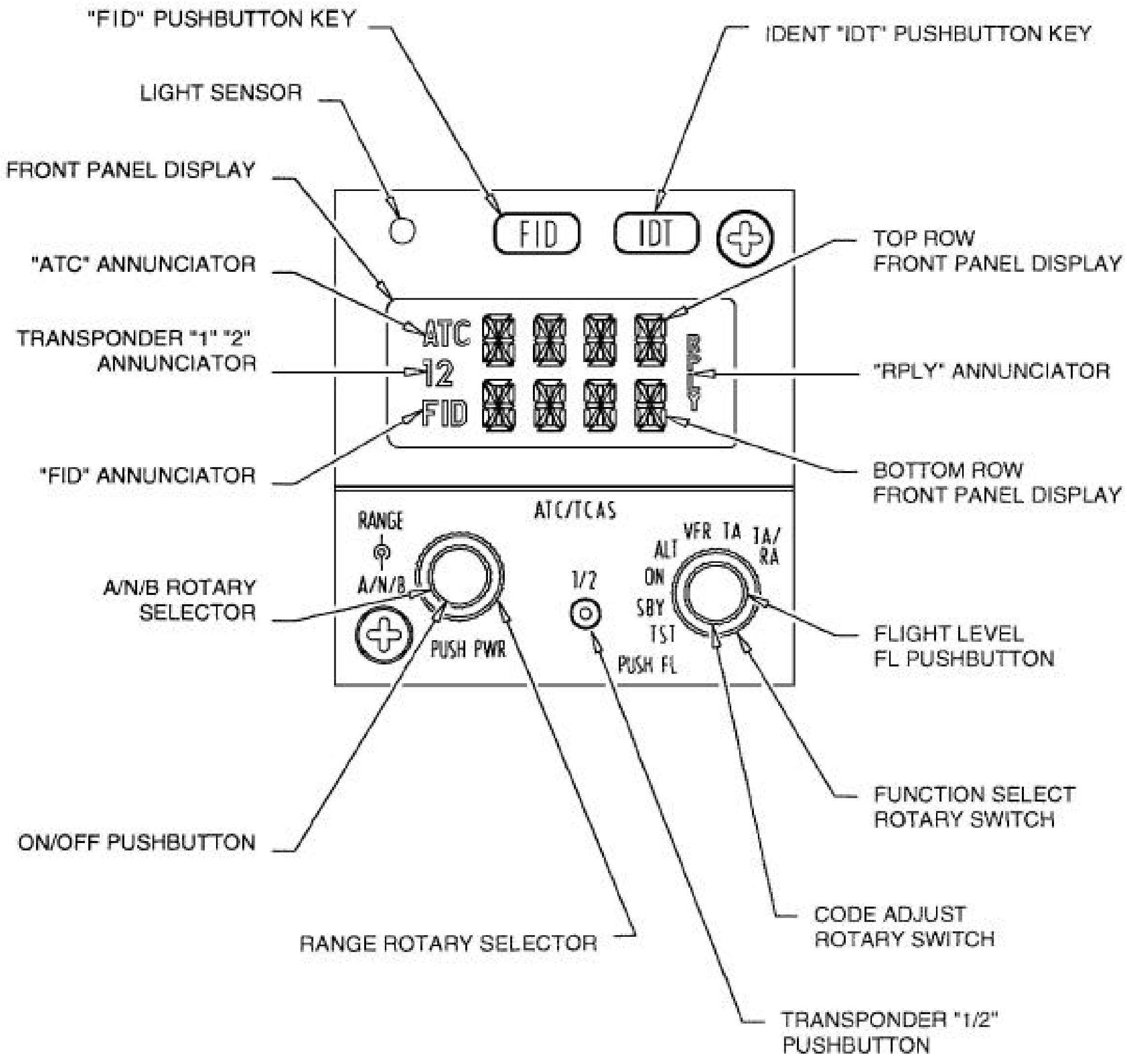
SECTION 7 – SYSTEMS OF AIRPLANE

NOTE

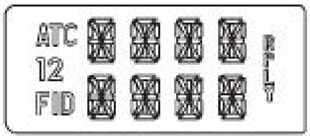
The instrument location is shown in the Supplement – Instrument panels.

The Honeywell MST 67A transponder is installed in the airplane. PS 578A control unit is located on the rear control panel. Altitude signal for transponder is taken from altitude encoder. It is possible to connect transponder to I or II altitude encoder by ALT SOURCE SEL switch on the instrument panel cover. When differ altitude on encoders is encoded, the amber ALT COMPARISON cell illluminates on the instrument panel cover. The ALT COMPARISON switch located next to cell is dedicated for canceling ALT COMPARISON annunciation and disabling altitude comparison function.
In Mode S the transponder unit transmits replies, which include the unique airplane address and information about maximum air speed. The airplane address and maximum air speed data must be set on transponder unit during installation (see Airplane Maintenance Manual).

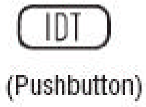
PS-578A MODE S/TCAS II CONTROL UNIT



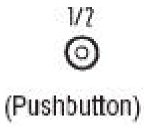
The PS-578A Control Unit is the master control for both TCAS and the Mode S transponder. Only transponder display and control elements are described below.



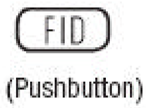
The **Display Window** Displays ATC code selection, Flight ID (FID) selection, whether transponder #1 or #2 is active, transponder mode, transponder ident and own aircraft flight level (in TEST).



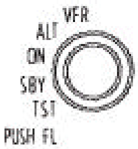
IDT initiates IDENT feature for ATC. The IDENT function is used at the request of an Air Traffic Controller, and holds the Ident reply for 18 ± 1 seconds.



