

Ty-154M

FLIGHT MANUAL

Book 1



MATERIAL BREAKDOWN

File 1. Flight Manual. Part 1

File 2. Flight Manual. Part 2

Maintenance Manual

File 3. Sections: 000, 005, 006, 007, 008,
009, 010, 011, 012, 020

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Section 1

GENERAL



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1.1. LIST OF SYMBOLS AND ABBREVIATIONS

AAT	- angle-of-attack and acceleration warning system
ADF	- automatic direction finder
AFCS	- automatic flight control system
ALW	- actual landing weight
APL	- actual payload
APU	- auxiliary power unit
ATC	- air traffic control
ASD	- accelerate-stop distance
ASDA	- accelerate-stop distance available
BRC	- best-range cruise
BT	- block time
CAS	- calibrated airspeed
CF	- compensation fuel
CG	- center of gravity
DG	- directional gyro
DME	- distance measuring equipment
EGT	- exhaust gas temperature
EWV	- equivalent tailwind (headwind) velocity
F	- field
FDI	- flight director indicator
FDRS	- flight data recording system
FLA	- field length available
FR	- fuel reserve
FS	- fuel supply required
G	- gradient of climb
GW	- gross weight
GPWS	- ground proximity warning system
HD	- horizontal distance
HF	- high frequency
HSC	- high-speed cruise
HSI	- horizontal situation indicator
IAS	- indicated airspeed
ICAO	- International Civil Aviation Organization

(cont'd)



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GENERAL - List of Symbols and Abbreviations

IFF	- identification friend-or-foe
IFR	- instrument flight rule
ILS	- instrument landing system
ISA	- International Standard Atmosphere
LD	- landing distance
LDA	- landing distance available
LG	- landing gear
MAC	- mean aerodynamic chord
MLW	- maximum allowable landing weight
M _{MO}	- maximum operating limit mach number
MOLW	- maximum operational limit landing weight
MOTOW	- maximum operational limit takeoff weight
MPL	- maximum limit payload
MPL/TOS	- maximum allowable payload limited due to takeoff safety
NWD	- no-wind distance
NWF	- no-wind fuel
OAT	- outside air temperature
OW	- operational weight
RD	- maximum distance to return point
RF	- regulatory fuel reserve
SR	- specific range
SWY	- stopway
TAS	- true airspeed
TGR	- takeoff ground run
TOD	- normal (continued) takeoff distance
TODA	- takeoff distance available
TRA	- takeoff run available
TT	- track in 180° turn
V _{BC}	- best-hourly-fuel-consumption speed
V _{LA}	- approach speed
V _{MO}	- maximum operating limit speed
V _R	- rotation speed
V _{REF}	- approach speed
V _S	- stalling speed
V _{TD}	- maximum limit touch-down speed

(cont'd)

V_1	- decision speed
V_2	- takeoff safety speed
V_{2n}	- climbout speed with all engines operating
V_3	- speed at start of extendable (high-lift) devices retraction
V_4	- clean configuration takeoff speed
V_{FR}	- visual flight rules
VHF	- very high frequency
WA	- wind angle
WCF	- wind correction fuel
WV	- wind velocity



FLIGHT MANUAL

GENERAL - Airworthiness Certificate

1.2. AIRWORTHINESS CERTIFICATE

Each Ty-154M airplane delivered to Syrian Arab Airlines is furnished with the Airworthiness Certificate issued by the Ministry of Aircraft Industry of the USSR.

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1.3. PURPOSE OF MANUAL

- (1) The Flight Manual of the Ty-154M airplane is the main technical publication establishing and regulating the rules of its flight operation, flight technique and procedures to be followed in various conditions of flight with peculiarities of the airplane piloting and procedures established for abnormal and emergency situations included.

The Flight Manual includes the performance data, required for calculation of flight parameters, and other reference data.

- (2) The correct operation of the airplane ensuring full safety and economic effectivity of each flight is impossible without excellent knowledge of the present Flight Manual and correct practical employment of the instructions covered therein.
- (3) The requirements and instructions of the Flight Manual are mandatory for all the flight crew members and other crew members during the flight operation of the airplane.
- (4) NEVER fly without the Flight Manual aboard the airplane.



FLIGHT MANUAL

GENERAL - Manual Holder's Duties

1.4. MANUAL HOLDER'S DUTIES

- (1) The holder of the Flight Manual is the Commander of the flight unit. In other divisions (organizations) using the Flight Manual as a standard publication the holder in their manager.
- (2) The holder of the Flight Manual is responsible for timely and correct introduction of all the issued revisions and additions into the Flight Manual in accordance with the established procedure (Ref. subsection 1.6).
- (3) The Captain is responsible for having the Flight Manual aboard the airplane in every flight and ensuring the possibility of rapid extraction of required information therefrom at any moment on the ground and in flight.

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FLIGHT MANUAL

GENERAL - Usage of Symbols and Abbreviations

1.5. USAGE OF SYMBOLS AND ABBREVIATIONS

- (1) For quick determination of the nature and coverage of the revisions and additions introduced in the Flight Manual after its initial issue, the respective portions of the text are identified by means of a vertical black line along the margins of the newly issued pages.
- (2) Abbreviation "cont'd" placed in the page lower margin indicates that the text of a given paragraph is continued on the following page.
- (3) Symbol "___ oOo ___" placed after an accomplished subsection indicates its end.
- (4) To reduce the Flight Manual bulk, abbreviations of several, most frequently used terms, words and groups of words are used in its text, e.g.:

MAC - mean aerodynamic chord

RWY - runway

TO - takeoff

___ oOo ___

1.6. REVISION SYSTEM

(1) Improvement of operational procedures, introduction of changes in design or composition of equipment causes a necessity of introduction of revised and additional data.

(2) Revisions are introduced in the following way:

Replacement of pages.

Insertion of additional pages.

Deletion of pages.

(3) The revised additional pages, list of effective pages are disseminated with the Service Bulletins. The date of revision appears on each new page.

Each revision is recorded in the Record of Revisions.

_____ oOo _____

1.7. USAGE OF CHECKLISTS AND PROCEDURES

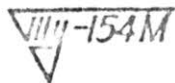
- (1) The check, being the main procedure in preparation of the airplane and the crew for the subsequent stage of flight, provides performance by each crew member of mandatory steps required for operation of the airplane and described in the checklist. Preparation in accordance with the checklists is performed:
 - (a) During outside inspection of the airplane.
 - (b) During inside inspection of the airplane.
 - (c) Before starting the engines.
 - (d) Before taxiing out of the parking area.
 - (e) after crossing altimeter setting altitude.
 - (f) Before descent.
 - (g) Before leaving the airplane in the parking area.
- (2) The detailed descriptions of procedures to be followed in operation of the airplane systems and equipment and specified by the checklists are covered in the respective subsections of section 8.
- (3) The checklist of operations to be performed by each crew member consists of two columns: the left one contains a brief nomenclature of the object to be checked, the right one contains a generalized description of the required operations.

In the checklists of the airplane outside and inside inspection during preflight preparation, the right column contains a generalized description of the required characteristic of the object to be inspected which can be assessed visually.

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Section 2

GENERAL OPERATIONAL LIMITATIONS



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GENERAL OPERATIONAL LIMITATIONS - Table of Contents

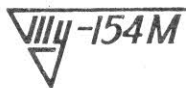
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2.1. AIRPLANE CATEGORY

- (1) The airplane is designed and built to the design criteria and requirements effective in the USSR and applicable to the given airplane category.
- (2) The airplane is intended for transportation of passengers, baggage, cargo and mail on the airlines having aerodromes with artificial pavement.
- (3) Performance of aerobatics is not allowed for the airplane.



2.2. GENERAL OPERATIONAL LIMITATIONS

2.2.1. Operational Conditions and Types of Operation

- (1) The airplane is authorized to perform the following types of flight:

Day and night flying.

VFR and IFR flying.

Flying in icing conditions, thunderstorm areas, shower, hail and snow showers.

Overwater flying.

Flying over unmarked and flat terrains.

Flying over mountainous terrain.

Flying in latitudes close to the poles.

- (2) The airplane is allowed to fly the routes running over the areas with any climatic and geographical conditions.

- (3) Weather minimum of 30x400 m (ICAO Category II) for the airplane for operation from aerodromes certificated according to ICAO category II. The minimum for takeoff is established at visibility of 200 m on the runway.

- NOTES:
1. The minimum for takeoff is used on the aerodromes, equipped with the runway centerline lights, in the daytime and at night.
 2. If the runway centerline lights are not available, with the runway centerline marked, the aerodrome minimum for takeoff is 500 m in the daytime and 700 m at night.
 3. If the lighting equipment is not available the aerodrome minimum for takeoff is established equal to the minimum for landing at the given aerodrome.
 4. The minimum for takeoff is used with an alternate aerodrome available, flight to which from the departure aerodrome does not exceed two hours.

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GENERAL OPERATIONAL LIMITATIONS - General Operational Limitations

2.2.2. Altitude of Flight and Air Temperature

- (1) The maximum allowable altitude of flight:

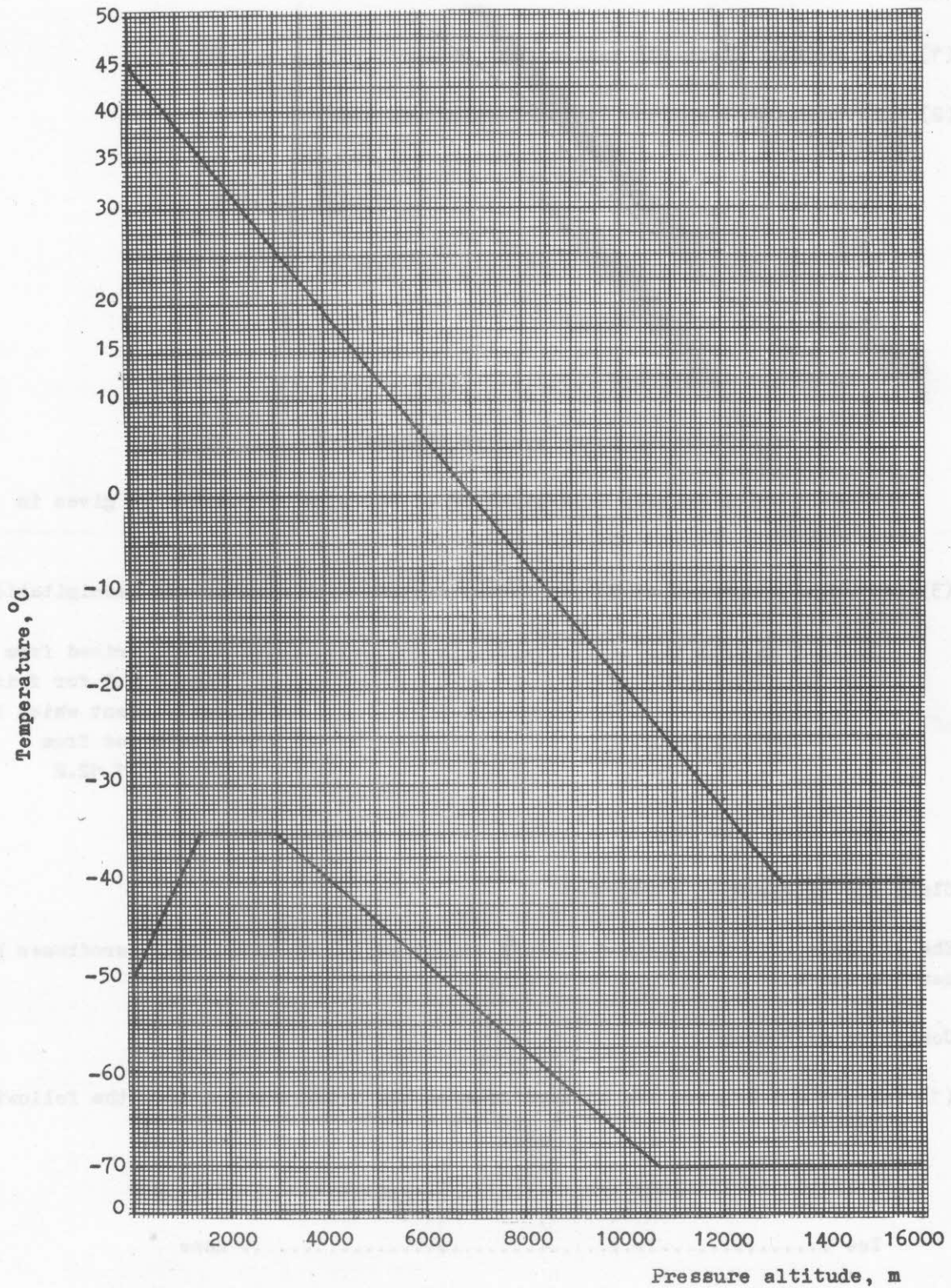
With CG up to 32 % MAC

Flight level	390	380	370
Pressure altitude, m	11900	11600	11300
Maximum gross weight, kg	84000	90000	96000

With CG aft of 32 % MAC, flight level is 330 (10,050 m)

- (2) Takeoff and landing of the airplane are allowed from/on the aerodromes located at elevations corresponding to pressure altitudes within the range from -305 up to 3000 m.
- (3) The airplane may be operated within the range of ambient temperatures indicated in Fig. 2.2.1 provided all the performance limitations depending on the aerodrome temperature and pressure are observed.

(cont'd)



ICAO Standard Atmosphere

Figure 2.2.1

(cont'd)

2.2.3. Wind

(1) Wind maximum limit for taxiing and towing 30 m/s

(2) Wind components maximum limits for takeoff and landing from /on dry runway:

Headwind 30 m/s

Tailwind 5 m/s

Crosswind at 90° to runway:

In normal conditions 17 m/s

With two hydraulic power systems inoperative 10 m/s

The graph which enables determination of the wind components is given in Fig. 2.2.2.

(3) Crosswind component at 90° to runway covered with atmospheric precipitation:

Up to 3 mm high To be derived from Fig. 2.2.3 for friction coefficient which is determined from Table 3.1.12.2

More than 3 mm high 5 m/s

2.2.4. Class and Category of Aerodromes

The airplane with the maximum takeoff weight may be operated from aerodromes having hard pavement.

2.2.5. Condition of Runway

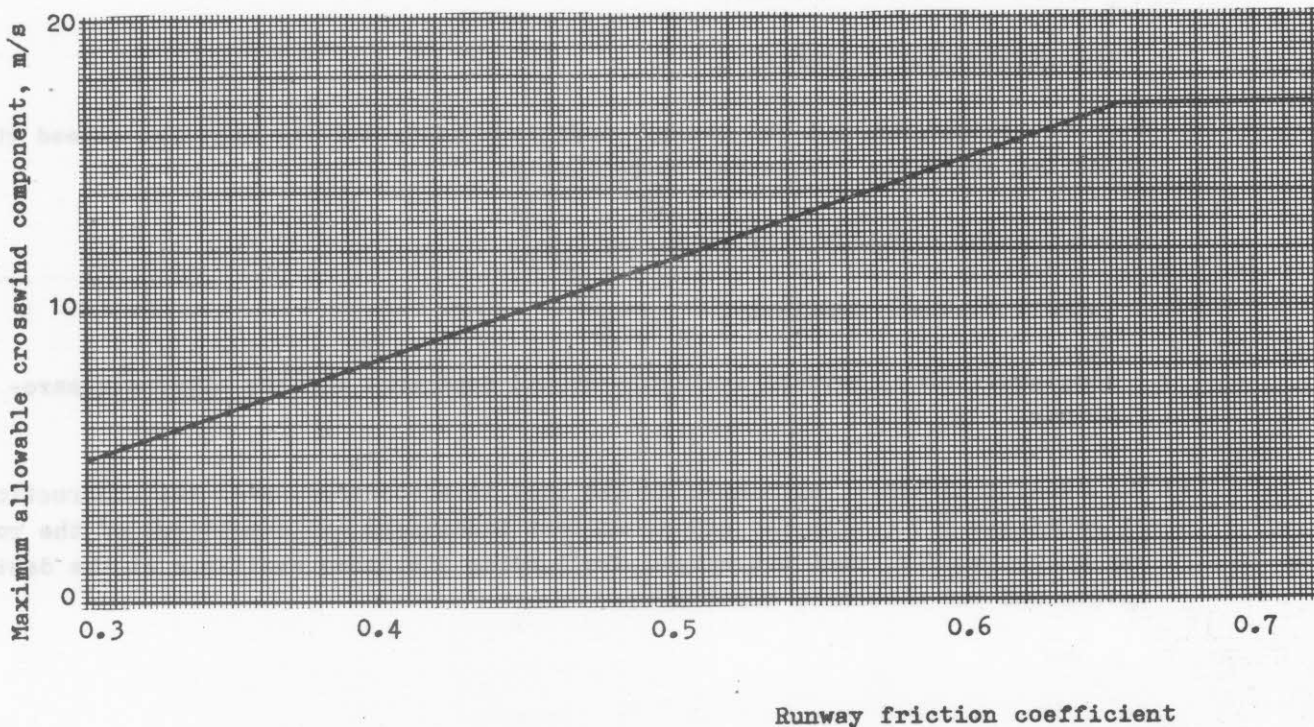
(1) Takeoff and landing are allowed from/on the runways which meet the following requirements:

Friction coefficient 0.3, min

Ice none

Height of layer of water 10 mm, max

(cont'd)



**Maximum Allowable Crosswind Component
for Runway Friction Coefficient**

Figure 2.2.3

(cont'd)



Height of layer of slush 12 mm, max

Height of layer of dry snow 50 mm, max

(2) The runway slope limit $\pm 2\%$

(3) The required distances calculated by the crew (Ref. paragraph 3.1.5):

Takeoff run distance.

Continued takeoff distance.

Accelerate-stop distance.

With the actual ambient and runway conditions accounted for must not exceed the following available distances, respectively:

Takeoff run distance available.

Takeoff distance available.

Accelerate-stop distance available at the departure and the alternate aerodromes.

(4) The landing distance calculated by the crew in accordance, with the instructions of paragraph 3.1.6 with the actual ambient conditions and conditions of the runway accounted for, must not exceed the landing distances available at the destination and the alternate aerodromes.



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GENERAL OPERATIONAL LIMITATIONS - Minimum Crew

2.3. MINIMUM CREW

- (1) The minimum flight crew with which the airplane is allowed to fly is three-member crew, including:

Captain.

Co-pilot.

Flight engineer.

- (2) Supernumerary crewmembers, for whom stations are provided in the airplane, may be included in the crew at the penalty of the payload.

____ oOo ____



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GENERAL OPERATIONAL LIMITATIONS - Maximum Number of Occupants

2.4. MAXIMUM NUMBER OF OCCUPANTS

- (1) The maximum number of occupants must not exceed the number of seats provided with the belts.
- (2) The maximum number of occupants for the airplane layout version is given in Table 2.4.1.

Table 2.4.1

Layout version	Maximum number of occupants	Passengers		Flight crew	Cabin attendants
		grown-ups	children up to 5 years		
136	149	136	4	3	6
149	162	149	4	3	6
159	172	159	4	3	6
93 - 104	106 to 117	93 to 104	4	3	6

— oOo —

2.5. GENERAL FLIGHT LIMITATIONS

2.5.1. Weight

- (1) Maximum weight 100,500 kg
- (2) Maximum takeoff weight 100,000 kg
- (3) Maximum landing weight 80,000 kg
- (4) Maximum zero fuel weight 74,000 kg

2.5.2. Cargo and Passenger Compartments Floor Loading

- (1) Maximum loading of passenger compartments flooring ... 280 kgf/sq.m
- (2) Maximum loading of structural framework of passenger compartments floor 400 kgf/sq.m
- (3) Maximum loading of cargo compartments floor 600 kgf/sq.m

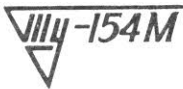
2.5.3. Center of Gravity

- (1) Forward center of gravity limit for takeoff,
LG down 21 % MAC
- (2) Forward center of gravity limit for landing,
LG down 18 % MAC
- (3) Aft center of gravity limit, LG up:
 - (a) for takeoff, enroute and landing 32 % MAC
 - (b) for conditions with no payload or with payload available not allowing to shift the center of gravity to 32 % MAC and farther forward, at take-off weights up to 80,000 kg and altitude of 10,200 m, with AFCS operating only in manual control mode 40 % MAC

2.5.4. Speed and Mach Number

All the speeds mentioned in the Flight Manual are the calibrated airspeeds (CAS), but due to the fact that with the airspeed indicators fed by the main static pressure system the values of the total airspeed corrections (accounting for both the

(cont'd)



FLIGHT MANUAL

GENERAL OPERATIONAL LIMITATIONS - General Flight Limitations

position and instrumental errors) are insignificant, the above airspeeds are assumed to be the indicated airspeeds (IAS).

When changing the instruments for the standby static pressure system, account for the altitude position error corrections (Ref. Table 7.9.4).

2.5.4.1. Maximum Operating Limit Speeds and Mach Numbers

- (1) Maximum operating limit speed V_{MO} and M_{MO} :
 - at altitudes from sea level up to 7000 m 600 km/hr
 - at altitudes from 7000 m up to 10,300 m 575 km/hr
 - at altitudes of 10,300 m and above $M = 0.88$
 - (2) Maximum operating limit speed with roll damper or yaw damper inoperative, at all gross weights 525 km/hr or $M = 0.85$
 - (3) Maximum flap extended speed V_{FE} with flaps extended to:
 - 15° 420 km/hr
 - 28° 360 km/hr
 - 36° 330 km/hr
 - 45° 300 km/hr
 - (4) Maximum landing gear operating speed V_{LO} :
 - In normal conditions 400 km/hr
 - In emergency descent within limitations of 2.5.4.1(1)
- NOTE: In case of emergency (ferry flight with the landing gear down or the landing gear retraction after takeoff with the LG doors closed), it is allowed to perform flight at a speed not more than 450 km/hr.
- (5) Maximum spoiler extended speed:
 - With mid-wing spoilers extended within limitations of 2.5.4.1(1)
 - With inboard spoilers extended 300 km/hr
 - (6) Maximum stabilizer operating speed 425 km/hr
 - (7) Maximum slat extended speed 425 km/hr

(cont'd)

(8) In the course of slat retraction, an acceleration up to 450 km/hr is allowed, this limit being attained by the moment of complete retraction of the slats.

(9) Maximum landing light extension speed 340 km/hr

(10) Maximum ground speeds:

For rotation 315 km/hr

For lift-off 325 km/hr

For touchdown by main LG wheels 280 km/hr

For touchdown by nose LG wheels 270 km/hr

For initial application of wheel brakes during
landing roll 230 km/hr

(11) Maximum taxiing speed:

Straightforward 30 km/hr

In turns with radii of 40 m and more 30 km/hr

In turns with minimum radius (7 m) 10 km/hr

NOTE: The taxiing speed is decreased in turns
from 30 km/hr down to 10 km/hr progres-
sively with the radius of turn decreasing
from 40 down to 7 m.

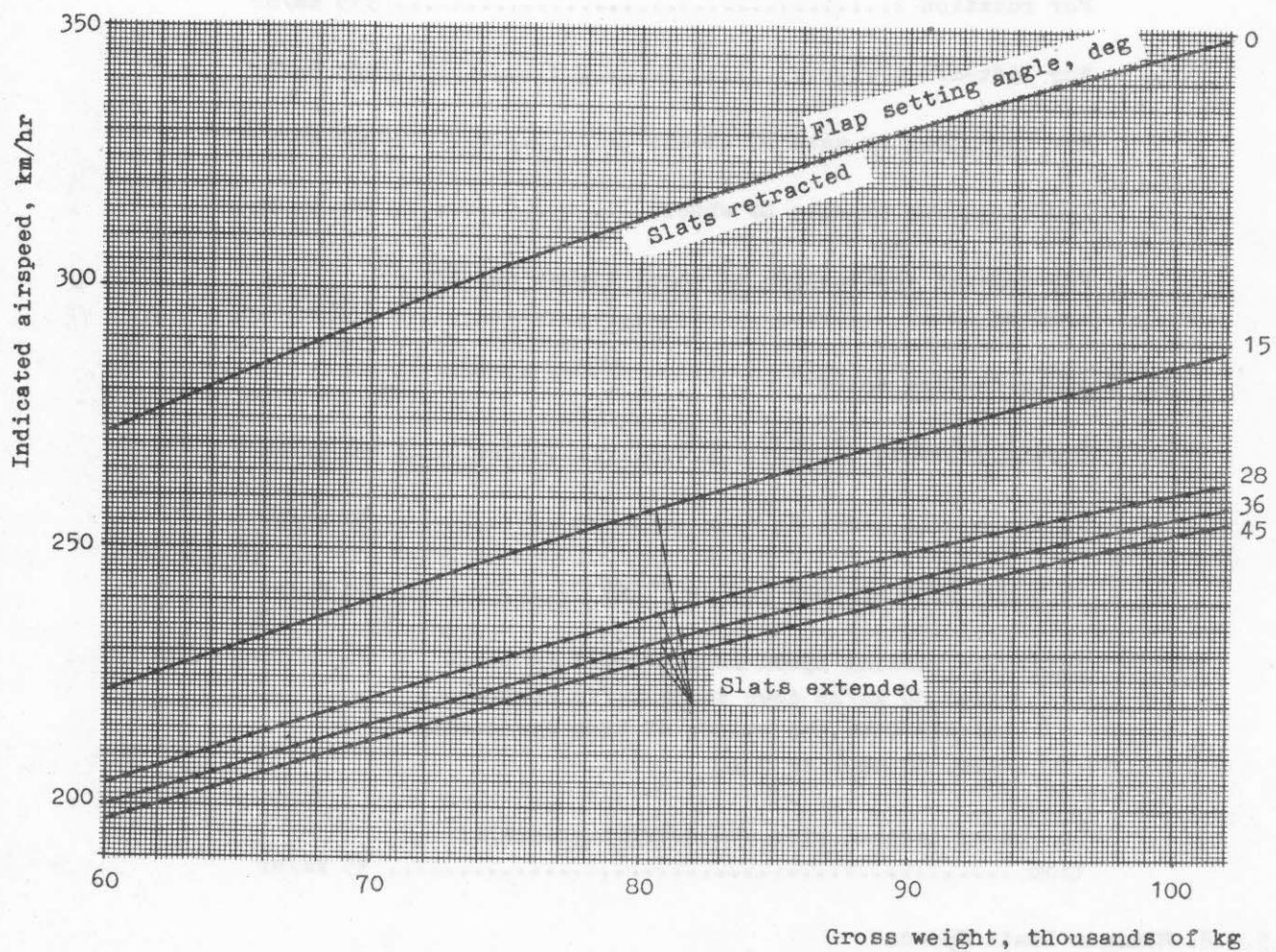
On runway covered with atmospheric precipita-
tion 15 km/hr

2.5.4.2. Minimum Limit Speeds

(1) The minimum limit speeds approved for takeoff and landing of the airplane (at which the automatic angle-of-attack and acceleration warning system (AAT) actuates) and the stalling speeds are shown in Figs 2.5.1, 2.5.2.

(2) The minimum safety speed during flight in enroute configuration shall be not less than 1.3 of stalling speed at altitudes below 5000 m and not less than 1.35 of stalling speed at altitudes above 5000 m (Ref. Fig. 7.8.1).

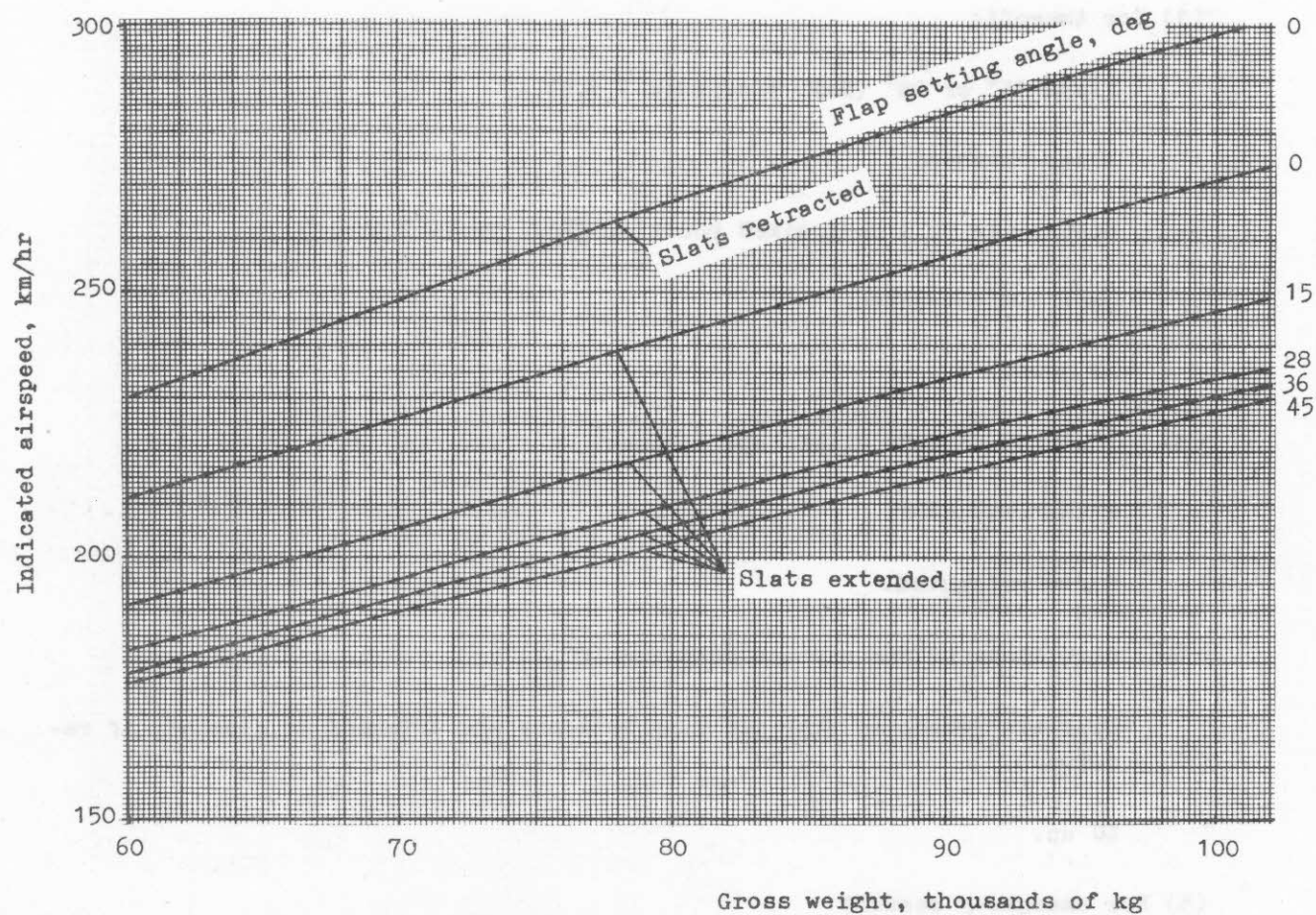
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Minimum Takeoff and Landing Speeds

Figure 2.5.1

(cont'd)



Stalling Speeds

Figure 2.5.2

(cont'd)

- (3) The crew is warned of attainment of the minimum limit speed at acceleration of 1 g by actuation of the light and audio warning devices which are actuated by the AAT (the red light on the AAT indicator at the Captain's station and the red STALL (α_{KP}) annunciator at the Co-pilot's station come on, and the loudspeaker installed at the crew's wardrobe partition sounds continuously).

2.5.4.3. Airplane Configurations for Various Stages of Flight

- (1) For takeoff:

Flaps 15° or 28° (Ref. paragraph 3.1.5).

Slats extended.

Stabilizer in a harmonized position (Ref. Table 2.5.4.1).

Spoilers retracted.

LG down.

- (2) For climb, enroute flight and descent:

Flaps retracted.

Slats retracted.

Stabilizer in the enroute position (0°).

Spoilers retracted (the mid-wing spoilers are extended in descent, if required).

LG up.

- (3) For emergency descent:

Flaps retracted.

Slats retracted.

Stabilizer in the enroute position (0°).

Mid-wing spoilers extended.

LG down.

(cont'd)

(4) For landing:

Flaps:

45° or 36° in normal conditions, as established by paragraph 3.1.6.

45°, 36° or 28° with two engines operating, as established by paragraph 3.1.6.

15° with one engine operating.

Slats extended.

Stabilizer in a harmonized position (Ref. Table 2.5.4.1).

Mid-wing and inboard spoilers extended (automatically after touchdown).

LG down.

(5) Harmonized positions of stabilizer and wing high-lift devices.

Table 2.5.4.1

Airplane configuration	Flap setting angle, deg.	Slat position	CG position, % MAC		
			18 to 24	24 to 32	32 to 40
			Stabilizer control setting		
			II (FWD) green	C (MIDWAY) black	3 (AFT) yellow
			Stabilizer harmonized position, deg.		
Enroute	0	Retracted	0	0	0
Takeoff	15, 28	Extended	3	1.5	0
Landing	36, 45	Extended	5.5	3	0

2.5.5. Load Factors

(1) Maximum operational limit load factors for all the airplane weights:

With the wing high-lift devices retracted 2.5

With the wing high-lift devices extended 2.0

(cont'd)



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GENERAL OPERATIONAL LIMITATIONS - General Flight Limitations

- (2) Minimum operational limit load factors for all the airplane weights:

With the wing high-lift devices retracted -1.0

With the wing high-lift devices extended 0

- (3) Execution of the maneuvers is limited by:

Maneuvering limit load factors:

Maximum 1.8

Minimum 0.5

Actuation as warned by the AAT.

Attainment of the bank limit angles warned by the coming-on of the HIGH L BANK (КРЕН ЛЕВ ВЕЛИК) or HIGH R BANK (КРЕН ПРАВ ВЕЛИК) annunciators.

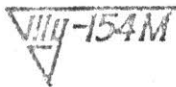
2.5.6. Bank Angles

- (1) Maximum limit bank angles:

For takeoff and landing $\pm 15^{\circ}$

For remaining conditions $\pm 33^{\circ}$

- (2) Attainment of the maximum limit bank angles is indicated to the pilots by the coming-on of the HIGH L BANK (КРЕН ЛЕВ ВЕЛИК) or HIGH R BANK (КРЕН ПРАВ ВЕЛИК) amber annunciators.



2.6. SYSTEMS AND EQUIPMENT

The systems and equipment operational limitations are covered for each system in section 8.

2.7 TEMPORARY LIMITATIONS

- (1) Maximum permissible flight altitude for all flight weights..11000m
(echelon 300)
- (2) Maximum permissible operating speeds V_{max} op. (V_{mo}) and M_{max} op. (M_{mo}):
- at altitudes from the ground level up to 7000 m600km/hour
 - at altitudes from 7000 m up to 9200 m575km/hour
 - Mach number at altitudes of 9200 m and over0.82

TO 2.2 GENERAL OPERATIONAL LIMITATIONS

Replace text 2.2.1 (3) "Weather minimum of 30x400 m (ICAO Category II) is established for airplane" with the text "2.2.1 The airplane may be operated at the weather minimum of 30x400 m (ICAO Category II).

Take off minimum when runway visibility range is 200 m.

- NOTES:
1. Take off minimum is applicable when the aerodrome provided with lights of runway axial line in the day and night.
 2. When runway axial line lights with axial line marking are absent the aerodrome take off minimum will be 500 m for day time and 700 m for night time.
 3. In the event of absence of the lighting equipment the aerodrome take off minimum is equal to landing minimum of the aerodrome concerned.
 4. Take off minimum is applicable when there is a standby airfield and flight time from it to the departure aerodrome doesn't exceed two hours.

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Section 3

PREPARATION FOR FLIGHT



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Contents

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3.1. CALCULATION OF FLIGHT DATA

3.1.1. General

The present section contains the information enabling the crew to perform the preflight calculation of flight data.

The crew must perform such a calculation before each flight.

The calculation of flight data includes the following operations:

Receiving of initial data for calculation.

Calculation of the maximum allowable takeoff and landing weights of the airplane.

Determination of the optimum regimes of flight (in climb, enroute and descent).

Calculation of the airplane fuel supply.

Calculation of payload.

Refinement of the actual takeoff and landing weights.

Calculation of takeoff and landing speeds.

Calculation of the airplane CG position and distribution of loads.

3.1.2. Initial Data for Calculation of Flight Data

The necessary initial data for calculation of the flight data are:

Track distance from the departure to the destination aerodrome and the block time.

The distance from the destination aerodrome to the most distant alternate aerodrome.

Wind profile (velocity and direction) for altitude over the route.

The actual ambient conditions at the departure aerodrome and forecast ambient conditions on the stages of flight, as well as the ambient conditions at the destination and alternate aerodromes (ambient temperature and atmospheric pressure, wind velocity and direction).

The lengths of runways, stopways and clearways, locations of obstacles, noise limits, condition of the runway surface (friction coefficient, type and amount

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of atmospheric precipitation) at the departure, destination and alternate aerodromes.

The airplane operational weight and its CG position as stated in the airplane Log Book.

3.1.3. Selection of Flight Level and Best Enroute Mode of Flight

- (1) Select the best altitude from Table 3.1.3.1 for the known distance to the destination aerodrome. For distances exceeding 600 km the optimum enroute flight level is the highest possible flight level allowed by the actual gross weight. The best will be the flight level indicated in the Table for a certain direction of flight.
- (2) The main recommended mode of flight ensuring the lowest fuel consumption is the best-range cruise (BRC). When flying using this mode maintain speeds and Mach numbers which yield the maximum level of specific range. This mode of flight ensures transportation of the maximum payload in conditions where its value is limited by the takeoff weight or the fuel tanks volumetric capacity. To select the Mach number in enroute flight at BRC for the flight level and gross weight refer to paragraph 4.4.2 or subsection 7.5.
- (3) In case of necessity to reduce the block time execute climb, horizontal flight and descent at speeds and Mach numbers of the high-speed cruise (HSC) (Ref. paragraph 4.4.2 or subsection 7.5).
- (4) The minimum enroute safety speeds at zero flaps and slats are maintained with the following margins above the stalling speeds:
30 % at altitudes from zero up to 5000 m and 35 % at altitudes above 5000 m (Ref. subsection 7.8).
- (5) At altitudes of 8400 m and more maintain the speeds not less than those of the best-range cruise mode (Ref. Fig. 7.5.1).

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Table 3.1.3.1.

Flight Levels for Flight Distance

Distance, km	Heading			
	0° to 179°	180° to 359°	0° to 179°	180° to 359°
	Flight level		Pressure altitude, m	
Below 300	190	200	5800	6100
300 to 400	270	280	8250	8550
400 to 500	300	320	9150	9750
500 to 600	330	350	10050	10650
600 and more	380	360 to 390*	11600	10950 to 11900*

NOTES: 1. * It is recommended to maintain a stepped flight profile upon authorization of the ATC service: occupy flight level 390 after the gross weight drops down to 91000 kg provided the distance to go to the destination point is not less than 400 km.

2. It is allowed to occupy a flight level higher than that derived from the Table the outside air temperature and the gross weight so allow and the maximum altitude limits are observed.

3.1.4. Calculation of Required Fuel Supply

(1) The fuel supply required for a flight (FS) must be not less than

$$FS = NWF + WCF + TF + RF$$

where NWF - fuel used since takeoff up to landing in no-wind conditions;

WCF - correction accounting for enroute wind (positive in case of headwind);

TF - fuel used for starting and warming up the engines and taxiing to lineup position (assumed to be equal to 500 kg and in excess of the maximum allowable takeoff weight);

RF - regulatory fuel reserve determined from the formula below:

$$RF = FR + CF, \text{ where}$$

FR - fuel reserve required for reaching the alternate aerodrome from the route estimated point with fuel required for holding for the selected period of time included;

(cont'd)



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CF - compensation fuel required for compensation of various errors assumed to be equal to 3 % of the main fuel supply (NWF + WCF).

- (2) Determine NWF, WCF and CF from Tables 3.1.4.1 through 3.1.4.31 for the route length (no-wind distance), flight level and mode of flight (Ref. Table 3.1.4.0).

Table 3.1.4.0

Flight level	Pressure altitude, m	Mode of flight			
		BRC	M=0.82	M=0.84	HSC
		Table number			
140	4250	3.1.4.1	-	-	3.1.4.21
200	6100	3.1.4.2	-	-	3.1.4.22
230	7000	3.1.4.3	-	-	3.1.4.23
250	7600	3.1.4.4	-	-	3.1.4.24
270	8250	3.1.4.5	-	-	3.1.4.25
290	8850	3.1.4.6	-	-	3.1.4.26
310	9450	3.1.4.7	3.1.4.12	-	3.1.4.27
330	10050	3.1.4.8	3.1.4.13	3.1.4.17	3.1.4.28
350	10650	3.1.4.9	3.1.4.14	3.1.4.18	3.1.4.29
370	11300	3.1.4.10	3.1.4.15	3.1.4.19	3.1.4.30
390	11900	3.1.4.11	3.1.4.16	3.1.4.20	3.1.4.31

(cont'd)



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Listed below are the conditions for which the tables are calculated:

The payload as limited by either the maximum limit payload MPL = 18000 kg or the maximum limit takeoff weight MLTOW = 100000 kg.

The values of NWF are calculated for no-wind conditions (WV = 0).

The values of WCF are calculated for a wind velocity of 30 km/hr.

Fuel used during takeoff for 2 min equals to 600 kg.

Fuel used for maneuvering during landing approach and landing for 10 min equals to 600 kg.

Fuel used for starting the engines and taxiing to lineup position equal to 500 kg is not included.

- (3) Determine fuel reserve from Table 3.1.4.32 for the distance between the destination aerodrome and the most distant alternate aerodrome with the selected time of holding in the holding area equal to 30 min.

CAUTION: IN ALL CASES THE CALCULATED REGULATORY FUEL RESERVE MUST BE NOT LESS THAN 5000 kg.

- (4) If the actual payload is less than that assumed in calculation of the Tables refine the fuel supply for the BRC mode (Ref. paragraphs 3.1.9 or 7.5.2) within the maximum allowable takeoff weight limits (Ref. paragraph 3.1.5).
- (5) If the holding time differs from 30 min, determine the fuel reserve (FR) for the selected holding time (Ref. paragraph 7.5.3).

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PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.4.1

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

BEST-RANGE CRUISE

FLIGHT LEVEL 140 (4250 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	5500	0.535	100	150	1.00
1000	10000	0.535	200	300	1.75
1500	14000	0.545	250	400	2.50
1600	15000	0.545	300	450	2.75
1700	15800	0.545	350	500	2.95
1800	16500	0.545	400	500	3.10
1900	17500	0.545	400	500	3.25
2000	18200	0.545	450	550	3.40
2100	19500	0.55	500	600	3.60
2200	20200	0.55	550	600	3.70
2300	21000	0.55	600	600	3.90
2400	21800	0.55	650	650	4.00
2500	22500	0.55	700	700	4.10
2600	23400	0.55	700	700	4.30
2700	24000	0.55	700	700	4.50
2800	25000	0.55	750	750	4.60
2900	25600	0.55	800	750	4.80
3000	26800	0.55	800	800	5.00
3100	27500	0.55	800	800	5.10
3200	28000	0.545	800	850	5.30
3300	29000	0.545	850	900	5.50
3400	29700	0.545	900	900	5.60
3500	30500	0.545	900	900	5.80
3600	31200	0.545	950	950	5.90
3700	32000	0.545	1000	950	6.00
3800	32900	0.545	1000	1000	6.20
3900	33700	0.545	1000	1000	6.40
4000	34500	0.545	1050	1050	6.50
4100	35500	0.545	1100	1050	6.70
4200	36200	0.545	1100	1100	6.90
4300	37000	0.535	1100	1100	7.00
4400	37800	0.535	1100	1150	7.20
4500	38500	0.535	1100	1150	7.35
4600	39250	0.535	1100	1200	7.50

(cont'd)

Table 3.1.4.2

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

BEST-RANGE CRUISE

FLIGHT LEVEL 200 (6100 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	5000	0.60	100	150	0.95
1000	8600	0.60	200	250	1.60
1500	12300	0.61	250	400	2.40
1600	13000	0.61	300	400	2.60
1700	13600	0.61	350	400	2.70
1800	14400	0.61	400	450	2.80
1900	15400	0.61	450	450	3.00
2000	16000	0.61	500	500	3.15
2100	16800	0.61	500	500	3.25
2200	17500	0.61	550	500	3.40
2300	18500	0.62	600	550	3.60
2400	19000	0.62	600	600	3.70
2500	19800	0.62	600	600	3.85
2600	20800	0.62	600	600	4.10
2700	21800	0.62	650	650	4.30
2800	22200	0.62	650	650	4.40
2900	22800	0.62	650	700	4.50
3000	23700	0.62	700	700	4.70
3100	24400	0.62	700	750	4.80
3200	25000	0.62	750	750	4.90
3300	25800	0.62	800	800	5.10
3400	26200	0.62	850	800	5.20
3500	27000	0.62	900	800	5.35
3600	27800	0.62	900	850	5.50
3700	28300	0.60	950	850	5.70
3800	28700	0.60	1000	850	5.80
3900	29500	0.60	1000	900	5.90
4000	30050	0.60	1000	900	6.00
4100	31000	0.60	1050	900	6.30
4200	31500	0.60	1050	950	6.35
4300	32000	0.60	1100	950	6.50
4400	32700	0.60	1100	1000	6.60
4500	33500	0.60	1100	1000	6.80
4600	34000	0.58	1100	1000	6.90
4700	34500	0.58	1100	1050	7.00
4800	35000	0.58	1100	1050	7.10
4900	36000	0.58	1100	1100	7.30
5000	36500	0.58	1100	1100	7.45

(cont'd)



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PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.4.3

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

BEST-RANGE CRUISE

FLIGHT LEVEL 230 (7000 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4700	0.65	150	150	0.96
1000	7600	0.65	200	250	1.60
1500	11100	0.66	250	350	2.25
1600	11750	0.66	300	350	2.40
1700	12500	0.66	350	400	2.50
1800	13250	0.66	400	400	2.65
1900	13800	0.66	400	400	2.75
2000	14500	0.66	450	450	2.90
2100	15200	0.66	450	450	3.04
2200	15900	0.66	450	500	3.18
2300	16700	0.66	500	500	3.35
2400	17500	0.66	500	550	3.45
2500	18100	0.66	500	550	3.65
2600	18800	0.66	550	550	3.75
2700	19500	0.67	600	600	3.85
2800	20200	0.67	650	600	4.00
2900	21000	0.67	700	650	4.13
3000	21700	0.67	750	650	4.25
3100	22500	0.67	800	700	4.40
3200	23200	0.67	800	700	4.55
3300	23900	0.67	800	700	4.65
3400	24500	0.67	800	750	4.80
3500	25200	0.67	800	750	4.95
3600	25800	0.67	800	800	5.10
3700	26500	0.67	850	800	5.25
3800	27100	0.66	850	800	5.40
3900	27800	0.66	900	850	5.55
4000	28400	0.66	900	850	5.70
4100	29000	0.66	900	850	5.85
4200	29700	0.66	900	900	5.95
4300	30200	0.66	900	900	6.10
4400	30800	0.66	900	950	6.20
4500	31500	0.66	950	950	6.35
4600	32100	0.66	950	950	6.45
4700	32700	0.66	950	1000	6.60
4800	33400	0.66	1000	1000	6.75
4900	34000	0.66	1050	1000	6.90
5000	34600	0.66	1100	1050	7.05

(cont'd)

Table 3.1.4.4

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

BEST-RANGE CRUISE

FLIGHT LEVEL 250 (7600 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4600	0.675	150	150	0.85
1000	7550	0.675	200	250	1.58
1500	10900	0.675	300	350	2.23
1600	11600	0.69	350	350	2.38
1700	12250	0.69	350	350	2.48
1800	12800	0.69	350	400	2.62
1900	13350	0.69	350	400	2.72
2000	14100	0.69	400	400	2.88
2100	14700	0.69	450	450	3.02
2200	15350	0.69	450	450	3.15
2300	16050	0.69	450	500	3.32
2400	16600	0.69	500	500	3.43
2500	17300	0.69	500	500	3.60
2600	18000	0.69	550	550	3.70
2700	18650	0.69	550	550	3.80
2800	19350	0.7	550	600	3.85
2900	19950	0.7	600	600	4.00
3000	20550	0.7	600	600	4.10
3100	21200	0.7	600	650	4.25
3200	22000	0.7	650	650	4.40
3300	22700	0.7	700	700	4.50
3400	23400	0.7	700	700	4.65
3500	24000	0.7	700	700	4.80
3600	24600	0.7	700	750	4.90
3700	25200	0.7	750	750	5.10
3800	25800	0.7	800	800	5.15
3900	26400	0.7	800	800	5.30
4000	26900	0.7	800	800	5.40
4100	27400	0.69	850	800	5.70
4200	27900	0.69	900	850	5.82
4300	28400	0.69	900	850	5.92
4400	29000	0.69	900	850	6.05
4500	29600	0.69	900	900	6.20
4600	30100	0.69	900	900	6.33
4700	30700	0.69	900	900	6.50
4800	31400	0.69	950	950	6.60
4900	32000	0.69	1000	950	6.75
5000	32600	0.69	1000	1000	6.85

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Table 3.1.4.5

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind
Distance (NWD) and Flight Level with Wind Correction (WCF) Included

BEST-RANGE CRUISE

FLIGHT LEVEL 270 (8250 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4550	0.7	150	150	0.83
1000	7500	0.7	200	200	1.50
1500	10600	0.7	300	300	2.10
1600	11200	0.7	300	350	2.22
1700	11900	0.715	350	350	2.32
1800	12500	0.715	400	400	2.42
1900	13200	0.715	400	400	2.60
2000	13900	0.715	400	400	2.70
2100	14400	0.715	400	450	2.85
2200	15000	0.715	400	450	2.98
2300	15600	0.715	400	450	3.10
2400	16300	0.715	400	500	3.23
2500	16900	0.715	450	500	3.35
2600	17500	0.715	500	550	3.45
2700	18100	0.715	500	550	3.60
2800	18800	0.715	550	550	3.70
2900	19400	0.73	550	600	3.80
3000	20000	0.73	550	600	3.90
3100	20650	0.73	600	600	4.00
3200	21300	0.73	650	650	4.10
3300	22000	0.73	700	650	4.20
3400	22600	0.73	700	700	4.32
3500	23200	0.73	700	700	4.45
3600	23800	0.73	700	700	4.60
3700	24400	0.73	750	750	4.70
3800	25000	0.73	800	750	4.80
3900	25500	0.73	850	750	4.93
4000	26100	0.73	850	800	5.07
4100	26600	0.73	850	800	5.15
4200	27000	0.715	900	800	5.30
4300	27500	0.715	900	800	5.40
4400	27900	0.715	900	850	5.52
4500	28400	0.715	900	850	5.65
4600	29000	0.715	900	850	5.80
4700	29600	0.715	950	900	5.95
4800	30100	0.715	950	900	6.00
4900	30600	0.715	950	900	6.10
5000	31200	0.715	950	950	6.20

(cont'd)