1/2 selects the active transponder. Only transponder 1 is installed in this airplane.



FID allows entry of an alphanumeric flight identification. Selecting the right inner pushbutton will cycle through the eight characters to be changed. Rotating the right inner knob will change the contents of the selected (flashing) character.



The outer concentric knob on the right selects the transponder mode of operation. Rotating the function knob (CCW) to the TST position initiates a comprehensive self test lasting approximately eight seconds.
All segments of the display are illuminated for 2 seconds, then the code window will display the encoded altitude for four seconds, then the control unit will return to the previously selected mode.

SBY places the Mode S Transponde in standby. SBY is annunciated on the display window. Use SBY during ground operations.

ON activates the selected transponder without altitude reporting. ON is annunciated in the display window.

ALT activates Mode S transponder with altitude reporting.

Selecting **VFR** for more than 3 seconds changes the ATC code to the pre-programmed VFR code (Typically 1200). VFR is annunciated in the display window for the 3 seconds prior to switching the programmed code The control unit will return to the mode selected prior to making the VFR selection.

SECTION 8 – HANDLING, SERVICING & MAINTENANCE – Not Affected

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SUPPLEMENT No. 75

AIRBORNE COLLISION AVOIDANCE SYSTEM II (ACAS II)

Honeywell CAS 67A TCAS II Version 7.0

Registration No.	**D4 – CBR**
Serial No.	**912533**

This supplement must be attached to the Airplane Flight Manual when the ACAS II system type CAS 67A is installed.
Information stated in this supplement complete or replace the data of basic Aircraft Flight Manual only in the areas that are stated here.
Considering the limitations, procedures and information about performances not stated in this supplement, the basic Aircraft Flight Manual is effective.

This Flight Manual Supplement was approved by the Civil Aviation Authority of the Czech Republic in English language version on

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ÚŘAD PRO CIVILNÍ LETECTVÍ 97

RECORD OF REVISION

Revision Number	Revised Pages	Description of Revision	Approved ON	Date

SECTION 1 – GENERAL

This system is compliant to RTCA DO-185A. It is reffered as ACAS II (Airborne Collision Avoidance System II) internationally and TCAS II (Traffic Alert and Collision Avoidance System II) Change 7.0 in the USA. TCAS is the terminology used in this supplement.

SECTION 2 – LIMITATIONS

1. Deviation from the ATC assigned altitude is authorized only to the extent necessary to comply with an TCAS resolution advisory.
2. Maneuvers must not be based solely on information presented on the traffic display or on a traffic advisory without visually sighting the traffic.
3. The transponder has been demonstrated only for purposes of Mode S Elementary Surveillance, surveillance modes A (identity), C (altitude), and TCAS functions.
4. The intruding aircraft must be equipped with a properly operating transponder for normal TCAS operation. TCAS is unable to detect any aircraft without an operating transponder.
5. If the intruder is non-altitude reporting (NAR), TCAS will display only the range and bearing. It can issue a Traffic Advisory based on distance and direction of flight but will not generate a Resolution Advisory. TCAS assumes non-altitude reporting (NAR) traffic is at the same altitude as your own aircraft.
6. A TCAS Resolution Advisory is based on the expectation that the crew will comply within 5 seconds. An increase or reversal to an RA requires two and half seconds reaction time.
7. Climb and Increase climb Resolution Advisories are inhibited in this installation.
8. Descent Resolution Advisories are inhibited below 1200 ft AGL while climbing and below 1000 ft while descending.
9. Increase descent Resolution Advisories are inhibited below 1450 ft AGL.
10. All Resolution Advisories are inhibited below 900 feet descending or 1100 feet ascending (TCAS automatically reverts to TA only).
11. TCAS II automatically reverts to TA ONLY when higher priority advisories (from EGPWS) occur.
12. All TCAS II audio warnings are inhibited below 400 ft AGL on approach and up to 600 ft AGL on departure.
13. The TCAS II surveillance may not function at distances less than 900ft.

SECTION 3 – EMERGENCY PROCEDURES

RECOMMENDED PROCEDURES FOR RESOLUTION ADVISORIES IN FLIGHT

The following Resolution Advisories require two and one-half seconds response time and up to 0, 35 G.

Aural	Visual	Crew response
"INCREASE DESCENT, INCREASE DESCENT"	Follows a "DESCEND" advisory. VSI RED from +6000 FPM to –2500 FPM and GREEN from - 2500 FPM to –3500 FPM.	Indicates the vertical speed MUST BE INCREASED to ensure adequate separation. Promptly and smoothly establish a 2500 FPM DESCENT as indicated by the GREEN arc on the VSI display.

SECTION 3A – ABNORMAL PROCEDURES

CAUTION

ALWAYS ATTEMPT TO VISUALLY CLEAR AIRSPACE BEFORE MANEUVERING YOUR AIRCRAFT IN RESPONSE TO A TCAS ADVISORY. DO NOT OVERREACT TO A RESOLUTION ADVISORY. FLY ONLY THE VERTICAL SPEED COMMANDED. USING HIGHER VERTICAL SPEED THAN THAT COMMANDED ON THE RA/VSI IS NOT BETTER. BE ALERT AND COMPLY WITH MODIFIED OR WEAKENING RAS (ANNUNCIATED BY “ADJUST VERTICAL SPEED, ADJUST”) TO MINIMIZE DISPLACEMENT FROM YOUR ATC CLEARENCE.

RECOMMENDED PROCEDURES FOR RESOLUTION ADVISORIES IN FLIGHT

The following Resolution Advisories require five seconds response time and up to 0, 25 G.

Aural	Visual	Crew response
“DESCEND, DESCEND”	VSI RED from +6000 FPM to -1500 FPM and GREEN from –1500 FPM to -2000 FPM.	Promptly and smoothly establish a 1500 FPM DESCENT as indicated by the GREEN arc on the VSI display.
“MONITOR VERTICAL SPEED”	Present vertical speed is outside the RED arc as shown on the VSI.	Keep vertical speed out of the RED, unsafe area as indicated on the VSI.
“ADJUST VERTICAL SPEED, ADJUST”	VSI indicates prohibited vertical speed in RED. GOAL is vertical speed in GREEN.	Promptly and smoothly reduce vertical speed to that shown in the GREEN arc as indicated on the VSI display.
“DESCEND, CROSSING DESCEND, DESCEND, CROSSING DESCEND”	Same as “DESCEND” and further indicates that own flight path will cross that of intruder.	Promptly and smoothly establish a 1500 FPM DESCENT as indicated by the GREEN arc on the VSI display.
“MAINTAIN VERTICAL SPEED, MAINTAIN”	VSI indicates prohibited vertical speed in RED. Goal is vertical speed in GREEN.	Maintain vertical speed to that indicated by the GREEN arc on the VSI.
“MAINTAIN VERTICAL SPEED, CROSSING MAINTAIN”	Same as “Maintain Vertical Speed, Maintain” and further indicates that own flight path will cross that of intruder.	Maintain vertical speed to that indicated by the GREEN arc on the VSI.

SECTION 4 – NORMAL PROCEDURES

BEFORE TAXI

SWITCHING ON AND CHECKING

On the overhead panel:

- BATTERY I, II,
  CENTRAL WARNING DISPLAY – ELECTRO,
  INTERCOM I, II, PA circuit breakers: check switching on

- RADAR, MFD, SSR, TCAS circuit breakers: switch on

On the central instrument panel:

- On the radar control box
  TRFC button press

On the rear control panel:

- On the TCAS control unit
  Function selector knob rotate to TST position

All system providing information to TCAS II must be operating in their normal mode during the self test

The test continues automatically for a period of approximately eight seconds. During the test the TCAS and transponder function is inhibited. When the knob is held for longer than eight seconds in the TST position the system remains in test until it is released.

During the first few seconds of the test sequence, the radar indicator allows verification of each type of intruder symbol. The test generates the symbols arranged as follows and the word TEST is annunciated in the lower left hand corner.

The following situation will appear on the radar indicator and on the TA/RA/VSI display:

- A Resolution Advisory (red square) will appear at 3 o'clock, range of 2 miles, 200 feet above and flying level.
- A Traffic Advisory (yellow circle) will appear at 9 o'clock, range of 2 miles, 200 feet below and climbing.
- Proximity traffic (solid white diamond) will appear at 1 o'clock, range 3.6 miles, 1000 feet below descending.
- Non-Threat traffic (open white diamond) will appear at 11 o'clock, range of 3.6 miles, flying level 1000 feet above.

TA/RA/VSI display test indications

The same traffic situation as above will appear on display. Moreover green arc from 0 to 250 fpm and red arcs (from 0 to – 6000 fpm and from 2000 to 6000 fpm) will appear on the display The yellow TEST message is in view throughout the test period.

At the conclusion of a successful Self-Test, a synthesized voice announces:

"TCAS SYSTEM TEST OK"

Use of the Self-Test function in flight will inhibit TCAS operation for up 20 seconds depending upon the number of aircraft being tracked. The ATC transponder will not function during some portion of the Self-Test sequence.

FAILURE CONDITIONS

On the TA/RA/VSI display: Should a power failure or VS source failure be detected at any time, the VSI flag will appear.
Yellow TCAS message will appear when TCAS is flagged or power is loss.

Should a failure be detected during Self Test, the audio message says:

"TCAS SYSTEM TEST FAIL"

The appropriate failure message will be displayed on the radar Indicator Type of failure is displayed in TCAS ONLY mode. For fault annunciation list see section II of the ACAS II CAS 67A Pilot's guide (P/N 006-18201-0000) Rev. 0 dated 4/99 or later applicable version.

TEST AUDIO INHIBIT

TCAS test audio is inhibited during EGPWS test or alert.

CAUTION

IF THE TCAS HAS DETECTED A FAILURE DO NOT USE IT IN FLIGHT.

The TCAS should not be selected out of STBY to TA/RA until just prior to take off.

USE IN FLIGHT

NOTE

For weather radar operation see appropriate supplement in Section 9 of this AFM.

On the TCAS control unit

- Function selector knob — rotate to TA/RA position
- ABOVE/NORM/BELOW push button ◊ — as required

Monitor TCAS traffic display - radar indicator and aural messages during flight

TCAS traffic advisory annunciation (TA)

Aural	Visual	Crew response
"Traffic, traffic"	Amber filled circle on the radar indicator	Conduct visual search of the intruder. If successful, maintain visual acquisition to ensure safe operation.

If above annunciation occur, be prepared for TCAS resolution advisories. In case of resolution advisory is given, maneuver the aircraft promptly and smoothly in response to the resolution advisory according to section 3 and 3A of this supplement.

Compliance with a TCAS resolution advisory is necessary unless the pilot consider it unsafe to do so, or unless the pilot has better information about the cause of the RA and can maintain safe separation.

NOTE

For a non-crossing RA the vertical speed should be accurately adjusted to comply with the RA to avoid negating the effectiveness of a coordinated maneuvers by the intruder aircraft. The evasive maneuvering should be made with the autopilot disengaged (if installed), and limited to the minimum required to comply with the RA.

WARNING

NONCOMPLIANCE WITH A CROSSING RA BY ONE AIRPLANE MAY RESULT IN REDUCED VERTICAL SEPARATION, THEREFORE, SAFE HORIZONTAL SEPARATION MUST ALSO BE ASSURED BY VISUAL MEANS.