Table 3.1.4.6

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

BEST-RANGE CRUISE

FLIGHT LEVEL 290 (8850 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4600	0.73	100	150	0.85
1000	7400	0.73	150	200	1.45
1500	10200	0.73	300	300	2.15
1600	11000	0.73	300	350	2.35
1700	11500	0.74	300	350	2.40
1800	12000	0.74	300	350	2.55
1900	13000	0.74	300	400	2.65
2000	13400	0.74	350	400	2.75
2100	14000	0.74	350	400	2.95
2200	14500	0.74	350	450	3.05
2300	15200	0.74	350	450	3.20
2400	15500	0.74	400	450	3.30
2500	16000	0.74	400	500	3.45
2600	16800	0.74	400	500	3.55
2700	17500	0.74	450	500	3.65
2800	18000	0.74	450	500	3.85
2900	18800	0.74	500	550	4.00
3000	19200	0.74	500	600	4.15
3100	20000	0.75	500	600	4.30
3200	20500	0.75	550	600	4.45
3300	21000	0.75	550	600	4.50
3400	21700	0.75	550	650	4.70
3500	22400	0.75	550	700	4.90
3600	23000	0.75	550	700	5.00
3700	23500	0.75	550	700	5.10
3800	24200	0.75	550	700	5.15
3900	24600	0.75	550	700	5.20
4000	25000	0.75	550	750	5.25
4100	25800	0.75	600	800	5.40
4200	26200	0.75	600	800	5.50
4300	26800	0.74	650	800	5.70
4400	27200	0.74	650	800	5.80
4500	28000	0.74	650	850	6.00
4600	28400	0.74	700	850	6.10
4700	29000	0.74	700	900	6.20
4800	29400	0.74	750	900	6.30
4900	30000	0.74	750	900	6.40
5000	30500	0.74	800	900	6.50

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Table 3.1.4.7

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind
, Distance (NWD) and Flight Level with Wind Correction (WCF) Included

BEST-RANGE CRUISE

FLIGHT LEVEL 310 (9450 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4500	0.755	100	150	0.90
1000	7250	0.755	150	200	1.50
1500	10000	0.755	200	300	2.10
1600	10600	0.755	200	300	2.15
1700	11100	0.755	250	350	2.35
1800	11600	0.765	250	350	2.40
1900	12300	0.765	300	400	2.60
2000	12800	0.765	350	400	2.70
2100	13400	0.765	350	400	2.80
2200	14000	0.765	350	450	2.90
2300	14500	0.765	400	450	3.00
2400	15000	0.765	400	450	3.15
2500	15700	0.765	400	500	3.30
2600	16300	0.765	450	500	3.40
2700	16800	0.765	450	500	3.50
2800	17400	0.765	500	550	3.65
2900	18000	0.765	500	550	3.80
3000	18500	0.765	500	550	3.90
3100	19200	0.765	550	550	4.00
3200	19800	0.775	600	600	4.05
3300	20400	0.775	600	600	4.20
3400	21000	0.775	600	600	4.30
3500	21500	0.775	600	650	4.40
3600	22200	0.775	600	700	4.50
3700	22900	0.775	600	700	4.65
3800	23400	0.775	650	700	4.80
3900	24100	0.775	650	700	4.90
4000	24400	0.775	650	750	5.00
4100	24900	0.775	700	750	5.10
4200	25500	0.775	700	800	5.20
4300	26000	0.775	750	800	5.35
4400	26400	0.775	750	800	5.45
4500	26800	0.765	800	800	5.55
4600	27400	0.765	800	850	5.70
4700	27900	0.765	850	850	5.80
4800	28400	0.765	850	850	5.90
5900	28900	0.765	900	900	6.05
5000	29500	0.765	900	900	6.15

(cont'd)

Table 3.1.4.8

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

BEST-RANGE CRUISE

FLIGHT LEVEL 330 (10050 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4400	0.775	100	150	0.90
1000	6900	0.775	150	200	1.50
1500	9800	0.775	200	300	2.10
1600	10200	0.775	250	300	2.25
1700	10700	0.775	250	350	2.40
1800	11100	0.775	250	350	2.50
1900	11700	0.785	300	350	2.55
2000	12300	0.785	300	400	2.70
2100	12900	0.785	350	400	2.80
2200	13400	0.785	350	400	2.90
2300	14000	0.785	400	450	3.00
2400	14500	0.785	400	450	3.15
2500	15000	0.785	400	450	3.30
2600	15500	0.785	450	500	3.40
2700	16100	0.785	450	500	3.50
2800	16600	0.785	500	500	3.65
2900	17200	0.785	500	550	3.75
3000	17800	0.785	500	550	3.85
3100	18400	0.785	550	550	3.95
3200	18900	0.785	600	600	4.10
3300	19600	0.785	600	600	4.25
3400	20200	0.795	650	600	4.35
3500	20800	0.795	650	650	4.40
3600	21400	0.795	650	650	4.50
3700	21900	0.795	700	650	4.60
3800	22500	0.795	750	700	4.70
3900	23100	0.795	750	700	4.85
4000	23600	0.795	800	700	4.95
4100	24100	0.795	800	750	5.10
4200	24700	0.795	800	750	5.20
4300	25100	0.795	800	750	5.30
4400	25600	0.795	800	800	5.40
4500	26100	0.795	850	800	5.55
4600	26500	0.785	900	800	5.80
4700	27000	0.785	900	800	5.90
4800	27400	0.785	900	850	6.00
4900	27900	0.785	900	850	6.15
5000	28400	0.785	950	850	6.25

(cont'd)



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PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.4.9

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

BEST-RANGE CRUISE

FLIGHT LEVEL 350 (10650 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4400	0.80	100	150	0.90
1000	7000	0.80	200	200	1.55
1500	9600	0.80	250	200	2.10
1600	10100	0.80	250	300	2.25
1700	10600	0.80	300	350	2.40
1800	11100	0.80	300	350	2.45
1900	11600	0.80	300	350	2.60
2000	12200	0.805	300	400	2.70
2100	12800	0.805	350	400	2.80
2200	13300	0.805	350	400	2.90
2300	13800	0.805	400	400	3.0
2400	14300	0.805	400	450	3.15
2500	14800	0.805	450	450	3.30
2600	15300	0.805	500	500	3.35
2700	15900	0.805	500	500	3.50
2800	16400	0.805	500	500	3.55
2900	17000	0.805	550	500	3.75
3000	17600	0.805	550	550	3.80
3100	18100	0.805	550	550	3.90
3200	18600	0.805	600	550	4.0
3300	19200	0.805	600	600	4.15
3400	19700	0.805	650	600	4.30
3500	20300	0.81	650	600	4.30
3600	20900	0.81	650	650	4.45
3700	21500	0.81	650	650	4.55
3800	22000	0.81	700	700	4.70
3900	22600	0.81	700	700	4.80
4000	23200	0.81	700	700	4.90
4100	23700	0.81	700	700	5.0
4200	24100	0.81	700	750	5.15
4300	24600	0.81	750	750	5.30
4400	25000	0.81	750	750	5.40
4500	25500	0.81	750	800	5.50
4600	26000	0.81	750	800	5.60
4700	26500	0.805	750	800	5.80
4800	26900	0.805	750	800	5.90
4900	27300	0.805	800	850	6.05
5000	27800	0.805	800	850	6.15

(cont'd)

Table 3.1.4.10

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

BEST-RANGE CRUISE

FLIGHT LEVEL 370 (11300 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4400	0.805	50	150	0.85
1000	6900	0.805	150	200	1.50
1500	9300	0.805	250	300	2.10
1600	9900	0.805	300	300	2.20
1700	10400	0.805	350	300	2.30
1800	10900	0.805	350	350	2.40
1900	11300	0.805	350	350	2.55
2000	11900	0.805	350	350	2.70
2100	12400	0.81	350	400	2.75
2200	13000	0.81	400	400	2.85
2300	13500	0.81	400	400	2.95
2400	14000	0.81	400	450	3.10
2500	14500	0.81	400	450	3.20
2600	15000	0.81	400	450	3.30
2700	15500	0.81	400	500	3.40
2800	16100	0.81	400	500	3.55
2900	16500	0.81	400	500	3.65
3000	17100	0.81	400	500	3.75
3100	17800	0.81	400	550	3.90
3200	18000	0.81	500	550	4.00
3300	19000	0.81	500	600	4.10
3400	19250	0.81	500	600	4.20
3500	19900	0.81	500	600	4.35
3600	20500	0.81	550	600	4.45
3700	21000	0.81	550	650	4.60
3800	21500	0.81	550	650	4.70
3900	22100	0.81	550	700	4.80
4000	22800	0.81	600	700	4.90
4100	23200	0.81	650	700	5.05
4200	23500	0.81	650	700	5.15
4300	24250	0.81	650	750	5.30
4400	24600	0.81	700	750	5.40
4500	25000	0.81	700	750	5.50
4600	25500	0.81	700	800	5.60
4700	26000	0.81	700	800	5.75
4800	26500	0.81	750	800	5.85
4900	26700	0.81	750	800	5.95
5000	27250	0.81	750	850	6.10

(cont'd)



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PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.4.11

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

BEST-RANGE CRUISE

FLIGHT LEVEL 390 (11900 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4500	0.81	50	150	1.0
1000	6800	0.81	150	200	1.60
1500	9350	0.81	250	300	2.15
1600	9700	0.81	250	300	2.25
1700	10300	0.81	250	300	2.40
1800	10700	0.81	300	350	2.50
1900	11200	0.81	300	350	2.60
2000	11600	0.81	300	350	2.70
2100	12250	0.81	300	400	2.85
2200	12900	0.81	350	400	2.95
2300	13500	0.81	350	400	3.10
2400	14000	0.81	350	450	3.20
2500	14500	0.81	350	450	3.30
2600	15000	0.81	400	450	3.40
2700	15700	0.81	450	500	3.55
2800	16100	0.81	450	500	3.65
2900	16700	0.81	450	500	3.80
3000	17200	0.81	500	550	3.90
3100	17750	0.81	500	550	4.0
3200	18200	0.81	500	550	4.10
3300	19000	0.81	500	600	4.20
3400	19500	0.81	500	600	4.35
3500	20000	0.81	550	600	4.40
3600	20500	0.81	550	600	4.55
3700	21000	0.81	550	650	4.70
3800	21800	0.81	550	650	4.80
3900	22300	0.81	600	700	4.90
4000	23000	0.81	600	700	5.0
4100	23300	0.81	600	700	5.10
4200	23750	0.81	600	700	5.20
4300	24200	0.81	650	750	5.35
4400	24800	0.81	650	750	5.45
4500	25200	0.81	700	750	5.60
4600	25500	0.81	700	800	5.70
4700	26000	0.81	700	800	5.80
4800	26600	0.81	750	800	5.90
4900	27000	0.81	750	800	6.05
5000	27400	0.81	800	850	6.15

(cont'd)

Table 3.1.4.12

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

CRUISING SPEED, M = 0.82

FLIGHT LEVEL 310 (9450 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4700	0.82	100	150	0.87
1000	7450	0.82	150	250	1.42
1500	10300	0.82	200	300	1.95
1600	10900	0.82	200	350	2.12
1700	11500	0.82	250	350	2.22
1800	12000	0.82	300	350	2.30
1900	12700	0.82	350	400	2.40
2000	13200	0.82	400	400	2.50
2100	13900	0.82	400	450	2.60
2200	14200	0.82	400	450	2.71
2300	14900	0.82	450	450	2.82
2400	15500	0.82	450	500	2.92
2500	16200	0.82	450	500	3.08
2600	16800	0.82	450	500	3.20
2700	17200	0.82	450	500	3.30
2800	18000	0.82	500	550	3.45
2900	18600	0.82	500	550	3.55
3000	19100	0.82	500	600	3.66
3100	19800	0.82	550	600	3.82
3200	20300	0.82	600	600	3.92
3300	21000	0.82	600	600	4.02
3400	21500	0.82	600	650	4.13
3500	22200	0.82	600	700	4.23
3600	22900	0.82	600	700	4.30
3700	23500	0.82	600	700	4.46
3800	24000	0.82	650	700	4.62
3900	24500	0.82	650	700	4.70
4000	25000	0.82	650	750	4.80
4100	25400	0.82	700	750	4.95
4200	26000	0.82	700	800	5.00
4300	26500	0.82	750	800	5.15
4400	27000	0.82	750	800	5.25
4500	27500	0.82	800	800	5.38
4600	28000	0.82	850	850	5.50
4700	28600	0.82	850	850	5.60
4800	29000	0.82	850	900	5.70
4900	29800	0.82	900	900	5.78
5000	30200	0.82	900	900	5.90

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Table 3.1.4.13

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind
Distance (NWD) and Flight Level with Wind Correction (WCF) Included

CRUISING SPEED, M = 0.82

FLIGHT LEVEL 330 (10050 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4500	0.82	150	150	0.9
1000	7100	0.82	200	200	1.43
1500	9950	0.82	300	300	1.97
1600	10400	0.82	350	300	2.12
1700	10950	0.82	350	350	2.23
1800	11500	0.82	400	350	2.33
1900	12050	0.82	400	350	2.43
2000	12650	0.82	450	400	2.52
2100	13250	0.82	450	400	2.62
2200	13750	0.82	450	400	2.72
2300	14300	0.82	450	450	2.83
2400	14850	0.82	450	450	2.93
2500	15400	0.82	450	450	3.09
2600	15900	0.82	450	500	3.22
2700	16500	0.82	450	500	3.35
2800	17050	0.82	450	500	3.47
2900	17650	0.82	500	550	3.58
3000	18250	0.82	550	550	3.68
3100	18900	0.82	550	550	3.84
3200	19400	0.82	550	600	3.93
3300	20000	0.82	600	600	4.06
3400	20500	0.82	600	600	4.15
3500	21100	0.82	600	650	4.25
3600	21700	0.82	600	650	4.35
3700	22300	0.82	600	700	4.48
3800	22950	0.82	650	700	4.63
3900	23450	0.82	650	700	4.72
4000	24000	0.82	700	700	4.82
4100	24500	0.82	700	750	4.97
4200	25100	0.82	700	750	5.05
4300	25600	0.82	700	750	5.20
4400	26000	0.82	700	800	5.30
4500	26600	0.82	750	800	5.40
4600	27100	0.82	800	800	5.52
4700	27600	0.82	800	850	5.62
4800	28000	0.82	800	850	5.75
4900	28500	0.82	800	850	5.85
5000	29000	0.82	850	850	5.95

(cont'd)

Table 3.1.4.14

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

CRUISING SPEED, M = 0.82

FLIGHT LEVEL 350 (10650 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4450	0.82	50	150	0.93
1000	7000	0.82	150	200	1.44
1500	9600	0.82	250	300	1.99
1600	10100	0.82	300	300	2.14
1700	10700	0.82	300	300	2.24
1800	11300	0.82	300	350	2.34
1900	11800	0.82	300	350	2.44
2000	12300	0.82	300	400	2.54
2100	12800	0.82	300	400	2.64
2200	13400	0.82	350	400	2.74
2300	13900	0.82	350	400	2.84
2400	14400	0.82	400	450	2.94
2500	15000	0.82	400	450	3.10
2600	15500	0.82	450	450	3.24
2700	16050	0.82	450	500	3.38
2800	16600	0.82	500	500	3.50
2900	17200	0.82	500	500	3.60
3000	17750	0.82	550	550	3.70
3100	18300	0.82	550	550	3.85
3200	18900	0.82	550	550	3.95
3300	19500	0.82	600	600	4.08
3400	20000	0.82	600	600	4.17
3500	20500	0.82	600	600	4.28
3600	21000	0.82	600	650	4.38
3700	21650	0.82	650	650	4.49
3800	22250	0.82	650	650	4.64
3900	22800	0.82	700	700	4.74
4000	23300	0.82	700	700	4.84
4100	23800	0.82	700	700	4.99
4200	24300	0.82	700	750	5.08
4300	24800	0.82	700	750	5.23
4400	25200	0.82	700	750	5.35
4500	25800	0.82	700	800	5.45
4600	26200	0.82	700	800	5.54
4700	26800	0.82	700	800	5.64
4800	27200	0.82	750	800	5.78
4900	27600	0.82	750	850	5.88
5000	28100	0.82	750	850	5.98

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PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.4.15

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind
Distance (NWD) and Flight Level with Wind Correction (WCF) Included

CRUISING SPEED, M = 0.82

FLIGHT LEVEL 370 (11300 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4400	0.82	50	150	0.85
1000	6900	0.82	150	200	1.45
1500	9300	0.82	250	300	2.00
1600	10000	0.82	300	300	2.15
1700	10400	0.82	350	300	2.25
1800	11000	0.82	350	350	2.35
1900	11500	0.82	350	350	2.45
2000	12000	0.82	350	350	2.55
2100	12500	0.82	400	400	2.65
2200	13000	0.82	400	400	2.75
2300	13500	0.82	400	400	2.85
2400	14050	0.82	400	450	2.95
2500	14600	0.82	400	450	3.10
2600	15050	0.82	450	450	3.25
2700	15500	0.82	450	500	3.40
2800	16250	0.82	450	500	3.50
2900	16600	0.82	450	500	3.60
3000	17200	0.82	450	500	3.70
3100	17850	0.82	450	550	3.85
3200	18400	0.82	500	550	4.00
3300	19000	0.82	500	600	4.10
3400	19400	0.82	500	600	4.25
3500	20100	0.82	500	600	4.30
3600	20650	0.82	550	600	4.40
3700	21200	0.82	550	650	4.50
3800	21600	0.82	550	650	4.65
3900	22500	0.82	600	700	4.75
4000	23000	0.82	600	700	4.85
4100	23500	0.82	600	700	5.00
4200	24000	0.82	600	700	5.10
4300	24400	0.82	650	700	5.25
4400	24900	0.82	700	750	5.40
4500	25300	0.82	700	750	5.50
4600	25700	0.82	700	800	5.55
4700	26100	0.82	700	800	5.65
4800	26700	0.82	750	800	5.80
4900	27000	0.82	750	800	5.90
5000	27500	0.82	750	850	6.00

(cont'd)

Table 3.1.4.16

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

CRUISING SPEED, $M = 0.82$

FLIGHT LEVEL 390 (11900 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4500	0.82	50	150	0.95
1000	6850	0.82	150	200	1.45
1500	9500	0.82	200	300	2.00
1600	9900	0.82	250	300	2.15
1700	10400	0.82	250	300	2.25
1800	10800	0.82	300	300	2.35
1900	11300	0.82	300	350	2.45
2000	11800	0.82	300	350	2.55
2100	12350	0.82	300	400	2.65
2200	12800	0.82	350	400	2.75
2300	13400	0.82	350	400	2.85
2400	14100	0.82	350	400	2.95
2500	14600	0.82	350	450	3.10
2600	15000	0.82	400	450	3.25
2700	15750	0.82	450	500	3.40
2800	16200	0.82	450	500	3.50
2900	16800	0.82	450	500	3.60
3000	17300	0.82	500	500	3.70
3100	17900	0.82	500	550	3.85
3200	18300	0.82	500	550	4.00
3300	19100	0.82	500	600	4.10
3400	19600	0.82	500	600	4.25
3500	20150	0.82	550	600	4.30
3600	20600	0.82	550	600	4.40
3700	21200	0.82	550	650	4.50
3800	21900	0.82	550	650	4.65
3900	22500	0.82	600	700	4.75
4000	23050	0.82	600	700	4.85
4100	23400	0.82	600	700	5.00
4200	23900	0.82	650	700	5.10
4300	24350	0.82	700	700	5.25
4400	24800	0.82	700	750	5.40
4500	25300	0.82	700	750	5.50
4600	25600	0.82	700	800	5.55
4700	26100	0.82	700	800	5.65
4800	26700	0.82	750	800	5.80
4900	27050	0.82	750	800	5.90
5000	27500	0.82	800	800	6.00

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PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.4.17

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

CRUISING SPEED, M = 0.84

FLIGHT LEVEL 330 (10050 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4600	0.84	150	150	0.80
1000	7200	0.84	200	200	1.38
1500	10100	0.84	300	300	1.88
1600	10600	0.84	300	300	2.05
1700	11100	0.84	300	350	2.18
1800	11700	0.84	350	350	2.23
1900	12250	0.84	350	400	2.34
2000	12800	0.84	350	400	2.44
2100	13400	0.84	350	400	2.54
2200	14000	0.84	400	400	2.70
2300	14500	0.84	400	450	2.80
2400	15100	0.84	400	450	2.90
2500	15700	0.84	400	450	3.05
2600	16200	0.84	400	500	3.15
2700	16800	0.84	450	500	3.25
2800	17400	0.84	450	500	3.38
2900	18000	0.84	500	550	3.50
3000	18600	0.84	550	550	3.60
3100	19250	0.84	550	600	3.70
3200	19800	0.84	550	600	3.85
3300	20400	0.84	600	600	3.93
3400	21000	0.84	600	650	4.00
3500	21600	0.84	600	650	4.10
3600	22200	0.84	650	650	4.18
3700	22900	0.84	700	700	4.30
3800	23400	0.84	700	700	4.50
3900	24000	0.84	700	700	4.55
4000	24400	0.84	700	750	4.70
4100	25000	0.84	750	750	4.80
4200	25500	0.84	750	750	4.85
4300	26000	0.84	750	800	5.00
4400	26600	0.84	800	800	5.15
4500	27000	0.84	800	800	5.25
4600	27500	0.84	800	850	5.35
4700	28000	0.84	800	850	5.50
4800	28600	0.84	800	850	5.60
4900	29000	0.84	800	850	5.70
5000	29600	0.84	800	900	5.80

(cont'd)

Table 3.1.4.18

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

CRUISING SPEED, $M = 0.84$

FLIGHT LEVEL 350 (10650 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4550	0.84	100	150	0.80
1000	7100	0.84	150	200	1.38
1500	9800	0.84	200	300	1.88
1600	10300	0.84	300	300	2.05
1700	10850	0.84	350	350	2.18
1800	11400	0.84	350	350	2.23
1900	11900	0.84	350	350	2.34
2000	12500	0.84	350	400	2.44
2100	13000	0.84	350	400	2.54
2200	13600	0.84	400	400	2.70
2300	14100	0.84	400	400	2.80
2400	14700	0.84	450	450	2.90
2500	15300	0.84	450	450	3.05
2600	15800	0.84	450	500	3.15
2700	16300	0.84	500	500	3.25
2800	16900	0.84	500	500	3.38
2900	17500	0.84	500	550	3.50
3000	18100	0.84	500	550	3.60
3100	18650	0.84	550	550	3.70
3200	19200	0.84	550	600	3.85
3300	19750	0.84	550	600	3.93
3400	20300	0.84	550	600	4.00
3500	20900	0.84	600	650	4.13
3600	21500	0.84	600	650	4.20
3700	22100	0.84	600	650	4.30
3800	22700	0.84	650	700	4.50
3900	23200	0.84	650	700	4.55
4000	23700	0.84	650	700	4.70
4100	24200	0.84	650	750	4.80
4200	24700	0.84	650	750	4.85
4300	25200	0.84	650	750	5.00
4400	25700	0.84	700	750	5.15
4500	26200	0.84	700	800	5.25
4600	26700	0.84	700	800	5.35
4700	27200	0.84	700	800	5.50
4800	27700	0.84	700	850	5.60
4900	28200	0.84	750	850	5.70
5000	28700	0.84	800	850	5.80

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FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.4.19

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind
, Distance (NWD) and Flight Level with Wind Correction (WCF) Included

CRUISING SPEED, $M = 0.84$

FLIGHT LEVEL 370 (11300 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4500	0.84	50	150	0.85
1000	7000	0.84	200	200	1.40
1500	9500	0.84	300	300	1.90
1600	10200	0.84	350	300	2.10
1700	10600	0.84	350	300	2.20
1800	11200	0.84	350	350	2.25
1900	11700	0.84	350	350	2.35
2000	12250	0.84	350	350	2.45
2100	12800	0.84	400	400	2.55
2200	13400	0.84	400	400	2.71
2300	13800	0.84	400	400	2.81
2400	14400	0.84	400	450	2.91
2500	14950	0.84	400	450	3.07
2600	15400	0.84	450	450	3.17
2700	16000	0.84	450	500	3.27
2800	16500	0.84	450	500	3.40
2900	17100	0.84	450	500	3.52
3000	17700	0.84	450	500	3.65
3100	18100	0.84	500	550	3.80
3200	18700	0.84	500	550	3.90
3300	19200	0.84	500	600	3.95
3400	19900	0.84	500	600	4.10
3500	20400	0.84	500	600	4.15
3600	21000	0.84	550	600	4.25
3700	21500	0.84	550	650	4.45
3800	22100	0.84	550	650	4.55
3900	22700	0.84	600	650	4.65
4000	23200	0.84	600	700	4.75
4100	23800	0.84	600	700	4.85
4200	24200	0.84	600	700	4.90
4300	24800	0.84	650	750	5.05
4400	25200	0.84	700	750	5.20
4500	25800	0.84	700	750	5.35
4600	26200	0.84	700	800	5.45
4700	26500	0.84	700	800	5.55
4800	27000	0.84	750	800	5.65
4900	27500	0.84	750	800	5.75
5000	28000	0.84	750	850	5.85

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FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.4.20

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level **with** Wind Correction (WCF) Included

CRUISING SPEED, M = 0.84

FLIGHT LEVEL 390 (11900 m)

94506

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4500	0.84	50	150	0.85
1000	6900	0.84	150	200	1.40
1500	9550	0.84	200	250	1.90
1600	10000	0.84	300	300	2.10
1700	10500	0.84	300	300	2.25
1800	10950	0.84	300	300	2.25
1900	11400	0.84	300	350	2.35
2000	12000	0.84	300	350	2.45
2100	12500	0.84	350	400	2.55
2200	13000	0.84	400	400	2.71
2300	13600	0.84	400	400	2.81
2400	14200	0.84	450	400	2.91
2500	14600	0.84	450	450	3.07
2600	15200	0.84	450	450	3.17
2700	15900	0.84	450	500	3.27
2800	16400	0.84	450	500	3.40
2900	17000	0.84	500	500	3.52
3000	17450	0.84	500	500	3.65
3100	18050	0.84	500	550	3.80
3200	18500	0.84	500	550	3.90
3300	19250	0.84	500	600	3.95
3400	19800	0.84	500	600	4.10
3500	20200	0.84	500	600	4.15
3600	21000	0.84	550	650	4.25
3700	21400	0.84	550	650	4.45
3800	22000	0.84	550	660	4.55
3900	22600	0.84	600	680	4.65
4000	23000	0.84	600	700	4.75
4100	23600	0.84	600	700	4.85
4200	24000	0.84	600	700	4.90
4300	24500	0.84	650	750	5.05
4400	25000	0.84	650	750	5.20
4500	25500	0.84	650	750	5.35
4600	25800	0.84	650	800	5.45
4700	26300	0.84	700	800	5.55
4800	26800	0.84	700	800	5.65
4900	27200	0.84	750	800	5.75
5000	28000	0.84	750	850	5.85

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FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.4.21

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

HIGH-SPEED CRUISE

FLIGHT LEVEL 140 (4250 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	5500	0.625	100	150	0.80
1000	10000	0.625	200	300	1.60
1500	14000	0.625	300	400	2.30
1600	15000	0.625	400	450	2.45
1700	15800	0.625	450	500	2.55
1800	16900	0.625	500	500	2.70
1900	17500	0.625	500	500	2.85
2000	18700	0.625	500	550	3.00
2100	19500	0.625	600	600	3.15
2200	20500	0.625	600	600	3.35
2300	21400	0.625	600	650	3.40
2400	22500	0.625	650	700	3.60
2500	23500	0.625	650	700	3.75
2600	24200	0.625	700	700	3.80
2700	25000	0.625	700	750	4.00
2800	25800	0.625	700	800	4.15
2900	26900	0.625	750	800	4.30
3000	27400	0.624	750	800	4.45
3100	28200	0.625	800	850	4.60
3200	29000	0.625	800	900	4.70
3300	30000	0.625	850	900	4.85
3400	31000	0.625	900	900	5.00
3500	31600	0.625	900	950	5.15
3600	32500	0.625	950	1000	5.30
3700	33500	0.625	1000	1000	5.40
3800	34600	0.625	1100	1050	5.60
3900	35200	0.625	1100	1050	5.80
4000	36000	0.625	1200	1100	5.90
4100	36800	0.625	1200	1100	6.00
4200	37600	0.625	1200	1100	6.10
4300	38500	0.625	1200	1150	6.30
4400	39250	0.625	1200	1200	6.40

(cont'd)

Table 3.1.4.22

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

HIGH-SPEED CRUISE

FLIGHT LEVEL 200 (6100 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	5200	0.7	150	150	0.87
1000	9000	0.7	200	250	1.50
1500	12700	0.7	350	400	2.10
1600	13500	0.7	400	400	2.22
1700	14400	0.7	450	450	2.35
1800	15150	0.7	450	450	2.50
1900	16000	0.7	500	500	2.60
2000	16800	0.7	500	500	2.70
2100	17500	0.7	500	550	2.82
2200	18300	0.7	500	550	2.98
2300	19000	0.7	500	550	3.10
2400	19700	0.7	550	600	3.20
2500	20500	0.7	550	600	3.30
2600	21300	0.7	600	650	3.45
2700	22100	0.7	650	650	3.60
2800	22900	0.7	650	700	3.70
2900	23600	0.7	700	700	3.80
3000	24400	0.7	750	750	3.95
3100	25050	0.7	750	750	4.05
3200	25800	0.7	800	750	4.20
3300	26500	0.7	800	800	4.30
3400	27200	0.7	850	800	4.40
3500	27900	0.7	900	850	4.55
3600	28600	0.7	900	850	4.68
3700	29400	0.7	950	900	4.80
3800	30100	0.7	1000	900	4.92
3900	30900	0.7	1050	950	5.05
4000	31700	0.7	1100	950	5.20
4100	32400	0.7	1100	950	5.30
4200	33000	0.7	1100	1000	5.42
4300	33700	0.7	1100	1000	5.60
4400	34350	0.7	1100	1050	5.70
4500	35150	0.7	1150	1050	5.80
4600	35900	0.7	1200	1100	5.95
4700	36600	0.7	1200	1100	6.10
4800	37300	0.7	1200	1100	6.20
4900	38000	0.7	1200	1150	6.30
5000	38600	0.7	1200	1150	6.44

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FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.4.23

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind
Distance (NWD) and Flight Level with Wind Correction (WCF) Included

HIGH-SPEED CRUISE

FLIGHT LEVEL 230 (7000 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	5000	0.74	100	150	0.75
1000	8500	0.74	150	250	1.40
1500	12000	0.74	200	250	1.90
1600	12800	0.74	250	400	2.10
1700	13300	0.74	250	400	2.20
1800	14000	0.74	300	400	2.30
1900	14800	0.74	300	450	2.50
2000	15500	0.74	300	450	2.60
2100	16500	0.74	350	500	2.70
2200	17000	0.74	350	500	2.90
2300	17500	0.74	400	550	3.00
2400	18200	0.74	400	550	3.10
2500	19000	0.74	400	600	3.20
2600	19700	0.74	400	600	3.30
2700	20500	0.74	400	600	3.40
2800	21000	0.74	400	600	3.50
2900	22000	0.74	450	650	3.70
3000	22700	0.74	450	700	3.80
3100	23100	0.74	450	700	3.90
3200	24000	0.74	500	700	4.15
3300	24800	0.74	500	750	4.25
3400	25400	0.74	500	750	4.35
3500	26000	0.74	600	800	4.50
3600	26800	0.74	700	800	4.55
3700	27200	0.74	700	800	4.75
3800	28000	0.74	750	850	4.85
3900	28600	0.74	750	850	4.90
4000	29400	0.74	750	900	5.00
4100	30000	0.74	800	900	5.25
4200	30500	0.74	800	900	5.35
4300	31300	0.74	800	950	5.50
4400	31900	0.74	850	950	5.60
4500	32500	0.74	850	1000	5.70
4600	33000	0.74	850	1000	5.80
4700	33800	0.74	900	1000	5.95
4800	34300	0.74	900	1000	6.10
4900	35000	0.74	900	1000	6.20
5000	35800	0.74	900	1050	6.30

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Table 3.1.4.24

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

HIGH-SPEED CRUISE

FLIGHT LEVEL 250 (7600 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	5000	0.74	100	150	0.80
1000	8000	0.74	150	250	1.40
1500	11200	0.74	200	300	2.00
1600	12000	0.74	200	350	2.20
1700	12500	0.74	250	400	2.30
1800	13000	0.74	250	400	2.35
1900	14000	0.74	300	400	2.50
2000	14600	0.74	300	400	2.65
2100	15300	0.74	300	450	2.80
2200	15800	0.74	350	500	2.90
2300	16500	0.74	350	500	3.05
2400	17200	0.74	400	500	3.15
2500	18000	0.74	400	500	3.25
2600	18800	0.74	400	550	3.40
2700	19400	0.74	400	600	3.50
2800	20000	0.74	400	600	3.55
2900	20700	0.74	400	650	3.75
3000	21200	0.74	450	650	3.85
3100	21800	0.74	450	650	3.95
3200	22600	0.74	500	700	4.10
3300	23200	0.74	500	700	4.20
3400	24000	0.74	500	700	4.30
3500	24500	0.74	500	700	4.45
3600	25000	0.74	550	750	4.50
3700	25500	0.74	550	750	4.70
3800	26100	0.74	550	800	4.80
3900	27000	0.74	550	800	4.90
4000	27500	0.74	600	800	5.00
4100	28000	0.74	600	800	5.20
4200	28700	0.74	600	850	5.30
4300	29300	0.74	650	900	5.40
4400	30000	0.74	650	900	5.50
4500	30500	0.74	700	900	5.60
4600	31000	0.74	700	900	5.75
4700	31800	0.74	700	950	5.90
4800	32200	0.74	750	950	6.00
4900	33000	0.74	750	1000	6.10
5000	33500	0.74	750	1000	6.20

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PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.4.25

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

HIGH-SPEED CRUISE

FLIGHT LEVEL 270 (8250 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4800	0.77	100	150	0.80
1000	7900	0.77	150	250	1.35
1500	11000	0.77	200	300	1.95
1600	11600	0.77	250	350	2.10
1700	12200	0.77	300	350	2.20
1800	13000	0.77	300	400	2.30
1900	13500	0.77	300	400	2.40
2000	14000	0.77	300	400	2.50
2100	14700	0.77	350	450	2.70
2200	15500	0.77	350	450	2.80
2300	16100	0.77	400	500	2.90
2400	16800	0.77	400	500	3.00
2500	17400	0.77	400	500	3.10
2600	18000	0.77	400	550	3.20
2700	18800	0.77	400	550	3.40
2800	19300	0.77	450	600	3.50
2900	20000	0.77	450	600	3.60
3000	20800	0.77	500	600	3.70
3100	21400	0.77	500	650	3.80
3200	22000	0.77	500	650	3.95
3300	22800	0.77	500	700	4.00
3400	23300	0.77	500	700	4.25
3500	24000	0.77	550	700	4.35
3600	24400	0.77	550	700	4.45
3700	25000	0.77	550	750	4.55
3800	25500	0.77	600	750	4.65
3900	26250	0.77	600	800	4.76
4000	26800	0.77	650	800	4.90
4100	27400	0.77	650	800	5.00
4200	28000	0.77	650	800	5.15
4300	28500	0.77	700	850	5.25
4400	29200	0.77	700	900	5.35
4500	29800	0.77	700	900	5.40
4600	30250	0.77	700	900	5.50
4700	31000	0.77	750	900	5.60
4800	31500	0.77	750	950	5.80
4900	32000	0.77	750	950	5.90
5000	32500	0.77	750	1000	6.00

(cont'd)

Table 3.1.4.26

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

HIGH-SPEED CRUISE

FLIGHT LEVEL 290 (8850 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4600	0.8	100	150	0.80
1000	7550	0.8	200	250	1.35
1500	10600	0.8	250	300	1.95
1600	11200	0.8	300	350	2.05
1700	11800	0.8	350	350	2.15
1800	12400	0.8	350	350	2.30
1900	13000	0.8	400	400	2.43
2000	13600	0.8	400	400	2.55
2100	14250	0.8	450	450	2.65
2200	14900	0.8	450	450	2.75
2300	15500	0.8	500	450	2.85
2400	16100	0.8	500	500	3.0
2500	16700	0.8	550	500	3.10
2600	17300	0.8	550	500	3.20
2700	17950	0.8	550	550	3.30
2800	18600	0.8	600	550	3.45
2900	19200	0.8	600	600	3.55
3000	19800	0.8	650	600	3.65
3100	20400	0.8	650	600	3.80
3200	21050	0.8	700	650	3.90
3300	21700	0.8	700	650	4.05
3400	22350	0.8	700	650	4.15
3500	23000	0.8	700	700	4.30
3600	23600	0.8	700	700	4.40
3700	24200	0.8	700	750	4.50
3800	24800	0.8	750	750	4.60
3900	25300	0.8	750	750	4.75
4000	25800	0.8	750	800	4.85
4100	26400	0.8	750	800	4.95
4200	27000	0.8	800	800	5.10
4300	27500	0.8	800	850	5.20
4400	28100	0.8	800	850	5.30
4500	28600	0.8	800	850	5.45
4600	29200	0.8	850	900	5.55
4700	29700	0.8	850	900	5.70
4800	30300	0.8	900	900	5.80
4900	30900	0.8	900	950	5.90
5000	31400	0.8	950	950	6.0

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.4.27

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind
Distance (NWD) and Flight Level with Wind Correction (WCF) Included

HIGH-SPEED CRUISE

FLIGHT LEVEL 310 (9450 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4700	0.83	100	150	0.80
1000	7500	0.83	150	250	1.38
1500	10500	0.83	200	300	1.88
1600	11000	0.83	200	300	2.05
1700	11600	0.83	250	350	2.18
1800	12200	0.83	300	350	2.23
1900	12900	0.83	350	400	2.34
2000	13400	0.83	400	400	2.44
2100	14000	0.83	400	400	2.54
2200	14600	0.83	450	450	2.70
2300	15100	0.83	450	450	2.80
2400	15800	0.83	450	500	2.90
2500	16500	0.83	450	500	3.05
2600	17000	0.83	450	500	3.15
2700	17500	0.83	500	500	3.25
2800	18000	0.83	500	550	3.38
2900	18800	0.83	500	550	3.50
3000	19500	0.83	500	600	3.60
3100	20050	0.83	550	600	3.70
3200	20700	0.83	600	600	3.85
3300	21250	0.83	600	650	3.93
3400	21800	0.83	600	650	4.00
3500	22500	0.83	650	700	4.13
3600	23200	0.83	650	700	4.20
3700	23700	0.83	650	700	4.30
3800	24200	0.83	650	700	4.50
3900	24900	0.83	700	750	4.55
4000	25500	0.83	700	750	4.70
4100	26000	0.83	700	800	4.80
4200	26500	0.83	700	800	4.85
4300	27000	0.83	750	800	5.00
4400	27500	0.83	750	800	5.15
4500	28000	0.83	800	850	5.25
4600	28600	0.83	850	850	5.35
4700	29100	0.83	850	900	5.50
4800	29800	0.83	850	900	5.60
4900	30200	0.83	900	900	5.70
5000	30800	0.83	900	900	5.80

(cont'd)

Table 3.1.4.28

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

HIGH-SPEED CRUISE

FLIGHT LEVEL 330 (10050 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4700	0.865	150	150	0.75
1000	7400	0.865	200	200	1.30
1500	10400	0.865	300	300	1.80
1600	11000	0.865	300	350	1.98
1700	11500	0.865	350	350	2.08
1800	12050	0.865	350	350	2.21
1900	12600	0.865	350	400	2.31
2000	13200	0.865	350	400	2.41
2100	13800	0.865	400	400	2.52
2200	14400	0.865	400	450	2.62
2300	15000	0.865	450	450	2.72
2400	15500	0.865	450	450	2.82
2500	16200	0.865	500	500	2.93
2600	16750	0.865	500	500	3.08
2700	17400	0.865	500	550	3.20
2800	18000	0.865	500	550	3.32
2900	18700	0.865	550	550	3.42
3000	19300	0.865	550	600	3.52
3100	20000	0.865	550	600	3.60
3200	20500	0.865	550	600	3.72
3300	21200	0.865	600	650	3.84
3400	21900	0.865	650	650	3.92
3500	22500	0.865	650	700	4.03
3600	23000	0.865	650	700	4.13
3700	23700	0.865	700	700	4.25
3800	24300	0.865	700	750	4.35
3900	24800	0.865	700	750	4.44
4000	25300	0.865	700	750	4.60
4100	25800	0.865	750	800	4.68
4200	26400	0.865	750	800	4.78
4300	26900	0.865	750	800	4.93
4400	27500	0.865	800	850	5.03
4500	28000	0.865	800	850	5.13
4600	28500	0.865	800	850	5.23
4700	29000	0.865	800	850	5.38
4800	29600	0.865	800	900	5.48
4900	30100	0.865	800	900	5.58
5000	30600	0.865	800	900	5.68

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FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.4.29

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

HIGH-SPEED CRUISE

FLIGHT LEVEL 350 (10650 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4700	0.87	100	150	0.73
1000	7400	0.87	150	250	1.28
1500	10200	0.87	200	300	1.78
1600	10650	0.87	250	300	1.95
1700	11300	0.87	300	350	2.05
1800	11800	0.87	300	350	2.20
1900	12400	0.87	350	350	2.30
2000	13000	0.87	350	400	2.40
2100	13600	0.87	350	400	2.50
2200	14100	0.87	350	400	2.60
2300	14700	0.87	350	450	2.70
2400	15300	0.87	350	450	2.80
2500	15900	0.87	400	500	2.92
2600	16550	0.87	400	500	3.05
2700	17100	0.87	450	500	3.18
2800	17750	0.87	450	550	3.30
2900	18300	0.87	500	550	3.40
3000	18900	0.87	500	550	3.50
3100	19500	0.87	500	600	3.58
3200	20050	0.87	550	600	3.70
3300	20700	0.87	550	600	3.82
3400	21300	0.87	600	650	3.90
3500	21900	0.87	650	650	4.01
3600	22550	0.87	650	700	4.12
3700	23100	0.87	650	700	4.23
3800	23700	0.87	700	700	4.34
3900	24200	0.87	700	700	4.43
4000	24700	0.87	700	750	4.55
4100	25200	0.87	700	750	4.67
4200	25700	0.87	700	750	4.77
4300	26200	0.87	700	800	4.90
4400	26800	0.87	700	800	5.00
4500	27400	0.87	700	800	5.12
4600	28000	0.87	750	850	5.20
4700	28500	0.87	750	850	5.35
4800	29000	0.87	800	850	5.45
4900	29400	0.87	800	900	5.55
5000	29900	0.87	850	900	5.65

(cont'd)

Table 3.1.4.30

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

HIGH-SPEED CRUISE

FLIGHT LEVEL 370 (11300 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4450	0.87	50	150	0.78
1000	7200	0.87	150	200	1.35
1500	9900	0.87	300	300	1.85
1600	10500	0.87	300	300	2.00
1700	11250	0.87	350	350	2.10
1800	11600	0.87	350	350	2.22
1900	12050	0.87	400	350	2.33
2000	12700	0.87	400	400	2.43
2100	13200	0.87	400	400	2.53
2200	13900	0.87	400	400	2.65
2300	14400	0.87	400	450	2.75
2400	14900	0.87	450	450	2.85
2500	15500	0.87	450	450	2.95
2600	16000	0.87	450	500	3.10
2700	16600	0.87	450	500	3.22
2800	17300	0.87	500	500	3.35
2900	17800	0.87	500	500	3.45
3000	18500	0.87	500	550	3.55
3100	18900	0.87	550	550	3.65
3200	19350	0.87	600	550	3.75
3300	20000	0.87	600	600	3.85
3400	20500	0.87	600	600	3.93
3500	21100	0.87	650	600	4.05
3600	22100	0.87	650	650	4.15
3700	22800	0.87	700	700	4.25
3800	23200	0.87	700	700	4.40
3900	23700	0.87	700	700	4.45
4000	24400	0.87	700	700	4.65
4100	24700	0.87	750	750	4.70
4200	25200	0.87	750	750	4.80
4300	25800	0.87	800	750	4.95
4400	26150	0.87	800	800	5.05
4500	26500	0.87	800	800	5.15
4600	27000	0.87	800	800	5.25
4700	27500	0.87	800	800	5.40
4800	28000	0.87	800	850	5.50
4900	28500	0.87	800	850	5.60
5000	29000	0.87	800	900	5.70

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PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.4.31

Mach Number, Fuel Used (NWF), Compensation Fuel (CF), Block Time (BT) for No-Wind Distance (NWD) and Flight Level with Wind Correction (WCF) Included

HIGH-SPEED CRUISE

FLIGHT LEVEL 390 (11900 m)

NWD, km	NWF, kg	Mach number	WCF, kg	CF, kg	BT, hr
500	4500	0.87	50	150	0.78
1000	7200	0.87	200	200	1.33
1500	9800	0.87	200	300	1.83
1600	10200	0.87	250	300	2.00
1700	10700	0.87	250	300	2.10
1800	11300	0.87	300	350	2.22
1900	11800	0.87	300	350	2.32
2000	12400	0.87	350	400	2.42
2100	13000	0.87	400	400	2.53
2200	13500	0.87	400	400	2.65
2300	14000	0.87	400	400	2.75
2400	14500	0.87	450	400	2.85
2500	15100	0.87	450	450	2.95
2600	15600	0.87	450	450	3.10
2700	16300	0.87	500	500	3.22
2800	17000	0.87	500	500	3.35
2900	17500	0.87	500	500	3.45
3000	18000	0.87	500	550	3.55
3100	18400	0.87	500	550	3.65
3200	19000	0.87	500	600	3.75
3300	19700	0.87	500	600	3.85
3400	20200	0.87	500	600	3.93
3500	20900	0.87	500	600	4.05
3600	21400	0.87	550	600	4.15
3700	22000	0.87	550	650	4.25
3800	22750	0.87	550	700	4.40
3900	23150	0.87	600	700	4.45
4000	23800	0.87	600	700	4.65
4100	24200	0.87	650	700	4.70
4200	24800	0.87	650	750	4.80
4300	25200	0.87	650	750	4.95
4400	25500	0.87	700	750	5.05
4500	26000	0.87	700	800	5.15
4600	26500	0.87	700	800	5.25
4700	26900	0.87	700	800	5.40
4800	27400	0.87	750	800	5.50
4900	28000	0.87	750	850	5.60
5000	28300	0.87	750	850	5.70

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Table 3.1.4.32

Fuel Reserve (FR) for Distance from Destination Aerodrome
to Alternate Aerodrome

Distance to alternate aerodrome	Heading				Mach number in horizontal flight	Landing weight at destination aerodrome, kg		
	0 to 179°	180 to 359°	0 to 179°	180 to 359°		70000	75000	80000
	Flight level		Pressure altitude, m			Fuel reserve, kg		
To 100	130	140	3950	4250	0.535	4200	4300	4400
150	170	180	5200	5500	0.56	4300	4400	4500
200	190	200	5800	6100	0.60	4620	4750	4850
300	270	280	8250	8550	0.69	5150	5300	5450
400	300	320	9150	9750	0.73	5650	5770	5950
500	330	350	10050	10650	0.785	6100	6200	6400
600	370	390	11300	11900	0.785	6500	6650	6800
700	370	390	11300	11900	0.785	6950	7100	7300
800	370	390	11300	11900	0.785	7400	7550	7750
900	370	390	11300	11900	0.785	7850	8000	8200
1000	370	390	11300	11900	0.785	8300	8450	8650

Conditions for which Table is calculated:

No wind.

The airplane is kept in the alternate aerodrome holding area for 30 minutes before landing.

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FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

3.1.5. Calculation of Maximum Allowable Takeoff Weight, Flap Setting Angle and Decision Speed

In all expected operational conditions calculate the maximum allowable takeoff weight from the actual ambient conditions (aerodrome temperature and pressure, runway slope, wind direction and velocity, runway friction coefficient, presence of obstacles) for the field lengths available at the departure aerodrome with the runway conditions accounted for (Ref. subsection 7.3).

In preparation for flight the crew may use Tables 3.1.5.1 and 3.1.5.2.

Tables 3.1.5.1 (where a stopway, 400 m long, is available) and 3.1.5.2 (where there is no stopway) allow to determine the maximum allowable takeoff weight (MTOW), decision speed V_1 and flap setting angle for the barometric pressure and ambient temperature at the departure aerodrome, the factored takeoff distance available at a friction coefficient equal to or less than 0.5 and no precipitation layer on the runway. Before so doing, use Table 3.1.5.3 to determine the factored takeoff field length available for the wind direction and velocity.

NOTE: When using the data extracted from Tables 3.1.5.1 and 3.1.5.2 take off with flaps 28° except for the crosshatched areas corresponding to flaps 15°.

Determine the target time of acceleration up to speed V_1 since the moment of break-away at the point of start with all the engines operating (with the actual conditions at the aerodrome accounted for) for the corrected takeoff weight and the flap setting angle following the instructions of paragraph 7.3.6.

3.1.5.1. Example of Determination of Maximum Allowable Takeoff Weight

(1) Conditions at aerodrome of takeoff

Field length	2200 m (no stopway and clearway)
Altitude	600 m
Temperature	30 °C
Wind velocity lengthwise component	-5.2 m/s (headwind)
Friction coefficient	0.5
Runway slope	0°

(cont'd)

(2) Use Table 3.1.5.3 to determine the factored takeoff field length available equal to 2600 m for the wind lengthwise component direction and magnitude, as well as for the field length (with no clearway and stopway).

(3) Use Table 3.1.5.2 to determine for a factored takeoff field length available of 2600 m, aerodrome altitude and temperature the following data:

maximum allowable takeoff weight MTOW = 98900 kg

flap setting angle equal to 28°

decision speed V_1 = 242.5 km/hr

(4) The actual takeoff weight and takeoff speeds are determined with the use of the procedure of paragraph 3.1.8.

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.5.1

Maximum Allowable Takeoff Weight, Decision Speed and Flap Setting Angle for
Aerodrome Temperature and Altitude (with Stopway, 400 m Long,
and Clearway)

Factored field length available, m		2100	2300	2500	2700	2900	3100	3300	3500	3700	3900	4100
Aero-drome alti-tude, m	Aero-drome tempe-rature, °C	Maximum allowable takeoff weight in 1000 kg and decision speed V_1 in km/hr										
0	0	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	5	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	10	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	15	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	20	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	25	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	30	100 235	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	35	98.9 230	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	40	96.3 230	100 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	45	93.7 225	97.8 230	100 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
100	0	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	5	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	10	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	15	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	20	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245

(cont'd)

Table 3.1.5.1, cont'd

Factored field length available, m		2100	2300	2500	2700	2900	3100	3300	3500	3700	3900	4100
Aero-drome altitude, m	Aero-drome temperature, °C	Maximum allowable takeoff weight in 1000 kg and decision speed V_1 in km/hr										
100	25	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	30	100 235	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	35	97.9 230	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	40	95.3 225	99.4 235	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	45	92.7 225	96.8 230	100 235	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245
200	0	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	5	100 230	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	10	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	15	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	20	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	25	100 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	30	99.4 230	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	110 245	100 245
	35	96.4 230	100 235	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	40	93.8 225	97.9 230	100 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	45	91.3 220	95.2 230	98.8 234	100 240	100 240	100 245	100 245	100 245	100 245	100 245	100 245

(cont'd)



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Table 3.1.5.1, cont'd

Factored field length available, m		2100	2300	2500	2700	2900	3100	3300	3500	3700	3900	4100
Aero-drome altitude, m	Aero-drome temperature, °C	Maximum allowable takeoff weight in 1000 kg and decision speed V_1 in km/hr										
400	-5	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	0	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	5	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	10	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	15	100 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	20	100 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	25	100 230	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	30	97.1 230	100 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	35	94.2 225	98.3 230	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	40	91.6 220	95.6 230	99.1 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
600	-5	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	0	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	5	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	10	100 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	15	100 235	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245

(cont'd)

Table 3.1.5.1, cont'd

Factored field length available, m		2100	2300	2500	2700	2900	3100	3300	3500	3700	3900	4100
Aero-drome altitude, m	Aero-drome temperature, °C	Maximum allowable takeoff weight in 1000 kg and decision speed V_1 in km/hr										
600	20	100 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	25	98 240	100 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	30	94.8 225	99 235	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	35	91.9 220	95.9 230	99.5 235	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	40	89.2 215	92.5 225	96.5 230	99.3 235	100 240	100 240	100 245	100 245	100 245	100 245	100 245
800	-5	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	0	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	5	100 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	10	100 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	15	100 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	20	99.1 230	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	25	95.6 225	99.8 235	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	30	92.5 225	96.5 230	100 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	35	89.5 220	93.4 225	96.9 230	99.7 235	100 240	100 245	100 245	100 245	100 245	100 245	100 245
	40	86.7 215	90.5 220	93.9 230	96.6 230	99 235	100 240	100 240	100 245	100 245	100 245	100 245

(cont'd)



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Table 3.1.5.1, cont'd

Factored field length available, m		2100	2300	2500	2700	2900	3100	3300	3500	3700	3900	4100
Aero-drome altitude, m	Aero-drome temperature, °C	Maximum allowable takeoff weight in 1000 kg and decision speed V_1 in km/hr										
1000	-5	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	0	100 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	5	100 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	10	100 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 235	100 245	100 245
	15	100 230	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	20	96.9 230	100 235	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	25	93.5 225	97.6 230	100 235	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	30	90.4 220	94.3 225	97.9 235	100 235	100 240	100 245	100 245	100 245	100 245	100 245	100 245
	35	87.3 215	91.2 225	94.6 230	97.3 230	99.7 235	100 240	100 245	100 245	100 245	100 245	100 245
	40	84.5 200	88.2 220	91.5 225	94.2 230	96.5 230	98.3 235	98.8 245	100 245	100 245	100 245	100 245
1500	-10	100 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	-5	100 235	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	0	99.5 230	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	5	98.2 230	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	10	97.1 230	100 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245

(cont'd)

Table 3.1.5.1, cont'd

Factored field length available, m		2100	2300	2500	2700	2900	3100	3300	3500	3700	3900	4100
Aero-drome altitude, m	Aero-drome temperature, °C	Maximum allowable takeoff weight in 1000 kg and decision speed V_1 in km/hr										
1500	15	94.7 225	98.8 230	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	20	91.3 220	95.3 230	98.9 235	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	25	87.9 215	91.8 225	95.2 230	97.9 235	100 240	100 245	100 245	100 245	100 245	100 245	100 245
	30	85 215	88.7 220	92 225	94.7 230	97 235	98.8 235	99.4 245	100 245	100 245	100 245	100 245
	35	82.1 210	85.7 215	88.9 220	91.5 225	93.7 230	95.5 230	96 245	97.5 245	99.5 245	100 245	100 245
2000	-15	100 235	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	-10	99.3 230	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	-5	97.4 230	100 235	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	0	95.6 225	99.8 235	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	5	94 225	98.1 230	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	10	92.3 225	96.3 230	99.9 235	100 240	100 245	100 245	100 245	100 245	100 245	100 245	100 245
	15	89.3 220	93.2 225	96.7 230	99.5 235	100 235	100 240	100 245	100 245	100 245	100 245	100 245
	20	85.9 215	89.7 220	93 225	95.7 230	98.1 235	99.9 245	100 245	100 245	100 245	100 245	100 245
	25	82.7 210	86.3 215	89.5 220	92.1 225	94.4 230	96.1 230	96.7 245	98.1 245	100 240	100 245	100 245
	30	79.8 205	83.3 210	86.4 220	88.9 220	91.1 225	92.8 230	93.3 240	94.7 240	96.7 245	98.8 245	100 240

(cont'd)



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Table 3.1.5.2

Maximum Allowable Takeoff Weight, Decision Speed and Flap Setting Angle for
Aerodrome Temperature and Altitude (No Stopway and Clearway)

Factored field length available, m		2100	2300	2500	2700	2900	3100	3300	3500	3700	3900	4100
Aero-drome altitude, m	Aero-drome temperature, °C	Maximum allowable takeoff weight in 1000 kg and decision speed V_1 in km/hr										
0	0	100 235	100 245	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	5	100 235	100 245	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	10	100 230	100 240	100 255	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	15	99.9 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	20	99.1 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	25	98.4 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	30	96.4 230	100 235	100 245	100 255	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	35	93.8 225	98.6 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	40	91.3 220	95.3 230	99.3 240	100 245	100 255	100 260	100 260	100 260	100 260	100 260	100 260
	45	88.8 220	92.8 225	96.7 235	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260
100	0	100 230	100 245	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	5	100 235	100 245	100 255	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	10	100 230	100 245	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	15	99.5 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	20	98.7 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	25	98.1 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	30	95.3 225	99.6 230	100 245	100 255	100 260	100 260	100 260	100 260	100 260	100 260	100 260

(cont'd)

Table 3.1.5.2, cont'd

Factored field length available, m		2100	2300	2500	2700	2900	3100	3300	3500	3700	3900	4100
Aero-drome altitude, m	Aero-drome temperature, °C	Maximum allowable takeoff weight in 1000 kg and decision speed V_1 in km/hr										
100	35	92.7 220	96.8 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	40	90.3 220	94.3 230	98.2 235	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260
	45	87.9 215	91.8 225	95.6 235	99 240	100 250	100 250	100 260	100 260	100 260	100 260	100 260
200	0	100 230	100 245	100 255	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	5	100 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	10	99.7 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	15	98.9 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	20	98.1 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	25	97.1 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	30	94.2 225	98.4 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	35	91.4 220	95.5 230	99.4 240	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	40	88.9 220	92.9 225	96.8 235	100 245	100 250	100 260	100 260	100 260	100 260	100 260	100 260
400	45	86.5 215	90.3 220	94.1 235	97.4 240	100 245	100 255	100 260	100 260	100 260	100 260	100 260
	-5	100 230	100 240	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	0	100 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	5	99.7 230	100 240	100 255	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	10	98.9 230	100 240	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	15	98.1 230	100 240	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260

(cont'd)



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Table 3.1.5.2, cont'd

Factored field length available, m		2100	2300	2500	2700	2900	3100	3300	3500	3700	3900	4100
Aero-drome altitude, m	Aero-drome temperature, °C	Maximum allowable takeoff weight in 1000 kg and decision speed V_1 in km/hr										
400	20	97.5 230	100 235	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	25	94.9 225	99.1 230	100 255	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	30	92 220	96.1 230	100 240	100 250	100 255	100 260	100 260	100 260	100 260	100 260	100 260
	35	89.3 220	93.2 225	97.2 235	100 245	100 250	100 255	100 260	100 260	100 260	100 260	100 260
	40	86.8 215	90.6 220	94.4 230	97.7 240	100 245	100 250	100 255	100 260	100 260	100 260	100 260
600	-5	100 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	0	99.7 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	5	99.0 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	10	98.2 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	15	97.4 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	20	95.9 225	100 235	100 245	100 255	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	25	92.8 220	96.9 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	30	89.9 220	93.8 230	97.8 240	100 245	100 250	100 260	100 260	100 260	100 260	100 260	100 260
	35	87.1 215	90.9 225	94.8 230	98.1 240	100 245	100 250	100 255	100 260	100 260	100 260	100 260
	40	84.5 210	88.2 220	91.9 230	95.2 235	98 240	100 250	100 255	100 260	100 260	100 260	100 260
800	-5	99.7 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	0	98.9 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	5	98.2 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260

(cont'd)

Table 3.1.5.2, cont'd

Factored field length available, m		2100	2300	2500	2700	2900	3100	3300	3500	3700	3900	4100
Aero-drome altitude, m	Aero-drome temperature, °C	Maximum allowable takeoff weight in 1000 kg and decision speed V_1 in km/hr										
800	10	97.5 230	100 235	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	15	96.7 230	100 235	100 250	100 255	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	20	94 220	98.1 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	25	90.6 220	94.6 230	98.8 240	100 245	100 250	100 260	100 260	100 260	100 260	100 260	100 260
	30	87.6 215	91.5 225	95.4 230	98.7 240	100 250	100 250	100 260	100 260	100 260	100 260	100 260
	35	84.9 210	88.6 220	92.3 230	95.6 240	98.4 240	100 250	100 260	100 260	100 260	100 260	100 260
	40	82.2 210	85.8 215	89.4 225	92.6 230	95.3 240	97.5 240	99.3 250	100 250	100 250	100 255	100 260
1000	-5	98.9 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	0	98.2 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	5	97.5 230	100 235	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	10	96.8 225	100 235	100 245	100 260	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	15	95.4 225	99.6 230	100 245	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	20	91.8 220	95.9 230	99.9 240	100 250	100 255	100 260	100 260	100 260	100 260	100 260	100 260
	25	88.5 215	94.5 225	96.4 235	99.8 240	100 250	100 255	100 260	100 260	100 260	100 260	100 260
	30	85.7 210	89.4 220	93.2 230	96.5 240	99.3 245	100 250	100 250	100 255	100 255	100 260	100 260
	35	82.8 210	86.4 220	90.1 225	93.2 230	96 245	98.2 245	100 250	100 250	100 250	100 260	100 260
1500	40	80.1 205	83.7 210	87.2 220	90.2 230	92.9 245	95 240	96.8 245	98.2 250	99.8 250	100 250	100 255
	-10	96.8 225	100 235	100 245	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260

(cont'd)

Table 3.1.5.2, cont'd

Factored, field length available, m		2100	2300	2500	2700	2900	3100	3300	3500	3700	3900	4100
Aero-drome altitude, m	Aero-drome temperature, °C	Maximum allowable takeoff weight in 1000 kg and decision speed V_1 in km/hr										
1500	-5	95.7 225	99.9 235	100 245	100 255	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	0	94.3 225	98.5 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	5	93.1 220	97.2 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	10	92 220	96.1 230	100 240	100 250	100 255	100 260	100 260	100 260	100 260	100 260	100 260
	15	89.7 215	93.7 225	97.7 235	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260
	20	86.5 215	90.3 225	94.2 230	97.5 240	100 240	100 250	100 255	100 260	100 260	100 260	100 260
	25	83.3 210	87 220	90.7 230	93.8 225	96.6 240	98.8 245	100 250	100 255	100 255	100 260	100 260
	30	80.5 205	84.1 215	87.7 225	90.7 230	93.4 240	95.5 240	97.4 245	98.7 250	100 250	100 250	100 260
	35	77.8 200	81.3 210	84.7 220	87.7 225	90.2 230	92.3 235	94.1 240	95.3 245	96.9 250	99 250	100 250
2000	-15	96 225	100 230	100 245	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	-10	94.2 225	98.3 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	-5	92.3 220	96.4 230	100 240	100 250	100 260	100 260	100 260	100 260	100 260	100 260	100 260
	0	90.6 220	94.6 230	98.6 240	100 245	100 250	100 260	100 260	100 260	100 260	100 260	100 260
	5	89.1 220	95 225	96.9 235	100 250	100 250	100 255	100 260	100 260	100 260	100 260	100 260
	10	87.5 215	91.3 225	95.2 230	96.5 240	100 245	100 250	100 260	100 260	100 260	100 260	100 260
	15	84.7 210	88.4 220	92.1 230	95.3 235	98.2 240	100 245	100 260	100 260	100 260	100 260	100 260
	20	81.4 210	85 215	88.6 225	91.7 230	94.4 240	96.7 240	98.4 245	99.8 250	100 250	100 255	100 260
	25	78.4 200	81.8 210	85.3 220	88.3 225	90.9 230	92.9 235	94.7 240	96 245	97.6 250	99.7 250	100 250
	30	75.7 200	79 210	82.3 215	85.2 220	87.7 230	89.7 235	91.4 235	92.7 250	94.2 250	96.3 250	98.1 250

(cont'd)

Table 3.1.5.3

Factored Takeoff Field Length Available for Takeoff Field Length
Available, Wind Direction and Lengthwise Component Magnitude

Wind direction			Tailwind	Headwind			
Wind velocity, m/s			5	5	10	15	20
Takeoff field length available, m	2000	Factored takeoff field length available, m	1890	2365	2735	3100	3475
	2200		2085	2585	2985	3115	3765
	2400		2270	2810	3255	3685	3645
	2600		2465	3060	3505	3945	4410
	2800		2650	3260	3775	4225	4710
	3000		2855	3500	4015	4515	5015
	3200		3045	3720	4254	4790	5305
	3400		3240	3940	4475	5015	5545
	3600		3430	4170	4755	5325	5910
	3800		3615	4370	4965	5570	6175
	4000		3820	4600	5205	5845	6380

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3.1.6. Calculation of Maximum Allowable Landing Weight

In all expected operational conditions determine the maximum allowable landing weight for the reported ambient conditions (aerodrome temperature and altitude, wind velocity and direction on the ground), the landing field length available and the runway surface condition (Ref. subsection 7.7).

For the sake of convenience of the crew in preparation of the flight data the maximum allowable weight data for the main operational conditions are summarized in the tables described below.

In calculation of the maximum allowable landing weight first of all determine the factored landing field length available from Tables 3.1.6.1 and 3.1.6.2:

Table 3.1.6.1 for the runway surface condition.

Table 3.1.6.2 for the wind direction and velocity.

When using Table 3.1.6.2 start with the initial landing distance available derived from Table 3.1.6.1 with the runway condition accounted for.

Thereafter use Table 3.1.6.3 to determine the maximum allowable landing weight at flaps 36° for the ambient conditions at the aerodrome of landing and the factored landing field length available.

If the actual landing weight proves to be inadequate, determine the maximum allowable landing weight at flaps 45° using Tables 3.1.6.5 for the purpose.

For landing at the alternate aerodrome use Tables 3.1.6.4 and 3.1.6.6 to determine the maximum allowable landing weight for the factored landing field length available, aerodrome temperature and altitude with flaps 36° and 45° respectively.

3.1.6.1. Example of Determination of Maximum Allowable Landing Weight

(1) Conditions at destination aerodrome

Field length	3350 m
Altitude	200 m
Temperature	+28 °C
Lengthwise component of wind velocity	+5 m/s (tailwind)

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PREPARATION FOR FLIGHT - Calculation of Flight Data

Friction coefficient 0.45

Runway slope 0°

- (2) Use Table 3.1.6.1 to determine the factored landing distance available equal to 3160 m for the landing distance available equal to the field length less 50 m i.e. to 3350 m - 50 m = 3300 m and friction coefficient $\mu = 0.45$.
- (3) Use Table 3.1.6.2 to determine the factored landing distance available with a lengthwise wind component of +5 m/s (tailwind) accounted for which equals to 2700 m.
- (4) Use Table 3.1.6.3 to determine the maximum allowable landing weight MLW = 78500 kg for a factored landing distance available of 2700 m and flaps 36°.
- (5) To rise the maximum allowable landing weight limit land with flaps 45°.

In this case repeat calculations to items 3 and 4 of the present example using Table 3.1.6.5 for flaps 45°.

Respectively, the resulting maximum allowable landing weight MLW equals to 80000 kg.

- (6) Thus, landing at the destination aerodrome in the given ambient conditions and runway condition must be performed with flaps 45° and a landing weight not exceeding the maximum allowable landing weight equal to 80000 kg.

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Table 3.1.6.1

Factored Landing Distance Available for Landing Distance
Available and Runway Condition

No layer of precipitations							Layer of precipitations present		
Friction coefficient			0.5 and more	0.45	0.4	0.35	0.3	Layer of water 3 to 10 mm high	Layer of slush, 3 to 12 mm high (dry snow 10 to 50 mm high)
Landing distance available (runway length - 50 m), m	2000	Factored landing distance available, m	2000	1920	1820	1720	1640	1630	1470
	2200		2200	2100	2000	1900	1800	1790	1610
	2400		2400	2280	2180	2080	1960	1960	1760
	2600		2600	2480	2380	2240	2120	2120	1910
	2800		2800	2670	2570	2420	2260	2280	2050
	3000		3000	2870	2760	2600	2440	2450	2200
	3200		3200	3060	2950	2780	2620	2610	2350
	3400		3400	3250	3100	2960	2780	2770	2490
	3600		3600	3450	3300	3130	2960	2930	2640
	3800		3800	3650	3500	3300	3140	3100	2790
4000		4000	3850	3700	3500	3300	3260	2930	

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Table 3.1.6.2

Factored Landing Distance Available
for Landing Distance Available, Wind Direction and Velocity
Lengthwise Component Magnitude

Wind direction			Tailwind	Headwind			
Wind velocity, m/s			5	5	10	15	20
Landing distance available, m	2000	Factored landing distance available, m	1730	2150	2300	2450	2600
	2200		1860	2360	2530	2690	2860
	2400		2070	2580	2770	2950	3140
	2600		2240	2800	3000	3200	3400
	2800		2410	3010	3220	3430	3650
	3000		2540	3220	3450	3670	3900
	3200		2730	3440	3680	3920	4160
	3400		2920	3650	3900	4150	4400
	3600		3090	3870	4140	4410	4680
	3800		3250	4080	4370	4660	4950
	4000		3420	4310	4620	4930	5250

NOTE: For a dry runway assume the landing distance available to be equal to the runway length less 50 m, for a wet runway or a runway covered with a layer of precipitations determine the landing distance available from Table 3.1.6.1.

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Table 3.1.6.3

Maximum Allowable Landing Weight for Factored Landing Distance
Available, Aerodrome Temperature and Altitude

DESTINATION AERODROME

FLAPS 36°

Factored landing distance available, m				2100	2300	2500	2700	2900 and more
Aerodrome conditions				Maximum allowable landing weight, 1000 kg				
Aerodrome altitude, m	0	Aerodrome temperature, °C	0	70	74.4	78.8	80	80
			5	69.4	73.9	78.3	80	80
			10	68.8	73.4	77.8	80	80
			15	68.2	72.9	77.3	80	80
			20	67.6	72.1	76.7	80	80
			25	67.0	71.5	76.1	79.5	80
			30	66.4	70.9	75.5	79	80
			35	65.8	70.3	74.9	78.5	80
			40	65.2	69.7	74.3	78.0	80
			45	64.6	69.1	73.7	77.5	80
	100		0	69.5	74	78.2	80	80
			5	68.9	73.4	77.7	80	80
			10	68.3	72.8	77.2	80	80
			15	67.7	72.2	76.7	80	80
			20	67.1	71.6	76.2	80	80
			25	66.5	71.0	75.6	79.4	80
			30	65.9	70.4	75.0	78.8	80
			35	65.3	69.8	74.4	78.2	80
			40	64.7	69.2	73.8	77.6	80
			45	64	68.6	73.2	77	80
	200		0	69	73.5	77.7	80	80
			5	68.4	72.9	77.2	80	80
			10	67.8	72.3	76.7	80	80
			15	67.2	71.7	76.2	80	80
			20	66.6	71.1	75.7	79.5	80
			25	66.0	70.5	75.1	78.9	80
			30	65.4	69.9	74.5	78.3	80
			35	64.8	69.3	73.9	77.7	80
			40	64.1	68.7	73.3	77.1	80
			45	63.4	68.1	72.7	76.5	80

(cont'd)

Table 3.1.6.3, cont'd

Factored landing distance available, m				2100	2300	2500	2700	2900	3100 and more
Aerodrome conditions				Maximum allowable landing weight, 1000 kg					
Aerodrome altitude, m	400	Aerodrome temperature, °C	0	68.5	73.0	77.2	80	80	80
			5	67.9	72.4	76.7	80	80	80
			10	67.3	71.8	76.2	80	80	80
			15	66.7	71.2	75.7	79.5	80	80
			20	66.1	70.6	75.2	79	80	80
			25	65.5	70.0	74.6	78.4	80	80
			30	64.9	69.4	74.0	77.8	80	80
			35	64.3	68.8	73.4	77.2	80	80
			40	63.6	68.2	72.8	76.6	80	80
			45	62.9	67.6	72.2	76	79.5	80
	600		-5	68.5	73.0	77.2	80	80	80
			0	67.9	72.4	76.7	80	80	80
			5	67.3	71.8	76.2	80	80	80
			10	66.7	71.2	75.7	79.5	80	80
			15	66.1	70.6	75.2	79	80	80
			20	65.5	70.0	74.6	78.4	80	80
			25	64.9	69.4	74.0	77.8	80	80
			30	64.3	68.8	73.4	77.2	80	80
			35	63.6	68.2	72.8	76.6	80	80
			40	62.9	67.6	72.2	76	79.5	80
	800		-5	67.8	72.3	76.5	80	80	80
			0	67.2	71.7	76.0	79.8	80	80
			5	66.2	71.1	75.5	79.3	80	80
			10	66.0	70.5	75.0	78.8	80	80
			15	65.4	69.9	74.5	78.3	80	80
			20	64.8	69.3	73.9	77.7	80	80
			25	64.2	68.7	73.3	77.1	80	80
			30	63.5	68.1	72.7	76.5	80	80
			35	62.8	67.5	72.1	75.9	79.4	80
			40	62.1	66.9	71.5	75.3	78.8	80

(cont'd)

Table 3.1.6.3, cont'd

Factored landing distance available, m				2300	2500	2700	2900	3100	3300 and more
Aerodrome conditions				Maximum allowable landing weight, 1000 kg					
Aerodrome altitude, m	1000	Aerodrome temperature, °C	-5	71.5	75.7	79.2	80	80	80
			0	70.9	75.2	78.7	80	80	80
			5	70.3	74.7	78.2	80	80	80
			10	69.7	74.2	77.7	80	80	80
			15	69.1	73.7	77.2	80	80	80
			20	68.5	73.1	76.7	80	80	80
			25	67.9	72.5	76.2	79.5	80	80
			30	67.3	71.9	75.7	79.0	80	80
			35	66.7	71.3	75.1	78.5	80	80
			40	66.1	70.7	74.5	78	80	80
	1500		-10	70	74.2	77.7	80	80	80
			-5	69.5	73.7	77.2	80	80	80
			0	68.9	73.2	76.2	80	80	80
			5	68.3	72.7	76.2	79.5	80	80
			10	67.7	72.2	75.7	79	80	80
			15	67.1	71.7	75.2	78.5	80	80
			20	66.5	71.1	74.7	78	80	80
			25	65.9	70.4	74.1	77.4	80	80
			30	65.2	69.8	73.5	76.8	80	80
			35	64.5	69.1	72.9	76.3	79.5	80
	2000		-10	68	72.2	75.7	79.2	80	80
			-5	67.5	71.7	75.2	78.6	80	80
			0	66.9	71.2	74.7	78	80	80
			5	66.3	70.7	74.2	77.5	80	80
			10	65.7	70.2	73.7	77.0	80	80
			15	65.1	69.7	73.2	76.5	79.5	80
			20	64.5	69.1	72.7	76	79	80
			25	63.8	68.3	70.0	75.3	78.4	80
			30	63.0	67.6	71.3	74.6	77.8	80
			35	62.2	66.8	70.6	74.0	77.2	80

(cont'd)

Table 3.1.6.4

Maximum Allowable Landing Weight for Factored Landing Distance
Available, Aerodrome Temperature and Altitude

ALTERNATE AERODROME

FLAPS 36°

Factored landing distance available, m				2100	2300	2500 and more
Aerodrome conditions				Maximum allowable landing weight, 1000 kg		
Aerodrome altitude, m	0	Aerodrome temperature, °C	0	77.8	80	80
			5	77.3	80	80
			10	76.8	80	80
			15	76.3	80	80
			20	75.7	80	80
			25	75.1	79.8	80
			30	74.5	79.2	80
			35	73.9	78.6	80
			40	73.3	77.9	80
			45	72.7	77.2	80
	100		0	77.3	80	80
			5	76.8	80	80
			10	76.2	80	80
			15	75.6	79.8	80
			20	75.0	79.3	80
			25	74.4	78.8	80
			30	73.8	78.3	80
			35	73.2	77.8	80
			40	72.6	77.3	80
			45	72	76.7	80
	200		0	76.8	80	80
			5	76.3	80	80
			10	75.7	80	80
			15	75.1	79.5	80
			20	74.5	79.0	80
			25	73.9	78.5	80
			30	73.3	78.0	80
			35	72.7	77.4	80
			40	72.1	76.8	80
			45	71.5	76.2	80

(cont'd)



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Table 3.1.6.4, cont'd

Factored landing distance available, m				2100	2300	2500	2700 and more
Aerodrome conditions				Maximum allowable landing weight, 1000 kg			
Aerodrome altitude, m	400	Aerodrome temperature, °C	0	76.3	80	80	80
			5	75.8	80	80	80
			10	75.2	79.6	80	80
			15	74.6	79.0	80	80
			20	74.0	78.5	80	80
			25	73.4	78.0	80	80
			30	72.8	77.5	80	80
			35	72.2	76.9	80	80
			40	71.6	76.3	80	80
			45	71.0	75.7	79.5	80
	600		-5	76.3	80	80	80
			0	75.7	80	80	80
			5	75.2	79.6	80	80
			10	74.6	79.0	80	80
			15	74.0	78.4	80	80
			20	73.4	77.9	80	80
			25	72.8	77.4	80	80
			30	72.2	76.9	80	80
			35	71.6	76.3	80	80
			40	71.0	75.7	79.5	80
	800		-5	75.6	80.0	80	80
			0	75.0	79.5	80	80
			5	74.5	78.9	80	80
			10	73.9	78.3	80	80
			15	73.3	77.3	80	80
			20	72.7	77.2	80	80
			25	72.1	76.7	80	80
			30	71.5	76.2	79.8	80
			35	70.9	75.6	79.3	80
			40	70.3	75.0	78.8	80

(cont'd)

Table 3.1.6.4, cont'd

Factored landing distance available, m				2300	2500	2700	2900 and more
Aerodrome conditions				Maximum allowable landing weight, 1000 kg			
Aerodrome altitude, m	1000	Aerodrome temperature, °C	-5	79.3	80	80	80
			0	78.7	80	80	80
			5	78.1	80	80	80
			10	77.5	80	80	80
			15	76.9	80	80	80
			20	76.4	80	80	80
			25	75.9	79.6	80	80
			30	75.4	79.0	80	80
			35	74.8	78.5	80	80
			40	74.2	78.0	80	80
	1500		-10	77.8	80	80	80
			-5	77.3	80	80	80
			0	76.7	80	80	80
			5	76.1	79.8	80	80
			10	75.5	79.2	80	80
			15	74.9	78.7	80	80
			20	74.4	78.2	80	80
			25	73.9	77.6	80	80
			30	73.4	77.0	80	80
			35	72.8	76.5	80	80
	2000		-10	75.8	79.5	80	80
			-5	75.3	79.0	80	80
			0	74.7	78.4	80	80
			5	74.1	77.8	80	80
			10	73.5	77.2	80	80
			15	72.8	76.6	80	80
			20	72.3	76.1	80.0	80
			25	71.7	75.4	79.4	80
			30	71.2	74.8	78.8	80
			35	70.5	74.2	78.2	80

(cont'd)



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Table 3.1.6.5

Maximum Allowable Landing Weight for Factored Landing
Distance Available, Aerodrome Temperature and Altitude

DESTINATION AERODROME

FLAPS 45°

Factored landing distance available, m				2100	2300	2500	2700 and more
Aerodrome conditions				Maximum allowable landing weight, 1000 kg			
Aerodrome altitude, m	0	Aerodrome temperature, °C	0	73	78.3	80	80
			5	72.4	77.7	80	80
			10	71.8	77.1	80	80
			15	71.2	76.5	80	80
			20	70.6	75.8	79.8	80
			25	70	75.1	79.2	80
			30	69.4	74.4	78.6	80
			35	68.8	73.7	78	80
			40	68.2	73	77.3	80
			45	67.5	72.3	76.6	80
	100		0	72.6	77.9	80	80
			5	72.0	77.3	80	80
			10	71.4	76.7	80	80
			15	70.8	76	79.8	80
			20	70.2	75.3	79.2	80
			25	69.6	74.6	78.6	80
			30	69	73.9	78	80
			35	68.4	73.2	77.4	80
			40	67.7	72.5	76.8	80
			45	67	71.8	76.1	80
	200		0	72.2	77.1	80	80
			5	71.6	76.5	80	80
			10	71	75.9	80	80
			15	70.4	75.3	79.5	80
			20	69.8	74.7	78.9	80
			25	69.2	74.1	78.3	80
			30	68.6	73.4	77.7	80
			35	67.9	72.7	77	80
			40	67.2	72	76.3	80
			45	66.5	71.3	75.6	79.6-80

(cont'd)

Table 3.1.6.5, cont'd

Factored landing distance available, m				2300	2500	2700	2900 and more
Aerodrome conditions				Maximum allowable landing weight, 1000 kg			
Aerodrome altitude, m	400	Aerodrome temperature, °C	0	76.4	80	80	80
			5	75.8	80	80	80
			10	75.2	79.5	80	80
			15	74.6	78.9	80	80
			20	74	78.3	80	80
			25	73.3	77.6	80	80
			30	72.6	76.9	80	80
			35	71.9	76.2	80	80
			40	71.2	75.5	79.5	80
			45	70.5	74.8	78	80
	600		-5	76.8	80	80	80
			0	75.6	80	80	80
			5	75	79.4	80	80
			10	74.4	78.8	80	80
			15	73.8	78.2	80	80
			20	73.2	77.5	80	80
			25	72.5	76.5	80	80
			30	71.8	76.1	79.5	80
			35	71.1	75.4	79.1	80
			40	70.4	74.7	78.7	80
	800		-5	75.4	79.8	80	80
			0	74.8	79.2	80	80
			5	74.2	78.6	80	80
			10	73.5	78	80	80
			15	72.8	77.3	80	80
			20	72.1	76.6	80	80
			25	71.4	75.9	79.5	80
			30	70.4	75.2	79	80
			35	70	74.5	78.4	80
			40	69.3	73.8	77.8	80

(cont'd)



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Table 3.1.6.5, cont'd

Factored landing distance available, m				2300	2500	2700	2900	3000 and more
Aerodrome conditions				Maximum allowable landing weight, 1000 kg				
Aerodrome altitude, m	1000	Aerodrome temperature, °C	-5	74.2	78.8	80	80	80
			0	73.8	78.1	80	80	80
			5	73.2	77.5	80	80	80
			10	72.6	76.9	80	80	80
			15	71.9	76.3	80	80	80
			20	71.2	75.7	79.5	80	80
			25	70.5	75.1	78.9	80	80
			30	69.8	74.4	78.3	80	80
			35	69.1	73.7	77.6	80	80
			40	68.4	72.9	76.9	80	80
	1500		-10	73.5	77.8	80	80	80
			-5	72.2	76.8	80	80	80
			0	71.6	76.2	80	80	80
			5	71	75.6	79.5	80	80
			10	70.3	74.9	78.8	80	80
			15	69.6	74.2	78.1	80	80
			20	68.9	73.5	77.4	80	80
			25	68.2	72.8	76.7	80	80
			30	67.5	72.1	76	79.4	80
			35	66.8	71.4	75.3	78.8	80
	2000		-10	71.3	75.6	79.5	80	80
			-5	70	74.6	78.9	80	80
			0	69.4	74	78.2	80	80
			5	68.7	73.4	77.5	80	80
			10	68	72.8	76.8	80	80
			15	67.3	72.2	76.1	79.4	80
			20	66.6	71.6	75.4	78.8	80
			25	65.9	71	74.6	78.1	80
			30	65.2	70.3	73.8	77.3	80
			35	64.5	69.6	73	76.5	79.6-80

(cont'd)

Table 3.1.6.6

Maximum Allowable Landing Weight for Factored Landing
Distance Available, Aerodrome Temperature and Altitude

ALTERNATE AERODROME

FLAPS 45°

Factored landing distance available, m				2100	2300 and more
Aerodrome conditions				Maximum allowable landing weight, 1000 kg	
Aerodrome altitude, m	0	Aerodrome temperature, °C	0	80	80
			5	80	80
			10	80	80
			15	79.5	80
			20	79	80
			25	78.4	80
			30	77.8	80
			35	77.2	80
			40	76.6	80
			45	76	80
	100		0	80	80
			5	80	80
			10	79.6	80
			15	79.2	80
			20	78.7	80
			25	78.1	80
			30	77.5	80
			35	76.9	80
			40	76.2	80
			45	75.6	79.5
	200		0	80	80
			5	79.8	80
			10	79.3	80
			15	78.9	80
			20	78.4	80
			25	77.8	80
			30	77.2	80
			35	76.6	80
			40	75.8	79.6
			45	75.2	79.0

(cont'd)



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Table 3.1.6.6, cont'd

Factored landing distance available, m				2100	2300	2500 and more
Aerodrome conditions				Maximum allowable landing weight, 1000 kg		
Aerodrome altitude, m	400	Aerodrome temperature, °C	0	79.7	80	80
			5	79.2	80	80
			10	78.7	80	80
			15	78.3	80	80
			20	77.8	80	80
			25	77.2	80	80
			30	76.6	80	80
			35	76	79.8	80
			40	75	79.2	80
			45	74.4	78.6	80
	600		-5	79.4	80	80
			0	79.0	80	80
			5	78.5	80	80
			10	78	80	80
			15	77.6	80	80
			20	77.1	80	80
			25	76.7	80	80
			30	75.9	79.4	80
			35	75.2	78.8	80
			40	74.2	78.2	80
	800		-5	78.7	80	80
			0	78	80	80
			5	77.5	80	80
			10	77	80	80
			15	76.6	80	80
			20	76.1	80	80
			25	75.7	79.4	80
			30	74.9	78.8	80
			35	74.2	78.1	80
			40	73.2	77.4	80
	1000		-5	77.7	80	80
			0	77	80	80
			5	76.5	80	80
			10	76	80	80
			15	75.6	80	80
			20	75.1	79.5	80
			25	74.7	78.8	80
			30	73.9	78.1	80

(cont'd)

Table 3.1.6.6, cont'd

Factored landing distance available, m				2100	2300	2500 and more	
Aerodrome conditions				Maximum allowable landing weight, 1000 kg			
Aerodrome altitude, m	1000	Aerodrome temperature, °C	35	73.2	77.4	80	
			40	72.2	76.7	80	
	1500		-10	76.5	80	80	
			-5	75.8	80	80	
			0	75.1	79.7	80	
			5	74.4	79.1	80	
			10	73.7	78.5	80	
			15	73.0	77.9	80	
			20	72.3	77.2	80	
			25	71.6	76.5	80	
			30	70.9	75.8	79.7	
			35	70.2	75.1	79.1	
			2000	-10	74.6	79.3	80
				-5	73.9	78.6	80
				0	73.2	78.0	80
				5	72.5	77.4	80
				10	71.8	76.7	80
				15	71.1	76.0	79.6
				20	70.4	75.3	79.0
				25	69.7	74.6	78.4
	30			69.0	73.9	77.8	
	35			68.2	73.2	77.1	

(cont'd)

3.1.7. Determination of Maximum Allowable Payload

- (1) Determine the maximum allowable payload for the maximum allowable takeoff and landing weights.

- (a) Maximum allowable payload limited due to takeoff safety conditions

$$MPL/TOS = MTOW - OW - (FS - TF),$$

where MTOW - maximum allowable takeoff weight (Ref. paragraph 3.1.5)

OW - operational weight

FS - fuel supply required (Ref. paragraph 3.1.4)

TF - fuel used for starting the engines and taxiing to the lineup position and filled in excess of the maximum allowable takeoff weight (500 kg).

- (2) The airplane operational weight comprises the following components:

Airplane empty weight as stated in the airplane Log Book*.

Weight of the operational items (Ref. Table 3.1.7.1).

Table 3.1.7.1

Operational Items

Nomenclature	Weight, kg
Flight crew (3 persons)	240
Cabin attendants (6 persons)	480
Removable buffet/galley equipment with food and leverage	1540
Oil in oil tanks	95
Airborne ladder	14
Baby cradles	16
Desodorant liquid in lavatories	70

* The airplane empty weight is 830 kg stated in the airplane Log Book and includes the weight of standard items listed in the Weight and Balance Manual.

(cont'd)

Table 3.1.7.1, cont'd

Nomenclature	Weight, kg
Water for buffet/galleys and lavatories	280
Airborne ground equipment	40
Tow bar	65
Total: operational items weight	2840

- (3) For overwater flying the following items are installed in the airplane at a sacrifice in the payload:

Life rafts (6 sets for the layouts of 136, 149 and 159 passengers and 5 sets for the layout of 104 passengers);

Life jackets (one per each passenger, flight crew member and cabin attendant).

The instructions accounting for the airplane weight and CG position variations due to installation of the emergency equipment are covered in the Weight and Balance Manual.

- (4) The maximum allowable payload limited due to landing with the maximum allowable landing weight

$$MPL/MLW = MLW - (OW + RF),$$

where MLW - maximum allowable landing weight (Ref. subsection 3.1.6)

RF - regulatory fuel reserve (Ref. subsection 3.1.4)

- (5) Assumed as maximum allowable payload for a given flight is the lowest payload obtained with the airplane takeoff and landing weights limits accounted for. The actual payload must not exceed the maximum allowable payload determined in the present paragraph. Arrange the payload in the airplane in accordance with the instructions of the Weight and Balance Manual.

3.1.8. Final Determination of Takeoff and Landing Weights and Selection of Takeoff and Landing Speeds

Calculate the actual landing weight from the formula:

$$ALW = OW + APL + RF,$$

(cont'd)



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where APL - actual payload.

Calculate the actual takeoff weight from the formula:

$$ATOW = ALW + (FS \pm WCF)$$

The actual landing weight must not exceed the maximum allowable landing weight (Ref. subsections 3.1.6 and 7.7) for a given aerodrome.

The actual takeoff weight must not exceed the maximum allowable takeoff weight (Ref. subsections 3.1.5 and 7.3) for a given aerodrome.

Use Tables 3.1.8.1, 3.1.8.2, 3.1.8.3 and 3.1.8.4 or follow the instructions of subsections 7.3 and 7.7 to select the following parameters for the actual takeoff and landing weights and the selected takeoff and landing flap settings:

Rotation speed V_R .

Takeoff safety speed V_2 .

Climbout speed with all the engines operating V_{2n} .

Speed at start of extendable (high-lift) devices retraction V_3 .

Clean configuration takeoff speed V_4 .

Approach speed V_{LA} .

(cont'd)

Table 3.1.8.1

Takeoff Speeds With Flaps 15°

Takeoff weight, 1000 kg	Rotation speed V_R , km/hr	Takeoff safety speed V_2 , km/hr	Climbout speed with all engi- nes operating V_{2n} , km/hr	Speed at start of extendable (high- lift) devices re- traction V_3 , km/hr
80-82	250	265	290	310
82-84	250	270	290	310
84-86	255	275	295	315
86-88	260	275	300	320
88-90	260	280	305	325
90-92	265	285	305	325
92-94	265	285	310	330
94-96	270	290	315	335
96-98	275	290	315	335
98-100	275	295	320	340

Table 3.1.8.2

Takeoff Speed With Flaps 28°

Takeoff weight, 1000 kg	Rotation speed V_R , km/hr	Takeoff safety speed V_2 , km/hr	Climbout speed with all engi- nes operating V_{2n} , km/hr	Speed at start of extendable (high-lift) devices retraction V_3 , km/hr	
				at 1-st segment (flaps from 28 to 15°)	at 2-nd segment (flaps from 15 to 0°)
80-82	230	250	275	265	310
82-84	235	255	275	270	310
84-86	235	260	280	275	315
86-88	240	260	285	275	320
88-90	240	265	290	280	325
90-92	245	270	290	285	325
92-94	250	270	295	285	330
94-96	250	275	300	290	335
96-98	255	280	300	290	335
98-100	255	280	305	295	340

(cont'd)



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PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.8.3

Clean Configuration Takeoff Speed

Takeoff weight, 1000 kg	80-82	82-84	84-86	86-88	88-90	90-92	92-94	94-96	96-98	98-100
Clean configuration takeoff speed V_4 , km/hr	345	350	355	360	365	370	370	375	380	385

Table 3.1.8.4

Landing Approach Speed for Landing Weight and Flap Setting Angle

Flap setting angle, deg.		0	15	28	36	45
Landing weight, 1000 kg	60-62	290	250	240	235	230
	62-64	295	255	245	240	235
	64-66	300	260	250	240	240
	66-68	305	265	250	245	245
	68-70	310	270	255	250	245
	70-72	315	275	260	255	250
	72-74	315	275	265	255	255
	74-76	320	280	265	260	255
	76-78	325	285	270	265	260
	78-80	330	290	275	265	265
	80-82	335	290	275	270	-
	82-84	340	295	280	275	-
	84-86	340	300	285	275	-
	86-88	345	300	285	280	-
	88-90	350	305	290	285	-

(cont'd)

3.1.9. Calculation of Time, Distance and Fuel for Stages of Flight

Fuel used, distance covered and time spent at various stages of flight for basic, most frequently encountered operational conditions are summarized in Tables 3.1.9.1 through 3.1.9.91 for the purpose of speeding up the preflight preparation.

If the actual conditions of flight differ from those for which the tables are calculated use the graphs of section 7 to calculate the flight data.

The order of calculation is as follows below:

Time, distance covered and fuel used in takeoff and climb.

Time, distance covered and fuel used in descent, landing approach and landing.

Time, distance covered and fuel used in horizontal flight.

Determine the total time of flight, distance and fuel supply required for flight as the sum of these values according to stages of flight.

3.1.9.1. Takeoff and Climb

- (1) The data describing takeoff and climb to the traffic altitude (2 minutes of time and 600 kg of fuel) are included in the respective climb data.
- (2) Listed below are the conditions for which the tables containing data describing climb to a desired flight level from the traffic altitude are calculated:

(a) modes of climb:

Best-range cruise (BRC) (Ref. Tables 3.1.9.1 through 3.1.9.28)

Pressure altitude, m	9450 or below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

High-speed cruise (HSC)

For air temperatures up to ISA+10 °C inclusively (Ref. Tables 3.1.9.29 through 3.1.9.49)

Pressure altitude, m	9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

(cont'd)

For air temperatures above ISA+10 °C (Ref. Tables 3.1.9.50 through 3.1.9.63)

Pressure altitude, m	8850 and below	Above 8850
IAS, km/hr	575	-
Mach number	-	0.8

- (b) The three engines operating at maximum continuous;
- (c) The air temperatures in °C: ISA-10, ISA, ISA+10, ISA+20;
- (d) The gross weights at the lineup position in kg:
100000, 95000, 90000, 85000, 80000, 75000, 70000.
- (e) The traffic altitude equal to 450 m.

3.1.9.2. Descent, Landing Approach and Landing

- (1) Listed below are the conditions for which the tables containing data describing descent from the flight level down to the traffic altitude are calculated:

- (a) Modes of descent:

Best-range cruise (BRC) (Ref. Table 3.1.9.64)

Pressure altitude, m	Above 10750	10750 and below
Mach number	0.8	-
IAS, km/hr	-	500

Midwing spoilers retracted

High-speed cruise (HSC) (Ref. Table 3.1.9.65)

Pressure altitude, m	Above 9750	9750 and below
Mach number	0.85	-
IAS, km/hr	-	575

Schedule of extension of midwing spoilers

(cont'd)

Pressure altitude, m	Above 7000	7000 to 3000	Below 3000
Midwing spoilers setting angle	0	45	0

High-speed cruise (HSC) in icing conditions (Ref. Table 3.1.9.66)

Pressure altitude, m	Above 9750	9750 and below
Mach number	0.85	-
IAS, km/hr	-	575

Midwing spoilers fully extended at all altitudes

- (b) Three engines operating at idle
- (c) Air temperature - ISA
- (d) Average airplane weight at the beginning of descent - 80000 kg
- (e) Traffic altitude - 450 m

- (2) Add 10 minutes of time and 600 kg of fuel spent in landing approach and landing to the respective descent data.

3.1.9.3. Enroute Flight

- (1) Calculate the enroute data in the following order:

- (a) The length of flight path horizontal segment in km:

$$HD = D - (CD + DD),$$

Where D - distance from the departure aerodrome to the destination aerodrome;

CD - distance covered in climb;

DD - distance covered in descent.

- (b) The time of enroute flight in min:

$$HT = BT - (CT + DT + AT),$$

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

where BT - block time;

CT - time in climb;

DT - time in descent;

AT - time in landing approach and landing.

(c) The ground speed on flight path horizontal segment in km/hr:

$$GS = \frac{HD}{HT},$$

where HD - horizontal distance

HT - enroute time.

(d) The true airspeed on flight path horizontal segment in km/hr:

$$TAS = GS \pm EWV,$$

where EWV - equivalent tailwind (+) or headwind (-) velocity determined from the formula:

$$EWV = WV \cdot \cos WA,$$

where WV - wind velocity, m/s

WA - wind angle.

(e) Calculate fuel used on flight path horizontal segment in kg from the following formulae:

As the first approximation

$$HF^* = NWF - (CF + DF + 600 \text{ kg}),$$

Where NWF - fuel used (Ref. paragraph 3.1.4);

CF - fuel used in climb;

DF - fuel used in descent.

From a known takeoff weight and fuel used in climb determine the airplane gross weight at the beginning of flight path horizontal segment:

(cont'd)

$$\text{IHGW} = \text{TOW} - \text{CF};$$

and thereafter the average gross weight for the flight path horizontal segment:

$$\text{AHGW} = \text{IHGW} - \frac{\text{HF}^*}{2}$$

For a selected flight level calculate the specific range SR from a known true speed and air temperature using the performance data of section 7.5.

As the second approximation the refined fuel consumption is determined from the formula below:

$$\text{HF} = \frac{\text{HD}}{\text{SR}},$$

where HD - horizontal distance;

SR - specific range.

Derive the specific range from the tables of horizontal flight data or the graphs of subsection 7.5.

(2) Listed below are the conditions for which the horizontal flight data are calculated:

(a) Horizontal flight modes:

Best-range cruise mode, ref. Tables 3.1.9.67 through 3.1.9.72;

M = 0.82, ref. Tables 3.1.9.73 through 3.1.9.78;

M = 0.84, ref. Tables 3.1.9.79 through 3.1.9.84;

High-speed cruise mode, ref. Tables 3.1.9.85 through 3.1.9.90;

Holding mode, ref. Table 3.1.9.91.

(b) Air temperature - ISA

(c) Airplane gross weight - 100000, 95000, 85000, 80000, 75000, 70000 kg

NOTES: 1. With the air temperature increased or decreased by 5° above or below ISA the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)

2. If the actual air temperature differs from the ISA air temperature, determine the actual true airspeed TAS from the formula:

$$TAS = TAS_{ISA} \sqrt{\frac{T}{T_{ISA}}}$$

3. For flight with one or two engines inoperative change hourly fuel consumption and specific range in accordance with Table 3.1.9.92.

3.1.9.4. Final Check of Fuel Supply Required

Determine the fuel supply required for flight as the sum of fuel used calculated for the segments of flight path with the following amounts of fuel added:

500 kg to be used for starting the engines and taxiing to lineup position;

regulatory fuel reserve determined in accordance with the instructions of paragraphs 3.1.4 or 7.5.3.

The actual fuel supply aboard the airplane should be not less than the sum so obtained.

3.1.10. Calculation of Maximum Distance to Return Point

Calculate the maximum distance to the point whence the airplane can return to the departure aerodrome or an alternate aerodrome from the formula:

$$RD = \frac{NWD - TT \left[1 - \left(\frac{EWV}{TAS} \right)^2 \right]}{2},$$

where RD - maximum distance to return point in km;

NWD - no-wind range for a given fuel supply in km;

TT - track in 180° turn in km;

TAS - true airspeed in km/hr.

Determine track in 180° turn from the formula:

$$TT = 2 \pi \frac{V^2}{g \cdot \operatorname{tg} \gamma} = 0.64 \frac{V^2}{\operatorname{tg} \gamma},$$

(cont'd)

where V - true airspeed in m/s;

γ - bank angle in turn in degrees.

3.1.11. Check of CG Position

Calculate and check the CG position using the data covered in the Weight and Balance Manual.