Modified advisories are posted after the response to an initial advisory has been completed and the TCAS airplane is projected to have adequate altitude separation from the intruder. The initial RA is said to weaken, indicating a return towards the original flight path or clearence is allowed. When the initial advisory weakens, the green arc is repositioned to indicate level flight, the magnitude of the red arc decreases, and “ADJUST VERTICAL SPEED, ADJUST” is announced. The modified RA indicates a return to level flight so that the altitude displacement in response to the initial RA can be minimized. This RA will remain displayed until the “CLEAR OF CONFLICT” aural annunciation is issued. Following the weakening advisory will greatly reduce the ultimate altitude deviation caused by the original corrective resolution advisory.

TA MODE

The TA position should only be used to preclude unnecessary RA’s when intentionally operating near other aircraft such as to closely spaced parallel runways (less than 1200 ft apart). In TA mode RA’s will not be issued.

During EGPWS warnings, TCAS II switches automatically into a TA mode with aural annunciation inhibited. In this mode, RA’s are not issued and curren’t RA’s become TA’s. The TCAS II remains in TA only mode for 10 seconds after the EGPWS warning is removed. TCAS aural annunciations are enabled immediately following the removal of the EGPWS warning aural annunciation.

RECOVERY AFTER CLEAR OF CONFLICT

NOTE

There can be a case where the threat aircraft track or altitude information is lost during an RA. In this case, the RA will terminate without a “CLEAR OF CONFLICT” annunciation.

- VSI red and green arcs are removed after a “CLEAR OF CONFLICT” annunciation.
- After deviating from an ATC clearence or instruction in response to a TCAS RA, notify ATC of the deviation as soon as possible.
- If iniatially in level flight, promptly but smoothly return to the previously assigned altitude unless otherwise directed by ATC.
- If climbing or descending resume the planned climb or descent after the intruder has passed by unless otherwise directed by ATC.

SWITCHING OFF

The TCAS should be selected to SBY immediatelly after clearing runway following landing.

On the overhead panel:

- TCAS circuit breaker: switch off

SECTION 5 – PERFORMANCE – Not affected

SECTION 6 – WEIGHT BALANCE

ITEM	QTY	TOTAL WEIGHT		MOMENT	
		kg	lb	kg.m	lb.in/100
TCAS II TPU 67A	1	9,52	21,02	-17, 830	- 15, 500
Antenna ANT 67A	2	3,08	6,72	3,205	2,782
Config. module CM 67A	1	0,045	0,099	- 0,085	- 0,074
TA/RA/VSI Display IVA 81D	2	2,50	5,52	- 1,630	- 1,414
Cables	-	1,45	3,20	- 1,827	- 1,586

SECTION 7 – SYSTEMS OF AIRPLANE

NOTE

The instrument location is shown in the Supplement – Instrument panels.

The Honeywell CAS 67A TCAS II Change 7.0 is installed in the airplane.

TCAS II is a system used for detecting and tracking aircraft in the vicinity of your own aircraft. By interrogating their transponders it analyzes the replies to determine range, bearing, and if reporting altitude, the relative altitude of the intruder. Should the TCAS II processor determine that a possible collision hazard exists, it issues visual and audio advisories to the crew for appropriate vertical avoidance maneuvers.

There are two types of cockpit displays for TCAS II, the Resolution Advisory (RA) display and the Traffic Advisory (TA) display. The RA are displayed on two TA/RA/VSI displays. By illuminating red and green arcs around the dial it displays the required rate, or limitation of climb or descent, to avoid a possible collision.

The TA are displayed on two TA/RA/VSI displays and on the weather radar indicator. The TA display shows the intruding aircraft's relative position and altitude with a trend arrow to indicate if it is climbing or descending at greater than 500 feet per minute

The TA display identifies the relative threat of each intruder by using various symbols and colors. Complementing the displays, TCAS II provides appropriate synthesized voice announcements.

TCAS II TRAFFIC DISPLAY SYMBOLS

TCAS II will display four different traffic symbols on the Traffic Advisory displays. The type of symbol selected by TCAS II is based on the intruder's location and closing rate.

The symbols change shape and color to represent increasing levels of urgency.

The traffic symbols may also have an associated altitude tag which shows relative altitude (FL) in hundreds of feet, indicating whether the intruder is climbing, flying level or descending. A + sign and number above the symbol means the intruder is above your altitude. A – sign and number beneath indicates it is below your altitude. A trend arrow appears when the intruder's vertical rate is 500 feet per minute or greater.

No altitude number or trend arrow will appear beside the intruder that is non-altitude reporting (NAR). If TCAS II direction finding techniques fail to locate the azimuth of another aircraft, a NO BEARING message appears on the screen.

Non-threat traffic

An open white diamond indicates that an intruder's relative altitude is greater than ±1200 feet, or its distance is beyond 6 nm range. It is not yet considered a threat.

Proximity intruder traffic

A filled white diamond indicates that the intruding aircraft is within ±1200 feet and within 6 nm range, but is still not considered a threat.

Traffic advisory (TA)

A symbol change to a filled yellow circle indicates that the intruding aircraft is considered to be potentially hazardous. Depending on your own altitude TCAS II will display a TA when time to Closest Point of Approach (CPA) is between 20 and 48 seconds.

Resolution advisory (RA)

A solid red square indicates that the intruding aircraft is projected to be a collision threat. TCAS II calculates that the intruder has reached a point where a Resolution Advisory is necessary. The time to closest approach with the intruder is now between 15 and 35 seconds depending on your altitude. The symbol appears together with an appropriate audio warning and a vertical maneuver indication on the RA/VSI. Voice announcements are listed later in this section.