(cont'd)

Table 3.1.9.1

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA-10°

REST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 70000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	551
10000	3050	4	15	961	621
12000	3650	4	19	1043	639
14000	4250	4	23	1126	658
16000	4900	5	28	1215	678
18000	5500	5	33	1299	699
19000	5800	5	36	1341	709
20000	6100	6	39	1383	719
21000	6400	6	42	1425	730
22000	6700	6	45	1468	741
23000	7000	6	48	1512	751
24000	7300	7	51	1556	763
25000	7600	7	55	1600	774
26000	7900	7	59	1645	785
27000	8250	8	64	1699	799
28000	8550	8	68	1745	812
29000	8850	8	72	1793	824
30000	9150	9	77	1842	836
31000	9450	9	82	1891	848
32000	9750	9	86	1928	845
33000	10050	10	91	1966	842
34000	10350	10	95	2003	839
35000	10650	10	99	2041	835
36000	10950	11	104	2080	831
37000	11300	11	110	2126	830
38000	11600	11	116	2168	830
39000	11900	12	122	2211	830
40000	12200	12	129	2257	831
41000	12500	13	137	2305	831
42000	12800	14	146	2355	831

(cont'd)

Time, Distance Covered, Fuel Used and True Airspeed in Entoute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA-10°

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 75000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	551
10000	3050	4	16	992	621
12000	3650	4	20	1082	639
14000	4250	5	25	1173	658
16000	4900	5	31	1271	678
18000	5500	6	36	1362	699
19000	5800	6	39	1408	709
20000	6100	6	42	1455	719
21000	6400	6	46	1501	730
22000	6700	7	49	1549	741
23000	7000	7	53	1596	751
24000	7300	7	56	1645	763
25000	7600	7	60	1694	774
26000	7900	8	65	1743	785
27000	8250	8	70	1803	799
28000	8550	9	75	1855	812
29000	8850	9	80	1908	824
30000	9150	9	85	1962	836
31000	9450	10	91	2016	848
32000	9750	10	95	2058	845
33000	10050	10	100	2100	842
34000	10350	11	105	2141	839
35000	10650	11	110	2184	835
36000	10950	11	115	2228	831
37000	11300	12	122	2281	830
38000	11600	12	129	2329	830
39000	11900	13	136	2379	830
40000	12200	14	144	2432	831
41000	12500	14	153	2489	831
42000	12800	15	164	2549	831

(cont'd)

Table 3.1.9.3

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA-10°

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 80000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	551
10000	3050	4	17	1023	621
12000	3650	4	22	1121	639
14000	4250	5	27	1219	658
16000	4900	5	33	1325	678
18000	5500	6	39	1425	699
19000	5800	6	42	1475	709
20000	6100	6	46	1525	719
21000	6400	7	49	1576	730
22000	6700	7	53	1628	741
23000	7000	7	57	1680	751
24000	7300	8	61	1733	763
25000	7600	8	66	1786	774
26000	7900	8	70	1841	785
27000	8250	9	76	1906	799
28000	8550	9	81	1963	812
29000	8850	10	87	2021	824
30000	9150	10	93	2081	836
31000	9450	10	99	2141	848
32000	9750	11	104	2187	845
33000	10050	11	109	2234	842
34000	10350	12	114	2280	839
35000	10650	12	120	2328	835
36000	10950	12	126	2378	831
37000	11300	13	134	2439	830
38000	11600	14	142	2494	830
39000	11900	14	150	2552	830
40000	12200	15	160	2614	831
41000	12500	16	171	2682	831
42000	12800	17	184	2756	831

(cont'd)

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA-10°

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 85000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	551
10000	3050	4	19	1056	621
12000	3650	4	24	1161	639
14000	4250	5	29	1267	658
16000	4900	6	36	1382	678
18000	5500	6	42	1490	699
19000	5800	6	46	1544	709
20000	6100	7	50	1599	719
21000	6400	7	53	1654	730
22000	6700	7	58	1710	741
23000	7000	8	62	1767	751
24000	7300	8	66	1824	763
25000	7600	8	71	1883	774
26000	7900	9	76	1943	785
27000	8250	9	83	2014	799
28000	8550	10	88	2077	812
29000	8850	10	95	2140	824
30000	9150	11	101	2206	836
31000	9450	11	108	2272	848
32000	9750	12	113	2323	845
33000	10050	12	119	2376	842
34000	10350	12	125	2429	839
35000	10650	13	132	2483	835
36000	10950	13	139	2540	831
37000	11300	14	148	2610	830
38000	11600	15	157	2674	830
39000	11900	15	167	2744	830
40000	12200	16	178	2820	831
41000	12500	17	192	2904	831
42000	12800	18	207	3000	831

(cont'd)

Table 3.1.9.5

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA-10°

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 90000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	551
10000	3050	4	20	1089	621
12000	3650	5	26	1202	639
14000	4250	5	32	1316	658
16000	4900	6	39	1440	678
18000	5500	6	46	1556	699
19000	5800	7	49	1615	709
20000	6100	7	53	1674	719
21000	6400	7	58	1734	730
22000	6700	8	62	1795	741
23000	7000	8	67	1856	751
24000	7300	9	72	1919	763
25000	7600	9	77	1983	774
26000	7900	9	82	2048	785
27000	8250	10	89	2126	799
28000	8550	10	96	2194	812
29000	8850	11	102	2264	824
30000	9150	11	110	2336	836
31000	9450	12	117	2408	848
32000	9750	12	123	2465	845
33000	10050	13	130	2525	842
34000	10350	13	137	2584	839
35000	10650	14	144	2646	835
36000	10950	14	152	2710	831
37000	11300	15	162	2791	830
38000	11600	16	173	2866	830
39000	11900	17	185	2948	830
40000	12200	18	198	3040	831
41000	12500	19	215	3145	831
42000	12800	21	237	3274	831

(cont'd)

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA-10°

BEST-RANGE GRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 95000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	551
10000	3050	4	21	1125	621
12000	3650	5	27	1247	639
14000	4250	5	34	1369	658
16000	4900	6	41	1502	678
18000	5500	7	49	1628	699
19000	5800	7	53	1691	709
20000	6100	7	58	1755	719
21000	6400	8	62	1820	730
22000	6700	8	67	1886	741
23000	7000	9	72	1952	751
24000	7300	9	77	2021	763
25000	7600	9	83	2090	774
26000	7900	10	89	2161	785
27000	8250	11	96	2245	799
28000	8550	11	103	2320	812
29000	8850	12	111	2396	824
30000	9150	12	119	2476	836
31000	9450	13	127	2557	848
32000	9750	13	134	2620	845
33000	10050	14	141	2689	842
34000	10350	14	149	2755	839
35000	10650	15	157	2825	835
36000	10950	16	166	2898	831
37000	11300	16	179	2991	830
38000	11600	17	191	3080	830
39000	11900	18	205	3179	830
40000	12200	20	222	3292	831
41000	12500	21	245	3435	831
42000	12800	24	277	3628	831

(cont'd)

Table 3.1.9.7

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA-10°

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 100000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	551
10000	3050	4	23	1163	621
12000	3650	5	30	1294	639
14000	4250	6	36	1426	658
16000	4900	6	45	1570	678
18000	5500	7	53	1706	699
19000	5800	7	57	1774	709
20000	6100	8	62	1844	719
21000	6400	8	67	1914	730
22000	6700	9	72	1986	741
23000	7000	9	78	2059	751
24000	7300	10	84	2133	763
25000	7600	10	90	2209	774
26000	7900	11	96	2286	785
27000	8250	11	105	2379	799
28000	8550	12	112	2461	812
29000	8850	12	120	2546	824
30000	9150	13	129	2636	836
31000	9450	14	139	2726	848
32000	9750	14	146	2797	845
33000	10050	15	155	2874	842
34000	10350	15	163	2948	839
35000	10650	16	173	3027	835
36000	10950	17	183	3111	831
37000	11300	18	198	3221	830
38000	11600	19	212	3326	830
39000	11900	20	229	3447	830
40000	12200	22	253	3605	831
41000	12500	24	287	3817	831
42000	12800	28	339	4130	831

(cont'd)

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 70000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	561
10000	3050	4	18	989	633
12000	3650	4	23	1078	652
14000	4250	5	28	1167	671
16000	4900	5	34	1264	692
18000	5500	6	40	1355	713
19000	5800	6	43	1401	723
20000	6100	6	46	1446	734
21000	6400	7	50	1493	745
22000	6700	7	54	1540	756
23000	7000	7	58	1587	767
24000	7300	8	62	1635	779
25000	7600	8	66	1684	791
26000	7900	8	70	1734	803
27000	8250	9	76	1792	817
28000	8550	9	81	1844	830
29000	8850	9	87	1896	842
30000	9150	10	92	1949	855
31000	9450	10	98	2003	868
32000	9750	11	103	2044	865
33000	10050	11	108	2085	862
34000	10350	11	113	2126	858
35000	10650	12	118	2167	855
36000	10950	12	124	2208	851
37000	11300	12	130	2259	850
38000	11600	13	137	2304	850
39000	11900	13	144	2351	850
40000	12200	14	152	2401	850
41000	12500	15	161	2454	850
42000	12800	15	171	2511	851

(cont'd)

Table 3.1.9.9

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 75000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	561
10000	3050	4	19	1023	633
12000	3650	4	25	1121	652
14000	4250	5	30	1219	671
16000	4900	6	37	1326	692
18000	5500	6	44	1426	713
19000	5800	6	47	1476	723
20000	6100	7	51	1527	734
21000	6400	7	55	1578	745
22000	6700	7	59	1630	756
23000	7000	8	63	1682	767
24000	7300	8	68	1736	779
25000	7600	8	73	1790	791
26000	7900	9	78	1844	803
27000	8250	9	84	1910	817
28000	8550	10	90	1967	830
29000	8850	10	96	2025	842
30000	9150	11	102	2085	855
31000	9450	11	109	2145	868
32000	9750	11	114	2191	865
33000	10050	12	119	2236	862
34000	10350	12	125	2282	858
35000	10650	13	131	2328	855
36000	10950	13	137	2375	851
37000	11300	14	145	2433	850
38000	11600	14	153	2486	850
39000	11900	15	161	2541	850
40000	12200	15	171	2600	850
41000	12500	16	181	2664	850
42000	12800	17	194	2733	851

(cont'd)

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 80000 kg

Pressure altitude		Time, m	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	561
10000	3050	4	21	1058	633
12000	3650	5	27	1165	652
14000	4250	5	33	1271	671
16000	4900	6	40	1387	692
18000	5500	7	48	1496	713
19000	5800	7	52	1551	723
20000	6100	7	56	1607	734
21000	6400	8	60	1663	745
22000	6700	8	64	1720	756
23000	7000	8	69	1777	767
24000	7300	9	74	1836	779
25000	7600	9	79	1896	791
26000	7900	9	85	1956	803
27000	8250	10	92	2028	817
28000	8550	10	98	2091	830
29000	8850	11	105	2156	842
30000	9150	11	112	2222	855
31000	9450	12	119	2289	868
32000	9750	12	125	2339	865
33000	10050	13	131	2391	862
34000	10350	13	137	2441	858
35000	10650	14	144	2494	855
36000	10950	14	151	2548	851
37000	11300	15	160	2615	850
38000	11600	15	169	2676	850
39000	11900	16	179	2741	850
40000	12200	17	191	2812	850
41000	12500	18	204	2890	850
42000	12800	19	219	2977	851

(cont'd)

Table 3.1.9.11

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 85000 kg

Pressure altitude		Time, m	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	561
10000	3050	4	23	1095	633
12000	3650	5	29	1210	652
14000	4250	6	36	1325	671
16000	4900	6	44	1452	692
18000	5500	7	52	1570	713
19000	5800	7	56	1630	723
20000	6100	8	60	1691	734
21000	6400	8	65	1752	745
22000	6700	8	70	1814	756
23000	7000	9	75	1877	767
24000	7300	9	80	1941	779
25000	7600	10	86	2006	791
26000	7900	10	92	2072	803
27000	8250	11	100	2152	817
28000	8550	11	107	2222	830
29000	8850	12	114	2292	842
30000	9150	12	122	2366	855
31000	9450	13	130	2440	868
32000	9750	13	137	2496	865
33000	10050	14	144	2556	862
34000	10350	14	151	2614	858
35000	10650	15	159	2674	855
36000	10950	15	167	2737	851
37000	11300	16	178	2815	850
38000	11600	17	188	2887	850
39000	11900	18	200	2966	850
40000	12200	19	214	3053	850
41000	12500	20	230	3153	850
42000	12800	21	251	3270	851

(cont'd)

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 90000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	561
10000	3050	4	25	1133	633
12000	3650	5	31	1257	652
14000	4250	6	39	1382	671
16000	4900	7	47	1518	692
18000	5500	7	56	1647	713
19000	5800	8	60	1712	723
20000	6100	8	65	1778	734
21000	6400	8	70	1844	745
22000	6700	9	76	1912	756
23000	7000	9	81	1980	767
24000	7300	10	87	2050	779
25000	7600	10	93	2122	791
26000	7900	11	100	2194	803
27000	8250	11	108	2282	817
28000	8550	12	116	2358	830
29000	8850	13	124	2436	842
30000	9150	13	133	2517	855
31000	9450	14	142	2599	868
32000	9750	14	150	2663	865
33000	10050	15	158	2731	862
34000	10350	15	166	2797	858
35000	10650	16	174	2866	855
36000	10950	17	184	2938	851
37000	11300	18	196	3029	850
38000	11600	18	209	3114	850
39000	11900	19	223	3209	850
40000	12200	21	240	3319	850
41000	12500	22	262	3448	850
42000	12800	24	291	3618	851

(cont'd)

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 95000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	561
10000	3050	5	27	1174	633
12000	3650	5	34	1308	652
14000	4250	6	42	1443	671
16000	4900	7	51	1591	692
18000	5500	8	60	1730	713
19000	5800	8	65	1801	723
20000	6100	9	70	1872	734
21000	6400	9	76	1945	745
22000	6700	9	82	2018	756
23000	7000	10	88	2093	767
24000	7300	10	94	2169	779
25000	7600	11	101	2247	791
26000	7900	12	109	2327	803
27000	8250	12	118	2422	817
28000	8550	13	126	2506	830
29000	8850	13	135	2592	842
30000	9150	14	145	2683	855
31000	9450	15	155	2775	868
32000	9750	15	164	2848	865
33000	10050	16	173	2926	862
34000	10350	17	182	3001	858
35000	10650	17	192	3080	855
36000	10950	18	203	3163	851
37000	11300	19	218	3270	850
38000	11600	20	232	3373	850
39000	11900	22	250	3491	850
40000	12200	23	273	3631	850
41000	12500	25	305	3823	850
42000	12800	29	357	4124	851

(cont'd)

Table 3.1.9.14

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 100000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	561
10000	3050	5	29	1218	633
12000	3650	6	37	1364	652
14000	4250	6	45	1510	671
16000	4900	7	55	1670	692
18000	5500	8	65	1822	713
19000	5800	9	71	1899	723
20000	6100	9	76	1977	734
21000	6400	10	82	2056	745
22000	6700	10	89	2136	756
23000	7000	11	95	2218	767
24000	7300	11	103	2302	779
25000	7600	12	110	2388	791
26000	7900	12	118	2476	803
27000	8250	13	128	2582	817
28000	8550	14	138	2675	830
29000	8850	15	148	2772	842
30000	9150	15	159	2874	855
31000	9450	16	171	2979	868
32000	9750	17	180	3061	865
33000	10050	17	191	3150	862
34000	10350	18	201	3237	858
35000	10650	19	213	3328	855
36000	10950	20	225	3425	851
37000	11300	21	243	3552	850
38000	11600	22	261	3679	850
39000	11900	24	284	3829	850
40000	12200	26	317	4039	850
41000	12500	30	373	4371	850

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.15

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 70000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	571
10000	3050	4	21	1027	645
12000	3650	5	27	1125	664
14000	4250	5	34	1224	684
16000	4900	6	41	1332	705
18000	5500	7	49	1433	727
19000	5800	7	53	1484	738
20000	6100	7	57	1536	749
21000	6400	8	62	1589	760
22000	6700	8	66	1642	771
23000	7000	8	71	1696	783
24000	7300	9	77	1751	795
25000	7600	9	82	1807	807
26000	7900	10	88	1863	819
27000	8250	10	95	1931	834
28000	8550	11	102	1991	847
29000	8850	11	109	2052	860
30000	9150	12	116	2115	873
31000	9450	12	124	2178	887
32000	9750	13	130	2225	884
33000	10050	13	136	2272	881
34000	10350	13	142	2317	878
35000	10650	14	149	2363	874
36000	10950	14	155	2409	870
37000	11300	15	163	2465	870
38000	11600	15	171	2515	870
39000	11900	16	180	2568	870
40000	12200	17	190	2625	870
41000	12500	17	201	2687	870
42000	12800	18	214	2754	870

(cont'd)

Table 3.1.9.16

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 75000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	571
10000	3050	4	23	1066	645
12000	3650	5	30	1174	664
14000	4250	6	37	1283	684
16000	4900	6	46	1403	705
18000	5500	7	54	1516	727
19000	5800	7	58	1573	738
20000	6100	8	63	1631	749
21000	6400	8	68	1689	760
22000	6700	9	73	1748	771
23000	7000	9	79	1808	783
24000	7300	9	85	1870	795
25000	7600	10	91	1933	807
26000	7900	10	97	1996	819
27000	8250	11	106	2073	834
28000	8550	12	113	2140	847
29000	8850	12	121	2209	860
30000	9150	13	130	2280	873
31000	9450	13	138	2351	887
32000	9750	14	145	2404	884
33000	10050	14	152	2457	881
34000	10350	15	159	2509	878
35000	10650	15	166	2560	874
36000	10950	16	174	2613	870
37000	11300	16	183	2678	870
38000	11600	17	192	2737	870
39000	11900	18	203	2801	870
40000	12200	18	215	2870	870
41000	12500	19	228	2947	870
42000	12800	21	245	3031	870

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.17

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
ISA, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 80000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	571
10000	3050	5	26	1106	645
12000	3650	5	33	1224	664
14000	4250	6	40	1344	684
16000	4900	7	50	1475	705
18000	5500	7	59	1599	727
19000	5800	8	64	1661	738
20000	6100	8	69	1725	749
21000	6400	9	75	1789	760
22000	6700	9	80	1854	771
23000	7000	10	86	1921	783
24000	7300	10	93	1989	795
25000	7600	11	100	2058	807
26000	7900	11	107	2129	819
27000	8250	12	116	2214	834
28000	8550	12	125	2289	847
29000	8850	13	133	2366	860
30000	9150	14	143	2446	873
31000	9450	14	153	2526	887
32000	9750	15	161	2586	884
33000	10050	15	168	2646	881
34000	10350	16	176	2704	878
35000	10650	17	184	2764	874
36000	10950	17	193	2826	870
37000	11300	18	204	2902	870
38000	11600	19	215	2972	870
39000	11900	20	228	3049	870
40000	12200	21	242	3134	870
41000	12500	22	260	3230	870
42000	12800	23	281	3343	870

(cont'd)

Table 3.1.9.18

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 85000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	571
10000	3050	5	28	1147	645
12000	3650	5	36	1276	664
14000	4250	6	44	1406	684
16000	4900	7	54	1550	705
18000	5500	8	64	1685	727
19000	5800	8	70	1753	738
20000	6100	9	75	1823	749
21000	6400	9	81	1894	760
22000	6700	10	88	1965	771
23000	7000	10	94	2039	783
24000	7300	11	102	2114	795
25000	7600	11	109	2191	807
26000	7900	12	117	2269	819
27000	8250	13	127	2364	834
28000	8550	13	137	2448	847
29000	8850	14	147	2534	860
30000	9150	15	157	2624	873
31000	9450	16	169	2714	887
32000	9750	16	177	2781	884
33000	10050	17	186	2853	881
34000	10350	17	195	2921	878
35000	10650	18	205	2991	874
36000	10950	19	215	3063	870
37000	11300	20	229	3154	870
38000	11600	21	242	3239	870
39000	11900	22	257	3334	870
40000	12200	23	276	3443	870
41000	12500	25	299	3575	870
42000	12800	27	330	3739	870

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.19

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 90000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	571
10000	3050	5	30	1191	645
12000	3650	6	38	1331	664
14000	4250	7	48	1472	684
16000	4900	8	58	1628	705
18000	5500	8	70	1776	727
19000	5800	9	76	1851	738
20000	6100	9	82	1927	749
21000	6400	10	88	2005	760
22000	6700	11	95	2084	771
23000	7000	11	103	2164	783
24000	7300	12	111	2247	795
25000	7600	12	119	2332	807
26000	7900	13	128	2419	819
27000	8250	14	139	2525	834
28000	8550	15	150	2618	847
29000	8850	15	161	2714	860
30000	9150	16	173	2814	873
31000	9450	17	185	2916	887
32000	9750	18	195	2994	884
33000	10050	18	206	3076	881
34000	10350	19	217	3155	878
35000	10650	20	228	3236	874
36000	10950	21	240	3321	870
37000	11300	22	256	3429	870
38000	11600	23	272	3532	870
39000	11900	24	291	3652	870
40000	12200	26	316	3798	870
41000	12500	28	349	3983	870
42000	12800	32	402	4265	870

(cont'd)

Table 3.1.9.20

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 95000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	571
10000	3050	5	32	1240	645
12000	3650	6	42	1392	664
14000	4250	7	52	1546	684
16000	4900	8	63	1715	705
18000	5500	9	76	1876	727
19000	5800	10	82	1958	738
20000	6100	10	89	2042	749
21000	6400	11	96	2127	760
22000	6700	11	104	2214	771
23000	7000	12	112	2302	783
24000	7300	13	121	2394	795
25000	7600	13	130	2488	807
26000	7900	14	140	2584	819
27000	8250	15	152	2701	834
28000	8550	16	164	2805	847
29000	8850	17	176	2912	860
30000	9150	18	190	3026	873
31000	9450	19	205	3144	887
32000	9750	19	216	3235	884
33000	10050	20	229	3332	881
34000	10350	21	241	3424	878
35000	10650	22	254	3520	874
36000	10950	23	269	3621	870
37000	11300	24	288	3750	870
38000	11600	26	308	3880	870
39000	11900	27	334	4039	870
40000	12200	30	369	4243	870
41000	12500	34	428	4577	870

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.21

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 100000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	571
10000	3050	5	35	1294	645
12000	3650	6	45	1459	664
14000	4250	7	56	1627	684
16000	4900	8	69	1812	705
18000	5500	10	82	1990	727
19000	5800	10	90	2080	738
20000	6100	11	97	2172	749
21000	6400	11	105	2266	760
22000	6700	12	114	2362	771
23000	7000	13	123	2461	783
24000	7300	14	133	2563	795
25000	7600	14	143	2668	807
26000	7900	15	154	2776	819
27000	8250	16	168	2907	834
28000	8550	17	181	3024	847
29000	8850	18	195	3148	860
30000	9150	19	212	3282	873
31000	9450	20	229	3418	887
32000	9750	21	243	3532	884
33000	10050	22	257	3638	881
34000	10350	23	271	3747	878
35000	10650	24	287	3861	874
36000	10950	26	304	3981	870
37000	11300	27	328	4143	870
38000	11600	29	354	4313	870
39000	11900	31	390	4532	870
40000	12200	36	453	4905	870

(cont'd)

Table 3.1.9.22

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +20°

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 70000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	581
10000	3050	5	27	1074	657
12000	3650	5	34	1185	676
14000	4250	6	42	1297	696
16000	4900	7	51	1420	719
18000	5500	8	61	1537	741
19000	5800	8	66	1596	752
20000	6100	8	72	1657	763
21000	6400	9	77	1718	775
22000	6700	9	83	1780	786
23000	7000	10	90	1843	798
24000	7300	10	97	1908	811
25000	7600	11	104	1975	823
26000	7900	11	111	2043	836
27000	8250	12	121	2125	851
28000	8550	13	130	2198	864
29000	8850	13	139	2273	878
30000	9150	14	150	2350	892
31000	9450	15	160	2429	905
32000	9750	15	168	2487	903
33000	10050	16	177	2545	900
34000	10350	16	185	2601	896
35000	10650	17	194	2658	893
36000	10950	18	202	2714	889
37000	11300	18	214	2783	889
38000	11600	19	224	2847	889
39000	11900	20	237	2916	889
40000	12200	21	251	2993	889
41000	12500	22	268	3080	889
42000	12800	23	289	3180	889

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.23

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +20°

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 75000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	581
10000	3050	5	29	1120	657
12000	3650	6	37	1243	676
14000	4250	6	46	1368	696
16000	4900	7	57	1506	719
18000	5500	8	68	1637	741
19000	5800	9	74	1703	752
20000	6100	9	80	1771	763
21000	6400	10	86	1840	775
22000	6700	10	93	1910	786
23000	7000	11	100	1982	798
24000	7300	11	108	2055	811
25000	7600	12	116	2131	823
26000	7900	12	125	2208	836
27000	8250	13	136	2301	851
28000	8550	14	146	2384	864
29000	8850	15	157	2470	878
30000	9150	16	168	2558	892
31000	9450	16	181	2649	905
32000	9750	17	190	2716	903
33000	10050	18	200	2783	900
34000	10350	18	209	2848	896
35000	10650	19	219	2913	893
36000	10950	20	229	2980	889
37000	11300	21	243	3063	889
38000	11600	21	256	3141	889
39000	11900	22	272	3228	889
40000	12200	24	291	3328	889
41000	12500	25	313	3444	889
42000	12800	27	342	3585	889

(cont'd)

Table 3.1.9.24

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA+20°

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 80000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	581
10000	3050	5	32	1167	657
12000	3650	6	41	1303	676
14000	4250	7	51	1440	696
16000	4900	8	63	1592	719
18000	5500	9	75	1737	741
19000	5800	9	81	1811	752
20000	6100	10	88	1886	763
21000	6400	10	95	1963	775
22000	6700	11	102	2041	786
23000	7000	12	111	2121	798
24000	7300	12	119	2203	811
25000	7600	13	128	2288	823
26000	7900	14	138	2374	836
27000	8250	14	150	2480	851
28000	8550	15	162	2575	864
29000	8850	16	174	2672	878
30000	9150	17	188	2773	892
31000	9450	18	202	2877	905
32000	9750	19	213	2954	903
33000	10050	19	224	3035	900
34000	10350	20	235	3110	896
35000	10650	21	247	3188	893
36000	10950	22	260	3269	889
37000	11300	23	276	3370	889
38000	11600	24	293	3468	889
39000	11900	25	313	3581	889
40000	12200	27	338	3716	889
41000	12500	29	372	3886	889
42000	12800	33	420	4119	889

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.25

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA+20°

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 85000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	581
10000	3050	5	35	1217	657
12000	3650	6	45	1365	676
14000	4250	7	55	1515	696
16000	4900	8	68	1683	719
18000	5500	9	82	1843	741
19000	5800	10	89	1924	752
20000	6100	11	96	2007	763
21000	6400	11	104	2092	775
22000	6700	12	113	2180	786
23000	7000	13	122	2268	798
24000	7300	13	131	2361	811
25000	7600	14	142	2456	823
26000	7900	15	153	2553	836
27000	8250	16	167	2673	851
28000	8550	17	180	2780	864
29000	8850	18	194	2891	878
30000	9150	19	209	3007	892
31000	9450	20	225	3126	905
32000	9750	21	238	3215	903
33000	10050	22	251	3311	900
34000	10350	22	265	3402	896
35000	10650	23	279	3497	893
36000	10950	24	294	3595	889
37000	11300	26	315	3721	889
38000	11600	27	336	3846	889
39000	11900	29	363	3998	889
40000	12200	32	400	4194	889
41000	12500	35	456	4475	889

(cont'd)

Table 3.1.9.26.

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA+20°

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 90000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	.2	0	600	581
10000	3050	6	38	1269	657
12000	3650	7	48	1431	676
14000	4250	8	60	1595	696
16000	4900	9	74	1779	719
18000	5500	10	89	1955	741
19000	5800	11	97	2045	752
20000	6100	11	105	2137	763
21000	6400	12	114	2231	775
22000	6700	13	123	2328	786
23000	7000	14	133	2427	798
24000	7300	14	144	2530	811
25000	7600	15	156	2637	823
26000	7900	16	168	2747	836
27000	8250	17	184	2882	851
28000	8550	18	199	3003	864
29000	8850	19	215	3130	878
30000	9150	21	233	3263	892
31000	9450	22	251	3400	905
32000	9750	23	266	3506	903
33000	10050	24	282	3622	900
34000	10350	25	299	3733	896
35000	10650	26	316	3849	893
36000	10950	27	335	3970	889
37000	11300	29	361	4130	889
38000	11600	31	390	4298	889
39000	11900	34	430	4520	889
40000	12200	38	492	4850	889

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.27

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA+20°

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 95000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	581
10000	3050	6	41	1329	657
12000	3650	7	53	1506	676
14000	4250	8	66	1686	696
16000	4900	10	81	1888	719
18000	5500	11	98	2082	741
19000	5800	12	106	2182	752
20000	6100	12	115	2283	763
21000	6400	13	125	2388	775
22000	6700	14	136	2496	786
23000	7000	15	147	2606	798
24000	7300	16	159	2721	811
25000	7600	17	172	2841	823
26000	7900	18	186	2965	836
27000	8250	19	204	3117	851
28000	8550	20	221	3256	864
29000	8850	21	239	3401	878
30000	9150	23	259	3555	892
31000	9450	24	282	3722	905
32000	9750	25	300	3851	903
33000	10050	27	320	3994	900
34000	10350	28	341	4131	896
35000	10650	30	363	4276	893
36000	10950	31	387	4430	889
37000	11300	33	421	4641	889
38000	11600	36	463	4887	889
39000	11900	41	530	5260	889

(cont'd)

Table 3.1.9.28

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA+20°

BEST-RANGE CRUISE

Altitude, m	9450 and below	Above 9450
IAS, km/hr	550	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 100000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	581
10000	3050	6	45	1396	657
12000	3650	8	58	1590	676
14000	4250	9	72	1790	696
16000	4900	10	90	2014	719
18000	5500	12	108	2230	741
19000	5800	13	117	2341	752
20000	6100	13	128	2456	763
21000	6400	14	139	2573	775
22000	6700	15	150	2695	786
23000	7000	16	163	2820	798
24000	7300	17	177	2951	811
25000	7600	18	192	3088	823
26000	7900	19	208	3230	836
27000	8250	21	228	3406	851
28000	8550	22	248	3567	864
29000	8850	24	270	3739	878
30000	9150	25	295	3932	892
31000	9450	27	323	4136	905
32000	9750	29	345	4296	903
33000	10050	30	371	4476	900
34000	10350	32	396	4649	896
35000	10650	34	425	4835	893
36000	10950	36	456	5036	889
37000	11300	40	506	5339	889
38000	11600	44	575	5742	889

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.29

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA-10°

HIGH-SPEED CRUISE

Altitude, m	9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 70000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	576
10000	3050	4	15	967	649
12000	3650	4	20	1051	668
14000	4250	4	24	1136	687
16000	4900	5	30	1228	708
18000	5500	5	35	1314	729
19000	5800	5	38	1357	739
20000	6100	6	41	1400	750
21000	6400	6	44	1444	761
22000	6700	6	47	1489	772
23000	7000	7	51	1534	783
24000	7300	7	55	1579	795
25000	7600	7	59	1626	807
26000	7900	7	63	1672	818
27000	8250	8	68	1728	833
28000	8550	8	72	1777	845
29000	8850	8	77	1827	858
30000	9150	9	82	1878	871
31000	9450	9	88	1931	884
32000	9750	10	94	1984	897
33000	10050	10	98	2024	895
34000	10350	10	103	2063	891
35000	10650	11	108	2103	887
36000	10950	11	113	2143	883
37000	11300	11	119	2192	882
38000	11600	12	125	2235	882
39000	11900	12	132	2280	882
40000	12200	13	139	2327	882
41000	12500	13	147	2377	882
42000	12800	14	156	2432	882

(cont'd)

Table 3.1.9.30

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA-10°

HIGH-SPEED CRUISE

Altitude, m	9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 75000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	576
10000	3050	4	17	995	649
12000	3650	4	21	1087	668
14000	4250	5	26	1178	687
16000	4900	5	32	1278	708
18000	5500	6	38	1372	729
19000	5800	6	41	1419	739
20000	6100	6	44	1466	750
21000	6400	6	48	1515	761
22000	6700	7	52	1563	772
23000	7000	7	55	1612	783
24000	7300	7	59	1662	795
25000	7600	8	64	1713	807
26000	7900	8	68	1765	818
27000	8250	8	74	1826	833
28000	8550	9	79	1880	845
29000	8850	9	84	1935	858
30000	9150	9	90	1991	871
31000	9450	10	96	2048	884
32000	9750	10	102	2107	897
33000	10050	11	108	2152	895
34000	10350	11	113	2196	891
35000	10650	11	118	2241	887
36000	10950	12	124	2286	883
37000	11300	12	131	2341	882
38000	11600	13	138	2391	882
39000	11900	13	146	2442	882
40000	12200	14	154	2499	882
41000	12500	14	164	2560	882
42000	12800	15	175	2627	882

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.31

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA-10°

HIGH-SPEED CRUISE

Altitude, m	9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 80000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	576
10000	3050	4	18	1029	649
12000	3650	4	23	1128	668
14000	4250	5	29	1227	687
16000	4900	5	35	1336	708
18000	5500	6	41	1438	729
19000	5800	6	45	1489	739
20000	6100	6	48	1540	750
21000	6400	7	52	1593	761
22000	6700	7	56	1645	772
23000	7000	7	60	1699	783
24000	7300	8	65	1753	795
25000	7600	8	69	1809	807
26000	7900	8	74	1865	818
27000	8250	9	80	1932	833
28000	8550	9	86	1991	845
29000	8850	10	92	2051	858
30000	9150	10	98	2113	871
31000	9450	11	105	2177	884
32000	9750	11	112	2242	897
33000	10050	11	118	2293	895
34000	10350	12	124	2342	891
35000	10650	12	130	2392	887
36000	10950	13	136	2443	883
37000	11300	13	144	2505	882
38000	11600	14	152	2562	882
39000	11900	14	161	2625	882
40000	12200	15	172	2692	882
41000	12500	16	184	2767	882
42000	12800	17	197	2850	882

(cont'd)

Table 3.1.9.32

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA-10°

HIGH-SPEED CRUISE

Altitude, m	9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 85000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	576
10000	3050	4	20	1062	649
12000	3650	4	25	1169	668
14000	4250	5	31	1276	687
16000	4900	6	38	1394	708
18000	5500	6	45	1504	729
19000	5800	6	48	1559	739
20000	6100	7	52	1615	750
21000	6400	7	56	1672	761
22000	6700	7	61	1730	772
23000	7000	8	75	1788	783
24000	7300	8	70	1848	795
25000	7600	9	75	1908	807
26000	7900	9	81	1970	818
27000	8250	9	87	2043	833
28000	8550	10	93	2108	845
29000	8850	10	100	2173	858
30000	9150	11	107	2242	871
31000	9450	11	114	2313	884
32000	9750	12	122	2384	897
33000	10050	12	129	2441	895
34000	10350	13	135	2496	891
35000	10650	13	142	2552	887
36000	10950	14	149	2610	883
37000	11300	14	159	2682	882
38000	11600	15	168	2750	882
39000	11900	16	179	2824	882
40000	12200	17	191	2906	882
41000	12500	18	206	2998	882
42000	12800	19	224	3106	882

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.33

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb
THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS
ISA-10°
HIGH-SPEED CRUISE

Altitude, m	9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 90000 kg

Pressure, altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	576
10000	3050	4	21	1096	649
12000	3650	5	27	1211	668
14000	4250	5	33	1326	687
16000	4900	6	41	1453	708
18000	5500	6	48	1572	729
19000	5800	7	52	1632	739
20000	6100	7	56	1693	750
21000	6400	7	61	1755	761
22000	6700	8	66	1817	772
23000	7000	8	71	1881	782
24000	7300	9	76	1946	795
25000	7600	9	81	2011	807
26000	7900	9	87	2076	818
27000	8250	10	94	2159	833
28000	8550	10	101	2229	845
29000	8850	11	108	2301	858
30000	9150	12	116	2376	871
31000	9450	12	124	2454	884
32000	9750	13	133	2534	897
33000	10050	13	140	2597	895
34000	10350	14	147	2658	891
35000	10650	14	155	2721	887
36000	10950	15	163	2788	883
37000	11300	15	175	2873	882
38000	11600	16	186	2954	882
39000	11900	17	199	3042	882
40000	12200	18	214	3143	882
41000	12500	19	233	3263	882
42000	12800	21	258	3412	882

(cont'd)

Table 3.1.9.34

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA -10°

HIGH-SPEED CRUISE

Altitude, m	9750 and below	Above 9750.
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 95000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	576
10000	3050	4	23	1130	649
12000	3650	5	29	1254	668
14000	4250	5	36	1378	687
16000	4900	6	44	1515	708
18000	5500	7	52	1643	729
19000	5800	7	56	1707	739
20000	6100	7	61	1773	750
21000	6400	8	66	1840	761
22000	6700	8	71	1908	772
23000	7000	9	76	1976	783
24000	7300	9	82	2047	795
25000	7600	10	88	2118	807
26000	7900	10	94	2191	818
27000	8250	11	102	2279	833
28000	8550	11	109	2356	845
29000	8850	12	117	2434	858
30000	9150	12	125	2517	871
31000	9450	13	135	2603	884
32000	9750	14	144	2691	897
33000	10050	14	152	2761	895
34000	10350	15	160	2830	891
35000	10650	15	169	2904	887
36000	10950	16	179	2982	883
37000	11300	17	192	3082	882
38000	11600	18	206	3177	882
39000	11900	19	221	3286	882
40000	12200	20	241	3417	882
41000	12500	22	268	3584	882
42000	12800	25	306	3810	882

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.35

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA -10°

HIGH-SPEED CRUISE

Altitude, m	9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 100000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	576
10000	3050	4	24	1166	649
12000	3650	5	31	1298	668
14000	4250	6	38	1431	687
16000	4900	6	47	1578	708
18000	5500	7	56	1715	729
19000	5800	7	60	1785	739
20000	6100	8	65	1856	750
21000	6400	8	70	1928	761
22000	6700	9	76	2001	772
23000	7000	9	82	2076	783
24000	7300	10	88	2152	795
25000	7600	10	94	2230	807
26000	7900	11	101	2309	818
27000	8250	11	110	2404	833
28000	8550	12	118	2488	845
29000	8850	12	126	2574	858
30000	9150	13	136	2665	871
31000	9450	14	146	2760	884
32000	9750	15	156	2857	897
33000	10050	15	165	2935	895
34000	10350	16	175	3015	891
35000	10650	16	185	3101	887
36000	10950	17	196	3192	883
37000	11300	18	212	3310	882
38000	11600	19	228	3426	882
39000	11900	21	249	3567	882
40000	12200	23	276	3746	882
41000	12500	25	317	4002	882

(cont'd)

Table 3.1.9.36

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA

HIGH-SPEED CRUISE

Altitude, m	9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 70000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	587
10000	3050	4	19	998	662
12000	3650	4	24	1092	681
14000	4250	5	30	1182	700
16000	4900	5	36	1283	722
18000	5500	6	43	1378	744
19000	5800	6	46	1425	755
20000	6100	6	50	1473	766
21000	6400	7	54	1522	777
22000	6700	7	58	1571	789
23000	7000	7	62	1621	800
24000	7300	8	66	1672	812
25000	7600	8	71	1723	824
26000	7900	8	76	1775	836
27000	8250	9	82	1838	851
28000	8550	9	88	1892	864
29000	8850	10	94	1947	877
30000	9150	10	100	2004	890
31000	9450	11	107	2064	904
32000	9750	11	114	2123	918
33000	10050	11	119	2166	916
34000	10350	12	125	2212	912
35000	10650	12	130	2255	908
36000	10950	12	136	2299	904
37000	11300	13	144	2353	903
38000	11600	13	151	2400	903
39000	11900	14	158	2450	903
40000	12200	15	167	2502	903
41000	12500	15	177	2559	903
42000	12800	16	188	2622	904

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.37

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA

HIGH-SPEED CRUISE

Altitude, m	.9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 75000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	587
10000	3050	4	21	1030	662
12000	3650	5	26	1130	681
14000	4250	5	32	1230	700
16000	4900	6	39	1340	722
18000	5500	6	47	1443	744
19000	5800	7	50	1495	755
20000	6100	7	54	1548	766
21000	6400	7	58	1601	777
22000	6700	7	63	1655	789
23000	7000	8	67	1710	800
24000	7300	8	72	1766	812
25000	7600	9	78	1823	824
26000	7900	9	83	1880	836
27000	8250	9	90	1949	851
28000	8550	10	96	2010	864
29000	8850	10	103	2071	877
30000	9150	11	110	2134	890
31000	9450	11	117	2198	904
32000	9750	12	125	2264	918
33000	10050	12	131	2316	916
34000	10350	13	137	2365	912
35000	10650	13	144	2415	908
36000	10950	14	150	2465	904
37000	11300	14	159	2526	903
38000	11600	15	167	2580	903
39000	11900	15	176	2639	903
40000	12200	16	187	2703	903
41000	12500	17	199	2775	903
42000	12800	18	213	2854	904

(cont'd)

Table 3.1.9.38

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA

HIGH-SPEED CRUISE

Altitude, m	9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 80000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	587
10000	3050	4	23	1068	662
12000	3650	5	29	1177	681
14000	4250	5	35	1286	700
16000	4900	6	43	1406	722
18000	5500	7	51	1519	744
19000	5800	7	55	1575	755
20000	6100	7	59	1633	766
21000	6400	8	64	1691	777
22000	6700	8	69	1750	789
23000	7000	8	74	1810	800
24000	7300	9	79	1871	812
25000	7600	9	85	1933	824
26000	7900	10	91	1996	836
27000	8250	10	98	2072	851
28000	8550	11	105	2138	864
29000	8850	11	112	2206	877
30000	9150	12	120	2276	890
31000	9450	12	128	2348	904
32000	9750	13	137	2422	918
33000	10050	13	144	2481	916
34000	10350	14	151	2536	912
35000	10650	14	158	2592	908
36000	10950	15	166	2649	904
37000	11300	15	176	2719	903
38000	11600	16	185	2783	903
39000	11900	17	197	2855	903
40000	12200	18	210	2935	903
41000	12500	19	225	3025	903
42000	12800	20	243	3128	904

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.39

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA

HIGH-SPEED CRUISE

Altitude, m	9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 85000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	587
10000	3050	4	24	1106	662
12000	3650	5	31	1224	681
14000	4250	6	38	1343	700
16000	4900	6	47	1473	722
18000	5500	7	55	1595	744
19000	5800	7	60	1657	755
20000	6100	8	64	1720	766
21000	6400	8	69	1784	777
22000	6700	9	75	1848	789
23000	7000	9	80	1914	800
24000	7300	9	86	1981	812
25000	7600	10	92	2049	824
26000	7900	10	99	2118	836
27000	8250	11	107	2202	851
28000	8550	11	114	2275	864
29000	8850	12	122	2350	877
30000	9150	13	131	2427	890
31000	9450	13	140	2508	904
32000	9750	14	150	2592	918
33000	10050	14	158	2660	916
34000	10350	15	166	2723	912
35000	10650	15	175	2786	908
36000	10950	16	184	2852	904
37000	11300	17	195	2934	903
38000	11600	18	207	3013	903
39000	11900	18	221	3101	903
40000	12200	20	237	3201	903
41000	12500	21	257	3319	903
42000	12800	23	283	3465	904

(cont'd)

Table 3.1.9.40

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA

HIGH-SPEED CRUISE

Altitude, m	9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 90000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	587
10000	3050	5	26	1145	662
12000	3650	5	33	1272	681
14000	4250	6	41	1401	700
16000	4900	7	50	1541	722
18000	5500	7	60	1674	744
19000	5800	8	64	1742	755
20000	6100	8	70	1810	766
21000	6400	9	75	1879	777
22000	6700	9	81	1950	789
23000	7000	10	87	2021	800
24000	7300	10	93	2095	812
25000	7600	10	100	2170	824
26000	7900	11	107	2246	836
27000	8250	12	116	2337	851
28000	8550	12	125	2418	864
29000	8850	13	133	2500	877
30000	9150	13	143	2586	890
31000	9450	14	153	2676	904
32000	9750	15	164	2770	918
33000	10050	16	174	2847	916
34000	10350	16	183	2919	912
35000	10650	17	192	2991	908
36000	10950	17	202	3068	904
37000	11300	18	217	3168	903
38000	11600	19	231	3263	903
39000	11900	20	248	3373	903
40000	12200	22	269	3503	903
41000	12500	24	297	3669	903
42000	12800	26	339	3901	904

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.41

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA

HIGH-SPEED CRUISE

Altitude, m	9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 95000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	587
10000	3050	5	28	1185	662
12000	3650	5	36	1323	681
14000	4250	6	44	1461	700
16000	4900	7	54	1613	722
18000	5500	8	64	1757	744
19000	5800	8	70	1830	755
20000	6100	9	75	1904	766
21000	6400	9	81	1980	777
22000	6700	10	87	2056	789
23000	7000	10	94	2134	800
24000	7300	11	101	2215	812
25000	7600	11	108	2296	824
26000	7900	12	116	2380	836
27000	8250	12	126	2480	851
28000	8550	13	135	2569	864
29000	8850	14	145	2660	877
30000	9150	14	156	2755	890
31000	9450	15	167	2855	904
32000	9750	16	180	2960	918
33000	10050	17	190	3047	916
34000	10350	17	200	3127	912
35000	10650	18	212	3215	908
36000	10950	19	224	3307	904
37000	11300	20	241	3427	903
38000	11600	21	258	3545	903
39000	11900	23	281	3687	903
40000	12200	25	311	3871	903
41000	12500	28	355	4131	903
42000	12800	34	443	4622	904

(cont'd)

Table 3.1.9.42

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA

HIGH-SPEED CRUISE

Altitude, m	9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 10000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	587
10000	3050	5	30	1227	662
12000	3650	6	39	1375	681
14000	4250	6	48	1524	700
16000	4900	7	58	1688	722
18000	5500	8	69	1844	744
19000	5800	9	75	1922	755
20000	6100	9	81	2003	766
21000	6400	10	87	2084	777
22000	6700	10	94	2168	789
23000	7000	11	101	2253	800
24000	7300	11	109	2340	812
25000	7600	12	117	2430	824
26000	7900	13	126	2521	836
27000	8250	13	137	2631	851
28000	8550	14	147	2729	864
29000	8850	15	157	2829	877
30000	9150	16	169	2934	890
31000	9450	16	182	3045	904
32000	9750	17	196	3163	918
33000	10050	18	208	3262	916
34000	10350	19	220	3360	912
35000	10650	20	234	3463	908
36000	10950	21	249	3574	904
37000	11300	22	269	3721	903
38000	11600	24	292	3873	903
39000	11900	26	323	4071	903
40000	12200	29	369	4357	903

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.43

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

HIGH-SPEED CRUISE

Altitude, m	9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 70000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	597
10000	3050	4	23	1040	674
12000	3650	5	30	1143	694
14000	4250	5	37	1247	714
16000	4900	6	45	1362	736
18000	5500	7	53	1469	758
19000	5800	7	58	1524	769
20000	6100	7	62	1579	781
21000	6400	8	67	1635	793
22000	6700	8	73	1692	805
23000	7000	9	78	1750	816
24000	7300	9	84	1809	829
25000	7600	9	90	1869	841
26000	7900	10	96	1931	854
27000	8250	11	105	2004	869
28000	8550	11	112	2070	883
29000	8850	12	120	2136	896
30000	9150	12	128	2205	909
31000	9450	13	138	2278	924
32000	9750	13	147	2350	938
33000	10050	14	155	2405	936
34000	10350	14	162	2456	932
35000	10650	15	169	2508	929
36000	10950	15	177	2561	925
37000	11300	16	187	2624	924
38000	11600	16	196	2682	924
39000	11900	17	206	2743	924
40000	12200	18	217	2808	924
41000	12500	19	230	2881	924
42000	12800	20	247	2965	924

(cont'd)

Table 3.1.9.44

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

HIGH-SPEED CRUISE

Altitude, m	9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 75000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	597
10000	3050	4	25	1077	674
12000	3650	5	32	1189	694
14000	4250	6	40	1302	714
16000	4900	6	49	1427	736
18000	5500	7	58	1546	758
19000	5800	8	63	1605	769
20000	6100	8	68	1666	781
21000	6400	8	74	1728	793
22000	6700	9	79	1791	805
23000	7000	9	85	1855	816
24000	7300	10	92	1921	829
25000	7600	10	99	1988	841
26000	7900	11	106	2057	854
27000	8250	11	115	2139	869
28000	8550	12	123	2213	883
29000	8850	13	132	2288	896
30000	9150	13	142	2365	909
31000	9450	14	152	2444	924
32000	9750	15	163	2527	938
33000	10050	15	171	2590	936
34000	10350	16	180	2649	932
35000	10650	16	188	2710	929
36000	10950	17	197	2770	925
37000	11300	17	208	2844	924
38000	11600	18	219	2912	924
39000	11900	19	231	2985	924
40000	12200	20	246	3069	924
41000	12500	21	264	3167	924
42000	12800	22	286	3282	924

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.45

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

HIGH-SPEED CRUISE

Altitude, m	9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 80000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	597
10000	3050	5	28	1122	674
12000	3650	5	35	1245	694
14000	4250	6	44	1369	714
16000	4900	7	54	1506	736
18000	5500	8	64	1636	758
19000	5800	8	69	1702	769
20000	6100	9	75	1769	781
21000	6400	9	81	1837	793
22000	6700	9	87	1906	805
23000	7000	10	94	1977	816
24000	7300	10	101	2049	829
25000	7600	11	108	2124	841
26000	7900	12	116	2199	854
27000	8250	12	126	2290	869
28000	8550	13	136	2371	883
29000	8850	14	146	2454	896
30000	9150	14	156	2541	909
31000	9450	15	168	2632	924
32000	9750	16	180	2727	938
33000	10050	16	190	2799	936
34000	10350	17	200	2868	932
35000	10650	18	210	2937	929
36000	10950	18	220	3008	925
37000	11300	19	233	3094	924
38000	11600	20	246	3175	924
39000	11900	21	262	3270	924
40000	12200	22	281	3382	924
41000	12500	24	306	3516	924
42000	12800	26	338	3684	924

(cont'd)

Table 3.1.9.46

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

HIGH-SPEED CRUISE

Altitude, m	9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 85000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	597
10000	3050	5	30	1166	674
12000	3650	6	38	1300	694
14000	4250	6	47	1436	714
16000	4900	7	58	1585	736
18000	5500	8	69	1728	758
19000	5800	9	75	1800	769
20000	6100	9	82	1873	781
21000	6400	10	88	1948	793
22000	6700	10	95	2025	805
23000	7000	11	103	2103	816
24000	7300	11	111	2184	829
25000	7600	12	119	2266	841
26000	7900	12	128	2350	854
27000	8250	13	139	2452	869
28000	8550	14	149	2542	883
29000	8850	15	160	2635	896
30000	9150	16	173	2734	909
31000	9450	16	186	2837	924
32000	9750	17	200	2945	938
33000	10050	18	211	3028	936
34000	10350	19	222	3107	932
35000	10650	19	234	3188	929
36000	10950	20	246	3270	925
37000	11300	21	262	3375	924
38000	11600	22	279	3481	924
39000	11900	24	299	3605	924
40000	12200	25	326	3756	924
41000	12500	28	363	3956	924
42000	12800	32	420	4253	924

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.47

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

HIGH-SPEED CRUISE

Altitude, m	9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 90000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	597
10000	3050	5	32	1212	674
12000	3650	6	42	1357	694
14000	4250	7	51	1505	714
16000	4900	8	63	1668	736
18000	5500	9	75	1824	758
19000	5800	9	82	1903	769
20000	6100	10	89	1984	781
21000	6400	10	96	2066	793
22000	6700	11	104	2151	805
23000	7000	11	112	2237	816
24000	7300	12	121	2326	829
25000	7600	13	130	2417	841
26000	7900	13	140	2511	854
27000	8250	14	152	2624	869
28000	8550	15	164	2725	883
29000	8850	16	177	2830	896
30000	9150	17	190	2941	909
31000	9450	18	205	3058	924
32000	9750	19	221	3181	938
33000	10050	20	234	3277	936
34000	10350	21	247	3369	932
35000	10650	21	261	3463	929
36000	10950	22	275	3563	925
37000	11300	24	296	3697	924
38000	11600	25	317	3833	924
39000	11900	27	345	4002	924
40000	12200	30	385	4229	924
41000	12500	34	451	4587	924

(cont'd)

Table 3.1.9.48

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

HIGH-SPEED CRUISE

Altitude, m	9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 95000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	597
10000	3050	5	35	1260	674
12000	3650	6	45	1417	694
14000	4250	7	56	1578	714
16000	4900	8	69	1755	736
18000	5500	9	82	1925	758
19000	5800	10	89	2012	769
20000	6100	10	96	2100	781
21000	6400	11	104	2191	793
22000	6700	12	113	2284	805
23000	7000	12	122	2379	816
24000	7300	13	132	2478	829
25000	7600	14	142	2579	841
26000	7900	15	153	2683	854
27000	8250	15	167	2809	869
28000	8550	16	180	2922	883
29000	8850	17	194	3040	896
30000	9150	18	209	3164	909
31000	9450	19	226	3297	924
32000	9750	21	245	3438	938
33000	10050	22	260	3550	936
34000	10350	23	275	3658	932
35000	10650	24	292	3775	929
36000	10950	25	310	3903	925
37000	11300	27	336	4074	924
38000	11600	28	366	4258	924
39000	11900	31	408	4512	924
40000	12200	36	481	4927	924

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.49

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

HIGH-SPEED CRUISE

Altitude, m	9750 and below	Above 9750
IAS, km/hr	575	-
Mach number	-	0.85

AIRPLANE WEIGHT AT LINEUP POSITION - 100000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	597
10000	3050	6	38	1310	674
12000	3650	6	48	1480	694
14000	4250	7	60	1653	714
16000	4900	9	74	1847	736
18000	5500	10	89	2032	758
19000	5800	10	96	2126	769
20000	6100	11	104	2223	781
21000	6400	12	113	2323	793
22000	6700	12	123	2425	805
23000	7000	13	133	2529	816
24000	7300	14	143	2638	829
25000	7600	15	155	2751	841
26000	7900	16	167	2866	854
27000	8250	17	182	3007	869
28000	8550	18	197	3133	883
29000	8850	19	213	3266	896
30000	9150	20	230	3407	909
31000	9450	21	250	3558	924
32000	9750	23	271	3721	938
33000	10050	24	289	3852	936
34000	10350	25	308	3990	932
35000	10650	26	329	4140	929
36000	10950	28	353	4302	925
37000	11300	30	388	4531	924
38000	11600	33	432	4806	924
39000	11900	38	509	5268	924

(cont'd)

Table 3.1.9.50

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

HIGH-SPEED CRUISE

Altitude, m	8850 and below	Above 8850
IAS, km/hr	575	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 70000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	597
10000	3050	4	23	1040	674
12000	3650	5	30	1143	694
14000	4250	5	37	1247	714
16000	4900	6	45	1362	736
18000	5500	7	53	1469	758
19000	5800	7	58	1524	769
20000	6100	7	62	1579	781
21000	6400	8	67	1635	793
22000	6700	8	73	1692	805
23000	7000	9	78	1750	816
24000	7300	9	84	1809	829
25000	7600	9	90	1869	841
26000	7900	10	96	1930	854
27000	8250	11	105	2004	869
28000	8550	11	112	2069	882
29000	8850	12	120	2134	896
30000	9150	12	126	2183	893
31000	9450	12	132	2230	889
32000	9750	13	137	2276	885
33000	10050	13	143	2322	882
34000	10350	14	150	2367	878
35000	10650	14	156	2413	874
36000	10950	14	162	2459	871
37000	11300	15	170	2514	870
38000	11600	16	178	2565	870
39000	11900	16	187	2618	870
40000	12200	17	197	2676	870
41000	12500	18	208	2739	870
42000	12800	18	220	2807	870

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.51

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

HIGH-SPEED CRUISE

Altitude, m	8850 and below	Above 8850
IAS, km/hr	575	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 75000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	597
10000	3050	4	25	1077	674
12000	3650	5	32	1189	694
14000	4250	6	40	1302	714
16000	4900	6	49	1427	736
18000	5500	7	58	1546	758
19000	5800	8	63	1605	769
20000	6100	8	68	1666	781
21000	6400	8	74	1728	793
22000	6700	9	79	1791	805
23000	7000	9	85	1855	816
24000	7300	10	92	1921	829
25000	7600	10	99	1988	841
26000	7900	11	106	2057	854
27000	8250	11	115	2139	869
28000	8550	12	123	2212	882
29000	8850	13	132	2286	896
30000	9150	13	139	2340	893
31000	9450	13	145	2392	889
32000	9750	14	152	2444	885
33000	10050	14	159	2496	882
34000	10350	15	166	2548	878
35000	10650	15	173	2599	874
36000	10950	16	180	2652	871
37000	11300	16	190	2717	870
38000	11600	17	199	2776	870
39000	11900	18	209	2841	870
40000	12200	19	221	2910	870
41000	12500	20	235	2988	870
42000	12800	21	251	3074	870

(cont'd)

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

HIGH-SPEED CRUISE

Altitude, m	8850 and below	Above 8850
IAS, km/hr	575	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 80000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	597
10000	3050	5	28	1122	674
12000	3650	5	35	1245	694
14000	4250	6	44	1369	714
16000	4900	7	54	1506	736
18000	5500	8	64	1636	758
19000	5800	8	69	1702	769
20000	6100	9	75	1769	781
21000	6400	9	81	1837	793
22000	6700	9	87	1906	805
23000	7000	10	94	1977	816
24000	7300	10	101	2049	829
25000	7600	11	108	2123	841
26000	7900	12	116	2199	854
27000	8250	12	126	2290	869
28000	8550	13	136	2371	882
29000	8850	14	146	2454	896
30000	9150	14	153	2515	893
31000	9450	15	160	2574	889
32000	9750	15	168	2633	885
33000	10050	16	176	2691	882
34000	10350	16	183	2749	878
35000	10650	17	192	2809	874
36000	10950	17	200	2871	871
37000	11300	18	212	2947	870
38000	11600	19	222	3017	870
39000	11900	20	235	3094	870
40000	12200	21	250	3180	870
41000	12500	22	267	3278	870
42000	12800	23	288	3392	870

(cont'd)

Table 3.1.9.53

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

HIGH-SPEED CRUISE

Altitude, m	8850 and below	Above 8850
IAS, km/hr	575	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 85000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	597
10000	3050	5	30	1166	674
12000	3650	6	38	1300	694
14000	4250	6	47	1436	714
16000	4900	7	58	1585	736
18000	5500	8	69	1728	758
19000	5800	9	75	1800	769
20000	6100	9	82	1873	781
21000	6400	10	88	1948	793
22000	6700	10	95	2025	805
23000	7000	11	103	2103	816
24000	7300	11	111	2184	829
25000	7600	12	119	2266	841
26000	7900	12	128	2350	854
27000	8250	13	139	2451	869
28000	8550	14	149	2542	882
29000	8850	15	160	2634	896
30000	9150	15	169	2703	893
31000	9450	16	177	2770	889
32000	9750	16	186	2836	885
33000	10050	17	194	2903	882
34000	10350	18	203	2970	878
35000	10650	18	213	3040	874
36000	10950	19	223	3112	871
37000	11300	20	236	3201	870
38000	11600	21	249	3286	870
39000	11900	22	265	3380	870
40000	12200	23	283	3488	870
41000	12500	25	306	3618	870
42000	12800	27	337	3780	870

(cont'd)

Table 3.1.9.54

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

HIGH-SPEED CRUISE

Altitude, m	8850 and below	Above 8850
IAS, km/hr	575	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 90000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	597
10000	3050	5	32	1212	674
12000	3650	6	42	1357	694
14000	4250	7	51	1505	714
16000	4900	8	63	1668	736
18000	5500	9	75	1824	758
19000	5800	9	82	1903	769
20000	6100	10	89	1984	781
21000	6400	10	96	2066	793
22000	6700	11	104	2151	805
23000	7000	11	112	2237	816
24000	7300	12	121	2326	829
25000	7600	13	130	2417	841
26000	7900	13	140	2510	854
27000	8250	14	152	2624	869
28000	8550	15	164	2725	882
29000	8850	16	176	2829	896
30000	9150	17	186	2906	893
31000	9450	17	195	2981	889
32000	9750	18	205	3057	885
33000	10050	19	215	3134	882
34000	10350	19	226	3213	878
35000	10650	20	237	3294	874
36000	10950	21	249	3378	871
37000	11300	22	264	3484	870
38000	11600	23	280	3587	870
39000	11900	24	300	3706	870
40000	12200	26	324	3850	870
41000	12500	28	356	4031	870
42000	12800	32	407	4302	870

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.55

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

HIGH-SPEED CRUISE

Altitude, m	8850 and below	Above 8850
IAS, km/hr	575	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 95000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	597
10000	3050	5	35	1260	674
12000	3650	6	45	1417	694
14000	4250	7	56	1578	714
16000	4900	8	69	1755	736
18000	5500	9	82	1925	758
19000	5800	10	89	2012	769
20000	6100	10	96	2100	781
21000	6400	11	104	2191	793
22000	6700	12	113	2284	805
23000	7000	12	122	2379	816
24000	7300	13	132	2478	829
25000	7600	14	142	2579	841
26000	7900	15	153	2682	854
27000	8250	15	167	2809	869
28000	8550	16	180	2922	882
29000	8850	17	194	3039	896
30000	9150	18	204	3126	893
31000	9450	19	215	3214	889
32000	9750	20	227	3302	885
33000	10050	20	238	3391	882
34000	10350	21	251	3482	878
35000	10650	22	264	3577	874
36000	10950	23	278	3677	871
37000	11300	24	297	3806	870
38000	11600	26	317	3934	870
39000	11900	27	342	4091	870
40000	12200	30	376	4291	870
41000	12500	34	433	4609	870

(cont'd)

Table 3.1.9.56

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +10°

HIGH-SPEED CRUISE

Altitude, m	8850 and below	Above 8850
IAS, km/hr	575	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 100000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	597
10000	3050	6	38	1310	674
12000	3650	6	48	1480	694
14000	4250	7	60	1653	714
16000	4900	9	74	1847	736
18000	5500	10	89	2032	758
19000	5800	10	96	2126	769
20000	6100	11	104	2223	781
21000	6400	12	113	2323	793
22000	6700	12	123	2425	805
23000	7000	13	133	2529	816
24000	7300	14	143	2638	829
25000	7600	15	155	2750	841
26000	7900	16	167	2865	854
27000	8250	17	182	3006	869
28000	8550	18	197	3133	882
29000	8850	19	213	3265	896
30000	9150	20	225	3367	893
31000	9450	20	238	3468	889
32000	9750	21	251	3571	885
33000	10050	22	265	3675	882
34000	10350	23	279	3783	878
35000	10650	24	295	3896	874
36000	10950	26	312	4015	871
37000	11300	27	335	4175	870
38000	11600	29	361	4343	870
39000	11900	31	396	4559	870
40000	12200	36	457	4917	870

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.57

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +20°

HIGH-SPEED CRUISE

Altitude, m	8850 and below	Above 8850
IAS, km/hr	575	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 70000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	607
10000	3050	5	29	1097	686
12000	3650	5	37	1215	706
14000	4250	6	46	1335	727
16000	4900	7	57	1468	750
18000	5500	8	68	1595	773
19000	5800	8	73	1659	784
20000	6100	9	80	1725	796
21000	6400	9	86	1792	808
22000	6700	10	93	1860	820
23000	7000	10	100	1930	832
24000	7300	11	108	2003	845
25000	7600	11	116	2077	858
26000	7900	12	125	2153	871
27000	8250	13	136	2245	886
28000	8550	14	147	2327	900
29000	8850	14	158	2410	913
30000	9150	15	166	2471	911
31000	9450	15	174	2530	907
32000	9750	16	182	2587	904
33000	10050	16	190	2644	900
34000	10350	17	198	2700	897
35000	10650	18	207	2756	893
36000	10950	18	216	2812	889
37000	11300	19	227	2880	889
38000	11600	20	237	2944	889
39000	11900	20	250	3013	889
40000	12200	21	264	3090	889
41000	12500	23	281	3176	889
42000	12800	24	302	3275	889

(cont'd)

Table 3.1.9.58

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +20°

HIGH-SPEED CRUISE

Altitude, m	8850 and below	Above 8850
IAS, km/hr	575	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 75000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	607
10000	3050	5	31	1138	686
12000	3650	6	40	1268	706
14000	4250	7	50	1399	727
16000	4900	7	62	1546	750
18000	5500	8	74	1686	773
19000	5800	9	80	1757	784
20000	6100	9	87	1830	796
21000	6400	10	95	1905	808
22000	6700	11	102	1982	820
23000	7000	11	110	2060	832
24000	7300	12	119	2141	845
25000	7600	12	129	2225	858
26000	7900	13	139	2312	871
27000	8250	14	151	2417	886
28000	8550	15	163	2511	900
29000	8850	16	176	2606	913
30000	9150	16	185	2676	911
31000	9450	17	194	2742	907
32000	9750	17	203	2808	904
33000	10050	18	213	2873	900
34000	10350	19	222	2938	897
35000	10650	19	232	3003	893
36000	10950	20	242	3069	889
37000	11300	21	256	3151	889
38000	11600	22	269	3229	889
39000	11900	23	285	3316	889
40000	12200	24	303	3415	889
41000	12500	26	326	3531	889
42000	12800	28	355	3670	889

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.59

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +20°

HIGH-SPEED CRUISE

Altitude, m	8850 and below	Above 8850
IAS, km/hr	575	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 80000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	607
10000	3050	5	35	1193	686
12000	3650	6	45	1336	706
14000	4250	7	56	1481	727
16000	4900	8	68	1643	750
18000	5500	9	82	1798	773
19000	5800	10	89	1877	784
20000	6100	10	96	1958	796
21000	6400	11	105	2041	808
22000	6700	11	113	2126	820
23000	7000	12	122	2213	832
24000	7300	13	132	2304	845
25000	7600	14	142	2398	858
26000	7900	14	154	2494	871
27000	8250	15	168	2611	886
28000	8550	16	181	2716	900
29000	8850	17	195	2823	913
30000	9150	18	206	2903	911
31000	9450	19	216	2979	907
32000	9750	19	227	3055	904
33000	10050	20	238	3130	900
34000	10350	21	249	3205	897
35000	10650	21	261	3283	893
36000	10950	22	273	3363	889
37000	11300	23	289	3464	889
38000	11600	25	306	3561	889
39000	11900	26	326	3672	889
40000	12200	28	351	3804	889
41000	12500	30	384	3971	889
42000	12800	33	430	4197	889

(cont'd)

Table 3.1.9.60

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +20°

HIGH-SPEED CRUISE

Altitude, m	8850 and below	Above 8850
IAS, km/hr	575	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 85000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	607
10000	3050	6	38	1247	686
12000	3650	6	49	1403	706
14000	4250	7	61	1563	727
16000	4900	9	75	1742	750
18000	5500	10	90	1913	773
19000	5800	10	98	2001	784
20000	6100	11	106	2091	796
21000	6400	12	115	2184	808
22000	6700	12	125	2279	820
23000	7000	13	135	2376	832
24000	7300	14	146	2478	845
25000	7600	15	158	2584	858
26000	7900	16	170	2693	871
27000	8250	17	187	2827	886
28000	8550	18	202	2947	900
29000	8850	19	218	3069	913
30000	9150	20	230	3161	911
31000	9450	20	242	3249	907
32000	9750	21	255	3337	904
33000	10050	22	267	3424	900
34000	10350	23	280	3515	897
35000	10650	24	295	3608	893
36000	10950	25	310	3705	889
37000	11300	26	330	3830	889
38000	11600	28	351	3953	889
39000	11900	30	378	4102	889
40000	12200	32	414	4293	889
41000	12500	36	467	4564	889
42000	12800	43	576	5089	889

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.61

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +20°

HIGH-SPEED CRUISE

Altitude, m	8850 and below	Above 8850
IAS, km/hr	575	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 90000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	607
10000	3050	6	41	1303	686
12000	3650	7	53	1474	706
14000	4250	8	66	1650	727
16000	4900	9	82	1846	750
18000	5500	11	98	2035	773
19000	5800	11	107	2133	784
20000	6100	12	116	2233	796
21000	6400	13	126	2336	808
22000	6700	13	137	2442	820
23000	7000	14	149	2552	832
24000	7300	15	161	2667	845
25000	7600	16	174	2786	858
26000	7900	17	189	2909	871
27000	8250	18	207	3062	886
28000	8550	20	225	3200	900
29000	8850	21	243	3341	913
30000	9150	22	257	3447	911
31000	9450	23	271	3548	907
32000	9750	24	286	3651	904
33000	10050	25	301	3758	900
34000	10350	26	317	3868	897
35000	10650	27	335	3982	893
36000	10950	28	353	4102	889
37000	11300	30	379	4259	889
38000	11600	32	407	4424	889
39000	11900	34	446	4640	889
40000	12200	38	505	4956	889

(cont'd)

Table 3.1.9.62

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +20°

HIGH-SPEED CRUISE

Altitude, m	8850 and below	Above 8850
IAS, km/hr	575	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 95000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	607
10000	3050	6	45	1362	686
12000	3650	7	58	1549	706
14000	4250	8	72	1741	727
16000	4900	10	89	1957	750
18000	5500	11	107	2166	773
19000	5800	12	117	2274	784
20000	6100	13	128	2385	796
21000	6400	14	139	2500	808
22000	6700	15	151	2619	820
23000	7000	15	164	2742	832
24000	7300	16	178	2871	845
25000	7600	18	193	3006	858
26000	7900	19	209	3147	871
27000	8250	20	230	3321	886
28000	8550	21	250	3480	900
29000	8850	23	272	3643	913
30000	9150	24	288	3765	911
31000	9450	25	305	3888	907
32000	9750	26	323	4014	904
33000	10050	28	341	4144	900
34000	10350	29	361	4280	897
35000	10650	30	383	4422	893
36000	10950	32	407	4574	889
37000	11300	34	440	4781	889
38000	11600	37	481	5019	889
39000	11900	41	545	5375	889

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.63

Time, Distance Covered, Fuel Used and True Airspeed in Enroute Climb

THREE ENGINES OPERATING AT MAXIMUM CONTINUOUS

ISA +20°

HIGH-SPEED CRUISE

Altitude, m	8850 and below	Above 8850
IAS, km/hr	575	-
Mach number	-	0.8

AIRPLANE WEIGHT AT LINEUP POSITION - 100000 kg

Pressure altitude		Time, min	Distance, km	Fuel, kg	TAS, km/hr
ft	m				
1500	450	2	0	600	607
10000	3050	6	48	1425	686
12000	3650	8	63	1629	706
14000	4250	9	78	1839	727
16000	4900	11	97	2076	750
18000	5500	12	117	2307	773
19000	5800	13	128	2426	784
20000	6100	14	140	2549	796
21000	6400	15	152	2677	808
22000	6700	16	165	2810	820
23000	7000	17	180	2948	832
24000	7300	18	196	3094	845
25000	7600	19	213	3247	858
26000	7900	20	231	3407	871
27000	8250	22	256	3607	886
28000	8550	24	279	3791	900
29000	8850	25	304	3980	913
30000	9150	27	324	4131	911
31000	9450	28	345	4281	907
32000	9750	29	367	4437	904
33000	10050	31	390	4599	900
34000	10350	33	415	4770	897
35000	10650	35	443	4952	893
36000	10950	37	474	5150	889
37000	11300	40	522	5445	889
38000	11600	44	588	5830	889

(cont'd)

Table 3.1.9.64

Time, Fuel Used and Distance Covered in Descent

BEST-RANGE CRUISE

THREE ENGINES OPERATING AT IDLE

MODE

Altitude, m	Above 10750	10750 and below
Mach number	0.8	-
IAS, km/hr	-	500

MIDWING SPOILERS RETRACTED

Pressure altitude		Time, min	Fuel, kg	Distance, km
ft	m			
41000	12500	23	830	268
39000	11900	22	800	258
37000	11300	21	770	243
35000	10650	20	720	226
33000	10050	19	670	208
31000	9450	18	630	190
29000	8850	16	580	173
27000	8250	15	540	156
25000	7600	14	490	140
23000	7000	13	450	126
20000	6100	11	380	105
15000	4550	8	280	70
10000	3050	5	180	45
5000	1500	2	70	17
1500	450	0	0	0

NOTE: Time and fuel for landing are not included.

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.65

Time, Fuel Used and Distance Covered in Descent

HIGH - SPEED CRUISE

THREE ENGINES OPERATING AT IDLE

MODE

Altitude, m	Above 9750	9750 and below
Mach number	0.85	-
IAS, km/hr	-	575

MIDWING SPOILER

Altitude, m	7000	7000 to 3000	3000
Spoiler setting angle	0°	45°	0°

Pressure altitude		Time, min	Fuel, kg	Distance, km
ft	m			
41000	12500	14	490	178
39000	11900	13	470	168
37000	11300	12	440	155
35000	10650	11	410	142
33000	10050	10	380	130
31000	9450	10	350	120
29000	8850	9	320	110
27000	8250	8	290	92
25000	7600	7	260	80
23000	7000	6	230	68
20000	6100	6	200	60
15000	4550	5	160	50
10000	3050	4	120	37
5000	1500	2	60	24
1500	450	0	0	0

NOTE: Time and fuel for landing are not included.

(cont'd)

Table 3.1.9.66

Time, Fuel Used and Distance Covered in Descent

HIGH-SPEED CRUISE (IN ICING CONDITIONS)

THREE ENGINES OPERATING AT IDLE

MODE

Altitude, m	Above 9750	9750 and below
Mach number	0.85	-
IAS, km/hr	-	575

MIDWING SPOILERS FULLY EXTENDED

Pressure altitude		Time, min	Fuel, kg	Distance, km
ft	m			
41000	12500	8	280	100
39000	11900	8	270	95
37000	11300	7	260	89
35000	10650	7	240	83
33000	10050	7	230	78
31000	9450	6	220	73
29000	8850	6	210	68
27000	8250	5	190	62
25000	7600	5	180	56
23000	7000	5	160	51
20000	6100	4	140	43
15000	4550	3	100	31
10000	3050	2	70	28
5000	1500	1	30	7
1500	450	0	0	0

NOTE: Time and fuel for landing are not included.

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.67

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

BEST-RANGE CRUISE

ISA

GROSS WEIGHT - 70000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.493	583	505	5106	0.114
110	3350	0.498	587	502	5000	0.117
120	3650	0.504	591	498	4893	0.121
130	3950	0.509	595	494	4785	0.124
140	4250	0.517	602	492	4715	0.128
150	4550	0.525	610	491	4651	0.131
160	4900	0.535	618	490	4574	0.135
170	5200	0.545	627	489	4517	0.139
180	5500	0.555	636	489	4471	0.142
190	5800	0.565	646	489	4429	0.146
200	6100	0.575	655	488	4387	0.149
210	6400	0.586	664	487	4348	0.153
220	6700	0.596	673	486	4304	0.156
230	7000	0.606	681	485	4257	0.160
240	7300	0.619	693	486	4224	0.164
250	7600	0.631	704	486	4186	0.168
260	7900	0.644	715	486	4143	0.173
270	8250	0.658	728	486	4093	0.178
280	8550	0.671	739	486	4054	0.182
290	8850	0.684	749	485	4020	0.186
300	9150	0.697	761	485	3990	0.191
310	9450	0.712	774	486	3969	0.195
320	9750	0.727	787	486	3954	0.199
330	10050	0.742	800	486	3938	0.203
340	10350	0.754	809	484	3903	0.207
350	10650	0.766	818	481	3864	0.212
360	10950	0.778	827	479	3824	0.216
370	11300	0.786	834	471	3756	0.222
380	11600	0.790	839	463	3708	0.226
390	11900	0.794	844	456	3668	0.230
400	12200	0.799	849	449	3628	0.234
410	12500	0.804	854	441	3595	0.238

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)

Table 3.1.9.68

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

BEST-RANGE CRUISE

ISA

GROSS WEIGHT - 75000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.501	592	514	5300	0.112
110	3350	0.508	598	511	5202	0.115
120	3650	0.514	604	509	5102	0.118
130	3950	0.521	609	506	5000	0.122
140	4250	0.529	616	504	4927	0.125
150	4550	0.537	624	503	4858	0.128
160	4900	0.547	632	501	4779	0.132
170	5200	0.557	641	501	4734	0.136
180	5500	0.568	652	501	4696	0.139
190	5800	0.579	662	501	4657	0.142
200	6100	0.590	671	501	4618	0.145
210	6400	0.601	681	501	4581	0.149
220	6700	0.612	691	500	4540	0.152
230	7000	0.623	700	500	4495	0.156
240	7300	0.636	712	500	4459	0.160
250	7600	0.649	724	501	4425	0.164
260	7900	0.662	735	501	4386	0.168
270	8250	0.677	748	501	4343	0.172
280	8550	0.690	759	500	4307	0.176
290	8850	0.703	770	500	4272	0.180
300	9150	0.716	781	499	4240	0.184
310	9450	0.730	793	499	4214	0.188
320	9750	0.743	805	498	4190	0.192
330	10050	0.757	815	497	4158	0.196
340	10350	0.767	823	493	4109	0.200
350	10650	0.778	831	489	4061	0.205
360	10950	0.788	838	486	4017	0.209
370	11300	0.794	843	477	3961	0.213
380	11600	0.797	847	468	3912	0.216
390	11900	0.801	851	460	3866	0.220
400	12200	0.804	854	452	3825	0.223
410	12500	0.808	858	444	3800	0.226

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.69

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

BEST-RANGE CRUISE

ISA

GROSS WEIGHT - 80000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.509	602	522	5481	0.110
110	3350	0.516	608	520	5384	0.113
120	3650	0.524	614	518	5285	0.116
130	3950	0.531	621	516	5188	0.120
140	4250	0.539	628	514	5118	0.123
150	4550	0.548	637	513	5053	0.126
160	4900	0.559	646	512	4989	0.129
170	5200	0.569	656	512	4946	0.133
180	5500	0.581	666	513	4907	0.136
190	5800	0.592	676	513	4868	0.139
200	6100	0.603	686	513	4841	0.142
210	6400	0.614	696	513	4812	0.145
220	6700	0.626	706	512	4777	0.148
230	7000	0.637	716	511	4736	0.151
240	7300	0.651	729	512	4707	0.155
250	7600	0.664	741	513	4671	0.159
260	7900	0.678	753	514	4630	0.163
270	8250	0.694	767	514	4588	0.167
280	8550	0.708	779	514	4556	0.171
290	8850	0.721	791	514	4522	0.175
300	9150	0.734	802	513	4485	0.179
310	9450	0.747	812	512	4452	0.182
320	9750	0.760	823	510	4421	0.186
330	10050	0.772	832	508	4386	0.190
340	10350	0.781	838	503	4336	0.193
350	10650	0.790	844	498	4286	0.197
360	10950	0.799	849	493	4238	0.200
370	11300	0.802	852	482	4177	0.204
380	11600	0.805	855	473	4124	0.207
390	11900	0.807	857	464	4072	0.211
400	12200	0.810	860	455	4050	0.212
410	12500	0.812	863	446	4032	0.214

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)

Table 3.1.9.70

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

BEST-RANGE CRUISE

ISA

GROSS WEIGHT - 85000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.515	609	529	5639	0.108
110	3350	0.523	616	527	5546	0.111
120	3650	0.531	623	525	5451	0.114
130	3950	0.539	630	523	5354	0.118
140	4250	0.549	639	524	5289	0.121
150	4550	0.559	649	524	5243	0.124
160	4900	0.571	660	524	5212	0.127
170	5200	0.583	671	525	5192	0.129
180	5500	0.595	682	526	5172	0.132
190	5800	0.607	693	526	5148	0.135
200	6100	0.619	704	527	5120	0.138
210	6400	0.631	715	527	5088	0.141
220	6700	0.643	726	527	5049	0.144
230	7000	0.655	736	527	5006	0.147
240	7300	0.669	749	528	4969	0.151
250	7600	0.683	761	528	4927	0.155
260	7900	0.696	773	529	4882	0.158
270	8250	0.712	788	529	4845	0.163
280	8550	0.726	799	529	4811	0.166
290	8850	0.740	811	528	4781	0.170
300	9150	0.753	822	527	4748	0.173
310	9450	0.764	830	524	4714	0.176
320	9750	0.775	839	521	4674	0.180
330	10050	0.786	847	518	4627	0.183
340	10350	0.792	850	511	4561	0.186
350	10650	0.798	852	504	4497	0.190
360	10950	0.804	855	496	4443	0.192
370	11300	0.807	857	486	4375	0.196
380	11600	0.809	859	476	4324	0.199
390	11900	0.811	861	467	4302	0.200
400	12200	0.813	864	457	4281	0.202
410	12500	0.815	866	448	4262	0.203

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.71

Hourly Fuel Consumption, Specific Range, Mach Number,
True Airspeed and Indicated Airspeed in Horizontal Flight

BEST-RANGE CRUISE

ISA

GROSS WEIGHT - 90000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.521	616	535	5792	0.106
110	3350	0.530	624	534	5699	0.110
120	3650	0.538	632	533	5603	0.113
130	3950	0.547	639	531	5528	0.116
140	4250	0.557	649	532	5498	0.118
150	4550	0.568	659	532	5477	0.120
160	4900	0.580	671	532	5446	0.123
170	5200	0.593	682	534	5428	0.126
180	5500	0.605	694	535	5411	0.128
190	5800	0.618	706	537	5389	0.131
200	6100	0.631	718	538	5362	0.134
210	6400	0.644	730	539	5329	0.137
220	6700	0.657	742	539	5289	0.140
230	7000	0.670	753	539	5245	0.144
240	7300	0.683	765	540	5200	0.147
250	7600	0.697	777	540	5152	0.151
260	7900	0.710	789	540	5126	0.154
270	8250	0.726	803	540	5101	0.157
280	8550	0.740	814	539	5072	0.161
290	8850	0.753	826	539	5034	0.164
300	9150	0.765	835	536	4993	0.167
310	9450	0.775	843	533	4947	0.170
320	9750	0.785	850	529	4898	0.174
330	10050	0.795	857	524	4843	0.177
340	10350	0.800	859	517	4774	0.180
350	10650	0.806	861	509	4717	0.182
360	10950	0.811	862	501	4659	0.185
370	11300	0.813	864	490	4594	0.188
380	11600	0.814	865	479	4568	0.189
390	11900	0.816	866	469	4542	0.191
400	12200	0.817	868	460	4519	0.192
410	12500	0.818	869	450	4514	0.192

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)

Table 3.1.9.72

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

BEST-RANGE CRUISE

ISA

GROSS WEIGHT - 95000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.526	622	540	5948	0.105
110	3350	0.535	630	539	5880	0.107
120	3650	0.544	638	538	5808	0.110
130	3950	0.553	646	537	5735	0.113
140	4250	0.563	656	538	5709	0.115
150	4550	0.574	667	538	5687	0.117
160	4900	0.587	679	539	5655	0.120
170	5200	0.600	691	541	5637	0.122
180	5500	0.613	703	542	5619	0.125
190	5800	0.627	716	544	5596	0.128
200	6100	0.640	728	546	5567	0.131
210	6400	0.653	740	547	5531	0.134
220	6700	0.667	753	547	5489	0.137
230	7000	0.680	765	548	5445	0.140
240	7300	0.694	777	549	5409	0.144
250	7600	0.708	789	549	5389	0.146
260	7900	0.722	802	549	5380	0.149
270	8250	0.738	816	549	5355	0.152
280	8550	0.752	828	549	5321	0.156
290	8850	0.766	840	549	5282	0.159
300	9150	0.777	849	546	5234	0.162
310	9450	0.786	854	541	5176	0.165
320	9750	0.795	860	536	5117	0.168
330	10050	0.803	865	530	5060	0.171
340	10350	0.807	865	521	4989	0.173
350	10650	0.810	866	512	4921	0.176
360	10950	0.814	866	504	4861	0.178
370	11300	0.816	867	492	4827	0.180
380	11600	0.817	868	481	4799	0.181
390	11900	0.818	869	471	4775	0.182
400	12200	0.819	870	461	4772	0.182
410	12500	0.820	871	451	4794	0.182

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.73

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

M = 0.82

ISA

GROSS WEIGHT - 70000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.820	969	852	10896	0.089
110	3350	0.820	966	838	10454	0.092
120	3650	0.820	962	823	10023	0.096
130	3950	0.820	959	809	9601	0.100
140	4250	0.820	955	795	9212	0.104
150	4550	0.820	952	781	8853	0.107
160	4900	0.820	947	764	8451	0.112
170	5200	0.820	944	751	8114	0.116
180	5500	0.820	940	737	7784	0.121
190	5800	0.820	937	723	7469	0.125
200	6100	0.820	933	710	7187	0.130
210	6400	0.820	929	696	6927	0.134
220	6700	0.820	926	683	6674	0.139
230	7000	0.820	922	670	6437	0.143
240	7300	0.820	918	657	6204	0.148
250	7600	0.820	915	644	5975	0.153
260	7900	0.820	911	631	5750	0.158
270	8250	0.820	906	616	5500	0.165
280	8550	0.820	903	603	5295	0.170
290	8850	0.820	899	591	5099	0.176
300	9150	0.820	895	579	4909	0.182
310	9450	0.820	891	566	4737	0.188
320	9750	0.820	887	554	4589	0.193
330	10050	0.820	884	542	4446	0.199
340	10350	0.820	880	531	4317	0.204
350	10650	0.820	876	519	4193	0.209
360	10950	0.820	872	507	4073	0.214
370	11300	0.820	871	494	3955	0.220
380	11600	0.820	871	483	3875	0.225
390	11900	0.820	871	472	3808	0.229
400	12200	0.820	871	462	3742	0.233
410	12500	0.820	871	451	3678	0.237

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)

Table 3.1.9.74

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

M = 0.82

ISA

GROSS WEIGHT - 75000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.820	969	852	10947	0.089
110	3350	0.820	966	838	10506	0.092
120	3650	0.820	962	823	10075	0.096
130	3950	0.820	959	809	9654	0.099
140	4250	0.820	955	795	9266	0.103
150	4550	0.820	952	781	8901	0.107
160	4900	0.820	947	764	8500	0.111
170	5200	0.820	944	751	8163	0.116
180	5500	0.820	940	737	7860	0.120
190	5800	0.820	937	723	7566	0.124
200	6100	0.820	933	710	7284	0.128
210	6400	0.820	929	696	7023	0.132
220	6700	0.820	926	683	6770	0.137
230	7000	0.820	922	670	6526	0.141
240	7300	0.820	918	657	6294	0.146
250	7600	0.820	915	644	6067	0.151
260	7900	0.820	911	631	5844	0.156
270	8250	0.820	906	616	5594	0.162
280	8550	0.820	903	603	5389	0.168
290	8850	0.820	899	591	5192	0.173
300	9150	0.820	895	579	5031	0.178
310	9450	0.820	891	566	4879	0.183
320	9750	0.820	887	554	4729	0.183
330	10050	0.820	884	542	4586	0.193
340	10350	0.820	880	531	4457	0.197
350	10650	0.820	876	519	4331	0.202
360	10950	0.820	872	507	4210	0.207
370	11300	0.820	871	494	4118	0.212
380	11600	0.820	871	483	4047	0.215
390	11900	0.820	871	472	3977	0.219
400	12200	0.820	871	462	3909	0.223
410	12500	0.820	871	451	3857	0.226

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.75

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

M = 0.82

ISA

GROSS WEIGHT - 80000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.820	969	852	10998	0.088
110	3350	0.820	966	838	10558	0.091
120	3650	0.820	962	823	10128	0.095
130	3950	0.820	959	809	9707	0.099
140	4250	0.820	955	795	9319	0.102
150	4550	0.820	952	781	8949	0.106
160	4900	0.820	947	764	8565	0.111
170	5200	0.820	944	751	8256	0.114
180	5500	0.820	940	737	7955	0.118
190	5800	0.820	937	723	7660	0.122
200	6100	0.820	933	710	7379	0.126
210	6400	0.820	929	696	7119	0.131
220	6700	0.820	926	683	6866	0.135
230	7000	0.820	922	670	6620	0.139
240	7300	0.820	918	657	6384	0.144
250	7600	0.820	915	644	6158	0.148
260	7900	0.820	911	631	5937	0.153
270	8250	0.820	906	616	5687	0.159
280	8550	0.820	903	603	5495	0.164
290	8850	0.820	899	591	5331	0.169
300	9150	0.820	895	579	5171	0.173
310	9450	0.820	891	566	5017	0.178
320	9750	0.820	887	554	4868	0.182
330	10050	0.820	884	542	4725	0.187
340	10350	0.820	880	531	4595	0.191
350	10650	0.820	876	519	4476	0.196
360	10950	0.820	872	507	4380	0.199
370	11300	0.820	871	494	4289	0.203
380	11600	0.820	871	483	4215	0.207
390	11900	0.820	871	472	4149	0.210
400	12200	0.820	871	462	4104	0.212
410	12500	0.820	871	451	4076	0.214

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)

Table 3.1.9.76

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

M = 0.82

ISA

GROSS WEIGHT - 85000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/hr
100	3050	0.820	969	852	11049	0.088
110	3350	0.820	966	838	10610	0.091
120	3650	0.820	962	823	10181	0.095
130	3950	0.820	959	809	9760	0.098
140	4250	0.820	955	795	9373	0.102
150	4550	0.820	952	781	9030	0.105
160	4900	0.820	947	764	8657	0.109
170	5200	0.820	944	751	8349	0.113
180	5500	0.820	940	737	8048	0.117
190	5800	0.820	937	723	7754	0.121
200	6100	0.820	933	710	7474	0.125
210	6400	0.820	929	696	7214	0.129
220	6700	0.820	926	683	6962	0.133
230	7000	0.820	922	670	6717	0.137
240	7300	0.820	918	657	6478	0.142
250	7600	0.820	915	644	6249	0.146
260	7900	0.820	911	631	6029	0.151
270	8250	0.820	906	616	5807	0.156
280	8550	0.820	903	603	5636	0.160
290	8850	0.820	899	591	5468	0.164
300	9150	0.820	895	579	5308	0.169
310	9450	0.820	891	566	5154	0.173
320	9750	0.820	887	554	5005	0.177
330	10050	0.820	884	542	4863	0.182
340	10350	0.820	880	531	4747	0.185
350	10650	0.820	876	519	4647	0.188
360	10950	0.820	872	507	4550	0.192
370	11300	0.820	871	494	4457	0.195
380	11600	0.820	871	483	4390	0.198
390	11900	0.820	871	472	4352	0.200
400	12200	0.820	871	462	4322	0.202
410	12500	0.820	871	451	4294	0.203

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.77

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

M = 0.82

ISA

GROSS WEIGHT - 90000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.820	969	852	11101	0.087
110	3350	0.820	966	838	10662	0.091
120	3650	0.820	962	823	10233	0.094
130	3950	0.820	959	809	9827	0.098
140	4250	0.820	955	795	9472	0.101
150	4550	0.820	952	781	9132	0.104
160	4900	0.820	947	764	8747	0.108
170	5200	0.820	944	751	8441	0.112
180	5500	0.820	940	737	8140	0.116
190	5800	0.820	937	723	7847	0.119
200	6100	0.820	933	710	7568	0.123
210	6400	0.820	929	696	7309	0.127
220	6700	0.820	926	683	7057	0.131
230	7000	0.820	922	670	6812	0.135
240	7300	0.820	918	657	6574	0.140
250	7600	0.820	915	644	6343	0.144
260	7900	0.820	911	631	6155	0.148
270	8250	0.820	906	616	5947	0.152
280	8550	0.820	903	603	5772	0.156
290	8850	0.820	899	591	5603	0.160
300	9150	0.820	895	579	5442	0.164
310	9450	0.820	891	566	5289	0.168
320	9750	0.820	887	554	5141	0.173
330	10050	0.820	884	542	5023	0.176
340	10350	0.820	880	531	4918	0.179
350	10650	0.820	876	519	4816	0.182
360	10950	0.820	872	507	4718	0.185
370	11300	0.820	871	494	4635	0.188
380	11600	0.820	871	483	4601	0.189
390	11900	0.820	871	472	4570	0.191
400	12200	0.820	871	462	4541	0.192
410	12500	0.820	871	451	4525	0.192

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)

Table 3.1.9.78

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

M = 0.82

ISA

GROSS WEIGHT - 95000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.820	969	852	11151	0.087
110	3350	0.820	966	838	10714	0.090
120	3650	0.820	962	823	10313	0.093
130	3950	0.820	959	809	9929	0.097
140	4250	0.820	955	795	9574	0.100
150	4550	0.820	952	781	9232	0.103
160	4900	0.820	947	764	8846	0.107
170	5200	0.820	944	751	8531	0.111
180	5500	0.820	940	737	8232	0.114
190	5800	0.820	937	723	7940	0.118
200	6100	0.820	933	710	7661	0.122
210	6400	0.820	929	696	7403	0.126
220	6700	0.820	926	683	7152	0.129
230	7000	0.820	922	670	6907	0.133
240	7300	0.820	918	657	6680	0.137
250	7600	0.820	915	644	6490	0.141
260	7900	0.820	911	631	6302	0.145
270	8250	0.820	906	616	6089	0.149
280	8550	0.820	903	603	5911	0.153
290	8850	0.820	899	591	5739	0.157
300	9150	0.820	895	579	5576	0.161
310	9450	0.820	891	566	5424	0.164
320	9750	0.820	887	554	5306	0.167
330	10050	0.820	884	542	5193	0.170
340	10350	0.820	880	531	5091	0.173
350	10650	0.820	876	519	4993	0.175
360	10950	0.820	872	507	4898	0.178
370	11300	0.820	871	494	4852	0.180
380	11600	0.820	871	483	4819	0.181
390	11900	0.820	871	472	4790	0.182
400	12200	0.820	871	462	4778	0.182
410	12500	0.820	871	451	4794	0.182

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.79

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

M = 0.84

ISA

GROSS WEIGHT - 70000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.840	993	874	11464	0.087
110	3350	0.840	989	859	11012	0.090
120	3650	0.840	986	844	10567	0.093
130	3950	0.840	982	830	10130	0.097
140	4250	0.840	979	815	9718	0.101
150	4550	0.840	975	801	9319	0.105
160	4900	0.840	971	784	8869	0.109
170	5200	0.840	967	770	8508	0.114
180	5500	0.840	963	756	8160	0.118
190	5800	0.840	959	742	7821	0.123
200	6100	0.840	956	728	7519	0.127
210	6400	0.840	952	714	7250	0.131
220	6700	0.840	948	701	6989	0.136
230	7000	0.840	944	687	6734	0.140
240	7300	0.840	941	674	6486	0.145
250	7600	0.840	937	661	6251	0.150
260	7900	0.840	933	648	6023	0.155
270	8250	0.840	929	632	5764	0.161
280	8550	0.840	925	620	5551	0.167
290	8850	0.840	921	607	5344	0.172
300	9150	0.840	917	594	5145	0.178
310	9450	0.840	913	582	4951	0.184
320	9750	0.840	909	569	4792	0.190
330	10050	0.840	905	557	4641	0.195
340	10350	0.840	901	545	4503	0.200
350	10650	0.840	897	533	4370	0.205
360	10950	0.840	893	521	4242	0.211
370	11300	0.840	892	508	4114	0.217
380	11600	0.840	892	496	4011	0.222
390	11900	0.840	892	485	3933	0.227
400	12200	0.840	892	474	3874	0.230
410	12500	0.840	892	464	3819	0.234

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)

Table 3.1.9.80

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

M = 0.84

ISA

GROSS WEIGHT - 75000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.840	993	874	11510	0.086
110	3350	0.840	989	859	11058	0.089
120	3650	0.840	986	844	10614	0.093
130	3950	0.840	982	830	10178	0.096
140	4250	0.840	979	815	9766	0.100
150	4550	0.840	975	801	9368	0.104
160	4900	0.840	971	784	8918	0.109
170	5200	0.840	967	770	8552	0.113
180	5500	0.840	963	756	8217	0.117
190	5800	0.840	959	742	7909	0.121
200	6100	0.840	956	728	7616	0.125
210	6400	0.840	952	714	7349	0.130
220	6700	0.840	948	701	7088	0.134
230	7000	0.840	944	687	6833	0.138
240	7300	0.840	941	674	6586	0.143
250	7600	0.840	937	661	6346	0.148
260	7900	0.840	933	648	6117	0.153
270	8250	0.840	929	632	5859	0.158
280	8550	0.840	925	620	5646	0.164
290	8850	0.840	921	607	5440	0.169
300	9150	0.840	917	594	5254	0.175
310	9450	0.840	913	582	5091	0.179
320	9750	0.840	909	569	4932	0.184
330	10050	0.840	905	557	4780	0.189
340	10350	0.840	901	545	4640	0.194
350	10650	0.840	897	533	4506	0.199
360	10950	0.840	893	521	4377	0.204
370	11300	0.840	892	508	4259	0.210
380	11600	0.840	892	496	4188	0.213
390	11900	0.840	892	485	4119	0.217
400	12200	0.840	892	474	4070	0.219
410	12500	0.840	892	464	4024	0.222

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.81

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

M = 0.84

ISA

GROSS WEIGHT - 80000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.840	993	874	11557	0.086
110	3350	0.840	989	859	11105	0.089
120	3650	0.840	986	844	10662	0.092
130	3950	0.840	982	830	10226	0.096
140	4250	0.840	979	815	9815	0.100
150	4550	0.840	975	801	9417	0.104
160	4900	0.840	971	784	8967	0.108
170	5200	0.840	967	770	8628	0.112
180	5500	0.840	963	756	8313	0.116
190	5800	0.840	959	742	8006	0.120
200	6100	0.840	956	728	7714	0.124
210	6400	0.840	952	714	7446	0.128
220	6700	0.840	948	701	7185	0.132
230	7000	0.840	944	687	6932	0.136
240	7300	0.840	941	674	6685	0.141
250	7600	0.840	937	661	6445	0.145
260	7900	0.840	933	648	6212	0.150
270	8250	0.840	929	632	5953	0.156
280	8550	0.840	925	620	5740	0.161
290	8850	0.840	921	607	5562	0.166
300	9150	0.840	917	594	5394	0.170
310	9450	0.840	913	582	5229	0.175
320	9750	0.840	909	569	5070	0.179
330	10050	0.840	905	557	4917	0.184
340	10350	0.840	901	545	4777	0.189
350	10650	0.840	897	533	4641	0.193
360	10950	0.840	893	521	4523	0.198
370	11300	0.840	892	508	4440	0.201
380	11600	0.840	892	496	4374	0.204
390	11900	0.840	892	485	4323	0.206
400	12200	0.840	892	474	4274	0.209
410	12500	0.840	892	464	4245	0.210

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)

Table 3.1.9.82

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

M = 0.84

ISA

GROSS WEIGHT - 85000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.840	993	874	11604	0.086
110	3350	0.840	989	859	11152	0.089
120	3650	0.840	986	844	10709	0.092
130	3950	0.840	982	830	10274	0.096
140	4250	0.840	979	815	9863	0.099
150	4550	0.840	975	801	9479	0.103
160	4900	0.840	971	784	9071	0.107
170	5200	0.840	967	770	8732	0.111
180	5500	0.840	963	756	8408	0.115
190	5800	0.840	959	742	8101	0.118
200	6100	0.840	956	728	7810	0.122
210	6400	0.840	952	714	7543	0.126
220	6700	0.840	948	701	7282	0.130
230	7000	0.840	944	687	7029	0.134
240	7300	0.840	941	674	6783	0.139
250	7600	0.840	937	661	6544	0.143
260	7900	0.840	933	648	6311	0.148
270	8250	0.840	929	632	6059	0.153
280	8550	0.840	925	620	5877	0.157
290	8850	0.840	921	607	5701	0.162
300	9150	0.840	917	594	5531	0.166
310	9450	0.840	913	582	5366	0.170
320	9750	0.840	909	569	5206	0.175
330	10050	0.840	905	557	5053	0.179
340	10350	0.840	901	545	4911	0.183
350	10650	0.840	897	533	4798	0.187
360	10950	0.840	893	521	4710	0.190
370	11300	0.840	892	508	4631	0.193
380	11600	0.840	892	496	4578	0.195
390	11900	0.840	892	486	4527	0.197
400	12200	0.840	892	474	4504	0.198
410	12500	0.840	892	464	4483	0.199

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.83

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

M = 0.84

ISA

GROSS WEIGHT - 90000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.840	993	874	11650	0.085
110	3350	0.840	989	859	11198	0.088
120	3650	0.840	986	844	10756	0.092
130	3950	0.840	982	830	10322	0.095
140	4250	0.840	979	815	9943	0.098
150	4550	0.840	975	801	9582	0.102
160	4900	0.840	971	784	9176	0.106
170	5200	0.840	967	770	8837	0.109
180	5500	0.840	963	756	8508	0.113
190	5800	0.840	959	742	8195	0.117
200	6100	0.840	956	728	7905	0.121
210	6400	0.840	952	714	7638	0.125
220	6700	0.840	948	701	7379	0.129
230	7000	0.840	944	687	7126	0.133
240	7300	0.840	941	674	6881	0.137
250	7600	0.840	937	661	6642	0.141
260	7900	0.840	933	648	6427	0.145
270	8250	0.840	929	632	6206	0.150
280	8550	0.840	925	620	6021	0.154
290	8850	0.840	921	607	5842	0.158
300	9150	0.840	917	594	5669	0.162
310	9450	0.840	913	582	5502	0.166
320	9750	0.840	909	569	5341	0.170
330	10050	0.840	905	557	5190	0.174
340	10350	0.840	901	545	5090	0.177
350	10650	0.840	897	533	4996	0.180
360	10950	0.840	893	521	4906	0.182
370	11300	0.840	892	508	4836	0.185
380	11600	0.840	892	496	4786	0.186
390	11900	0.840	892	485	4764	0.187
400	12200	0.840	892	474	4742	0.188
410	12500	0.840	892	464	4721	0.189

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)

Table 3.1.9.84

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

M = 0.84

ISA

GROSS WEIGHT - 95000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.840	993	874	11697	0.085
110	3350	0.840	989	859	11244	0.088
120	3650	0.840	986	844	10812	0.091
130	3950	0.840	982	830	10417	0.094
140	4250	0.840	979	815	10044	0.097
150	4550	0.840	975	801	9686	0.101
160	4900	0.840	971	784	9279	0.105
170	5200	0.840	967	770	8940	0.108
180	5500	0.840	963	756	8611	0.112
190	5800	0.840	959	742	8291	0.116
200	6100	0.840	956	728	7999	0.119
210	6400	0.840	952	714	7733	0.123
220	6700	0.840	948	701	7474	0.127
230	7000	0.840	944	687	7223	0.131
240	7300	0.840	941	674	6978	0.135
250	7600	0.840	937	661	6766	0.138
260	7900	0.840	933	648	6573	0.142
270	8250	0.840	929	632	6350	0.146
280	8550	0.840	925	620	6166	0.150
290	8850	0.840	921	607	5987	0.154
300	9150	0.840	917	594	5814	0.158
310	9450	0.840	913	582	5647	0.162
320	9750	0.840	909	569	5498	0.165
330	10050	0.840	905	557	5389	0.168
340	10350	0.840	901	545	5293	0.170
350	10650	0.840	897	533	5200	0.173
360	10950	0.840	893	521	5111	0.175
370	11300	0.840	892	508	5049	0.177
380	11600	0.840	892	496	5025	0.178
390	11900	0.840	892	485	5002	0.178
400	12200	0.840	892	474	4979	0.179
410	12500	0.840	892	464	4994	0.179

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.85

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

HIGH-SPEED CRUISE

ISA

GROSS WEIGHT - 70000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.583	690	600	6146	0.112
110	3350	0.594	699	600	6085	0.115
120	3650	0.604	709	600	6023	0.118
130	3950	0.615	719	600	5961	0.121
140	4250	0.626	730	600	5916	0.123
150	4550	0.638	740	600	5873	0.126
160	4900	0.651	752	600	5821	0.129
170	5200	0.663	763	600	5775	0.132
180	5500	0.675	774	600	5727	0.135
190	5800	0.688	786	600	5677	0.138
200	6100	0.701	797	600	5623	0.142
210	6400	0.714	809	600	5560	0.145
220	6700	0.727	820	600	5502	0.149
230	7000	0.740	832	600	5452	0.153
240	7300	0.725	812	575	5108	0.159
250	7600	0.739	824	575	5065	0.163
260	7900	0.753	836	575	5024	0.166
270	8250	0.770	851	575	4955	0.172
280	8550	0.785	864	575	4907	0.176
290	8850	0.800	877	575	4876	0.180
300	9150	0.815	890	575	4859	0.183
310	9450	0.831	903	575	4852	0.186
320	9750	0.847	917	575	4858	0.189
330	10050	0.864	931	575	4948	0.188
340	10350	0.870	933	567	4920	0.190
350	10650	0.870	929	555	4789	0.194
360	10950	0.870	925	542	4569	0.199
370	11300	0.870	925	529	4539	0.204
380	11600	0.870	925	517	4446	0.208
390	11900	0.870	924	505	4357	0.212
400	12200	0.870	924	494	4311	0.214
410	12500	0.870	924	483	4311	0.214

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)

Table 3.1.9.86

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

HIGH-SPEED CRUISE

ISA

GROSS WEIGHT - 75000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.583	690	600	6225	0.111
110	3350	0.594	699	600	6163	0.113
120	3650	0.604	709	600	6101	0.116
130	3950	0.615	719	600	6038	0.119
140	4250	0.626	730	600	5992	0.122
150	4550	0.638	740	600	5949	0.124
160	4900	0.651	752	600	5897	0.128
170	5200	0.663	763	600	5850	0.130
180	5500	0.675	774	600	5801	0.133
190	5800	0.688	786	600	5750	0.137
200	6100	0.701	797	600	5696	0.140
210	6400	0.714	809	600	5632	0.144
220	6700	0.727	820	600	5577	0.147
230	7000	0.740	832	600	5539	0.150
240	7300	0.725	812	575	5194	0.156
250	7600	0.739	824	575	5153	0.160
260	7900	0.753	836	575	5114	0.164
270	8250	0.770	851	575	5050	0.169
280	8550	0.785	864	575	5010	0.172
290	8850	0.800	877	575	4979	0.176
300	9150	0.815	890	575	4986	0.178
310	9450	0.831	903	575	4991	0.181
320	9750	0.847	917	575	5006	0.183
330	10050	0.864	931	575	5112	0.182
340	10350	0.870	933	567	5091	0.183
350	10650	0.870	929	555	4957	0.187
360	10950	0.870	925	542	4825	0.192
370	11300	0.870	925	529	4723	0.196
380	11600	0.870	925	517	4638	0.199
390	11900	0.870	924	505	4618	0.200
400	12200	0.870	924	494	4625	0.200
410	12500	0.870	924	483	4620	0.200

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.87

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

HIGH-SPEED CRUISE

ISA

GROSS WEIGHT - 80000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.583	690	600	6306	0.109
110	3350	0.594	699	600	6242	0.112
120	3650	0.604	709	600	6178	0.115
130	3950	0.615	719	600	6114	0.118
140	4250	0.626	730	600	6068	0.120
150	4550	0.638	740	600	6024	0.123
160	4900	0.651	752	600	5971	0.126
170	5200	0.663	763	600	5923	0.129
180	5500	0.675	774	600	5874	0.132
190	5800	0.688	786	600	5822	0.135
200	6100	0.701	797	600	5767	0.138
210	6400	0.714	809	600	5704	0.142
220	6700	0.727	820	600	5659	0.145
230	7000	0.740	832	600	5629	0.148
240	7300	0.725	812	575	5309	0.153
250	7600	0.739	824	575	5276	0.156
260	7900	0.753	836	575	5247	0.159
270	8250	0.770	851	575	5192	0.164
280	8550	0.785	864	575	5153	0.168
290	8850	0.800	877	575	5120	0.171
300	9150	0.815	890	575	5124	0.174
310	9450	0.831	903	575	5132	0.176
320	9750	0.847	917	575	5152	0.178
330	10050	0.864	931	575	5280	0.176
340	10350	0.870	933	567	5277	0.177
350	10650	0.870	929	555	5146	0.181
360	10950	0.870	925	542	5016	0.184
370	11300	0.870	925	529	4930	0.188
380	11600	0.870	925	517	4936	0.187
390	11900	0.870	924	505	4929	0.187
400	12200	0.870	924	494	4934	0.187
410	12500	0.870	924	483	4930	0.187

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)

Table 3.1.9.88

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

HIGH-SPEED CRUISE

ISA

GROSS WEIGHT - 85000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.583	690	600	6422	0.107
110	3350	0.594	699	600	6358	0.110
120	3650	0.604	709	600	6293	0.113
130	3950	0.615	719	600	6226	0.116
140	4250	0.626	730	600	6179	0.118
150	4550	0.638	740	600	6133	0.121
160	4900	0.651	752	600	6078	0.124
170	5200	0.663	763	600	6028	0.127
180	5500	0.675	774	600	5977	0.130
190	5800	0.688	786	600	5924	0.133
200	6100	0.701	797	600	5858	0.136
210	6400	0.714	809	600	5804	0.139
220	6700	0.727	820	600	5772	0.142
230	7000	0.740	832	600	5752	0.145
240	7300	0.725	812	575	5433	0.149
250	7600	0.739	824	575	5409	0.152
260	7900	0.753	836	575	5383	0.155
270	8250	0.770	851	575	5330	0.160
280	8550	0.785	864	575	5291	0.163
290	8850	0.800	877	575	5257	0.167
300	9150	0.815	890	575	5261	0.169
310	9450	0.831	903	575	5268	0.171
320	9750	0.847	917	575	5296	0.173
330	10050	0.864	931	575	5459	0.171
340	10350	0.870	933	567	5467	0.171
350	10650	0.870	929	555	5336	0.174
360	10950	0.870	925	542	5236	0.177
370	11300	0.870	925	529	5246	0.176
380	11600	0.870	925	517	5249	0.176
390	11900	0.870	924	505	5236	0.177
400	12200	0.870	924	494	5250	0.176

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

Table 3.1.9.89

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

HIGH-SPEED CRUISE

ISA

GROSS WEIGHT - 90000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.583	690	600	6535	0.106
110	3350	0.594	699	600	6469	0.108
120	3650	0.604	709	600	6403	0.111
130	3950	0.615	719	600	6353	0.114
140	4250	0.626	730	600	6286	0.116
150	4550	0.638	740	600	6239	0.119
160	4900	0.651	752	600	6183	0.122
170	5200	0.663	763	600	6132	0.124
180	5500	0.675	774	600	6079	0.127
190	5800	0.688	786	600	6013	0.131
200	6100	0.701	797	600	5939	0.134
210	6400	0.714	809	600	5904	0.137
220	6700	0.727	820	600	5888	0.139
230	7000	0.740	832	600	5879	0.142
240	7300	0.725	812	575	5558	0.146
250	7600	0.739	824	575	5541	0.149
260	7900	0.753	836	575	5517	0.152
270	8250	0.770	851	575	5466	0.156
280	8550	0.785	864	575	5427	0.159
290	8850	0.800	877	575	5392	0.163
300	9150	0.815	890	575	5395	0.165
310	9450	0.831	903	575	5403	0.167
320	9750	0.847	917	575	5445	0.168
330	10050	0.864	931	575	5637	0.165
340	10350	0.870	933	567	5655	0.165
350	10650	0.870	929	555	5579	0.167
360	10950	0.870	925	542	5549	0.167
370	11300	0.870	925	529	5558	0.166
380	11600	0.870	925	517	5558	0.166
390	11900	0.870	924	505	5555	0.166

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)

Table 3.1.9.90

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Horizontal Flight

HIGH-SPEED CRUISE

ISA

GROSS WEIGHT - 95000 kg

Flight level	Pressure altitude, m	Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
100	3050	0.583	690	600	6645	0.104
110	3350	0.594	699	600	6578	0.106
120	3650	0.604	709	600	6510	0.109
130	3950	0.615	719	600	6440	0.112
140	4250	0.626	730	600	6390	0.114
150	4550	0.638	740	600	6342	0.117
160	4900	0.651	752	600	6291	0.120
170	5200	0.663	763	600	6240	0.122
180	5500	0.675	774	600	6177	0.125
190	5800	0.688	786	600	6098	0.129
200	6100	0.701	797	600	6015	0.132
210	6400	0.714	809	600	6001	0.135
220	6700	0.727	820	600	6001	0.137
230	7000	0.740	832	600	6004	0.139
240	7300	0.725	812	575	5680	0.143
250	7600	0.739	824	575	5671	0.145
260	7900	0.753	836	575	5650	0.148
270	8250	0.770	851	575	5601	0.152
280	8550	0.785	864	575	5562	0.155
290	8850	0.800	877	575	5526	0.159
300	9150	0.815	890	575	5529	0.161
310	9450	0.831	903	575	5543	0.163
320	9750	0.847	917	575	5600	0.164
330	10050	0.864	931	575	5814	0.160
340	10350	0.870	933	567	5914	0.158
350	10650	0.870	929	555	5890	0.158
360	10950	0.870	925	542	5858	0.158
370	11300	0.870	925	529	5867	0.158
380	11600	0.870	925	517	5885	0.157

NOTE: With the air temperature increased or decreased by 5° above or below ISA, the hourly fuel consumption increases or decreases respectively by 1%.