OFF SCALE TRAFFIC

The presence of TA or RA aircraft that are beyond the selected display range is indicated by one half of the traffic symbol at the edge of the screen. The position of the half-symbol represents the bearing of the intruder.

NO BEARING TRAFFIC

If the intruder is located where the TCAS cannot determine the azimuth of the intruder, a "No Bearing" TA or RA will be annunciated on the bottom of the radar indicator and TA/RA/VSI display.

THE TA/RA/VSI INSTRUMENT

The TA/RA/VSI instrument combines the plan position of intruding airplane and TCAS on the vertical speed instrument. A pointer and circular vertical speed scale indicate airplane vertical rate. Climb and descent Resolution Advisories are shown as red and green bands outside of the scale. TCAS uses the green band to indicate whether to descend or remain level. Red band indicates where not to climb, descend or remain level. The bands are OFF unless an active Resolution Advisory is in progress. The center of the display presents intruding traffic.

Resolution Advisories are grouped as Corrective Advisories or Preventive Advisories. Corrective Advisories require a positive action by the crew accompanied by a green arc on the TA/RA/VSI showing "Fly-To" guidance. Preventive Advisories require that NO action be taken to alter the flight path of the aircraft.

When TCAS issues an RA, certain red band will appear. Green band will appear when the pilot is required to actively maneuver the aircraft to satisfy the resolution. For safe separation from the intruder, the pilot should maneuver the aircraft within the vertical speeds represented by the green band. Vertical speeds within the red area must be avoided.

An RA may be presented on the TA/RA/VSI requiring avoidance of two or three threat aircraft simultaneously. For example, a "do not descend" indication may be visible at the same time a "limit climb rate" indication appears because of threat aircraft above and below your own aircraft.

AUDIO ANNOUNCEMENTS

Voice announcements are issued by TCAS over the aircraft audio system. The following tables list all of the resolution advisories, audio messages, and advisories.

AUDIO MESSAGES

CONDITION	ADVISORY MESSAGE
Traffic advisory	“Traffic, traffic” *
RA cleared	“Clear of conflict.”
Self test passed	“TCAS system OK”
Self test failed	“TCAS system fail”

*) - “Traffic" is spoken once if a second TA appears during an advisory.

RESOLUTION ADVISIORIES AND SYNTHESIZED VOICE ANNOUCEMENTS

RA category	Corrective	Preventive
Descent	“Descend, descend”	“Maintain vertical speed, maintain”
Crossover descent	Descend, crossing descend, descend crossing descend	“Maintain vertical speed, crossing maintain
Vertical speed restricted (climbing)	Adjust vertical speed, adjust	“Maintain vertical speed, maintain or “Maintain vertical speed, crossing maintain
Vertical speed restricted (descending)	Adjust vertical speed, adjust	“Maintain vertical speed, maintain or “Maintain vertical speed, crossing maintain

RA INCREASES

The following resolution advisory is changed from those previously issued.

RA category	Corrective	Preventive
Increase descent rate	“Increase descent, increase descent”	N/A