(cont'd)

Table 3.1.9.91

Hourly Fuel Consumption, Specific Range, Mach Number, True
Airspeed and Indicated Airspeed in Holding

ISA

Gross weight, kg	Pressure altitude		Mach number	TAS, km/hr	IAS, km/hr	Hourly fuel consumption, kg/hr	Specific range, km/kg
	ft	m					
70000	1500	450	0.307	374	365	4722	0.079
	5000	1500	0.325	391	365	4394	0.089
	10000	3050	0.360	426	368	4095	0.104
	15000	4550	0.402	466	374	3846	0.121
	20000	6100	0.445	506	374	3611	0.140
	25000	7600	0.493	550	376	3452	0.159
	30000	9150	0.551	601	378	3340	0.180
	35000	10650	0.617	659	381	3296	0.200
	40000	12200	0.707	751	392	3347	0.224
80000	1500	450	0.328	400	391	5090	0.079
	5000	1500	0.350	421	393	4745	0.089
	10000	3050	0.385	455	393	4470	0.102
	15000	4550	0.428	497	399	4300	0.116
	20000	6100	0.473	538	399	4090	0.132
	25000	7600	0.525	586	401	3943	0.148
	30000	9150	0.590	644	406	3820	0.169
	35000	10650	0.664	709	412	3805	0.186
	40000	12200	0.763	810	426	3880	0.209
90000	1500	450	0.347	423	414	5334	0.079
	5000	1500	0.370	446	415	5199	0.086
	10000	3050	0.408	482	417	4979	0.097
	15000	4550	0.454	527	423	4766	0.111
	20000	6100	0.502	571	424	4534	0.126
	25000	7600	0.560	625	429	4431	0.141
	30000	9150	0.630	688	435	4328	0.159
	35000	10650	0.710	758	443	4325	0.175
	40000	12200	0.710	754	394	4208	0.179
100000	1500	450	0.367	447	438	5905	0.076
	5000	1500	0.392	472	440	5728	0.082
	10000	3050	0.432	511	442	5442	0.094
	15000	4550	0.479	556	447	5170	0.108
	20000	6100	0.528	601	447	5002	0.120
	25000	7600	0.593	661	455	4913	0.135
	30000	9150	0.668	729	463	4851	0.150
	35000	10650	0.747	798	468	4843	0.165
	40000	12200	0.747	793	416	4770	0.166

(cont'd)

Table 3.1.9.92

Change of Specific Range and Hourly Fuel Consumption
with One or Two Engines Inoperative

Flight level		0	Up to 100	110 to 200	210 to 250	260 to 350	Above 350
Pressure altitude, m		0	600 to 350	3350 to 6100	6400 to 7600	7900 to 10650	Above 10650
One engine inoperative	Specific range, km/kg	+15	+10	+5	0	-1	-4
	Hourly fuel consumption, kg/hr	-15	-10	-5	0	+1	+4
Two engines inoperative	Specific range, km/kg	+25	+20	+15	+10	-	-
	Hourly fuel consumption, kg/hr	-25	-20	-15	-10	-	-

(cont'd)



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PREPARATION FOR FLIGHT - Calculation of Flight Data

3.1.12. Reference Tables for Calculation of Flight Data

3.1.12.1. Conversion of Aerodrome Pressure into Aerodrome Altitude (Table 3.1.12.1)

Table 3.1.12.1

Pressu- re, mm Hg	Altitu- de, m	Pressu- re, mm Hg	Altitu- de, m	Pressu- re, mm Hg	Altitu- de, m	Pressu- re, mm Hg	Altitu- de, m	Pressu- re, mm Hg	Altitu- de, m
787	-300	750	112	713	537	676	975	639	1437
786	-287	749	125	712	550	675	987	638	1450
785	-275	748	137	711	560	674	1000	637	1462
784	-262	747	150	710	570	673	1012	636	1475
783	-250	746	160	709	580	672	1025	635	1487
782	-240	745	170	708	590	671	1037	634	1500
781	-230	744	180	707	600	670	1050	633	1512
780	-220	743	190	706	612	669	1062	632	1525
779	-210	742	200	705	625	668	1075	631	1537
778	-200	741	212	704	637	667	1087	630	1550
777	-187	740	225	703	650	666	1100	629	1562
776	-175	739	237	702	662	665	1112	628	1575
775	-162	738	250	701	675	664	1125	627	1587
774	-150	737	260	700	687	663	1137	626	1600
773	-140	736	270	699	700	662	1150	625	1617
772	-130	735	280	698	712	661	1162	624	1634
771	-120	734	290	697	725	660	1175	623	1650
770	-110	733	300	696	737	659	1187	622	1662
769	-100	732	312	695	750	658	1200	621	1675
768	-87	731	325	694	762	657	1212	620	1687
767	-75	730	337	693	775	656	1225	619	1700
766	-62	729	350	692	787	655	1237	618	1712
765	-50	728	362	691	800	654	1250	617	1725
764	-40	727	375	690	810	653	1262	616	1737
763	-30	726	387	689	820	652	1275	615	1750
762	-20	725	400	688	830	651	1287	614	1762
761	-10	724	410	687	840	650	1300	613	1775
760	0	723	420	686	850	649	1312	612	1787
759	12	722	430	685	862	648	1325	611	1800
758	25	721	440	684	875	647	1337	610	1812
757	37	720	450	683	887	646	1350	609	1825
756	50	719	462	682	900	645	1362	608	1837
755	60	718	475	681	912	644	1375	607	1850
754	70	717	487	680	925	643	1387	606	1867
753	80	716	500	679	937	642	1400	605	1884
752	90	715	512	678	950	641	1412	604	1900
751	100	714	525	677	962	640	1425	603	1912

(cont'd)

Table 3.1.12.1, cont'd

Pressu- re, mm Hg	Altitu- de, m	Pressu- re, mm Hg	Altitu- de, m	Pressu- re, mm Hg	Altitu- de, m	Pressu- re, mm Hg	Altitu- de, m	Pressu- re, mm Hg	Altitu- de, m
602	1925	587	2125	572	2334	557	2550	542	2762
601	1937	586	2137	571	2350	556	2562	541	2775
600	1950	585	2150	570	2362	555	2575	540	2787
599	1962	584	2167	569	2375	554	2587	539	2800
598	1975	583	2184	568	2387	553	2600	538	2817
597	1987	582	2200	567	2400	552	2617	537	2834
596	2000	581	2212	566	2417	551	2634	536	2850
595	2017	580	2225	565	2434	550	2650	535	2867
594	2034	579	2237	564	2450	549	2662	534	2884
593	2050	578	2250	563	2462	548	2675	533	2900
592	2062	577	2262	562	2475	547	2687	532	2912
591	2075	576	2275	561	2487	546	2700	531	2925
590	2087	575	2287	560	2500	545	2717	530	2937
589	2100	574	2300	559	2517	544	2734	529	2950
588	2112	573	2317	558	2534	543	2750	528	2967
								527	2984
								526	3000

3.1.12.2. Qualitative Correlation between Runway Surface Condition and Average Friction Coefficients (Table 3.1.12.2)

- (1) The runway surface condition is determined by presence and effect of precipitation on the takeoff and landing performance.

The precipitation can be classified into two kinds:

- (a) Precipitation causing changes in the tyres friction on the runway surface which can be assessed only by variation of the friction coefficient (such as the water or slush layer, up to 3 mm high, as well as the dry snow layer, up to 10 mm high).
 - (b) Precipitation causing additional hydrodynamic forces depending on the precipitation height and density.
- (2) The friction coefficient is a qualitative characteristic of the braking effectiveness on the runway.
- (3) The moist runway means that the surface is soaked with water but free from puddles.
- (4) The wet runway means that water fills up recesses and rough areas of the runway and puddles are present.

(cont'd)

- (5) The water layer on the runway is the water surface above projections and rough areas of the runway surface.
- (6) Dry snow is non-compacted snow with a density less than 0.35 g/cm^3 . A snowball made of this snow desintegrates.
- (7) Wet snow is snow with a density from 0.35 to 0.5 g/cm^3 . It can be pressed into a snowball.
- (8) Slush is snow soaked with water with density more than 0.5 g/cm^3 . It splashes out being kicked by leg.
- (9) Pressed snow is snow pressed into compact mass practically not yielding under the wheels of the aircraft and automobiles.

Table 3.1.12.2

Runway surface condition	Average friction coefficient or precipitations layer height
Clean, dry, moist	More than 0.5
Wet (including presence of puddles)	0.45
Dry snow (partially removed*)	0.45
Pressed snow (evenly spread)	0.4
Frozen snow with ice	0.4
Wet snow, slush (partially removed*)	0.35
Hoar-frost or rime (not more than 1 mm thick)	0.35
Ice (partially removed*)	0.3
Ice (over the whole runway)	Less than 0.3
Water (over the whole runway)	3 to 10 mm high
Wet snow, slush (over the whole runway)	3 to 12 mm high
Dry snow (over the whole runway)	10 to 50 mm high

*Partially removed - not more than 10 % of the runway surface is covered with precipitation.

(cont'd)

3.1.12.3. Conversion of Kilometers per Hour into Knots, Kilometers into Nautical Miles

(Table 3.1.12.3)

Table 3.1.12.3

km/hr (km)	0	100	200	300	400	500	600	700	800	900
	Knots (nautical miles)									
0		53.9	107.8	161.7	215.6	269.5	323.4	377.3	431.2	485.1
1	0.539	54.5	108.3	162.2	216.1	270.0	323.9	377.8	431.7	485.6
2	1.1	55.0	108.9	162.8	216.7	270.6	324.5	378.4	432.3	486.2
3	1.6	55.5	109.4	163.3	217.2	271.1	325.0	378.9	432.8	486.7
4	2.2	56.1	110.0	163.9	217.8	271.7	325.6	379.5	433.4	487.3
5	2.7	56.6	110.5	164.4	218.3	272.2	326.1	380.0	433.9	487.8
6	3.2	57.1	111.0	164.9	218.8	272.7	326.6	380.5	434.4	488.3
7	3.8	57.7	111.6	165.5	219.4	273.3	327.2	381.1	435.0	488.9
8	4.3	58.2	112.1	166.0	219.9	273.8	327.7	381.6	435.5	489.4
9	4.9	58.8	112.7	166.6	220.5	274.4	328.3	382.2	436.1	490.0
10	5.4	59.3	113.2	167.1	221.0	274.9	328.8	382.7	436.6	490.5
11	5.9	59.8	113.7	167.6	221.5	275.4	329.3	383.2	437.1	491.0
12	6.5	60.4	114.3	168.2	222.1	276.0	329.9	383.8	437.7	491.6
13	7.0	60.9	114.8	168.7	222.6	276.5	330.4	384.3	438.2	492.1
14	7.5	61.4	115.3	169.2	223.1	277.0	331.0	384.8	438.7	492.6
15	8.1	62.0	115.9	169.8	223.7	277.6	331.5	385.4	439.3	493.2
16	8.6	62.5	116.4	170.3	224.2	278.1	332.0	385.9	439.8	493.7
17	9.2	63.1	117.0	170.9	224.8	278.7	332.6	386.5	440.3	494.3
18	9.7	63.6	117.5	171.4	225.3	279.2	333.1	387.0	440.9	494.8
19	10.2	64.1	118.0	171.9	225.8	279.7	333.6	387.5	441.4	495.3
20	10.8	64.7	118.6	172.5	226.4	280.3	334.2	388.1	442.0	495.9
21	11.3	65.2	119.1	173.0	226.9	280.8	334.7	388.6	442.5	496.4
22	11.9	65.8	119.7	173.6	227.5	281.4	335.3	389.1	443.1	497.0
23	12.4	66.3	120.2	174.1	228.0	281.9	335.8	389.7	443.6	497.5
24	12.9	66.8	120.7	174.6	228.5	282.4	336.3	390.2	444.1	498.0
25	13.5	67.4	121.3	175.2	229.1	283.0	336.9	390.8	444.7	498.6
26	14.0	67.9	121.8	175.7	229.6	283.5	337.4	391.3	445.2	499.1
27	14.6	68.5	122.4	176.3	230.2	284.1	338.0	391.8	445.8	499.7
28	15.1	69.0	122.9	176.8	230.7	284.6	338.6	392.4	446.3	500.2
29	15.6	69.5	123.4	177.3	231.2	285.1	339.0	392.9	446.8	500.7
30	16.2	70.1	124.0	177.9	231.8	285.7	339.6	393.5	447.4	501.3

(cont'd)



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Table 3.1.12.3, cont'd

km/hr (km)	0	100	200	300	400	500	600	700	800	900
	Knots (nautical miles)									
31	16.7	70.6	124.5	178.4	232.3	286.2	340.1	394.0	447.9	501.8
32	17.2	71.2	125.0	178.9	232.8	286.7	340.6	394.5	448.4	502.3
33	17.8	71.7	125.6	179.5	233.4	287.3	341.2	395.1	449.0	502.9
34	18.3	72.2	126.1	180.0	233.9	287.8	341.7	395.6	449.5	503.4
35	18.9	72.8	126.7	180.6	234.5	288.4	342.3	396.2	450.1	504.0
36	19.4	73.3	127.2	181.1	235.0	288.9	342.8	396.7	450.6	504.5
37	19.9	73.8	127.7	181.6	235.5	289.4	343.3	397.2	451.1	505.0
38	20.5	74.4	128.3	182.2	236.1	290.0	343.9	397.8	451.7	505.6
39	21.0	74.9	128.8	182.7	236.6	290.5	344.4	398.3	452.2	506.1
40	21.6	75.5	129.4	183.3	237.2	291.1	345.0	398.9	452.8	506.7
41	22.1	76.0	129.9	183.8	237.7	291.6	345.5	399.4	453.3	507.2
42	22.6	76.5	130.4	184.3	238.2	292.1	346.0	399.9	453.8	507.7
43	23.2	77.1	131.0	184.9	238.8	292.7	346.6	400.5	454.4	508.3
44	23.7	77.6	131.5	185.4	239.3	293.2	347.1	401.0	454.9	508.8
45	24.3	78.2	132.1	186.0	239.9	293.8	347.7	401.6	455.5	509.4
46	24.8	78.7	132.6	186.5	240.4	294.3	348.2	402.1	456.0	509.9
47	25.3	79.2	133.1	187.0	240.9	294.8	348.7	402.6	456.5	510.4
48	25.9	79.8	133.7	187.6	241.5	295.4	349.3	403.2	457.1	511.0
49	26.4	80.3	134.2	188.1	242.0	295.9	349.8	403.7	457.6	511.5
50	27.0	80.8	134.7	188.6	242.6	296.5	350.4	404.2	458.1	512.0
51	27.5	81.4	135.3	189.2	243.1	297.0	350.9	404.8	458.7	512.6
52	28.0	81.9	135.8	189.7	243.6	297.5	351.4	405.3	459.2	513.1
53	28.6	82.5	136.4	190.3	244.2	298.1	352.0	405.9	459.8	513.7
54	29.1	83.0	136.9	190.8	244.7	298.6	352.5	406.4	460.3	514.2
55	29.6	83.5	137.4	191.3	245.2	299.1	353.0	406.9	460.8	514.7
56	30.2	84.1	138.0	191.9	245.8	299.7	353.6	407.5	461.4	515.3
57	30.7	84.6	138.5	192.4	246.3	300.2	354.1	408.0	461.9	515.8
58	31.3	85.2	139.1	193.0	246.9	300.8	354.7	408.6	462.5	516.4
59	31.8	85.7	139.6	193.5	247.4	301.3	355.2	409.1	463.0	516.9
60	32.3	86.2	140.1	194.0	247.9	301.8	355.7	409.6	463.5	517.4

(cont'd)

Table 3.1.12.3, cont'd

km/hr (km)	0	100	200	300	400	500	600	700	800	900
	Knots (nautical miles)									
61	32.9	86.8	140.7	194.6	248.5	302.4	356.3	410.2	464.1	518.0
62	33.4	87.3	141.2	195.1	249.0	302.9	356.8	410.7	464.6	518.5
63	34.0	87.9	141.8	195.7	249.6	303.5	357.4	411.3	465.2	519.1
64	34.5	88.4	142.3	196.2	250.1	304.0	357.9	411.8	465.7	519.6
65	35.0	88.9	142.8	196.7	250.6	304.5	358.4	412.3	466.2	520.1
66	35.6	89.5	143.4	197.3	251.2	305.0	359.0	412.9	466.8	520.7
67	36.1	90.0	143.9	197.8	251.7	305.6	359.5	413.4	467.3	521.2
68	36.7	90.6	144.5	198.4	252.3	306.1	360.0	414.0	467.9	521.8
69	37.2	91.1	145.0	198.9	252.8	306.7	360.6	414.5	468.4	522.3
70	37.7	91.6	145.5	199.4	253.3	307.2	361.1	415.0	468.9	522.8
71	38.3	92.2	146.1	200.0	253.9	307.8	361.7	415.6	469.5	523.4
72	38.8	92.7	146.6	200.5	254.4	308.3	362.2	416.1	470.0	523.9
73	39.3	93.2	147.1	201.0	254.9	308.8	362.7	416.6	470.5	524.4
74	39.9	93.8	147.7	201.6	255.5	309.4	363.3	417.2	471.1	525.0
75	40.4	94.3	148.2	202.1	256.0	309.9	363.8	417.7	471.6	525.5
76	41.0	94.9	148.8	202.7	256.6	310.5	364.4	418.3	472.2	526.1
77	41.5	95.4	149.3	203.2	257.1	311.0	364.9	418.8	472.7	526.6
78	42.0	95.9	149.8	203.7	257.6	311.5	365.4	419.3	473.2	527.1
79	42.6	96.5	150.4	204.3	258.2	312.1	366.0	419.9	473.8	527.7
80	43.1	97.0	150.9	204.8	258.7	312.6	366.5	420.4	474.3	528.2
81	43.7	97.6	151.5	205.4	259.3	313.2	367.1	421.0	474.9	528.8
82	44.2	98.1	152.0	205.9	259.8	313.7	367.6	421.5	475.4	529.3
83	44.7	98.6	152.5	206.4	260.3	314.2	368.1	422.0	475.9	529.8
84	45.3	99.2	153.1	207.0	260.9	314.8	368.7	422.6	476.5	530.4
85	45.8	99.7	153.6	207.5	261.4	315.3	369.2	423.1	477.0	530.9
86	46.4	100.3	154.2	208.1	262.0	315.9	369.8	423.7	477.6	531.5
87	46.9	100.8	154.7	208.6	262.5	316.4	370.3	424.2	478.1	532.0
88	47.4	101.3	155.2	209.1	263.0	316.9	370.8	424.7	478.6	532.5
89	48.0	101.9	155.8	209.7	263.6	317.5	371.4	425.3	479.2	533.1
90	48.5	102.4	156.3	210.2	264.1	318.0	371.9	425.8	479.7	533.6

(cont'd)



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Table 3.1.12.3, cont'd

km/hr (km)	0	100	200	300	400	500	600	700	800	900
	Knots (nautical miles)									
91	49.0	102.9	156.8	210.7	264.6	318.5	372.4	426.3	480.2	534.1
92	49.6	103.5	157.4	211.3	265.2	319.1	373.0	426.9	480.8	534.7
93	50.1	104.0	157.9	211.8	265.7	319.6	373.5	427.4	481.3	535.2
94	50.7	104.6	158.5	212.4	266.3	320.2	374.1	428.0	481.9	535.8
95	51.2	105.1	159.0	212.9	266.8	320.7	374.6	428.5	482.4	536.3
96	52.7	105.6	159.5	213.4	267.3	321.2	375.1	429.0	482.9	536.8
97	52.3	106.2	160.1	214.0	267.9	321.8	375.7	429.6	483.5	537.4
98	52.8	106.7	160.6	214.5	268.4	322.3	376.2	430.1	484.0	537.9
99	53.4	107.3	161.2	215.1	269.0	322.9	376.8	430.7	484.6	538.5

Example of use of table

Given:

Speed-480 km/hr

Solution:

Pattern 400

Answer:

258.7 knots



80 → 258.7

Determine:

Speed in knots

Conversion of kilometers into nautical miles is carried out in a similar way.

(cont'd)



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PREPARATION FOR FLIGHT - Calculation of Flight Data

3.1.12.4. Conversion of Meters into Feet (Table 3.1.12.4)

Table 3.1.12.4

Meters (units)	Feet	Meters (tens)	Feet	Meters (hundreds)	Feet	Meters (thousands)	Feet
1	3.2808	10	33	100	328	1000	3281
2	7	20	66	200	656	2000	6562
3	10	30	98	300	984	3000	9842
4	13	40	131	400	1312	4000	13123
5	16	50	164	500	1640	5000	16404
6	20	60	197	600	1968	6000	19685
7	23	70	230	700	2297	7000	22966
8	26	80	262	800	2625	8000	26246
9	30	90	295	900	2953	9000	29527
						10000	32808
						11000	36089
						12000	39370
						13000	42650

Example of use of table

Given:

Altitude-4325 m

Solution:

4000 m = 13123 ft

300 m = 984 ft

20 m = 66 ft

5 m = 16 ft

Total = 14189 ft

Answer:

14189 ft

Determine:

Altitude in feet (ft)

(cont'd)



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3.1.12.5. Conversion of Feet into Meters (Table 3.1.12.5)

Table 3.1.12.5

Feet (units)	Meters	Feet (tens)	Meters	Feet (hundreds)	Meters	Feet (thousands)	Meters
1	0.3048	10	3	100	30	1000	305
2	0.6	20	6	200	61	2000	610
3	0.9	30	9	300	91	3000	914
4	1.2	40	12	400	122	4000	1219
5	1.5	50	15	500	152	5000	1524
6	1.8	60	18	600	183	6000	1829
7	2.1	70	21	700	213	7000	2134
8	2.4	80	24	800	244	8000	2438
9	2.7	90	27	900	274	9000	2743
						10000	3048

Feet (thousands)	Meters	Feet (thousands)	Meters	Feet (thousands)	Meters
11000	3353	21000	6401	31000	9449
12000	3658	22000	6706	32000	9754
13000	3962	23000	7010	33000	10058
14000	4267	24000	7315	34000	10363
15000	4572	25000	7620	35000	10668
16000	4877	26000	7925	36000	10973
17000	5182	27000	8230	37000	11278
18000	5486	28000	8534	38000	11582
19000	5791	29000	8839	39000	11887
20000	6096	30000	9144	40000	12192
				41000	12497
				42000	12802

Example of use of table

Given:

Altitude-30245 ft

Solution:

30000 ft = 9144 m

200 ft = 61 m

40 ft = 12 m

5 ft = 2 m

Total = 9219 m

Answer:

9219 m

Determine:

Altitude in meters (m)

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Calculation of Flight Data

3.1.12.6. Conversion of Barometric Pressure in mm Hg into Millibars (Table 3.1.12.6)

Table 3.1.12.6

mm Hg	mb	mm Hg	mb	mm Hg	mb	mm Hg	mb	mm Hg	mb
684	912	711	948	741	988	771	1028	801	1067
685	913	712	949	742	989	772	1029	802	1069
686	914	713	950	743	990	773	1030	803	1070
687	916	714	952	744	992	774	1032	804	1071
688	917	715	953	745	993	775	1033	805	1073
689	918	716	954	746	994	776	1034	806	1074
690	920	717	955	747	996	777	1036	807	1075
691	921	718	957	748	997	778	1037	808	1077
692	922	719	958	749	998	779	1038	809	1078
693	923	720	960	750	1000	780	1040		
694	925	721	961	751	1001	781	1041		
695	926	722	962	752	1002	782	1042		
696	928	723	964	753	1004	783	1044		
697	929	724	965	754	1005	784	1045		
698	930	725	966	755	1006	785	1046		
699	932	726	968	756	1008	786	1048		
700	933	727	969	757	1009	787	1049		
701	934	728	970	758	1010	788	1050		
702	936	729	972	759	1012	789	1052		
703	937	730	973	760	1013	790	1053		
704	938	731	974	761	1014	791	1054		
705	940	732	976	762	1016	792	1056		
706	941	733	977	763	1017	793	1057		
707	942	734	978	764	1018	794	1058		
708	944	735	980	765	1020	795	1060		
709	945	736	981	766	1021	796	1061		
710	946	737	982	767	1022	797	1062		
		738	984	768	1024	798	1064		
		739	985	769	1025	799	1065		
		740	986	770	1026	800	1066		

3.2. PRE-FLIGHT CHECK

3.2.1. General

- (1) The airplane walkaround check on the route shown in Fig. 3.2.1 is carried out only by the Flight Engineer. In this period of time the Captain is being briefed on the weather condition and receives final instructions for flight, and the Copilot supervises the airplane loading and checks the CG position.
- (2) Before the walkaround check the Flight Engineer must make sure the following documents are aboard the airplane:
 - (a) Certificate of Airworthiness
 - (b) Certificate of Aircraft Registration
 - (c) Flight Manual
 - (d) Aircraft Flight Log (check the entry on the flight recorder tape reserve)
 - (e) Sanitary Log
 - (f) Report on compliance of the preflight maintenance performed with the requirements and presence of the service life reserves of the airframe and the engines sufficient for the anticipated flight.

3.2.2. Walkaround Check. Flight Engineer's Checklist

Inspection area/topic	Required action/acceptable condition
Areas in front of engines and LG wheels*	Free from rocks, and from snow and ice in winter
Fire-fighting means	Prepared and placed near aircraft
Covers, blanks, shields, protective shrouds	Removed
Airplane outer surfaces	Free from damage, ice, snow and frost
APU air intake and exhaust doors**	Completely closed

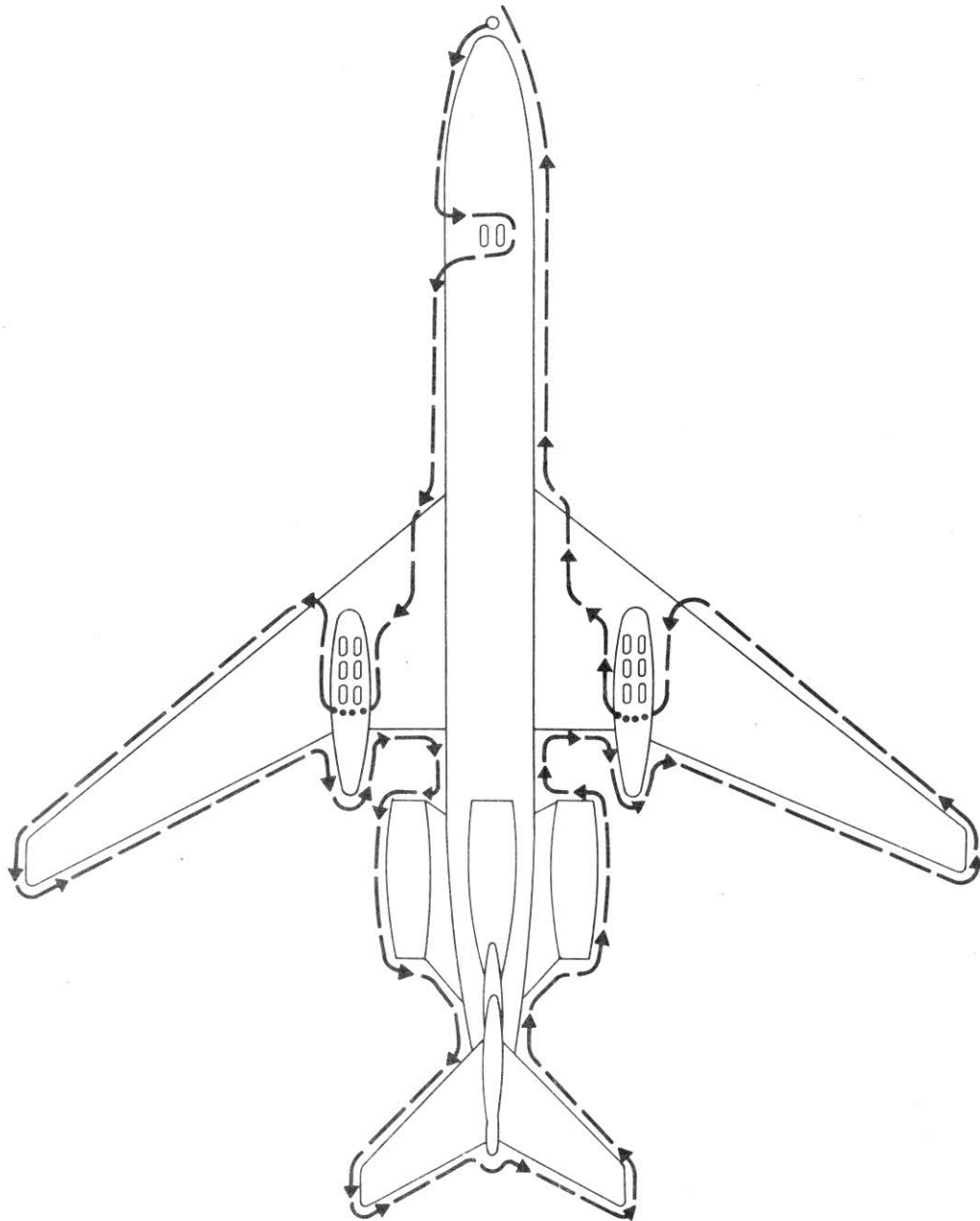
* To be performed only in foreign airports.

** To be performed only at the base airport.

(cont'd)

Inspection area/topic	Required action/acceptable condition
Passengers' and crew's entrance doors, emergency exits doors and centre buffet/galley emergency exit door	Closed
Engines nacelles (inspected from the ground)	Free from visible damage
Engines cowlings and fuselage area near APU	Free from fuel and oil leaks
(1) Nose LG well. Wheels and tyres	Wheels reliably attached, tyres free from turning and damage. Deflection of tyres: - 30 to 55 mm with gross weight within takeoff range of weight - 25 to 50 mm with gross weight within landing range of weight
Hydraulic units, pipes, hoses	Free from damage and leaks of hydraulic fluid
Shock strut	Visible shock strut piston exposed surface is at least 35 mm long at maximum taxi weight
(2) Main LG wells. Wheels, tyres	Hubs free from dents and tyres free from turning on hubs. Tyres free from damage. Deflection of tyres: - 60 to 75 mm with gross weight within takeoff range of weight - 40 to 60 mm with gross weight within landing range of weight
Brake disks	Tolerated wear (as shown by indicator pin)
Shock strut and hydraulic pipes	Free from leaks of hydraulic fluid. Shock strut normally charged as shown by its compression.

(cont'd)



Walkaround Check Route

Figure 3.2.1

(cont'd)

Inspection area/topic	Required action/acceptable condition
(3) Areas of installation of airframe systems unit	Visible shock strut piston exposed surface at least 40 mm long at maximum taxi weight
Areas of installation of fuel tanks, fuel system units and pipes	Free from leaks of fuel
Pressure fueling connection and control panel covers	Closed, switched off
Draining of fuel from fuel system drain points and absence of water and mechanical impurities	Check
Overwing fueling filler neck plugs if fuel has been filled through filler neck with Flight Engineer present	Closed
Oxygen pressure relief connection	Check for presence of blue disc

3.2.3. Internal Check. Checklists

3.2.3.1. Captain's Checklist

Inspection area/topic	Required action/acceptable condition
Reports on airplane and crew readiness for flight	Receive
Individual peculiarities of airplane, equipment and instrumentation	Familiarize with
Flight documentation	Check
IFF transponder codes	Obtained
Flight compartment, glazing	Inspect
Calculations of CG position, maximum allowable takeoff weight, speeds V_1 , V_R , V_2 , V_3 and V_4 , landing weight and landing approach speed	Check

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Pre-Flight Check

Inspection area/topic	Required action/acceptable condition
Seat	Intact. Adjust to own stature
Left-side console equipment and instrumentation	Check
Parking brake	Applied
Direct vision window open/closed position	Check
Aileron, rudder and elevator trim tabs control switches	Neutral
Elevator trim tab emergency control switch	Closed with guard
HOR STAB (СТАБИЛИЗАТОР) selector switch	Set neutral and closed with guard
HOR STAB SELECT (ЗАДАТЧИК СТАБИЛИЗАТОРА) selector switch	Set in accordance with actual CG position
SLATS (ПРЕДКРЫЛКИ) selector switch	OFF (ВЫКЛ) and closed with guard
Spoilers	Retracted, control handle locked in zero position
FLAPS (ЗАКРЫЛКИ) control handle	In zero position
Flap operation mode selector switch	AUTO (АВТ)
WHEEL STEER (РАЗВОРОТ КОЛЕСА) switch	OFF (ВЫКЛ)
WHEEL STEER 10 DEG - 63 DEG (РАЗВОРОТ КОЛЕСА 10° - 63°) selector switch	63 DEG
EMERGENCY BRAKES (ТОРМОЗА АВАРИЙНЫЕ) control handles	Check for easy and smooth travel
EMER BRAKE (АВАРИЙНОЕ ТОРМОЖЕНИЕ) hydraulic accumulator pressure	200 to 220 kgf/sq.cm
БКО oxygen mask	Check for intact condition
Smoke goggle	At hand

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Pre-Flight Check

Inspection area/topic	Required action/acceptable condition
MICROPHONE (МИКРОФОН) selector switch	HEADSET (ГЧМ)
All light indicators and station lighting	Test
PEDAL ADJUST (РЕГУЛИРОВКА ПЕДАЛЕЙ) selector switch	Operate to adjust pedals position to own stature

3.2.3.2. Copilot's Checklist

Inspection area/topic	Required action/acceptable condition
Individual peculiarities of airplane	Familiarize with
Flight documentation	Check
Takeoff weight and CG position	Refine
Right-side console equipment and instrumentation	Check
Seat	Intact. Adjust to own stature
БКО oxygen mask	Check
Smoke goggle	At hand
Portable oxygen unit with smoke mask	At hand
Direct vision window open/closed position	Check
LG (ШАССИ) control handle	Set neutral and locked
LG emergency extension handle	At lower position and sealed
LG standby emergency extension switch	Closed with guard and sealed
Correction charts to airspeed indicators, altimeters and magnetic compass	Available
MICROPHONE (МИКРОФОН) selector switch	HEADSET (ГЧМ)
Aircraft clock	Check for correct reading

(cont'd)

Inspection area/topic	Required action/acceptable condition
Internal and external indication and warning devices	Test
Station lighting	Test
Elevator trim tab control system	Test
Readiness for flight	Report to Captain

3.2.3.3. Flight Engineer's Checklist

Inspection area/topic	Required action/acceptable condition
Individual peculiarities of airplane noted in Flight Log	Familiarize with
Airplane serviced condition	Check documentation to make sure
Entrance, service and emergency exit doors, emergency exit hatches	Intact, doors rubber seals free from damage, locks operate reliably, locks and latches in flight positions
CAUTION: CLOSE THE DOORS ONLY FROM INSIDE.	
Flight compartment	Clean and free from foreign objects. Canopy free from damage and clean
Portable fire extinguishers	In position and sealed
Oxygen system	Charged
EKO oxygen mask	Check for intact condition
Smoke goggles	Check if available
LG main control handles	Neutral and locked
LG emergency extension handle	At lower position and sealed
LG standby emergency extension handle	Closed with guard and sealed
Hydraulic systems 2 and 3 electrically-driven pumping units, nose LG steering, servo hydraulic power supply YAW (K/PC), ROLL (K/PEH), PITCH (TAHTAM) switches	OFF (ВЫКЛ)

(cont'd)

Inspection area/topic	Required action/acceptable condition
All circuit breakers on LH and RH CB panels	Closed
All electrical power loads switches	OFF (ВЫКЛ)
All controls and indicators	At initial condition
Seat	Check for intact condition and reliable locking
Seat belts	Check for intact condition
Output voltage of storage batteries	Check
MICROPHONE (МИКРОФОН) selector switch	HEADSET (ИЧМ)
Give an order: "Connect ground power source" or "Start APU"	
Voltage in 27 VDC, 200 VAC and 36 VAC mains	Check and report to crew: "Electric power on"
Cooling (in summer) or heating (in winter) of passenger compartments by ground air conditioner or APU	Switch on if required
Door heating system	Switch on at subzero ambient temperatures
Fuel supply	Adequate for flight mission
Oil quantity in engines oil tanks	Read oil contents gauges to make sure it is OK
Engines EGT and vibration indicators	Check for serviceability
Fuel quantity indicator, fuel management system and fuel pumps	Check for serviceability
Fuel flowmeter	Set actual fuel supply
Air conditioning system	Prepare for use
Landing gear and flap position indication panel	Test by depressing the LAMP TEST (КОНТРОЛЬ ЛАМП) button

(cont'd)

Inspection area/topic	Required action/acceptable condition
All light indicators and annunciators on Flight Engineer's instrument panel	Test by depressing the LAMP TEST (КОМПОНЬ ЛАМП) button
Flight data recorder	Switched on for warming up, necessary data inserted
Electrically-driven hydraulic pumping units	Check for serviceability
Hydraulic fluid level in hydraulic systems reservoirs	Check
Doors, locks and latches	Read annunciators to make sure they are in closed position
AUTO-MAN (АВТОМАТ-РУЧНОЕ) selector switch	AUTO (АВТОМАТ)
Hydraulic fluid level in hydraulic reservoirs	Normal
Hydraulic power systems pressures	200 to 220 kgf/sq.cm
Fuel system automatic controls	Test
Icing detector	Switch on
Anti-icing system	Switch on, if required
Air conditioning system	Switch on, pressure of 650 mm set
Oxygen system	Switch on
Readiness for flight	Report to Captain

(cont'd)



FLIGHT MANUAL

PREPARATION FOR FLIGHT - Pre-Flight Check

3.2.4. Before Starting Engines. Checklists

3.2.4.1. Captain's Checklist

Inspection area/topic	Required action/acceptable condition
Cockpit voice recorder	Switch on
Instrument panels, initial readings of instruments	Check
Left FDI, gyro horizon, turn indicator, attitude monitor, AAT attitude indicators	Test, align marks
Spoilers, annunciators	Check
Throttle levers	IDLE (МАЛЫЙ ГАЗ)
Thrust reverser	Retracted
Horizontal stabilizer indicator reading	0°
Artificial feel units (EL T.O. LAND, RUD T.O. LAND (БЗЛЕТ ИОС РВ, БЗЛЕТ ИОС РН) annunciators)	Check
Trim actuators (roll, yaw, pitch) neutral	Functionally check
Attitude monitor and GPWS indicators	Test
Instrumentation panels lighting and navigation lights (by night)	Test
Crewmember's reports on readiness for flight	Receive
Engines	Start in accordance with instructions of subsection 8.1.2

(cont'd)

3.2.4.2. Copilot's Checklist

Inspection area/topic	Required action/acceptable condition
Compass system latitude selector	Set to MAN (PYQH), operate to insert airplane fix latitude
Compensator, navigation computer correction selector, BOM and BMO altimeters	Set to zero
VOR radiomagnetic indicator	Select to ADF mode
ILS mode selector	Select to CH-50 (ILS)
LH FDI, RH FDI, attitude monitor, AFCS, autopilot system, reference vertical gyro, ATP gyro horizon, compass system, air data computer, intercom, P/A system, cockpit voice recorder	Make sure these units and systems are switched on
Intercom, audio system, VHF 1 and VHF 2	Functionally check
Readiness for starting engines	Report to Captain

3.2.4.3. Flight Engineer's Checklist

Inspection area/topic	Required action/acceptable condition
Longitudinal controllability augmentation system	Switch on
Electric power	Connected
Doors and hatches annunciators	Check
Fire protection system	Switch on
Vibration meter and EGT indicator	Switch on
Fuel quantity indicator, fuel management system, fuel pumps	Switch on
Fuel shutoff valves	Open

(cont'd)



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PREPARATION FOR FLIGHT - Pre-Flight Check

Inspection area/topic	Required action/acceptable condition
Fuel flowmeter	Switch on
EMER BRAKE (АВАРИЙНОЕ ТОРМОЖЕНИЕ) pressure gauge reading	150 kgf/sq.cm, min
APU and air bleed valve	Open
Engines starting panel	Prepare*
Throttle levers	IDLE (МАЛЫЙ ГАЗ)
HP fuel shutoff valves levers	CLOSED (ЗАКРЫТ)
Readiness for starting engines	Report to Captain

3.2.5. Preparation for Taxiing. Checklists

3.2.5.1. Captain's Checklist

Inspection area/topic	Required action/acceptable condition
Pressures in hydraulic power systems 1, 2, 3 and EMERGENCY BRAKING (АВАРИЙНОЕ ТОРМОЖЕНИЕ) hydraulic accumulator	Check
Flight controls	Functionally check being powered by all hydraulic power systems in turn
Trim tabs	Neutral
All electrical loads	On
Direct vision windows	Closed

3.2.5.2. Copilot's Checklist

Inspection area/topic	Required action/acceptable condition
AAT, turn indicator, radio altimeter, VHF, МИКРОН HF radio set, weather radar	Make sure these units and systems are on
VOR/ILS, DME	Switch on

(cont'd)

Inspection area/topic	Required action/acceptable condition
Doppler radar, compass system, ADF, navigation computer, air data computer	Switch on, functionally check
Aerodrome reported pressure and readouts of altimeters	Compare
Readiness for flight	Report to Captain

3.2.5.3. Flight Engineer's Checklist

Inspection area/topic	Required action/acceptable condition
Starting panel	Switches at initial position, panel closed
Generators	Switch on
36 VAC transformers	Check
Engines instruments readings	OK
Drain nozzles of central buffet/galley and rear lavatory	Switch on

Ty-154M

Section 4

NORMAL PROCEDURES



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FLIGHT MANUAL

NORMAL PROCEDURES - Taxiing

4.1. TAXIING

4.1.1. General

- (1) While taxiing it is allowed to control the airplane from the LH or RH pilots' stations with the flight crew complete.
- (2) Before taxiing, perform all the operations listed in the "Before taxiing" checklists (Ref. 3.2.5) and the "Before taxiing" section (Ref. paragraph 4.8.2.2.) of Procedures.
- (3) During taxiing in an area where obstacles may be encountered, to improve vision open both direct vision windows of the flight compartment and watch the wings to prevent their contact with the obstacles. Perform all the operations listed in the "During taxiing" section of the Procedures (Ref. paragraph 4.8.2.3).
- (4) The crewmembers must report obstacles they see within the airplane taxiing area. The Flight engineer monitors the operation of the engines and the airframe systems.

4.1.2. Taxiing Procedure

- (1) Before initiation of taxiing, release the parking brake.
- (2) After the airplane breaks away, during straightforward movement, switch on the nose LG steering system and select its mode selector switch to the taxiing mode whose onset is indicated by coming-on of the 63 DEG STEER (PA3BOPOT 63°) annunciator.

CAUTION: NEVER STEER THE NOSE LG BY MEANS OF THE STEERING SYSTEM IN STATIONARY CONDITION, BEFORE THE AIRPLANE BREAKS AWAY.

- (3) After the airplane begins rolling, test first the main and then the emergency brakes, both by the pilot's and copilot's controls. If, upon application of the main brakes, braking proves to be ineffective, immediately apply the emergency brakes until the airplane comes to a complete standstill, and shut down the engines.

CAUTION: NEVER USE THE MAIN AND THE EMERGENCY BRAKES SIMULTANEOUSLY.

- (4) As a rule, taxi with the engines running at idle. Operation of the engines at the compressor air bleed valves operation speeds (76.5 to 80 %) is NOT RECOMMENDED.
- (5) Fuel used on the ground for starting the engines and taxiing is 500 kg. For the purpose of fuel economy it is allowed to taxi after landing with one engine No. 2 operating.

(cont'd)

- (6) The maximum taxi speed on a dry taxiway is 30 km/hr, that, with the taxiway covered with a layer of precipitation, is 15 km/hr.
- (7) Neither taxi with the wing high-lift devices extended except for taxiing to the parking area after landing in icing conditions, on a runway covered with snow or dirt, nor use reverse thrust before the airplane comes to a complete standstill.

4.1.3. Ground Maneuvering

- (1) The minimum allowable radius of turn is 7 m, the radius being measured from the main LG bogie located inside the turn path (Ref. Fig. 4.1.1).

At the minimum allowable radius of turn the least radius of the nose LG wheels rolling path is 23 m.

- (2) The airplane needs a taxiway, 45 m wide, to turn through 180°. In case of necessity to turn on a taxiway, less than 44 m wide, it is allowed to slightly apply the brakes of the inside LG bogie wheels.