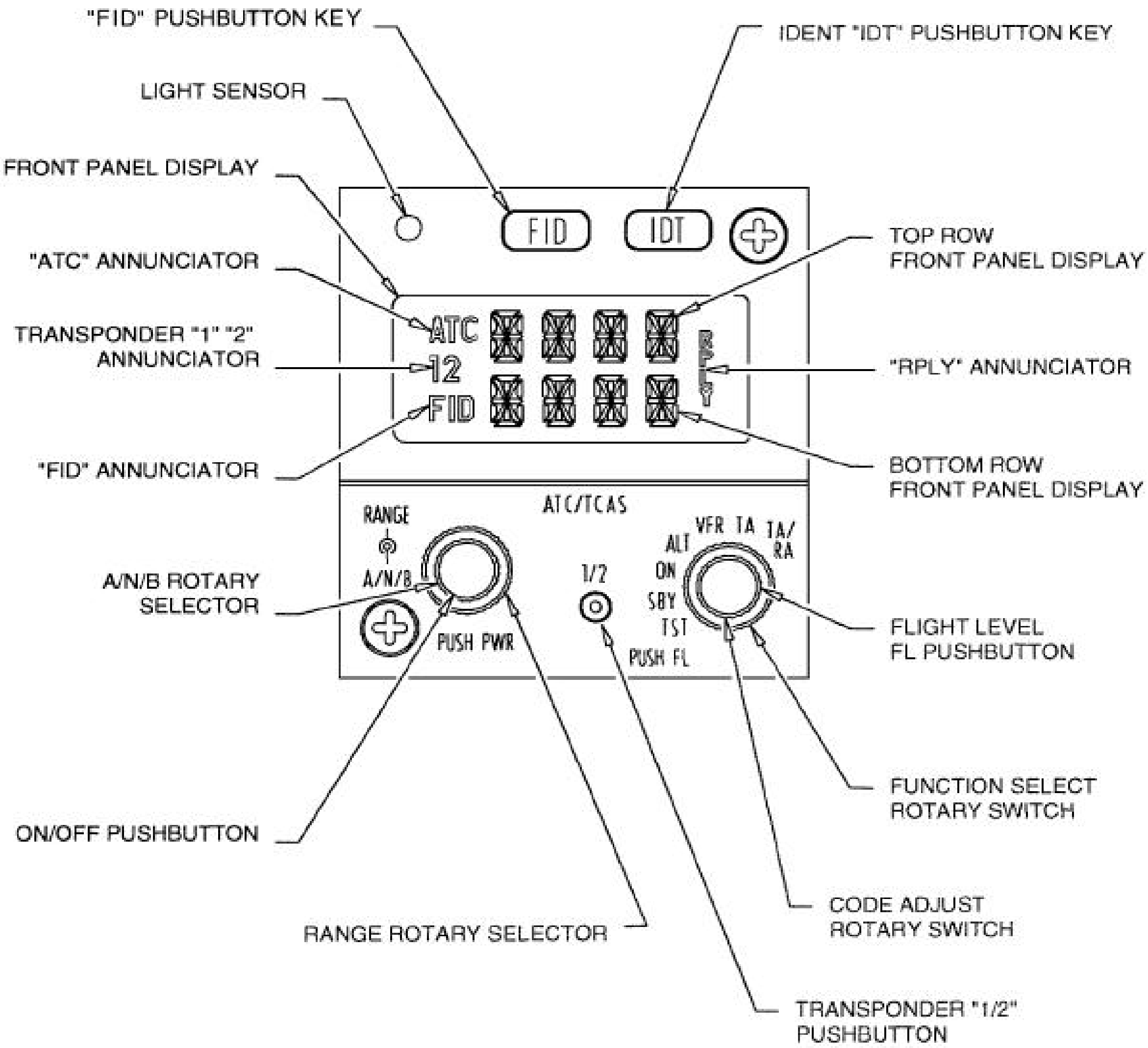
PS-578A MODE S/TCAS II CONTROL UNIT

The PS-578A Control Unit is the master control for both TCAS and the Mode S transponder. The PS 578A will also display the selected alpha numeric flight identification (FID) and selected 4096 ATC code in the display window. A “FAIL“ annunciation indicates failure of the transponder, antenna or control data.

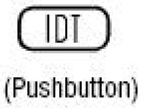
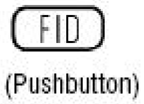
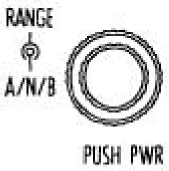
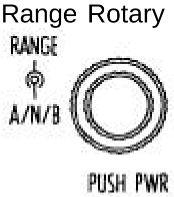
NOTE

If the MST 67 A Mode S transponder senses a failure that is not internal to the transponder, not a Mode S antenna fault and not a PS 578A control data fault, the annunciated mode will blink (i.e. a TCAS flag may cause the selected mode to blink on the PS 578A). Press again TRANSPONDER “1” “2” pushbutton and wait approx. 30 s until annunciated mode stops shimmer and transponder 1 is displayed as active transponder. Repeat it if necessary.

For MST 67A Mode S transponder description see appropriate supplement in this section of AFM.

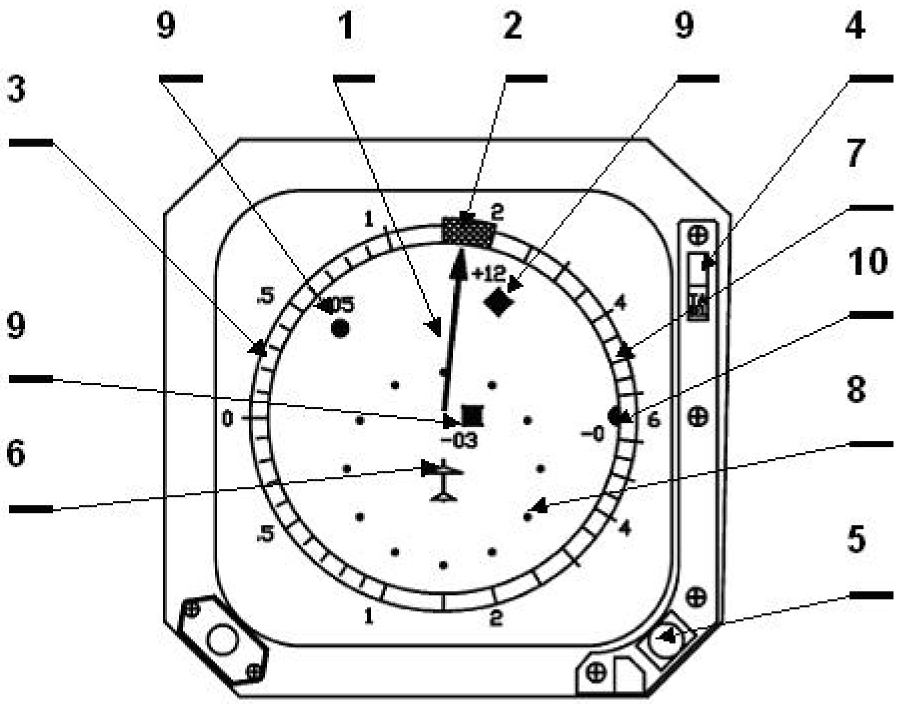


PS-578A Control Unit Controls

Control element/indication	Function/description
Ident “IDT” Pushbutton Key 	When this switch is pressed and released, it initiates IDENT feature for ATC.
“FID“ Pushbutton Key 	ATC Mode - (default mode) allows entry of the four-digit ATC code. FID Mode - allows entry of alpha numeric flight identifica-tion. FID allows entry of an alphanumeric flight identification. Selecting the right inner pushbutton will cycle through the eight characters to be changed. Rotating the right inner knob will change the contents of the selected (flashing) character.
“ATC” Annunciator	Annunciates transponder ATC identification code selected by the Code Select.
Transponder “1” “2” Annunciator	Annunciates selected transponder (transponder No. 2 is not installed).
“FID“ Annunciator	Annunciates alpha numeric flight identification “FID” on display.
A/N/B Rotary Selector 	The inner concentric knob on the left selects (when rotated) Traffic Advisory altitude display limits (Above, Normal or Below). The Above/ Normal/Below select knob has no effect on the TCAS II logic giving TAs and RAs. ABOVE: 9000 feet above and 2700 feet below own aircraft. ABOVE is annunciated on screen of traffic display. Typiccally used during climb phase of flight. NORM: 2700 feet above and 2700 feet below own aircraft on traffic display. Typically used during en route phase of flight. BELOW: 2700 feet above and 9000 feet below own aircraft. BELOW is annunciated on screen of traffic display. Typiccally used during descent phase of flight.
Range Rotary Selector 	The outer knob on the left hand dual concentric switch selects the Traffic Advisory display range in nautical miles (40, 20, 15, 10, 5, 3). The selected range is annunciated on the traffic display. The range annunciation is the maximum displayed range to the front of the aircraft. The selected range has no effect on the TCAS II logic giving TAs and RAs. Note: Selected range is displayed in the upper right hand corner of a TA/VSI.
ON/OFF Pushbutton	Not installed.