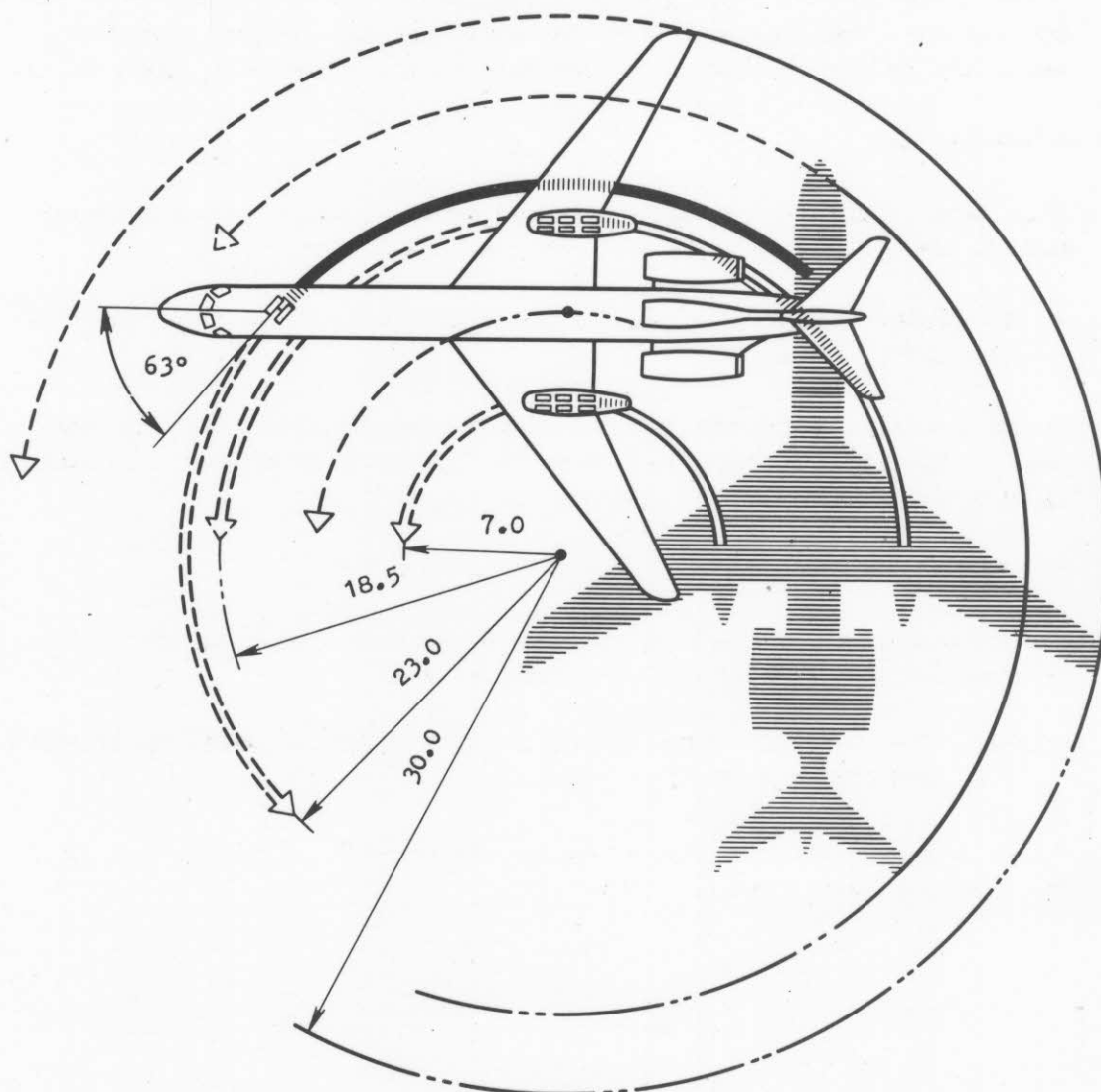
Pivoting about one stationary LG bogie is FORBIDDEN.

- (3) During taxiing avoid sharp movements of the nose LG steering wheel to avoid application of excessive loads to the nose LG.

CAUTION: NEVER SHARPLY APPLY BRAKES IN TURNS TO AVOID DAMAGE TO THE NOSE LG STEERING MECHANISM.

- (4) Before the airplane comes to a complete standstill, align the nose LG wheels with the airplane centerline.

(cont'd)



Radii of Airplane Path Most Remote Points
in Turn Without Application of Brakes , m

Figure 4.1.1

— oOo —

4.2. TAKEOFF

4.2.1. General

- (1) Execute takeoff with flaps 28° or 15° . Select the flap setting angle basing on the calculated flight data (Ref. paragraph 3.1.5).
- (2) Before takeoff, switch on the pitot tubes heaters not later than 1 minute before initiation of the takeoff run at overzero ambient temperatures and not later than 3 minute before initiation of the takeoff run at zero and subzero ambient temperatures.

CAUTION: IN CASE OF DELAY AT THE HOLDING POSITION EXCEEDING 10 MINUTES, SWITCH OFF THE PITOT TUBE HEATER (TO COOL IT DOWN) AND SWITCH IT ON AGAIN 3 MINUTES BEFORE INITIATION OF THE TAKEOFF RUN.

- (3) Switch on the glazing heaters at LOW (СЛАБО).
- (4) Before takeoff the crew must perform all the operations listed in the "At holding position", "At lineup position" sections of the Procedures (Ref. paragraphs 4.8.2.4 and 4.8.2.5).

4.2.2. Normal Takeoff

4.2.2.1. Takeoff Run and Climbout to 10 m

- (1) The crew's actions during takeoff are covered in the "Takeoff run and climbout to 10 m" sequence diagram.
- (2) NEVER initiate takeoff with the NOT READY FOR TO (К ВЗЛЕТУ НЕ ГОТОВ) annunciator illuminating.
- (3) If setting of the throttle levers to TAKEOFF (ВЗЛЕТНЫЙ РЕЖИМ) causes continuous sounding of the horn, the Captain gives an order STOP and aborts takeoff.
- (4) If the NOT READY FOR TO (К ВЗЛЕТУ НЕ ГОТОВ) annunciator comes on in the course of takeoff run, the Captain must do the following:

Abort takeoff at speeds equal to or less than V_1 .

Continue takeoff at speeds above V_1 .

At traffic altitude, depending on the reason for coming-on of the NOT READY FOR TO (К ВЗЛЕТУ НЕ ГОТОВ) annunciator, take a decision either to continue mission or land on the departure aerodrome.

(cont'd)

- (5) During takeoff from a wet, ice, snow-or slush-covered runway, bear in mind that the airplane cannot be held stationary by the wheel brakes after the engines have accelerated to takeoff power, therefore one must not attempt to hold it stationary by the wheel brakes. Accelerate the engines to takeoff power in the course of takeoff run, after the airplane breaks away.
- (6) Due to a high position of the airplane nose during takeoff (particularly during takeoff with the flaps 15°) and a necessity to closely maintain the airplane speed and attitude, proceed to IFR flying beginning with the moment when rotation speed V_R is attained until the wing high-lift devices are retracted.
- (7) After lift-off, do not brake the wheels as they are braked automatically.

(cont'd)

(8) Crew's actions during normal takeoff

Takeoff run and climbout to 10 m

Captain	Copilot	Flight engineer
At the lineup position calls "Request takeoff clearance" After receiving takeoff clearance calls "Takeoff power, hold throttles" Switches on the external lights at night or in adverse ornithological condition	Reports readiness to take off to the start controller Requests takeoff clearance	Smoothly and synchronously advances the throttle levers to a position of 0.4 maximum continuous within a period of time of 3 to 5 s Checks the compressor air bleed valves for closing (the BLEED VALVES (КЛАПАНА ИЗПЕ-ИЛСКА) annunciators must go out. Calls "Compressor air bleed valves closed" Makes an interval of 2 to 3 seconds and advances the throttle levers to TAKEOFF (ВЗЛЕТНЫЙ РЕЖИМ) Makes sure the engines and airframe systems

(cont'd)

Captain	Copilot	Flight engineer
Starts the clock Warns the crew: "Takeoff, next check (V_1)" Releases the wheel brakes, maintains the direction of the air- plane movement aligned with the runway center- line (during takeoff by night refers to the run- way lights line) by the steerable nose LG with further transition to the rudder control Calls "Continue takeoff", if no reasons for abor- tion of takeoff are detected At speed V_R pulls the control column to rotate, pilots the airplane ac- cording to IFR Calls "Up gears" at a height not less than 3 m	Starts the clock Retains alertness to assume control Reports airplane de- viations from the run- way centerline, if any, to the Captain Monitors the speed and reports it every 20 km/hr Calls "Check" upon at- tainment of speed V_1 Calls "Rotate" upon attainment of speed V_R	operational parameters are within the speci- fied limits Adjusts the throttle lever brake Calls "Takeoff power, parameters OK, throttles held" Starts the clock Observes the engines and systems instru- ments and annunciators to monitor their ope- ration and reports malfunctions, if any, to the Captain

(cont'd)

Captain	Copilot	Flight engineer
Accelerates the airplane up to speed V_2 in climb-out to 10 m	Sets the LG control valve handle to retraction Calls "Safety speed" upon attainment of speed V_2	

4.2.2.2. Climb to Traffic Altitude

- (1) The crew's actions during takeoff are covered in the "Climb to traffic altitude" sequence diagram.
- (2) During takeoff by night, switch off and retract the lights at a height not less than 50 m. If clouds are present do the same before entering them.
- (3) Retract the wing high-lift devices using the joint control mode.
- (4) During takeoff with the flaps set to 28° retract them in two steps:
 - from 28° to 15° at a speed not less than 330 km/hr;
 - from 15° to 0° at a speed not less than 340 km/hr.

During takeoff with the flaps 15° retract them in one step.
- (5) During takeoff from an aerodrome having obstacles exceeding 120 m in height below the takeoff path, retract the wing high-lift devices and accelerate the airplane in accordance with the instructions of subsection 7.3.
- (6) At takeoff weights of 92,000 kg and less, it is allowed to reduce power (to a level not less than maximum continuous) at altitudes below the traffic altitude in order not to exceed the maximum speed limits.

(cont'd)

(7) Crew's actions during normal takeoff

Climb to traffic altitude

Captain	Copilot	Flight engineer
Continues acceleration in climb up to $V_2 + 40$ km/hr	Calls "Gears up" after retraction of the LG	Monitors the operation of the engines
Switches off and retracts the lights	Monitors the regime of climb and assists the Captain in piloting the airplane	
	Calls "Altitude 50"	
	Calls "Altitude 120"	
<u>During takeoff with flaps 28°</u>		
Increases the speed up to 330 to 340 km/hr		
Calls RETRACT FLAPS	Calls "Speed 330"	
Increases the speed up to 340 to 350 km/hr	Retracts the flaps from 28° to 15°	
<u>During takeoff with flaps 15°</u>		
Increases the speed up to 340 to 350 km/hr		
Calls "Retract flaps"	Calls "Speed 340"	
Relieves forces from the control column by trimming out the elevator	Retracts the flaps from 15° to 0° , retains alertness to act in case of malfunctions in the wing high-lift devices and the horizontal stabilizer	

(cont'd)

Captain	Copilot	Flight engineer
By the end of the flap retraction cycle accelerates the airplane up to a speed of 380 to 400 km/hr so as to avoid the airplane settling-in Increases the speed up to the selected speed in climb to the flight level Climbs up to the traffic altitude Executes maneuver required for entering the corridor In turn calls "Bank 15°" Monitors readings of the attitude indicators, altimeters and airspeed indicators Upon attainment of the traffic altitude and the selected speed, calls "Set maximum continuous"	Monitors retraction of the wing high-lift devices and at the end of the retraction cycle calls "Flaps and slats retracted, stabilizer zero" Sets the landing gear control valve neutral Selects the traffic controller communication frequency on the VHF transceiver control panel and reports takeoff Monitors maneuver of entering the corridor	Sets maximum continuous power on the engines and calls "Maximum continuous ready"

(cont'd)

Captain	Copilot	Flight engineer
In case of necessity calls "Switch on engine heaters, switch on anti-icing system"		Notes the time of engines operation at takeoff power Switches on the engine heaters Switches on the anti-icing system

4.2.3. Crosswind Takeoff

- (1) The maximum limit wind components are indicated in paragraph 2.2.3.
- (2) During crosswind takeoff run the airplane has a tendency to weathervane into the wind. Execute takeoff run with the control column pushed forward. Maintain the heading during takeoff run by appropriate application of the pedals.
- (3) Upon attainment of the rotation speed during takeoff run, set the pedals neutral simultaneously with pulling the control column. In this case the airplane lifts off with a wind correction angle established.
- (4) At the moment of lift-off and thereafter counteract possible rolling of the airplane due to the wind gust by appropriate application of the ailerons.
- (5) After lift-off and in climb, maintain the heading by establishing a wind correction angle.

4.2.4. Takeoff in Icing Conditions

In case of takeoff in icing conditions (clouds, fog, snowfall, rain or drizzle at ambient temperatures of +5 °C and below), switch on the anti-icing heaters at the following stages of flight:

The engines and air intakes heaters after starting the engines and setting idle.

The slats, horizontal stabilizer and wing heaters after lift-off.

(cont'd)

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4.2.5. Engine Failure during Takeoff

- (1) The engine failure at takeoff is indicated by decrease in the acceleration or by the signs of the engine failure described in 8.1.3(3).
- (2) Depending on the speed at which an engine failure is detected the Captain must proceed as instructed below:

Abort takeoff if an engine fails at a speed below V_1 .

Continue takeoff with one engine inoperative if it fails at a speed exceeding V_1 .

4.2.5.1. Aborted Takeoff

- (1) The crew's actions at an engine failure during takeoff are described in the "Aborted takeoff" sequence diagram.

CAUTION: BEFORE SHUTTING DOWN AN ENGINE, MAKE SURE THE FAILED ENGINE IS DETERMINED CORRECTLY IN ORDER NOT TO SHUT DOWN AN OPERATING ENGINE.

- (2) When the airplane moves on the runway covered with a layer of water or slush the aquaplaning mode may take place. At the aquaplaning onset speed (about 190 km/hr) the contact force between the tyres and the runway surface is lost, the efficiency of the brakes and the nose LG steering control decreases. The wheels anti-skid controls become inoperative in aquaplaning. In this condition one must apply the wheel brakes at speeds not exceeding 190 km/hr. In so doing, first apply the wheel brakes intermittently until the first indications of the anti-skid control operation (oscillations of the braking line pressure) are detected. Thereafter use vigorous braking. Actuation of the anti-skid controls indicates that the aquaplaning is absent or incomplete.
- (3) If a head-on collision with an obstacle is looming, the Captain must select the nose LG steering mode selector switch to 63° and divert the airplane from the obstacle by steering the nose LG. In case of necessity apply the emergency brakes.
- (4) If the central engine fails during takeoff run, the Flight engineer must switch on the electrically-driven pumping unit of hydraulic power system 2 without waiting for the Captain's order to ensure operation of the nose LG steering system.

(cont'd)

(5) Crew's Actions during Aborted Takeoff

Captain	Copilot	Flight engineer
Calls "Stop" Applies the brakes Sets all the throttle levers to the idling stop Deploys the thrust reversers and simultaneously calls "Thrust reversed"	Calls "Spoilers extended" after automatic extension of the inboard and mid-wing spoilers Reports aborted takeoff to the ATC service	Calls "Engine No. failed" or "Fire in engine nacelle No." In case of necessity shuts down the failed engine immediately Monitors the power-plant instruments readings In case of fire in an engine nacelle proceeds in accordance with the emergency procedure Turns on the LG VENTIL switch

4.2.5.2. Continued Takeoff

- (1) The crew's actions in case of an engine failure during takeoff are described in the "Continued Takeoff" sequence diagram.

CAUTION: DURING TAKEOFF FROM AN AERODROME HAVING OBSTACLES HIGHER THAN 120 M UNDER THE TAKEOFF PATH, RETRACT THE WING HIGH-LIFT DEVICES AND ACCELERATE THE AIRPLANE IN ACCORDANCE WITH THE INSTRUCTIONS OF SUBSECTION 7.3.

- (2) Retract the flaps intermittently or in several steps as the acceleration increases (Ref. Table 3.1.8.2).
- (3) Depending on the situation either proceed to enroute flight or land on the departure or the nearest aerodrome proceeding as instructed in paragraph 4.6.4.

(cont'd)

(4) Crew's actions during continued takeoff

Captain	Copilot	Flight engineer
Calls "Continuing takeoff" Counteracts the airplane turning tendency by appropriate applications of the rudder and the ailerons After attainment of V_R smoothly and continuously pulls the control column to initiate rotation Pilots the airplane to IFR After lift-off accelerates the airplane in climbout Calls UP GEARS Continues acceleration to V_2 in climb Maintains V_2, takeoff heading and a bank angle of 1 to 2° towards the operating engine up to an altitude of 120 m	Calls "Rotation" after attainment of V_R Selects the LG control valve to retraction Calls "Safety speed" after attainment of V_2 Calls "Gears up" after completion of the LG retraction Monitors maintenance of V_2 and when the speed decreases or	Calls "Engine No. failed" or "Fire in engine nacelle No." In case of necessity reduces power or immediately shuts down the failed engine In case of fire in an engine nacelle proceeds in accordance with the emergency procedure Monitors the power-plant instruments readings

(cont'd)

Captain	Copilot	Flight engineer
Switches off and retracts the lights Increases the speed in horizontal flight up to V_3 Calls "Retract flaps" In the course of flap retraction increases the speed up to V_4 Establishes climb At the traffic altitude calls "Shut down failed engine" Sets maximum continuous power on the operating engines	increases by 10 km/hr below or above V_2 calls "Low speed" or "High speed" Calls "Altitude 50" Calls "Altitude 120" Retracts the flaps and retains alertness to act in case of failures of the wing high-lift devices and the horizontal stabilizer Monitors retraction of the wing high-lift devices and upon its completion calls "Flaps and slats retracted, stabilizer zero" Assists the Captain in piloting the airplane according to his orders and monitors the flight conditions	Shuts down the failed engine and closes its fuel shutoff valve (if there was no need to do so earlier) and the air bleed valve. Calls "Engine No. shut down"

(cont'd)

Captain	Copilot	Flight engineer
Reports the engine failure and decision to continue flight to the ATC service		Switches off the failed engine generator

4.2.6. Noise-Abatement Takeoff Procedure

- (1) Execute takeoff run, lift-off and retraction of the LG in accordance with the instructions of paragraph 4.2.2. "Normal Takeoff".
- (2) After lift-off accelerate the airplane up to $V_2 + 20$ km/hr in the course of the LG retraction. In further climb maintain a speed equal to $V_2 + 20$ km/hr and take-off power.
- (3) At an altitude of 450 m or being 500 m short of the noise check point, reduce power to a level providing a rate-of-climb of 3 to 4 m/s.
- (4) After climbing above 900 m, advance power up to maximum continuous, in the course of acceleration retract the flaps at a speed of 330 to 340 km/hr and accelerate the airplane up to speeds recommended for climb.

NOTE: In some instances it is allowed to divert from the populated areas to obtain additional abatement of noise being not less than 100 m clear of the obstacles and banked not more than 15° .

4.3. CLIMB

4.3.1. General

- (1) The crew's actions in climb are described in the sequence diagram.
- (2) Climb at maximum continuous power.
- (3) Climb to the desired flight level with the AFCS operating in the manual control mode, speed or Mach number holding mode.
- (4) In the course of climb to the selected flight level the crew must perform all the operations listed in the "After crossing pressure selection altitude" checklist (Ref. paragraph 4.3.2).

CAUTION: NEVER CLOSE THE FLIGHT COMPARTMENT GLAZING FOR PROTECTION FROM SUN RAYS.

- (5) Crew's actions in climb

Captain	Copilot	Flight engineer
Calls "Set Pressure 760" Sets a pressure of 760 mm Hg to the altimeters Maintains the established regime of climb Calls "Control transferred". Listens to radio traffic	At the pressure selection altitude calls "Pressure Selection Altitude" Sets a pressure of 760 mm Hg to the altimeters Maintains command radio communication Reports about crossing pressure selection altitude to the ATC controller Calls "Control taken over" Maintains the selected regime of climb	Sets a pressure of 760 mm Hg to the altimeter Functionally checks the fuel system Selects the air conditioning system to the automatic mode of operation In steady climb, performs the operations listed in the "After crossing pressure selection altitude" checklist and reports to the Captain.

(cont'd)

Captain	Copilot	Flight engineer
Assesses air traffic situation Performs the operations listed in the "After crossing pressure selection altitude" checklist In steady climb warns the crew "Engaging autopilot" and does so Depresses the V button to hold the speed and depresses the M button at an altitude selected for holding the Mach number Monitors the heading established by the Copilot or flies the airplane himself. Reports reaching of the selected flight level to the ATC controller Gives an order to the Flight engineer to set power ensuring flight at a desired speed	Calculates the time of the waypoint flyover and reports it to the ATC controller Performs the operations listed in the "After crossing pressure selection altitude" checklist Monitors the regime of climb in the automatic mode of control by the autopilot or flies the airplane manually. Attentively listens to radio traffic and timely reports the selected parameters of flight to the ATC controller Monitors the regime of flight in altitude, heading, speed and freedom from bank Monitors the airplane position Writes down in the airplane Log the time of reaching the selected flight level, the	Monitors the operation of the engines and the airframe systems If the IGV ICING (ОБЛЕДЕНИЕ ВНА) or ICING (ОБЛЕДЕНИЕ) annunciators come on reports this condition, to the Captain and switches on the anti-icing system upon the Captain's order At an altitude of 2000 m opens the pressurization line valve which has been closed before takeoff At an altitude of 8400 to 8600 m checks the cabin pressure differential and calls "Pressure differential 0.59 established". Every 15 minutes of flight calls "Fuel system OK, in automatic mode. Fuel booster and transfer pumps on, kg of fuel in service tank" Upon the Captain's order sets cruising power on the engines and notes the time run at maximum continuous power Reports the fuel quantity and the hourly fuel consumption at the selected power setting

(cont'd)

Captain	Copilot	Flight engineer
Flies the airplane with the aid of the autopilot or monitors the automatic mode of control Switches off all the lighted signs except for the NO SMOKING (HE KVPMTb) lighted sign.	steady true airspeed, the fuel supply Upon the Captain's permission operates the TURN (PA3BOPOT) knob of the autopilot Calls "Rolling out to course, on course" during maneuver.	

4.3.2. "After Crossing Pressure Selection Altitude" Checklists

4.3.2.1. Captain's Checklist

Inspection area/topic	Required action/acceptable condition
Altimeters	Set a pressure of 760 mm Hg (1013 millibars) and check
AFCS	Functionally check
Autopilot	Prepare for engagement
Crew	Warn of the autopilot engagement

4.3.2.2. Copilot's Checklist

Inspection area/topic	Required action/acceptable condition
Attainment of pressure selection altitude	Report
Altimeters	Set a pressure of 760 mm Hg (1013 millibars) and check
Weather radar scope	Monitor location of thunderstorm cells

(cont'd)

4.3.2.3. Flight Engineer's Checklist

Inspection area/topic	Required action/acceptable condition
Altimeter	Set a pressure of 760 mm Hg and check

4.3.3. Regimes of Climb

(1) In accordance with the calculated flight data (Ref. paragraph 3.1.3) use the following modes for climb:

- The best-range cruise mode at an IAS of 550 km/hr up to an altitude of 9450 m, further on at a constant Mach number of 0.8.
- The high-speed cruise mode at an IAS of 575 km/hr up to an altitude of 9750 m, further on at a constant Mach number of 0.85.
- Upon reaching an altitude of the constant Mach number, continue climb at the constant selected Mach number, having selected the AFCS from the speed holding mode to the Mach number holding mode.

NOTES: 1. In case of emergencies it is allowed to use powers above maximum continuous (up to takeoff power inclusive) in climb and horizontal flight.

2. At ambient temperatures exceeding the standard temperatures by more than 10 °C, execute climb in the high-speed cruise mode at an IAS of 575 km/hr up to an altitude of 8850 m, further on at a constant Mach number of 0.8.

(2) The climb performance data are covered in subsection 7.4.

4.3.4. Climb in Turbulent Atmosphere

The regime of flight and piloting technique in turbulent atmosphere are covered in paragraph 4.4.5 "Peculiarities of Piloting in Turbulent Atmosphere and in Stalling".

4.3.5. Failure of Engine in Climb

(1) In case of failure of an engine in climb:

The Captain :

Prevents the airplane from turning and rolling, reduces the speed down to 440 km/hr. In case of necessity of Captain executes climb at the same speed up to an altitude of 8300 m, further on at a Mach number of 0.6.

(cont'd)

Depending on the situation continues enroute flying or executes landing on the departure aerodrome (or the nearest aerodrome) proceeding as instructed in paragraph 4.7.3.

The Flight Engineer :

Shuts down the failed engine upon the Captain's order.

CAUTION: BEFORE SHUTTING DOWN AN ENGINE, MAKE SURE THE FAILED ENGINE IS DETERMINED CORRECTLY IN ORDER NOT TO SHUT DOWN AN OPERATING ENGINE.

Closes the fuel shutoff valve and the air bleed valve of the failed engine.

Switches off the engine and air intake heaters of the failed engine.

- (2) The service ceiling of the airplane with two engines operating at maximum continuous power is indicated in subsection 7.8.

Execute turns in either direction at an airspeed of 440 km/hr, banked not more than 15°.

- (3) In case of failure of engine No. 2 or No. 3 the Flight Engineer must start the electrically-driven pumping unit of hydraulic power system 2 or 3, respectively, before landing to restore the serviceability of the hydraulic systems.



FLIGHT MANUAL

NORMAL PROCEDURES - Enroute Flight

4.4. ENROUTE FLIGHT

4.4.1. General

- (1) The crew's actions in enroute flight are described in the sequence diagram.
- (2) It is recommended to execute enroute flight at the speeds established for the best-range cruise mode (Ref. paragraph 4.4.2).
- (3) It is not allowed to execute enroute flight:

At speeds exceeding the maximum operational limit speed V_{MO} (Ref. subparagraph 2.5.4.1).

At speeds less than the minimum enroute safety speed depending on the altitude and the gross weight (Ref. subsection 7.8).

At altitudes above the maximum altitude of flight established for the gross weight (Ref. paragraph 2.2.2).

If required, power exceeds maximum continuous.

- (4) At the end of horizontal enroute segment, the crew must perform all the operations listed in the "Before descent" checklists (Ref. paragraph 4.5.2) and in the "Before descent" section of the detailed procedure (Ref. subparagraph 4.8.2.6).

For reducing fatigue and for prophylactic purposes, all the crewmembers are recommended to breathe oxygen under 100 % - flow condition or mixture for 10 min after every 2 hours of flight, if time in flight exceeds four hours.

(cont'd)

(5) Crew's Actions in Enroute Flight

Captain	Copilot	Flight engineer
From the Flight Engineer's report assesses the amount of fuel used after reaching the selected flight level and the hourly fuel consumption in steady conditions of flight Monitors operation of the automatic flight control system Establishes communication through the intercom Takes active part in operation of the navigation complex Fills in the flight mission form Monitors maintenance of the flight schedule using the enroute charts	Periodically checks the airplane position and maintains track on the established course Being 2 to 3 minutes short of a route crossing (convergent) area calls "Attention Route crossing (convergence) area in minutes" Being 5 to 10 minutes short of the waypoint at which the flight level is to "be changed, calls "Flight level change in minutes". Requests an ATC controller's clearance to change the flight level at the selected waypoint Proceeding from the actual fuel quantity refines the point of return to the destination aerodrome or possibility to reach the alternate aerodrome Monitors holding of the altitude, speed and heading when the	Receives the data on actual weather conditions and the hourly weather forecasts on the destination, alternate and other aerodromes Monitors operation of the engines and the airframe systems. Reports the cabin altitude and pressure differential to the Captain. Checks operation of the electric power sources every 15 minutes of flight and 15 minutes before landing Checks operation of the fuel system every 15 minutes and calls "Fuel system ok, in automatic mode, fuel transfer and booster pumps on, kg of fuel in service tank"

(cont'd)

Captain	Copilot	Flight engineer
	Captain transfers the control for a short period of time	Reports the hourly fuel consumption, fuel flow through the engines and fuel quantity every hour in flight Switches on the anti-icing system upon the Captain's order before entering clouds Monitors operation of the AFCS Inspects the passenger compartments upon the Captain's permission
10-15 minutes before initiation of descent calls "Begin preparation for landing. Report readiness at" (indicates time)	Refines the landing course proceeding from the actual weather conditions at the destination aerodrome	Prepares data on the weather conditions at the destination and alternate aerodromes, the runway condition and friction coefficient.
Performs the operations listed in the "Before descent" checklist	Performs the operations listed in the "Before descent" checklist	Performs the operations listed in the "Before descent" checklist
Mentally investigates the procedure of descent from the flight level	Refines the landing weather limits of the destination aerodrome Refines amount of fuel required for reaching the alternate aerodrome Fills in the landing form	Determines the fuel quantity and reports it to the Captain. Switches on the anti-icing system upon the Captain's order
Calls "Check"		
Replies to the checklist items	Replies to the checklist items	Reads the "Before descent" section of the checklist Answers the checklist items

(cont'd)

Captain	Copilot	Flight engineer
Switches on the FASTEN BELTS (ЗАСТЕЖИ РЕМНИ) and EXIT (ВЫХОД) lighted signs	1 to 2 minutes before the estimated time of descent initiation calls "Descent initiation at minutes" Requests an ATC controller's clearance to descent and, having obtained it, reports initiation of descent to an altitude of to the ATC controller. Calls "Estimated vertical speed of descent m/s"	

4.4.2. Enroute Flight Regimes

- (1) The enroute flight regime is established versus the selected Mach number or the selected speed through setting of a required power.
- (2) In scheduled operation of the airplane the most profitable enroute flight regime is determined by an optimum combination of the flight level and speed (Mach number) with the route length and the payload.
- (3) In the best-range cruise the speeds ensuring the maximum level of the specific range are maintained (Ref. Table 4.4.2.1).

(cont'd)

Best-Range Cruise Mach Number for Altitude and Gross Weight

Table 4.4.2.1

Weight, thousands of kg Flight level	98 to 94	94 to 90	90 to 86	86 to 82	82 to 78	78 to 74	74 to 70
390	-	-	-	0.81	0.81	0.805	0.8
370	0.815	0.815	0.81	0.81	0.805	0.8	0.79
350	0.81	0.81	0.81	0.805	0.8	0.79	0.78
330	0.805	0.8	0.795	0.785	0.775	0.765	0.755
310	0.79	0.785	0.775	0.765	0.755	0.74	0.73
290	0.775	0.765	0.75	0.74	0.73	0.71	0.7
270	0.75	0.74	0.73	0.715	0.7	0.69	0.67
250	0.72	0.71	0.7	0.69	0.675	0.66	0.65
230	0.69	0.68	0.67	0.66	0.65	0.63	0.62
200	0.64	0.63	0.62	0.61	0.6	0.58	0.575
140	0.56	0.555	0.55	0.545	0.535	0.53	0.52

(4) In the high-speed cruise the speeds close to the maximum ones are maintained:

IAS = 600 km/hr at flight levels up to 230

IAS = 575 km/hr at flight levels 230 up to 330

M = 0.87 at flight levels above 330

4.4.3. Peculiarities of Airplane Stability and Responses at High Altitudes, Speeds and Mach Numbers

(1) The control column forces vary slightly in the course of acceleration and must be completely relieved by trimming.

The airplane responses to control inputs are normal.

(2) Execution of turns at the maximum operating limit speeds and Mach numbers presents no problems.

(cont'd)

- (3) Within the Mach number range from 0.7 to 0.8 the airplane roll response to the rudder input is normal, at Mach numbers exceeding 0.895 the airplane shows a reverse roll response consisting in a changed response to the rudder input: upon application of the left pedal the airplane rolls right, upon application of the right pedal the airplane rolls left. In case of inadvertent overspeeding beyond a Mach number of 0.88, take measures to reduce the Mach number by reducing power.

Due to good lateral controllability of the airplane the reverse response does not practically involve difficulties in the airplane control.

4.4.4. Peculiarities of Airplane Stability and Responses at Low Speeds in Enroute Configuration

- (1) At all stages of flight do not allow the airspeed drop below the minimum limit speeds (Ref. subparagraph 2.5.4.2).

In case of inadvertent loss of speed the AAT warning system actuates. As this takes place, immediately take measures to increase the speed.

- (2) Execution of maneuvers at speeds exceeding the minimum limits by 20 - 30 km/hr requires increased alertness from the pilot. Execute a maneuver (turn, transition from descent to horizontal flight, etc) at the minimum possible load factors, using smooth movements of the controls and at bank angles not exceeding 20°.

4.4.5. Peculiarities of Airplane Piloting in Turbulent Atmosphere and during Stalling

- (1) Whenever the airplane enters an area of severe bumping (causing load factors exceeding 1.5), this event being indicated by sharp shaking and separate shocks, proceed as follows:

Establish an IAS of 500 km/hr or, at altitudes above 10,750 m - a Mach number of 0.8.

Discontinue the altitude holding mode if it has been on.

Fly with the controls semi-fixed.

Do not try to precisely maintain altitude and speed, fly the airplane referencing to average readouts of the gyro horizon, rate-of-climb indicator, airspeed indicator, altimeter and course indicators. In so doing, maintain the average values of the parameters of flight by smooth applications of the flight controls.

(cont'd)

Avoid pitching-up and any maneuvers involving bank angles in excess of 10 to 15°.

- (2) When being close to thunderstorm areas execute turns at Mach numbers not exceeding 0.8.

Having entered a severe updraft, try to maintain a selected pitch attitude indicated by the gyro horizon. If a severe shaking is experienced in this condition, push the control column without changing the power setting and see to it that thereafter the Mach number does not exceed 0.88 at altitudes above 10,300 m or the speed maximum operational limits (Ref. subparagraph 2.5.4.1) are not exceeded at lower altitudes.

In case of sharp descent of the airplane caused by a severe downdraft, do not prevent this descent, keep the controls at the initial (balanced) position and monitor the speed so as not to allow it exceed the operational limits.

- (3) With the airplane piloted correctly, its stalling is practically ruled out. But if it takes place (this condition being detected by the coming-on of the AAT warning system light, a speed drop below the minimum limit and vigorous pitching-up) immediately push the control column fully forward. After decreasing the angle of attack and increasing the speed up to a level exceeding the minimum limit speed by not less than 50 to 70 km/hr, establish horizontal flight. During stall recovery, avoid establishing excessive load factors (more than 1.2 to 1.3) to prevent repeated stalling.

If correct piloting is employed, loss in the altitude during stall recovery does not exceed 650 m.

- (4) If during flight in severe turbulence an unstable operation of the engine (engine stalls) is detected, which is accompanied by an engine speed drop, temperature rise and possible change in the engine noise pitch, the Flight engineer must closely watch variation of the engine operational parameters. If after the engine stalls it fails to return to normal operation, shut down the engine upon the Captain's order avoiding a temperature surge beyond the allowed limit.

After the airplane reaches the normal angles of attack, start the engine in accordance with the instructions of paragraph 8.1.2.

4.4.6. Flight with One Engine Inoperative

In case of failure of one engine in enroute flight, land on the departure or an alternate aerodrome or continue enroute flight up to the destination aerodrome, decision being dependent on the situation and instructions of the ATC service. In so doing, proceed as follows:

(cont'd)

Descend at the best-range cruise mode in accordance with the instructions of paragraph 4.5.3 (1) (with deceleration if speeds exceeding those of the best-range cruise mode have been used in enroute flight) down to the nearest flight level being within the limits of two-engine-operating service ceiling (Ref. subsection 7.8).

Continue enroute flight maintaining a constant Mach number of 0.7 at flight levels above 8750 m or an IAS of 500 km/hr at flight levels below 8750 m.

Descend down to the traffic altitude proceeding in accordance with the instructions of paragraph 4.5.3 (7).

Land as directed in paragraph 4.6.4.

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FLIGHT MANUAL

NORMAL PROCEDURES - Descent

4.5. DESCENT

4.5.1. General

- (1) The crew's actions in execution of descent are described in the sequence diagram.
- (2) Execute normal descent with all the engines running at idle.

CAUTION: WITH THE AIR BLEED FOR AIR CONDITIONING AND THE ANTI-ICING SYSTEM ENGAGED, IT IS PROHIBITED TO DECREASE THE ENGINE POWER RATING BELOW 62 % HP COMPRESSOR TO AVOID DISENGAGEMENT OF THE CSD UNIT.

- (3) Determine the descent initiation moment using the instructions of paragraph 7.6.1 for a selected mode of descent.
- (4) At the end of descent, the crew must perform all the operations listed in the "After selection of aerodrome pressure" section of the checklist (Ref. subparagraph 4.8.2.7).

(cont'd)

(5) Crew's actions in descent

Captain	Copilot	Flight engineer
Having obtained the ATC controller's clearance to descend calls "Initiating descent" Sets the throttle levers to IDLE (МАЛЫЙ ГАЗ) and establishes descent at a selected vertical speed If it is decided to descend in the automatic mode calls "Control through autopilot" Executes descent at the selected airspeeds Sets the spoiler position depending on the regime of descent Corrects the vertical speed of descent depending on the distance to the aerodrome Maintains the established regime of flight beginning with the speed limiting threshold. Calls "Test radio altimeter" Functionally checks the radio altimeter	Observes the instruments to monitor descent in automatic mode or, upon the Captain's order, pilots the airplane according to IFR and selected parameters In reaching the flight level established by the ATC controller, calls "Selected flight level" Checks the distance to aerodrome, introduces corrections to the regime of descent After crossing the flight level closest to the selected one warns the Captain of this condition and reports it to the ATC controller When approaching the speed limitation altitude, warns the Captain. Uses the weather radar to watch thunderstorm cells and receives an ATC controller's approval of the diversion route. Depresses the TEST (КОМПРОБ) button and checks the radio altimeter	Monitors operation of the engines and the airframe systems Monitors variation of the cabin altitude (a rate-of-descent not more than 3 m/s, the pressure differential decreases)

(cont'd)

Captain	Copilot	Flight engineer
Continues descent in the manual control mode down to the pressure selection altitude. At the pressure selection altitude calls "Control taken over" Smoothly establishes horizontal flight, retracts the spoilers and calls "Set pressure" Sets the aerodrome pressure to the altimeters Monitors the altitude of flight read by the Copilot's altimeter Calls CHECK Replies to the check-list items	Reports altitude of flight and landing approach mode to the traffic controller. Receives from the traffic controller the data on aerodrome pressure, the pressure selection flight level and clearance to landing approach, and reports these to the Captain. Calls "Control transferred" Sets the aerodrome pressure and calls "Pressure set". Monitors the altitude of flight read by the Captain's altimeter. Reports the pressure set to the altimeters to the ATC controller Replies to the check-list items	Sets the aerodrome pressure to the altimeter Reads out the "After selection of aerodrome

(cont'd)

Captain	Copilot	Flight engineer
Continues descent to the traffic altitude at a vertical speed of 5 to 7 m/s in the direction indicated by the Copilot or the ATC controller and, in case of necessity, executes maneuver required for diversion from thunderstorm cells	Monitors the distance to runway and lateral deviation	pressure" section of the checklist Replies to the checklist items Monitors the engine and aircraft systems operational parameters

4.5.2. "Before Descent" Checklists

4.5.2.1. Captain's Checklist

Inspection area/topic	Required action/acceptable condition
Weather at destination and alternate aerodromes	Familiarize with
Descent and landing approach pattern	Familiarize with
Copilot's report on estimated landing weight and CG position	Receive
Horizontal situation indicator	Set landing course
Radio altimeter	Set decision height

(cont'd)

4.5.2.2. Copilot's Checklist

Inspection area/topic	Required action/acceptable condition
Weather at destination and alternate aerodromes	Familiarize with
Descent and landing approach pattern	Familiarize with
Landing approach pattern components	Calculate
Landing weight and CG position	Calculate and report
Horizontal situation indicator	Set landing course
Radio altimeter	Set traffic altitude
III-6 control panel selector switch	Set to LANDING (IIOC)
III-5 control panel PROGRAM CLEAR (CEPOC IIPOIP) light-button	Depress
ILS system mode selector	CII or ILS
KVPC-MII VOR system	Set desired frequency
Compass system, directional gyro	Align
Gyro/mag monitor	Insert correction
Readiness for descent	Report to Captain

4.5.2.3. Flight Engineer's Checklist

Inspection area/topic	Required action/acceptable condition
Air conditioning system selector	Set aerodrome pressure
Hydraulic power systems pressure	Check
Water in water tanks (in winter)	Drained/Check
Readiness for descent	Report

(cont'd)

4.5.3. Regimes of Descent

- (1) In the best-range cruise mode, execute descent at $M = 0.8$ down to an altitude of 10,750 m and further on at $IAS = 500$ km/hr. In so doing, do not extend the mid-wing spoilers within the entire range of altitudes.
- (2) In the high-speed cruise mode, execute descent at $M = 0.85$ down to an altitude of 9750 m, further on at $IAS = 575$ km/hr. In so doing, extend the midwing spoilers to 45° within the range of altitudes from 7000 to 3000 m. In case of necessity it is allowed to extend the spoilers to 30° in the course of descent from 9000 to 7000 m. In case of necessity it is allowed to use the spoilers for deceleration of the airplane at altitudes below 3000 m.
- (3) Execute descent under control of the ATC service in accordance with their instructions with the speed limitations observed.
- (4) With one engine inoperative, descend down to the traffic altitude with two engines running at idle maintaining the speeds established for the best-range cruise. In so doing, do not use the midwing spoilers within the entire range of altitudes.
- (5) The descent performance data are given in paragraph 7.6.1.

4.5.4. Emergency Descent

- (1) To execute emergency descent from the enroute altitude, proceed as follows:

Retard the throttle levers to IDLE (МАЛЫЙ ГАЗ) position.

Extend the midwing spoilers to 45° .

At a speed not exceeding $M = 0.88$ or $IAS = 575$ km/hr set the LG (ШАССИ) control switch to EXTSN (ВНУЧЬ).

Without waiting for the LG to lock down (the main LG extension cycle completes in 10 to 12 s) proceed to descent at a load factor of 0.3 to 0.5 and establish the vertical speed of descent at a level of 60 to 70 m/s. If the nose LG fails to lock down, continue descent with the nose LG in this position (the nose LG will lock down after reduction of IAS to 470 km/hr).

- (2) In emergency descent maintain Mach number and IAS so as not to exceed their respective limits (Ref. subparagraph 2.5.4.1).

(cont'd)

The time of emergency descent from an altitude of 11,000 m down to an altitude of 4000 m is 3 min if the above procedure is followed.

The airplane displays good controllability and stability in descent.

- (3) Upon attainment of a safe altitude (not more than 4000 m if descent has been caused by loss of pressurization in the pressurized compartments), smoothly pull the control column to establish horizontal flight with load factors of 1.2 to 1.3, retract the spoilers. In so doing, the loss of altitude in descent recovery is 300 to 400 m.

4.5.5. Descent in Turbulent Atmosphere

In entering an area of high turbulence, maintain IAS not higher than 500 km/hr and Mach number not higher than 0.8.

The peculiarities of the airplane behaviour in turbulent atmosphere are covered in paragraph 4.4.5.

4.5.6. Descent in Icing Conditions

- (1) In enroute flight and in descent, switch on the anti-icing heaters in the following cases:

Before entering an area of possible icing.

Upon coming-on of the ICING (ОБЛЕДЕНЕНИЕ) or IGV ICING (ОБЛЕДЕНЕНИЕ ВНА) annunciators.

- (2) Select the windshield heater to HIGH (СИЛЬНО) in advance before entering an area of possible icing (before crossing clouds, in haze or fog). Upon leaving the icing area, make sure ice is removed from the glazing heated surfaces and thereafter select the windshield heaters to LOW (СЛАБО).
- (3) In icing conditions descend with all the three engines operating at idle, at the speeds corresponding to high-speed cruise mode, with the midwing spoilers fully extended within the entire range of altitudes.
- (4) After leaving the icing area, switch off the heaters having made sure there is no ice on the airplane surfaces but not earlier than 10 to 15 minutes after leaving the above area.
- (5) If icing conditions are encountered in enroute flight and continuous occurrence of these conditions exceeds 10 minutes, report to the ATC service and take measures to leave the icing area.

(cont'd)

4.5.7. Flight in Holding Area

- (1) In the holding area maintain the speeds agreed upon by the ATC service.
- (2) The best hourly fuel consumption is attained at the speeds ensuring the maximum L/D ratio.

The hourly fuel consumption rates for the best-range speeds V_{BC} and the speeds up to $1.2 V_{BC}$ are indicated in paragraph 7.6.2.

4.6. LANDING APPROACH

4.6.1. General

- (1) In the course of landing approach, before initiating base turn at the traffic altitude or being at a distance of 20 to 25 km from the runway threshold, execute all the operations listed in the "Before base turn or at a distance of 20 to 25 km from runway threshold" section of the procedures (Ref. subparagraphs 4.8.2.8 and 4.8.2.9).
- (2) Execute landing approach either in the manual, flight director or automatic modes of the airplane control.

4.6.2. Piloting Technique and Regimes

4.6.2.1. General

- (1) Execute intermediate approach in accordance with the standard pattern established for a given aerodrome and instructions of the ATC service. The procedure is described in the "Actions of crew members during landing approach" sequence diagram (Ref. paragraph 4.6.3).
- (2) Select the regimes of flight during landing approach in accordance with the instructions of paragraph 3.1.8 or subsection 7.7.
- (3) If upon attainment of the traffic altitude the pressure-actuated altimeter readings differ from the radio altimeter readings in more than 100 m (330 feet), discontinue descent, request the ATC controller for the aerodrome pressure and refine the airplane position.

After comparing the readings of the altimeters, select YB-5 radio altimeter No. 2 to the decision height or to an altitude of 200 feet if the decision height exceeds 200 feet.

- (4) Refine the airplane alignment with the runway centerline immediately after completion of final turn.

CAUTION: IF THE PILOTS DID NOT MANAGE TO BRING THE AIRPLANE TO THE LANDING CONFIGURATION BEFORE AN ALTITUDE OF 100 M IS REACHED, NEVER CONTINUE LANDING PROCEDURE. IN THIS CASE PROCEED TO GO-AROUND.

- (5) When on the glide slope, operate the ELEV FEEL (ЗАПРЯЖАТЕЛЬ PB) button to trim out the airplane. When flying on the glide slope in the flight director mode of landing, correct deviations of the vertical speed from the design values by application of the elevator and deviations from the selected IAS only

(cont'd)

by changing the power setting. It is recommended to maintain the gliding speed by small variations in the throttle levers settings causing the engine speed variations within $\pm 5\%$, timely responding to initiation of the airspeed variations.

CAUTION: IF THE ENGINES SPEEDS DROP BY 10 % AND MORE THE SPEED OF THE AIRPLANE IN THE LANDING CONFIGURATION DROPS RAPIDLY. THEREFORE, IF A NECESSITY TO SIGNIFICANTLY REDUCE THE SPEED ARISES, THE PILOTS MUST EXERCISE INCREASED ALERTNESS IN MAINTAINING THE REGIME OF DESCENT TO AVOID DANGEROUS LOSS OF SPEED.

- (6) In case of crosswind landing correct for drift, after final turn up to the moment of touchdown, only by establishing a wind correction angle without slipping and bank. When selecting to manual control, ensure maintenance of the established wind correction angle.
- (7) During landing approach switch on the landing lights at an altitude of 150 to 100 m. When flying in clouds, switch on the lights after leaving clouds. In snowfall, rain and haze the Captain takes decision to switch on the lights.

NOTE: During landing approach in snowfall, rain and dust, switching-on of the light causes appearance of the so called "light screen" which hinders piloting of the airplane. It is recommended in this case to switch on all the lights simultaneously and separately the fuselage and wing lights for short periods of time, execute landing with the landing illumination most favourable for given weather conditions or proceed to an alternate aerodrome.

4.6.2.2. Procedure of Correction of Lateral Deviations

- (1) Before reaching the decision height, the Captain must assess the magnitudes of the airplane path deviations from the runway centerline (lateral deviation) and from the glide slope.

The maximum acceptable lateral deviations from the runway centerline are tabulated below

Maneuver initiation altitude, m	100	80	60	45	30
Distance to runway threshold, m	1950	1500	1050	700	400
Maximum acceptable lateral deviation	100	70	40	30	30 (but not more than half runway width)

(cont'd)

The actual magnitudes of lateral deviation are assessed by the Captain by the coming-on of the course and glide slope maximum limit deviation annunciators or visually, by referencing to the runway lights and other reference objects (by day and night).

The following light aids are used as the reference objects for these purposes:

VASI (visual approach slope indicator) light bar No. 1 (closest to inner marker), whose half width on both sides from the runway centerline is 42 m (for VASI with six light bars) and 37 m or 27 m (for VASI with five light bars).

Runway edge lights whose distance from the runway centerline is determined by the runway width.

Runway end identifier lights (red) (lateral distance of extreme lights from the runway centerline is 12 to 15 m).

Runway threshold lights (green).

If the actual lateral deviation exceeds the maximum acceptable limit the Captain must proceed as follows:

In the automatic approach mode immediately select the automatic go-around mode.

In the flight director approach mode discontinue piloting to the command bars and immediately proceed to go around in the automatic or manual modes of control.

- (2) If the actual lateral deviation is within the acceptable limits the Captain, deciding to land, must disengage the autopilot or discontinue piloting to the command bars and immediately initiate maneuver aimed at elimination of the lateral deviation.

- (a) At maneuver initiation altitudes of 60 m and more:

Execute turn towards the runway centerline by coordinated application of the controls. The lateral maneuver track has the form of letter S and consists of two conjugated turns. The first turn (towards the runway centerline) is performed at a bank angle of 10 to 12° and the second turn (out of the runway centerline) is performed at a bank angle of 6 to 8°. The maximum angle of bank must not exceed 15° at the beginning of the maneuver and 2 to 3° at the runway threshold.

(cont'd)

- (b) At maneuver initiation altitudes below 60 m down to 30 m inclusive

An approach must be considered successful (crosswind landing approach as well) if the direction of the ground speed vector does not go beyond the runway width, i.e. at the moment the decision height is attained the airplane is in such a position and moves in such a way that it will not go beyond the continued runway border lines.

- (3) If, with the airplane at the decision height, its lateral deviation is within the stopway red lights (12 to 15 m), the decision to land may be taken even with the runway threshold not seen, and landing can be executed without correction for lateral deviation. With the lateral deviations exceeding 12 to 15 m up to 30 m inclusive (but not in excess of half the runway width) the decision to land may be taken if the runway threshold is seen. In this case landing includes correction for the lateral deviation for which purpose a single corrective turn towards the runway centerline through an angle of 1 to 3° banked up to 5° is executed through coordinated application of the controls. Execute turn in such a way that the airplane touches down having the same or a lower angle with the runway centerline, within the area between the centerline and the inner touchdown zone lights at the lateral deviation side. This done, align the airplane with the runway centerline or a line parallel to it. An airplane touchdown off the runway centerline increases hazard of overrunning the runway. The maximum acceptable landing path deviations in altitude not needing corrections are ± 1 dot on the horizontal situation indicator (about ± 5 m).

Such errors cause variation of the airborne segment by approximately 100 m due to lengthwise shift of touchdown point.