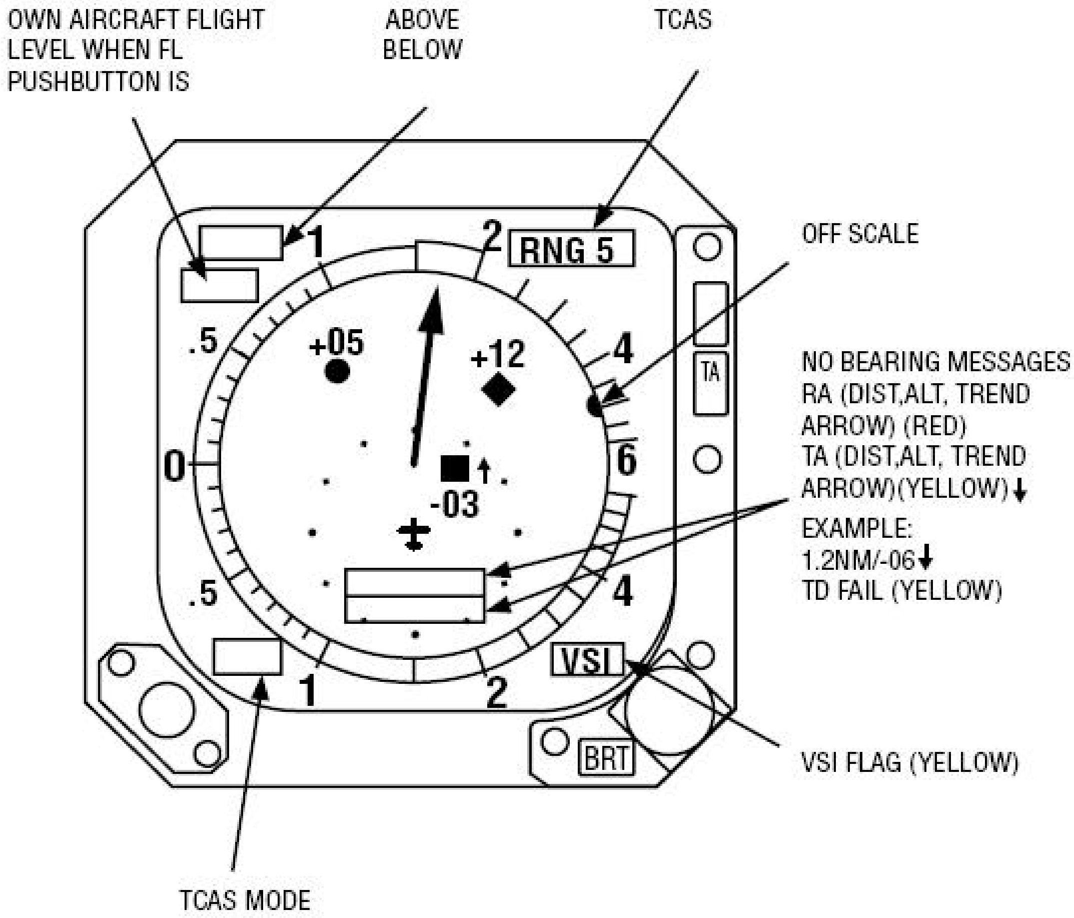
Control element/indication	Function/description
Transponder “1” “2” Pushbutton  	Selects Mode S transponder – it must be in 1 position.
Function Select Rotary Switch  	The outer concentric knob on the right selects the Mode S and TCAS mode of operation. TST: Initiates TCAS and Mode S transponder functional self-test. SBY: Places the Mode S Transponder and TCAS in standby. SBY is annunciated on the display window. Use SBY during ground operations. ON: Activates the selected transponder without altitude reporting. TCAS is in standby. ON is annunciated in the display window. ALT: Activates Mode S transponder with altitude reporting, TCAS is in standby. VFR: Selecting VFR for more than 3 seconds changes the ATC code to the pre-programmed VFR code (Typically 1200). VFR is annunciated in the display window for the 3 seconds prior to switching the programmed code The control unit will return to the mode selected prior to making the VFR selection. TA: The TA (Traffic Advisory) mode. Activates the Mode S transponder, altitude reporting and TCAS “TA ONLY” mode. Traffic will be presented on the traffic (TA) display but no RAs (Resolution Advisories) will be issued. “TA” mode is annunciated in the control unit display window and “TA ONLY” will be annunciated on the TCAS traffic display(s). TA/RA: (Traffic Advisory and Resolution Advisory) mode. Activates the Mode S transponder, altitude reporting, and TCAS “TA/RA” mode. Aural and visual RAs (Resolution Advisories) will be issued for traffic determined to be a threat. Traffic will be presented on the traffic (TA) display. TA/RA mode is annunciated in the display window, on the optional color radar indicator or dedicated traffic display.
Flight Level FL Pushbutton  	The traffic display switches to the FL (flight level) display function when the inner knob is pressed in for more than four seconds. The relative altitude tags are replaced with absolute altitude (FL) tags. The traffic display will revert to relative altitude after 15 seconds.

IVA – 81D TA/RA/VSI TRAFFIC ADVISORY/RESOLUTION ADVISORY/VERTICAL SPEED DISPLAY



Pos.	Item	Function/description
1	Vertical speed pointer	Indicates vertical speed.
2	Resolution advisory – green arc	Recommended vertical speeds range.
3	Resolution advisory – red arc	Prohibited vertical speeds range.
4	TA select pushbutton	Pressing the button alternates between showing all traffic and VSI display only. Pressing the button has no effect when TA or RA traffic is present.
5	Brightness control	It is used to set display brightness.
6	Airplane symbol	Own airplane symbol.
7	Traffic display border	Maximum range border.
8	Dots ring	2 miles range ring.
9	Intruders	Intruder symbols.
10	Off scale traffic	Off scale traffic symbols.

TA/RA/VSI DISPLAY MESSAGE LOCATIONS



WEATHER RADAR INDICATION

RADAR ONLY MODE

In this mode of operation, only weather radar information is displayed until a Traffic Advisory or Resolution Advisory is issued by the TCAS processor. The range is controlled by the weather radar range control in this mode of operation. When a Traffic or Resolution Advisory occurs the display will revert to the default TCAS display. When the advisory is removed, the display will revert back to the weather radar display. This mode is annunciated by TA/RA AUTO or TA AUTO in the lower left hand corner of the screen.

RADAR WITH TCAS OVERLAY MODE

A full time TCAS display overlays the weather display in this mode. Weather is blanked in the areas where TCAS traffic is displayed. The range displayed in this mode is that which was selected for weather radar. If weather radar is in the standby mode or other non-radar mode, the display will be the same as that in the TCAS ONLY mode. This mode is maintained unless another mode is manually selected. The TCAS operational mode is annunciated in addition to WX that annunciates the weather mode in the lower left hand corner of the screen unless the radar is in standby, in which case the TCAS mode is displayed in the upper right hand corner.

TCAS ONLY MODE

In this mode the screen's origin point is 1/3 up from the bottom of the screen. Only TCAS information is displayed. This mode is maintained unless another mode is manually selected. The range displayed is controlled by the TCAS control panel. A 2 nm range ring is displayed on ranges 3, 5, 10 and 15 nm. The 2 nm range ring consists of discrete dots (cyan) at each of the 12 clock positions. The 2 nm range ring is not displayed on ranges 20 and 40 nm; instead a half-range ring is displayed. The half-range ring consists of discrete dashes (cyan). The TCAS operational mode is annunciated in the lower left hand corner of the screen.
On the "TCAS ONLY" display, "WX ON" will be annunciated in the upper right hand corner if the weather radar is transmitting.

NOTE

For more detail information than is mentioned in this supplement see ACAS II CAS 67A Honeywell Collision Avoidance System Pilot's Guide P/N 006-18201-0000 Revision 2 (dated 3/04) or later applicable version.

SECTION 8 – HANDLING, SERVICING & MAINTENANCE – Not Affected

SUPPLEMENT No. 81

Flight Data Recorder BUR-1-2G

with SPEEL FDR 59BL

Registration mark	**D4 – CBR**
Serial number	**912533**

This Supplement must be attached to the approved Flight Manual, where the Flight Data Recorder BUR-1-2G with SPEEL FDR 59BL are installed.
Information contained in this Supplement complete or substitutes the data of the basic Flight manual only in those areas, which are shown here.
As regards the limitations, procedures and information about performances, which are not contained in this Supplement, the data of the basic Flight Manual are valid.

The technical content of this document is approved under the authority of DOA Nr. EASA.21J.119.

Signature: ....

Date: 11. 4. 2006

LOG OF REVISIONS

Revision number	Revised pages	Revision description	Approved by	Date

Chapter 1 – GENERAL - Not affected

Chapter 2 – LIMITATIONS - Not affected

Chapter 3 - EMERGENCY PROCEDURES - Not affected

Chapter 3A - ABNORMAL PROCEDURES - Not affected

Chapter 4 - NORMAL PROCEDURES - Not affected

Chapter 5 - PERFORMANCE - Not affected

Chapter 6 - WEIGHT AND BALANCE - Not affected

Chapter 7 - SYSTEMS OF AEROPLANE

FLIGHT DATA RECORDER BUR-1-2G

The FDR 59BL solid-state flight data recorder is a state-of-the-art unit which is used as a replacement for the ZBN-1 magnetic tape recorder in the BUR-1-2G flight data recorder system.
The FDR 59BL container has a high impact-and fire resistance. It is bright orange and it has a reflective tape affixed to its external surface to facilitate its location under water.
The BUR-1-2G FDR system has been complemented with an 6895-D-2-X-5-5 inertia switch (located between frames 21 and 22) interrupting power to the recorder when the acceleration level of 5g is reached in the longitudinal or lateral direction. When the switch is closed a red warning light will illuminate. To recover power supply to the recorder the impact switch must be reset by means of a reset button. When the button is pressed the warning light will go off.
The FDR 59BL provides for recording flight data for a time period of 25 hours. To facilitate its location under water, the recorder is provided with a DK 120 or ELP-362D underwater locator beacon and its container is bright orange. The container is shock proof and fire proof.
The purpose of the DK 120 or ELP-362D underwater acoustic beacon is to transmit a signal to enable location of an airplane crashed into water.

Chapter 8 - HANDLING, SERVICING & MAINTENANCE - Not affected

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