(cont'd)

4.6.3. Crew's Actions in Landing Approach (Manual Mode)

Captain	Copilot	Flight engineer
Upon reaching the traffic altitude, smoothly proceeds to horizontal flight Sets power required for a speed of 400 km/hr Determines correlation of the altitude and the distance to the rectangular pattern point of entry Prepares himself for extension of LG At the traffic altitude and a speed of 400 km/hr trims out the airplane in pitch and sets the HOR STAB SELECT (ЗАДАТЧИК СТАБИЛИЗАТОРА) selector switch to a position corresponding to the elevator position indicator color coding Calls DOWN GEARS	Monitors the descent speeds Upon reaching the traffic altitude, this event being indicated by the coming-on of the radio altimeter warning light, resets its index to the decision height. Compares the radio altimeter readings with the pressure-actuated altimeters readings (with the terrain profile accounted for) Monitors the direction of flight, the distance to the runway, lateral deviation After reaching the outer marker abeam position, starts the stopwatch and calls "Abeam outer marker, lateral deviation km" During straight-in approach calls "Distance to runway 22 to 25 km" Selects the LG control valve to EXTSN (ВЫПУСК) Monitors the process of extension	Before engagement of the autothrottle, checks the throttle levers for unlocked condition and calls "Throttles unlocked". Upon engagement of the autothrottle, checks the AUTO THR ON (АТ ВКЛЮЧЕН) annunciator for coming on. Monitors the operational parameters of the engine and the airplane systems. Monitors the extension of the LG. 20 to 25 s after coming-on of the LG position indication lights and attainment of a pressure of 200 to

(cont'd)

Captain	Copilot	Flight engineer
	<u>NOTE:</u> The LG is extended at a distance of 25 km from the runway threshold with a traffic altitude of 400 m and at a distance of 30 km from the runway threshold with a traffic altitude of 500 to 600 m. Sets the LG valve neutral, locks it and calls "LG down" Reports passing-over of the outer marker beam to the ATC controller	220 kgf/sq.cm in hydraulic power system 1 calls "Time LG valve neutral"
Makes sure the LG is down.		
Maintains the speed at 380 to 370 km/hr		
Calls "Check"		
Replies to the checklist items	Replies to the checklist items	Reads the "Before base turn or at distance of 20 to 25 km" section of the checklist
	Determines the moment of initiation of base turn	Carries out the commands to change the power setting (in flight without using the autothrottle)
	Calls "Base turn"	Monitors the operational parameters of the engine and the airplane systems
Executes base turn at a bank angle not exceeding 30° and a speed of 380 to 370 km/hr	Reports initiation of base turn to the ATC controller	

(cont'd)

Captain	Copilot	Flight engineer
After base turn, reduces the speed down to 360 km/hr Calls "Flaps 28" Makes sure the wing high-lift devices are set to correct positions Trims out the airplane in pitch Maintains the speed at 300 km/hr Depresses the APPROACH (ЗАХОД) light button Executes final turn banked not more than 30° Maintains the selected parameters (angle of bank, speed, altitude). Rolls the airplane in or out to align it with the runway centerline.	Monitors reaching the selected course Sets the flap control handle to 28° After extension of the flaps and the slats, resetting of the horizontal stabilizer, calls "High-lift extended" Monitors automatic disengagement of the elevator and rudder enroute artificial feel units. If they fail to disengage, sets the ENROUTE FEEL (ПОЛЕТНЫЙ ЗАПРЯЖАТЕЛЬ) selector switch to TOL (ВЗЛЕТ ПОСАДКА) Determines the moment of initiation of final turn and calls "Final turn" Reports to the traffic controller initiation of final turn. Assists the Captain in piloting the airplane Reports to the landing controller the heading and altitude In approaching the glide slope interception point, calls "..... Kilometers to glide slope interception point"	

(cont'd)

Captain	Copilot	Flight engineer
Controls power or orders the Flight engineer "Power" (in flight without the use of the auto-throttle) Extends the lights Being at a distance of 4 to 3 km to the glide slope interception point calls "Flaps 36" or "Flaps 45"	Resets the flap control handle to 36° (or 45°) Monitors final extension of the flaps and resetting of the horizontal stabilizer (immediately reports any malfunctions detected in the course of extension). When crossing the estimated point of glide slope interception, calls "Glide slope intercepted, vertical speed m/s"	
Trims out the airplane and establishes descent at the selected vertical speed (or flies the airplane referencing to the command bars while landing in the flight director mode) Calls "Check" Replies to the checklist items	Replies to the checklist items	Reads the "Before interception of glide slope" of the checklist

(cont'd)

Captain	Copilot	Flight engineer
Maintains the required heading Monitors maintenance on the glide slope attitude Controls power or gives respective orders to the Flight engineer in flight without use of the autothrottle Establishes visual contact with ground reference objects Assesses and corrects the airplane attitude relative to the landing course, the glide slope and the runway centerline Controls the speed and the power of the engines.	Monitors the actual position of the airplane relative to the landing course and the glide slope, reports deviations to the Captain. Reports readiness for landing to the ATC controller If the speed deviates from the target value by ± 10 km/hr, calls "Low (High) speed" If the vertical speed exceeds 5 m/s, calls "Steep descent" When crossing the outer marker, calls "Outer marker, altitude m" At a height exceeding the decision height by 30 m, calls "Assess, holding to instruments"	On the Captain's command, sets the required power on the engines (in flight without the use of the autothrottle). Under icing conditions, switches on the anti-icing system and monitors its operation

(cont'd)

4.6.4. Landing Approach with One Engine Inoperative

- (1) Execute landing approach and glide with one engine inoperative with the flaps set to 36° . Select the landing approach speed and the runway threshold speed for the airplane gross weight and setting of the wing high-lift devices (Ref. paragraph 3.1.8 or subsection 7.7).
- (2) When flying the glide slope with one engine inoperative, use the same piloting technique as with the three engines operating.
- (3) If engine No. 2 or No. 3 has failed, switch on the electrically-driven pumping unit of hydraulic power system 2 or 3, respectively, before landing to increase hydraulic power available.
- (4) If an engine fails during glide, advance the power setting of the operating engines to restore on-glide-slope condition.

Continue gliding descent without changing the setting of the flaps.

If a significant deviation of the airplane from the selected path takes place at the moment of failure of an engine, proceed to go around in accordance with the instructions of paragraph 4.6.10 and execute repeated landing approach with one engine inoperative.

4.6.5. Landing Approach with Two Engines Inoperative

Execute landing approach with two engines inoperative following the instructions of subsection 6.5.

4.6.6. Landing Approach in Icing Conditions

- (1) In possible icing conditions, execute landing approach and landing with the airplane anti-icing devices on.
- (2) In case of prolonged (more than 10 minutes) flying in an icing area during descent or holding at altitudes above 4000 m or when executing landing approach maneuver in icing conditions at altitudes below 4000 m (regardless of duration of flight in an icing area), execute landing approach observing the following instructions:

After extension of the landing gear and the flaps to 28° up to entering final approach (at a distance of 12 to 13 km from the runway threshold), maintain a speed 20 to 30 km/hr above the normal approach speed.

(cont'd)

At a distance of 12 to 13 km from the runway threshold, reduce IAS to 300 km/hr and finally extend the flaps to 36° or 45°.

CAUTION: EXTEND THE FLAPS TO 28°, 36° AND 45° IN THE COURSE OF LANDING APPROACH IN SUCH A WAY THAT AT THE END OF THE FLAP EXTENSION IAS DOES NOT EXCEED THE ESTABLISHED LIMITS: 360 KM/HR FOR FLAPS 28°, 330 KM/HR FOR FLAPS 36° AND 300 KM/HR FOR FLAPS 45°.

Continue further flight up to crossing the runway threshold at a speed 10 to 15 km/hr higher than that recommended for normal approach.

Switch off the HOR STAB & WING HEAT VALVES (ЗАКЛЮЧКИ ОБОГРЕВА СТАБИЛИ И КРЫЛА), SLATS (ПРЕДУП) and PITOT HEAT (ОБОГРЕВ ПИЛЛ) switches after touchdown, during landing roll, at a speed of 160 to 180 km/hr.

Switch off the windshield and engine heaters before shutting down the engines.

CAUTION: AFTER LANDING, DO NOT RETRACT THE WING HIGH-LIFT DEVICES UNTIL TAKING PLACE AT THE PARKING AREA. AT THE PARKING AREA, MAKE SURE THAT THE SLATS, FLAPS AND SPOILERS ARE FREE FROM ICE, AND THEN RETRACT THE WING HIGH-LIFT DEVICES AND THE LIGHTS. ONLY RETRACTION OF THE FLAPS TO 28° IS ALLOWED BEFORE TAKING PLACE AT THE PARKING AREA.

4.6.7. No-Flap Landing

Execute no-flap landing approach in accordance with the instructions of subsection 5.2.

4.6.8. Overweight Landing Approach

Execute overweight landing approach at gross weights exceeding the maximum landing weight equal to 80,000 kg in accordance with the instructions of subsection 5.1.

4.6.9. Peculiarities of Piloting Technique with CG at Forward and Aft Limits and Responses at Low Speeds with Wing High-Lift Devices Extended

4.6.9.1. Landing Approach with CG at Forward and Aft Limits

- (1) After interception of the glide slope at the selected vertical speed, read the respective indicator to check the position of the elevator, correct setting of the horizontal stabilizer (the elevator position indicator pointer shall be in the recommended range of 3° to 12° of the up-deflection within the wide portion of the scale green segment).

(cont'd)

If in steady glide on the glide slope the elevator position pointer goes beyond the above limits, correct the setting of the horizontal stabilizer so as the elevator position pointer is within the recommended range of the wide portion of the scale green segment.

If the elevator position indicator pointer goes below the wide portion of the scale green segment, reduce the horizontal stabilizer setting angle by placing the HOR STAB (СТАБИЛИЗАТОР) selector switch to NOSE DOWN (НИЖЕ) in the manual mode of control.

If the elevator position indicator pointer moves above the wide portion of the scale green segment, proceed as follows:

- (a) With a horizontal stabilizer setting angle below 5.5° , increase the horizontal stabilizer setting angle.
- (b) With the horizontal stabilizer set to 5.5° , increase the landing approach speed by 10 km/hr above the target speed if the speed has not been increased.
- (c) If the speed has been increased, and the elevator position indicator pointer is above the wide portion of the scale green segment, it indicates that the CG is forward of the forward CG limit. In this case proceed to go-around and, while in horizontal flight in traffic area, take measures to shift the CG aft and land after bringing the CG to the specified limits.

NOTE: Shifting of the CG 1 % MAC aft reduces the required elevator deflection angle by 1° and is attained by replacing 3 passengers from the seats of the front rows of passenger compartment 1 to the seats of the rear rows of passenger compartment 2.

- (d) If it proves impossible to shift the CG in flight, execute landing approach and landing with flaps 28° and stabilizer 5.5° controlling the horizontal stabilizer manually. After extension of the wing high-lift devices and setting the horizontal stabilizer to the above position, close the horizontal stabilizer control switch guard to provide for possible go-around. In this case determine the landing approach speed and the threshold speed for the airplane gross weight following the instructions of paragraph 3.1.8 or subsection 7.7.
- (2) With the CG aft of 32 % MAC, the airplane retains practically the same stability and controllability characteristics as with the CG forward of 32 % MAC.

(cont'd)

Nevertheless, the following features must be accounted for in operation:

To improve turning performance during taxiing with the CG aft of 35 % MAC, apply intermittently the inside LG bogie wheel brakes as required.

During landing (in the course of flare-out) the control column pulling forces are considerably lower than those at more forward CG positions.

The operational limitations for flight with the CG at the forward and aft limits are indicated in paragraph 2.5.3.

4.6.9.2. Peculiarities of Piloting Technique at Low Speeds

CAUTION: NEVER REDUCE THE SPEED INTENTIONALLY BELOW THE RECOMMENDED LEVEL.
(REF. 3.1.8).

- (1) Reduction of speed down to the minimum speed (Ref. Fig. 2.5.1) is indicated by:

Continuous sounding of the loudspeaker.

Coming-on of the STALL (α_{KP}) annunciator.

Coming-on of the red annunciator on the AAT control panel.

In this condition the Captain must take all measures to reduce the angle of attack and increase the speed.

NOTE: The airplane does not show other symptoms of approaching the stalling speed.

- (2) The AAT actuation speeds and the stalling speeds for the flap setting angle are indicated in subparagraph 2.5.4.2.

4.6.10. Go-Around Piloting Technique

- (1) The piloting technique and interaction of the crewmembers during go-around are covered in the sequence diagram.
- (2) Go-around can be performed both with all the engines operating and with the engine inoperative.
- (3) The go-around piloting technique is the same both with all the engines operating and with one engine inoperative.

CAUTION: TO AVOID EXCEEDING OF THE STRENGTH LIMITATIONS IN GO-AROUND WITH ALL THE ENGINES OPERATING, REDUCTION OF POWER SETTING TO A LEVEL NOT LESS THAN MAXIMUM CONTINUOUS IS ALLOWED AT ALTITUDES NOT LESS THAN THE TRAFFIC ALTITUDE.

(cont'd)

(4) Crew's Actions during Go-Around in Manual Control Mode

Captain	Copilot	Flight engineer
At the decision height, having made the decision to go around, immediately advances all the throttle levers to the takeoff power position and calls "Takeoff power, going around"	If at the decision height the Captain did not give order "Landing" or "Going around", warns the crew "Going around, takeoff power"	
Calls "Flaps 28°"	Advances power up to takeoff	
Discontinues descent and establishes climb without loss of speed and change in the heading.	Resets the flap control handle to 28°.	Checks setting of the throttle levers to the takeoff power position and calls "Takeoff power set"
Monitors resetting of the flaps and the horizontal stabilizer	Checks the wing high-lift devices and the horizontal stabilizer for synchronous resetting.	Monitors operation of the engines
After onset of a positive vertical speed, calls "Up gears"	Pulls the control column to recover from descent.	
	Maintains the heading without rolling.	
	Monitors the speed	
	Resets the LG control valve to retraction.	
	After the LG is retracted, calls "Gears up"	
After the LG is retracted, calls "Switch off and retract lights"		
Keeps the airplane level	Switches off and retracts the lights	

(cont'd)

Captain	Copilot	Flight engineer
Upon attainment of a speed of 320 km/hr, calls "Retract flaps" Monitors retraction of the wing high-lift devices and resetting of the horizontal stabilizer Maintains the heading Upon attainment of a speed of 400 km/hr at the traffic altitude, reduces power or gives an order to do so to the Flight Engineer After completion of the go-around procedure, takes a decision either to execute repeated landing approach or proceed to an alternate aerodrome	Resets the flap control handle to 0° After retraction of the wing high-lift devices, calls "Flaps, slats retracted, stabilizer zero" Requires maintenance of the on-course condition in case of deviations by calling "Going left (right)" At an altitude of 200 m, sets the traffic controller communication frequency to the VHF transceiver After retraction of the wing high-lift devices, calls "Heading". Reports execution of go-around procedure to the ATC controller	Upon the Captain's order sets the required power and calls "Power set". Monitors the operational parameters of the airplane systems

4.7. LANDING

4.7.1. Landing Procedure

- (1) Joint actions of the crewmembers during landing are described in the sequence diagram.
- (2) Cross the runway threshold and fly further down to a height of 6 to 4 m along the continued glide slope. Select the target touchdown point in such a way that at the moment of touchdown the lateral deviations of the airplane from the runway centerline do not exceed $1/4$ runway width and the direction of the ground speed vector is parallel to the runway centerline or directed at the runway centerline.

If these requirements are not met, proceed to go-around before the throttle levers are retarded down to idle.

During glide at vertical speeds up to 4 m/s the minimum height for initiation of go-around procedure is 6 to 4 m, this at vertical speeds up to 5 m/s along a steep glide slope is 15 m provided the airplane landing weight does not exceed the maximum limit indicated in paragraph 3.1.6.

With an engine failed during glide, the minimum height for initiation of go-around is 15 m.

- (3) During landing approach along a non-standard glide slope (with a slope above 3° and a vertical speed in excess of 4 m/s) reduce the vertical speed down to 3 to 4 m/s at a height of 20 to 15 m and maintain the recommended landing approach speed.
- (4) At a height of 6 to 4 m, reduce the power setting of the operating engines down to idle and initiate flare-out.

At the end of flare-out, apply the elevator to prevent pitching-up and land avoiding holding-off and ballooning which cause extension of the landing distance.

- (5) If correct piloting technique is used the airplane touches down within the target area located at a distance of 300 to 600 m from the runway threshold, at a speed 5 to 10 km/hr below the landing approach speed and at a vertical speed of 0.5 to 1.0 m/s.

(cont'd)

- (6) Deploy the thrust reverser:

At a height not more than 3 to 2 m if there is no necessity to correct for lateral deviations.

On the ground after complete elimination of lateral deviations.

- (7) In case of bouncing fix the control column in the landing position (the position taking place at the moment of touchdown), deploy the thrust reverser (if it has not been deployed earlier) and, avoiding nose-down motion, execute repeated touchdown by the main LG wheels.

- (8) After touchdown, eliminate the wind correction angle by applying the pedals.

The inboard and midwing spoilers will extend automatically at the moment of touchdown. Smoothly rotate the airplane to touch down by the nose LG wheels with subsequent pushing of the control column home forward (the Copilot keeps the control column in this position until the landing roll is completed). Smoothly align the airplane with a line parallel to the runway centerline.

- (9) Initiate braking at the speed determined in accordance with the instructions of subsection 7.7. Apply the brakes by smoothly and synchronously depressing the brake pedals.

CAUTION: TO PREVENT INADVERTENT AND ERRONEOUS ACTIONS DURING APPLICATION OF THE RUDDER AND THE BRAKES IN THE COURSE OF LANDING APPROACH AND LANDING ROLL, ADHERE TO THE FOLLOWING RULES:

- (a) IN THE COURSE OF LANDING APPROACH THE FEET MUST BE SO POSITIONED AT THE PEDALS THAT THE HEEL IS IN CONTACT WITH THE FLOOR AND THE MIDDLE PORTION OF THE FOOT TIP IS AT THE LOWER EDGE OF THE PEDAL. THIS POSITION MUST BE RETAINED UNTIL APPLICATION OF THE BRAKES IS INITIATED.
- (b) BEFORE APPLICATION OF THE BRAKES, PLACE THE FEET TIPS SO THAT THE MIDDLE PORTION OF THE HEEL IS AT THE LOWER EDGE OF THE PEDAL AND THE FEET TIPS ARE PLACED UPON THE UPPER PORTION OF THE BRAKE PEDALS. THIS POSITION ENSURES AN ADEQUATE TRAVEL OF THE BRAKE PEDALS REQUIRED FOR THEIR FULL DEPRESSION.
- (c) WHEN MOVING THE DIRECTIONAL CONTROL PEDALS TO THEIR EXTREME POSITIONS, AVOID INADVERTENT DEPRESSION OF THE BRAKE PEDAL DEFLECTED REARWARD.

- (10) During landing roll maintain the heading by smooth application of the rudder and timely counteract the airplane tendency to yaw off the runway centerline. To maintain the heading at speeds of 230 km/hr and less in case of necessity apply

(cont'd)

the aileron into the required turn through not more than half the control wheel full deflection angle.

Differential application of the wheel brakes is also allowed on a dry runway.

- (11) After making sure the airplane has touched down without overshoot, the conditions of the runway and the brakes provide efficient braking and the remaining runway distance adequate for bringing the airplane to a complete standstill at a speed not below 120 km/hr, gradually stow the thrust reversers.

At a speed of 60 to 70 km/hr, retract the thrust reverser doors to the direct thrust position.

- (12) In case of necessity (landing on a slippery runway, failure of the brakes, inadequate length of the runway, etc) it is allowed to use the maximum reverse thrust up to the moment the airplane comes to a complete standstill.

After landing in which reverse thrust has been used up to the moment of a complete standstill, inspect the IGV and compressor stage 1 to assess their condition.

CAUTION: IF THE AIRPLANE TENDS TO RUN OFF THE RUNWAY CENTERLINE AND OVERRUN THE RUNWAY EDGE PROCEED AS FOLLOWS:

- (a) IMMEDIATELY RETRACT THE THRUST REVERSER DOORS OF BOTH ENGINES AND SIMULTANEOUSLY RELEASE THE WHEEL BRAKES COMPLETELY.
 - (b) APPLY THE DIRECTIONAL CONTROL PEDALS AND THE AILERONS AND, WHILE ON A DRY RUNWAY, DIFFERENTIALLY APPLY THE WHEEL BRAKES TO MAKE THE AIRPLANE MOVE PARALLEL TO THE RUNWAY CENTERLINE.
 - (c) AFTER COMPLETE REGAINING OF CONTROL AND STEADY MOTION PARALLEL TO THE RUNWAY CENTERLINE APPLY THE WHEEL BRAKES AND, IN CASE OF NECESSITY, DEPLOY THE THRUST REVERSER DOORS AGAIN AND USE REVERSE THRUST UP TO THE MOMENT THE AIRPLANE COMES TO A COMPLETE STANDSTILL.
 - (d) DIFFERENTIAL REVERSING OF THE ENGINES FOR THE PURPOSE OF ELIMINATION OF THE AIRPLANE LATERAL DEVIATIONS IS NOT ALLOWED.
 - (e) EMPLOYMENT OF S-TURNS DURING LANDING ROLL FOR THE PURPOSE OF ELIMINATION OF THE LATERAL DEVIATIONS IS NOT ALLOWED.
- (13) When landing on a runway possessing a low friction coefficient, it is necessary to closely maintain the landing approach speed and the threshold speed recommended by the Flight Manual.
 - (14) In case of failure of one thrust reverser and occurrence of hazard to overrun the runway edge, discontinue using reverse thrust.

(cont'd)

After returning the airplane to required direction of motion, set reverse thrust again if required.

If after setting the thrust reverser control levers to the direct thrust position, the thrust reverser doors fail to retract to the direct thrust position, this condition being indicated by continued illumination of the RVSR LOCK (SAMOK PEBEPCA) annunciator, shut down the respective engine.

- (15) During night landing, upon completion of the landing roll, set the LIGHT BEAM (CBET ΦAP) selector switches to TAXIING (PVJEMHHA).
- (16) After completion of the landing roll, retract the midwing spoilers.
- (17) After completion of the landing roll, the Captain selects the nose wheel steering control to 63°. The Flight engineer dumps the cabin pressure and, in case of necessity, starts the APU to provide air conditioning and illumination of the passenger compartment during taxiing and disembarkation of the passengers after shutting down the engines.

CAUTION: NEVER START THE APU IF THE TEMPERATURE OF OIL IN THE APU OIL TANK READ BY THE "OIL TEMP" (T° MACJA) INDICATOR IS LESS THAN -25 °C.

NOTE: After completion of the landing roll and cooling down the engines at idle for 1 minute, it is recommended to shut down engines No. 1 and No. 3 and taxi on one engine No. 2.

Before taxiing into the parking area, make sure the brakes operate normally and there is pressure (210 kgf/sq.cm) in the hydraulic power systems.

- (18) When approaching the parking area, stop the airplane at a distance of 50 m therefrom and begin taxiing following the signals of a signalman standing on the ground. In the course of taxiing-in, watch the signals given by the signalman. In the course of taxiing-in, the Copilot monitors the obstacles and timely reports them when detected. Use of reverse thrust for taxiing in the parking area is allowed only in cases of extreme urgency and only on aerodromes whose surface coating precludes ingress of foreign objects into the engine air dust.
- (19) After the airplane taxiing into the parking area and coming to a complete standstill, perform all the operations listed in the "Before leaving airplane at parking area" checklist.

(cont'd)

(20) Crew's Actions during Landing

Captain	Copilot	Flight engineer
In VFR flight, switches on the lights at an altitude of 150 to 100 m (at night, on leaving clouds, in adverse ornithological conditions) Makes sure a reliable visual contact with the ground reference objects (high-intensity lights) is established After attainment of the decision height, calls "Landing" Assumes control In correcting the airplane lateral or vertical deviations from the target path, avoids sharp movements of the control surfaces particularly of the elevator By the moment of initiation of flare-out, operates the throttle levers himself By the moment of initiation of flare-out, maintains the vertical speed not in excess of 3 to 4 m/s	Without leaving the controls free, observes the instruments to monitor the airplane attitude, vertical speed, air speed, angle of bank. If the respective limits are exceeded calls "Excessive bank, steep descent" Down from a height of 60 m reads aloud the radio altimeter readings every 10 meters and down from a height of 20 m every 5 m up to the moment of touchdown	In bumping conditions assists the Captain in operating the throttle levers

(cont'd)

Captain	Copilot	Flight engineer
After crossing the runway threshold, at a height of 6 to 4 m, sets the throttle levers to the idling position and begins flare-out At a height not exceeding 3 to 2 m or after touchdown, having eliminated lateral deviations calls "Reverser" Smoothly rotates the airplane to touch down by the nose LG Initiates braking Maintains the heading during landing roll keeping the airplane aligned with the runway centerline Calls "Off reverser" At the end of landing roll and at a taxi speed, selects the nose LG steering mode selector switch to 63°	Deploys the thrust reversers and holds the thrust reversers control levers in the course of landing roll Holds the control column in the foremost position until the landing roll is completed Notes and reports to the Captain the moments of crossing the runway midway point and the point located at a distance of 600 m to the runway end Retracts the thrust reversers Makes sure the thrust reversers control levers remain in the OFF (ВЫКЛЮЧЕН) position	Monitors deployment of the thrust reversers by coming-on of the PVSR DOORS (CTBOPKA PEBEPCA) annunciators Calls "Reversers on" Monitors operation of the engines in the reverse thrust mode. In the course of landing roll, reports the current values of speed every 20 km/hr particularly accentuating 120 km/hr (at which the thrust reversers must be retracted) Checks the thrust reverser doors for setting to the retracted position by going-out of the annunciators. Calls "Reversers off"

(cont'd)

Captain	Copilot	Flight engineer
		CAUTION: IN CASE OF UNSTABLE OPERATION OF AN ENGINE (ENGINES) IN THE REVERSE THRUST MODE OR A FAILURE TO DISCONTINUE THIS MODE, THE FLIGHT ENGINEER MUST REPORT THIS CONDITION TO THE CAPTAIN AND SHUT DOWN THE ENGINE (ENGINES) UPON HIS ORDER.
At the end of landing roll, stops the ELAPSED TIME (BPEMH HOJETA) pointers of the aircraft clock Calls "Retract high-lift" Retracts the spoilers Leaves the runway by taxiing along the nearest taxiway Determines the direction of taxiing to the parking area Calls "Cool down engines, shut down engine No. 3" (or No. 1, No. 2 depending on the situation and the direction of taxiing)	At the end of landing roll, stops the ELAPSED TIME (BPEMH HOJETA) pointers of the aircraft clock. Reports landing to the ATC controller, receives from him instructions for taxiing Retracts the wing high-lift devices Switches off the pitot tubes and windshield heaters. After leaving the runway, reports to the taxiing controller that the airplane taxis on taxiway No. Reports the airplane fuel quantity (upon request)	Calls "Steering 63°"

(cont'd)

Captain	Copilot	Flight engineer
		After cooling down the engines for 1 minute, shuts down the engine (engines) as requested and calls "Engine No. (engines Nos) shut down" Switches off the air conditioning system. In case of necessity, starts the APU Within 30 min after landing, turn off the LG VENTIL switch

4.7.2. Crosswind Landing

- (1) Cross wind landing is allowed at the crosswind velocities indicated in paragraph 2.2.3.
- (2) In bumpy air the gliding speed must be 10 km/hr higher than in normal conditions up to the moment of touchdown.
- (3) The minimum limit runway friction coefficient for crosswind landing is 0.4.
- (4) Make landing with lead angle, without bank and drift.
- (5) Immediately after touchdown, eliminate the wind correction angle by application of the pedals. Smoothly rotate the airplane to touch down by the nose LG wheels and thereafter push the control column home forward (the Copilot holds the control column in this position up to the end of landing roll). Smoothly bring the airplane to a track parallel with the runway centerline.

If the airplane moving parallel to the runway centerline touches the runway surface off the centerline, maintain the initial direction of the airplane travel parallel to the centerline.
- (6) The crosswind landing piloting technique is the same as that covered in paragraph 4.7.1.

4.7.3. Landing with One Engine Inoperative

- (1) Landing with one engine inoperative is executed with flaps 36°.

If the engine fails on the glide slope, do not change the position of the flaps (Ref. 4.6.4(4)).

(cont'd)

- (2) Employment of reverse thrust of one operating engine after touchdown does not cause a considerable turning moment.

The Flight engineer reports to the crew ONLY FIRST (THIRD) ENGINE THRUST REVERSER OPERATING.

- (3) The piloting technique of landing with one engine inoperative is the same as with all the three engines operating.
- (4) In case of necessity (landing on a slippery, wet or short runway), use reverse thrust of the operating engine until the airplane comes to a complete standstill.

4.7.4. Landing with Two Engines Inoperative

Execute landing with two engines inoperative in accordance with the instructions of subsection 6.5.

4.7.5. No-Flap Landing

Execute no-flap landing in accordance with the instructions of subsection 5.2.

4.7.6. Overweight Landing

Execute landing with weight exceeding the maximum landing weight equal to 80,000 kg in accordance with the instructions of subsection 5.1.

4.7.7. Landing on Slippery Runway

- (1) In landing on a runway with a low friction coefficient it is necessary to closely maintain the landing approach speed and the threshold speed recommended by the Flight Manual.
- (2) In case of failure of the thrust reverser of an engine and occurrence of hazard of overrunning the runway towards the operating thrust reverser, after full application of the rudder and differential application of the wheel brakes, switch off the thrust reverser of the operating engine.

After returning the airplane to the desired heading, deploy the operating engine thrust reverser again, if required.

(cont'd)

CAUTION: IF REVERSE THRUST HAS BEEN USED UNTIL THE AIRPLANE COMES TO A COMPLETE STANDSTILL, OR AFTER LANDING ON A RUNWAY COVERED WITH SNOW OR DIRT, DO NOT RETRACT THE WING HIGH-LIFT DEVICES UNTIL PLACING THE AIRPLANE IN THE PARKING AREA. THIS DONE, MAKE SURE THE SLATS, FLAPS AND SPOILERS ARE FREE FROM ICE, SNOW OR DIRT AND RETRACT THE WING HIGH-LIFT DEVICES AND THE LIGHTS. UNTIL PLACING THE AIRPLANE IN THE PARKING AREA ONLY RETRACTION OF THE FLAPS TO 28° IS ALLOWED.

4.7.8. "Inspection before Leaving Airplane in Parking Area" Checklists

4.7.8.1. Captain's Checklist

Inspection area/topic	Required action/acceptable condition
<u>At stopover airport</u>	
Duration of stopover	Brief the crew
Flight preparation procedure	Refine
Amount of fuel for the next leg	Determine
Instruction for airplane fueling	Give to the Flight Engineer
LG wheels	Inspect
Quality of operation of the landing radio aids	Make respective report to the ATC service
<u>At destination airport</u>	
LG wheels	Inspect
Quality of operation of the landing radio aids	Make respective report to the ATC service
Examination of the accomplished flight with the crew	Carry out

(cont'd)



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NORMAL PROCEDURES - Landing

4.7.8.2. Copilot's Checklist

Inspection area/topic	Required action/acceptable condition
<u>At stopover airport</u>	
Bill of lading and data on maximum allowable payload.	Dispatch to the cargo service representative
Aeronavigation and communication manuals and navigator's equipment	Place in the case and seal it
Antennas and radome	Inspect
<u>At destination airport</u>	
Bill of lading	Hand in
Antennas and radome	Inspect
Aeronautical charts and manuals	Hand in
Actual weather condition on the route and in the aerodrome area	Report to weather forecaster
<u>At transfer of airplane from one crew to another</u>	
Antennas and radome	Inspect
Actual loads and CG position, condition of flight and navigation equipment, weather conditions in flight	Brief the accepting crew Copilot

(cont'd)

4.7.8.3. Flight Engineer's Checklist

Inspection area/topic	Required action/acceptable condition
Airframe	Inspect visually from the ground
Malfunctions, failures of material and defects of airframe detected during the above inspection	Make respective entries in the airplane Log Book
(a) During short-duration parking: KB-7 valve	Close
(b) During prolonged parking: KB-7 valve Oxygen supply unit knobs	Close Remove locking wire, set to OFF and seal
All the airplane doors	Close and lock
Airplane keys and documents	Hand in to the parking area watchman

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4.8. PROCEDURES

4.8.1. General

- (1) The checklist is a document providing additional means of checking performance of the most critical operations determining readiness of the airplane and the crew for the next stage or threshold of flight and having direct effect on the safety of flight.

It is presumed by the checklist that before carrying out checks, each crewmember has fully performed all the procedures in accordance with the requirements of the checklists and section 8 for the respective stages of flight.

- (2) Checks against the read-aloud checklist items make up a complex of mandatory operations performed by the crew under the Captain's supervision at the established thresholds during preparation for flights of any type and in flight.
- (3) The checks against the read-aloud checklist items are initiated at the thresholds established for this purpose upon the Captain's order.
- (4) The checklist sections are read aloud by the Flight engineer.
- (5) Listed below are the thresholds for reading the checklist sections:

Before starting the engines - after carrying out the operations listed in the checklists and receiving all the crewmembers' reports on readiness for starting the engines.

Before taxiing - after receiving all the crewmembers' reports on readiness for taxiing.

During taxiing - during straight taxiing on a taxiway with no obstacles requiring increased alertness.

At holding position - before requesting clearance to taxi to lineup position.

At lineup position - before requesting takeoff clearance.

Before descent - 5 to 10 minutes before requesting descent clearance.

After selection of the aerodrome pressure - after receiving instruction to descend with the reference to the aerodrome pressure. During circuit flight and during repeated landing approach after a balked landing, this check is performed after completion of downwind turn.

(cont'd)

Before base turn or at a distance of 20 to 25 km - after completion of the LG extension cycle.

Before interception of the glide slope - after completion of final turn or, during straight-in approach, at a distance of 2 to 3 km from the glide slope interception point.

- NOTES:**
1. Persons responsible for a check and order of reports are indicated by figures in the checklist columns.
 2. If conditions favourable for taxiing take place it is allowed to perform the operations of "At holding position" section in the course of taxiing.
 3. If only one of the pilots is to report some item of the checklist and this very pilot is busy piloting the airplane, this item must be reported by the pilot free from piloting.

4.8.2. Abbreviated Procedures

4.8.2.1. Before Starting Engines

Nos	Inspection area/topic	Report wording	Reporting crewmembers		
			Flight engineer	Copilot	Captain
1	MAPC cockpit voice recorder	On	-	1	2
2	Blanks, shields, keys	Aboard	1	-	-
3	Doors, hatches	Closed, annunciators off	1	-	-
4	Flight recorder, GPWS (radio altimeter No. 1)	On, data inserted	1	2	-
5	Fuel pumps	Fuel booster and transfer pumps on	1	-	2
6	Hydraulic power systems and brake line pressures	210 and 120	1	2	3
7	Trimming	Neutral	-	1	2

(cont'd)

Nos	Inspection area/topic	Report wording	Reporting crewmembers		
			Flight engineer	Copilot	Captain
8	Takeoff data	Weight kg CG at % MAC V ₁ km/hr V _R km/hr V ₂ km/hr	-	1	2
9	Horizontal stabilizer selector	At position	-	-	1

4.8.2.2. Before Taxiing

Nos	Inspection area/topic	Report wording	Reporting crewmembers		
			Flight engineer	Copilot	Captain
1	Electrical power systems, loads	Checked, on	1	-	-
2	Navigation complex	On	-	1	2
3	KVPC-MII VOR/ILS, ADF	On, frequency ...	-	1	-
4	IFF transponder	On	-	-	1
5	Booster, artificial feel unit	On, guard closed, AUTO	-	2	1
6	Attitude indicators	Checked, marks aligned	-	1	2
7	Compass system	On, slaved	-	1	-
8	AFCS	OK, manual control mode	1	-	-
9	Pressurization control system, pressure selector	Pressure 650 selected	1	-	-

(cont'd)

4.8.2.3. During Taxiing

Nos	Inspection area/topic	Report wording	Reporting crewmembers		
			Flight engineer	Copilot	Captain
1	Brakes	Checked	-	1	2
2	Anti-icing heaters	On (Off)	1	2	-
3	Turn indicator	On, checked	-	1	2

4.8.2.4. At Holding Position

Nos	Inspection area/topic	Report wording	Reporting crewmembers		
			Flight engineer	Copilot	Captain
1	Altimeters	Altitude zero Pressure .. mm (mil-libar) Radio altimeters on	1	2	3
2	Wing high-lift devices	Extended, annunciators on	-	1	-
3	Horizontal stabilizer	... degrees	-	1	-
4	Elevator and rudder artificial feel units	OFF, TOL RUD & ELEV (ВЗЛЕТ ПОСАДКА PH и PB) annunciators on	-	1	2
5	Spoilers	Retracted, annunciators off	-	1	2
6	Attitude indicators and gyro horizons	Checked, marks aligned	-	1	2

(cont'd)

Nos	Inspection area/topic	Report wording	Reporting crewmembers		
			Flight engineer	Copilot	Captain
7	Direct vision windows	Closed	-	1	2
8	Control surfaces	Checked, free	-	-	1
9	APU, fuel system	On (off), AUTO	1	-	-

4.8.2.5. At Lineup Position

Nos	Inspection area/topic	Report wording	Reporting crewmembers		
			Flight engineer	Copilot	Captain
	CO-70 transponder ON				
	Readiness for takeoff	Compass system slaved			
		Course deg			
		Pitot tubes heaters on			
		READY	-	1	-
		NOT READY FOR TO annunciator off			
		READY	-	-	2

4.8.2.6. Before Descent

Nos	Inspection area/topic	Report wording	Reporting crewmembers		
			Flight engineer	Copilot	Captain
1	Landing approach pattern	Briefed	-	1	2
2	Landing data	Weight kg CG at % MAC Descent speed km/hr	-	1	-

(cont'd)

Nos	Inspection area/topic	Report wording	Reporting crewmembers		
			Flight engineer	Copilot	Captain
3	Compass system	Set to magnetic meridian of aerodrome of landing, course deg DG mode	-	1	2
4	Radio altimeter selector	Selector at m	-	1	2
5	Fuel	Fuel kg	1	-	-

4.8.2.7. After Selection of Aerodrome Pressure

Nos	Inspection area/topic	Report wording	Reporting crewmembers		
			Flight engineer	Copilot	Captain
1	Altimeters	Pressure ... mm Hg (milli-bar) set	1	2	3
2	VOR/ILS system (CH, ILS)	On, frequency	-	1	-
3	Horizontal situation indicator	Landing course deg set	-	1	2
4	ADF 1	Outer marker	-	1	-
	ADF 2	Inner marker	-	1	-
5	III-5 and III-6 AFCS control panels	Ready	-	1	-

NOTE: In case of change of the landing course or the runway, read this checklist once again.

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4.8.2.8. Before Base Turn or at a Distance of 25 to 20 km

Nos	Inspection area/topic	Report wording	Reporting crewmembers		
			Flight engineer	Copilot	Captain
1	Spoilers	Retracted	-	-	1
2	Horizontal stabilizer selector	Set in accordance with color coding	-	-	1
3	LG	Down, three green lights on, control valve lever neutral	-	1	-
4	Radio altimeters	On, selector at m	-	1	2

4.8.2.9. Before Interception of Glide Slope

Nos	Inspection area/topic	Report wording	Reporting crewmembers		
			Flight engineer	Copilot	Captain
1	Wing high-lift devices	Extended, flaps deg	-	1	2
2	Horizontal stabilizer	 deg	-	1	-
3	Artificial feel units	Off, TOL RUD & ELEV (БЗЛЕТ ПОСАДКА PH и PB) annunciators on	-	1	2
4	Lights	Extended	-	-	1

(cont'd)

4.8.3. Detailed Procedures

4.8.3.1. Before Starting Engines

- (1) Cockpit voice recorder - On. Copilot. Captain

The Copilot and the Captain make sure the cockpit voice recorder switch is on and the VOICE RCDR (МАРС) annunciator on the flight recorder control panel illuminates.

- (2) Blanks, shields, keys - Aboard. Flight engineer

The Flight Engineer makes sure all the blanks, shields and keys are aboard the airplane.

- (3) Doors, hatches - Closed, annunciators off. Flight Engineer

The Flight Engineer makes sure all the doors and hatches are closed and the respective annunciators are off.

- (4) Flight recorder, GPWS radio altimeter No. 1 - On, data inserted.
Flight Engineer, Copilot.

The Copilot must make sure the radio altimeter No. 1 switch is on and report to the Flight Engineer GPWS ON.

The Flight Engineer makes sure the FDRS PWR (ПИТАНИЕ МСРП) switch is on, precise time, date of departure and flight number are inserted, the tape transports are on and the GPWS OK (ССОС ИСПРАВН) annunciator illuminates.

- (5) Fuel pumps - Fuel booster and transfer pumps on. Flight Engineer, Captain.

The Flight Engineer and the Captain make sure the SERVICE TANK No. 1 (РАСХОДНЫЙ БАК № 1), TANK No. 2 L (БАК № 2 ЛЕВ), TANK No. 2 R (БАК № 2 ПРАВ), TANK No. 3 L (БАК № 3 ЛЕВ), TANK No. 3 R (БАК № 3 ПРАВ), TANK No. 4 (БАК № 4) switches are on and their respective annunciators illuminate with the AUTO-MAN (АВТОМАТ-РУЧНОЕ) selector switch set to MAN (РУЧНОЕ) and illuminate in accordance with the schedule, with the (АВТОМАТ-РУЧНОЕ) selector switch set to AUTO (АВТОМАТ).

- (6) Hydraulic power systems and brake line pressure - 210 and 120.
Flight engineer, Copilot, Captain.

The Flight engineer, the Copilot and the Captain read the pressure gauges to make sure the hydraulic power systems pressures are 200 to 210 kgf/sq.cm and the brake line pressure is 110 to 130 kgf/sq.cm.

(cont'd)

(7) Trimming - Neutral. Copilot, Captain

The Copilot and the Captain make sure the aileron, rudder and elevator trimming selector switches are set neutral, the elevator emergency trimming selector switch is closed by the guard, the ROLL NEUTRAL (РЕЙТРАЖ КРЕН), YAW NEUTRAL (РЕЙТРАЖ КУРС) and PITCH NEUTRAL (РЕЙТРАЖ ТАХТАЖ) annunciators illuminate.

(8) Takeoff data - Weight thousands of kg, CG at % MAC, V_1 km/hr, V_R km/hr, V_2 km/hr. Copilot.

The Copilot reports the values of takeoff weight, CG position and the values of speeds V_R , V_1 and V_2 .

(9) Horizontal stabilizer selector - At position. Captain

The Captain sets the horizontal stabilizer selector switch to a position agreeing with the calculated CG position.

4.8.3.2. Before Taxiing

(1) Electrical power systems, loads - Checked, on. Flight engineer.

The Flight Engineer must make sure the electrical power systems and loads are checked and on.

(2) Navigation complex - On Copilot, Captain

The Copilot and the Captain make sure the navigation complex is on, OK and operates normally.

(3) VOR/ILS, ADF - On, frequency Copilot

The Copilot must make sure the VOR/ILS system is on, OK and operates normally, and the ADF are set to the desired frequency, OK and operate normally.

(4) IFF transponder - On. Captain

The Captain must make sure the IFF transponder is on, OK and operates normally.

(5) Boosters, artificial feel units - On, guard closed, AUTO. Captain, Copilot.

The Captain and the Copilot make sure the POWERED CONTROL 1, 2, 3 (ВЫСТЕПНОЕ УПРАВЛЕНИЕ 1, 2, 3) selector switches are on and closed by the guard, the

(cont'd)

STEER CYLIND (ВУСТЕРА) annunciator is off, the RUD & ELEV ENROUTE FEEL (ПОЛЕТНЫЙ ЗАПРЯЖАТЕЛЬ РИ И РВ) selector switch is set to AUTO (АВТОМАТ) and closed by the guard, the ELEV TOL (БЗЛЕТ ПОС РВ) and RUD TOL (БЗЛЕТ ПОС РИ) annunciators illuminate.

- (6) Attitude indicators - Checked, marks aligned. Copilot, Captain.

The Copilot and the Captain make sure the FDI COPLT'S (ИКИ ПРАБ) and FDI FLTS (ИКИ ЛЕБ) switches are on and their cards deflect in pitch with the knobs on the indicators face panels turned, and align the marks on the knobs and the indicators housings. The Copilot and the Captain make sure the attitude monitor and the power fail switch are OK.

- (7) Compass system - On, slaved. Copilot.

The Copilot makes sure that both gyro units (main and reference) are aligned with the departure aerodrome meridian and the directional gyro mode is selected.

- (8) AFCS - OK. Flight Engineer

Manual control mode. Captain

The Flight Engineer makes sure the AFCS is OK by checking that the AFCS OK (ИСП АБС) annunciator is illuminating. The Captain makes sure the manual control mode is selected, the ROLL (КРЕН) and PITCH (ТАНТАЖ) flags display .

- (9) Pressurization control system, pressure selector - Pressure 650 selected. Flight Engineer.

The Flight Engineer must make sure a pressure of 650 mm Hg is set to the pressure selector.

4.8.3.3. During Taxiing

- (1) Brakes - Checked, OK. Copilot, Captain.

The Copilot and the Captain make sure the main and emergency wheel brakes are OK.

- (2) Anti-icing heaters - On (Off). Flight engineer, Copilot.

The Flight Engineer must make sure the wing and horizontal stabilizer heaters are off and the air intakes and engines heaters are on or off (depending on weather conditions), the airplane icing detector is on. The Copilot must make sure the windshield heaters are selected to LOW (СЛАБО).

(cont'd)

- (3) Turn indicator - On, checked. Copilot, Captain

The Copilot and the Captain must make sure the turn indicator is on and its pointer deflects into the turn.

4.8.3.4. At Holding Position

- (1) Altimeters - Altitude zero, pressure mm Hg (millibar), radio altimeters on. Flight engineer, Copilot, Captain

The Flight engineer, the Copilot and the Captain must make sure the aerodrome pressure is set to the altimeters and they read zero altitude.

The Captain must check that radio altimeters Nos 1 and 2 are on.

- (2) Wing high-lift devices - Extended, annunciator on. Copilot

The Copilot must make sure:

- the flaps are extended to degrees;
- the flap extension was synchronous;
- the slats are extended, the SLATS EXTND (ПРЕДКР ВЛИВН) annunciator illuminates.

- (3) Horizontal stabilizer deg. Copilot

The Copilot makes sure the horizontal stabilizer is in a harmonized position degrees

- (4) Elevator and rudder artificial feel units - Off. Copilot, Captain.

The Copilot and the Captain make sure that the RUD & ELEV ENROUTE FEEL (ПОЛЕТНЫЙ ЗАГРУЖАТЕЛЬ РН И РВ) selector switch is set to AUTO (АВТОМАТ) and that the rudder and elevator enroute artificial feel units are disengaged by the illumination of the ELEV TOL (БЗЛЕТ ПОС РВ) and RUD TOL (БЗЛЕТ ПОС РН) annunciators.

- (5) Spoilers - Retracted, annunciators off. Copilot, Captain.

The Copilot and the Captain make sure the spoilers are retracted, their control handle is set to the foremost position and locked, the OUTBD (СРЕДН) and INBD (ВНУТР) annunciators are off.

(cont'd)

- (6) Attitude indicators and gyro horizons - Checked, marks aligned. Copilot, Captain

The Copilot and the Captain make sure the marks made on the knob and the indicator housing are aligned, and the GH (Af) flag is removed from the flight director indicators and gyro horizons face panels.

- (7) Direct vision windows - Closed. Copilot, Captain

The Copilot and the Captain make sure the direct vision windows are closed.

- (8) Control surfaces - Checked, free. Captain

The Captain makes sure the control surfaces deflect easily within the entire range until abutted against the stops.

- (9) APU, fuel system - On (when air conditioning is performed from the APU), AUTO. Flight engineer.

The Flight engineer, after air conditioning has been changed over to the engines, cuts off the APU and makes sure that the APU compartment doors are closed, the INTAKE OPEN (СТВОРКИ ОТКРЫТЫ) annunciators are off, and the AUTO-MAN (АВТОМАТ-РУЧНОЕ) selector switch on the fuel system control panel is set to AUTO (АВТОМАТ).

4.8.3.5. At Lineup Position

Readiness for takeoff - CO-70 IFF transponder, compass system slaved, course deg, pitot tubes heaters on, READY. Copilot. NOT READY FOR TO (К БЗЛЕТУ НЕ ГОТОВ) annunciator is off, READY. Captain.

The Copilot makes sure the PITOT HEAT (ОБОГРЕВ ПИЛУ) switch is on, the airplane is aligned with the runway centerline, the compass system reading agrees with the takeoff course (in case of necessity align with the actual heading).

The Captain makes sure the required code is keyed on the ATC transponder control panel, the mode selector switch is set to READY (ГОТОВ) and the NOT READY FOR TO (К БЗЛЕТУ НЕ ГОТОВ) annunciator is off.

4.8.3.6. Before Descent

- (1) Landing approach pattern - Briefed. Copilot, Captain.

The Copilot and the Captain must look through and refine the landing approach pattern of the airport in question in the Manual.

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- (2) Landing data - Weight thousands of kg, CG at % MAC, descent speed km/hr. Copilot.

The Copilot calls WEIGHT thousands of kg, CG at % MAC, DESCENT SPEED km/hr.

- (3) Compass system - Adjusted to the magnetic meridian of the aerodrome of landing, course deg, in the directional gyro mode. Copilot, Captain.

The Copilot must perform magnetic correction of gyro/mag monitor No. 1 and No. 2 in the following way:

The CORRECTION (КОРРЕКЦИЯ) selector switches - make sure are on of gyro/mag monitor No. 1 and No. 2

The compass system mode selector switch - DG (ИТК)

The SLAVING (СОГЛАСОВАНИЕ) button - depress and keep depressed until the Copilot's radio-magnetic indicator readings agree with those of KM-5 unit No. 1 and the Captain's radiomagnetic indicator readings agree with those of KM-5 unit No. 2 and release

The CORRECTION (КОРРЕКЦИЯ) selector switch - OFF (ВЫКЛЮЧЕНО) of gyro/mag monitor No. 1 and No. 2

The Copilot must report COMPASS SYSTEM READY, DIRECTIONAL GYRO MODE, COURSE DEG.

NOTE: If flight is conducted in icing conditions, switch off the SLAT (ПРЕДУП) heater switch for the period of correction of the gyro/mag monitors and switch it on again.

- (4) Radio altimeter selector - Selector at m. Copilot, Captain.

The Copilot sets his radio altimeter selector to the traffic altitude and the Captain sets his radio altimeter selector to the decision height.

(cont'd)

- (5) Fuel - Fuel thousands of kg. Flight engineer.

The Flight Engineer must monitor operation of the fuel system and report to the Captain the hourly fuel consumption, fuel flow rate and fuel quantity.

4.8.3.7. After Selection of Aerodrome Pressure

- (1) Altimeters - Pressure mm Hg (millibar) is set. Flight Engineer, Copilot, Captain.

The Flight Engineer, the Copilot and the Captain must make sure the landing aerodrome pressure is set correctly and call the altimeters readings.

- (2) KVPC-MII VOR/ILS system (CII, ILS) - On, frequency, Copilot.

The Copilot must make sure the KVPC-MII VOR/ILS system is on, a required frequency is set and the system is prepared for landing:

- (a) HSI INDICATION-RH (ИНДИКАЦИЯ ПНП-ПРАВ) - AUTOMATIC APPROACH II
selector switch of the ПН-6 control panel (A3 II)

- (b) on IIVP control panel No. 2

- the DME-VOR-CAPTURE (DME-VOR - ЗАХВАТ) - DME-VOR
selector switch
- operate the MHz and kHz knobs to
select the localizer operating
frequency

- (c) on the mode selector panel set:

- the ENROUTE-LANDING (МАРШРУТ-ПОСАДКА) - LANDING (ПОСАДКА)
selector switch
- the CII-KATET-ILS selector switch - position corresponding to
the system installed at
the aerodrome of landing

- (d) on course selector No. 2 - set the landing course

- (e) Reports KVPC-MII VOR-ILS READY

(cont'd)

(f) After the Captain depresses the APPROACH (ЗАХОД) button, the Copilot proceeds as follows:

- the HSI INDICATION-RH (ИНДИКАЦИЯ ПНП-ПРАВ) selector switch
- AUTOMATIC APPROACH I (АЗ I)
- on IVP control panel No. 1;
- the DME-VOR-CAPTURE (ДМЕ-VOR-ЗАХВАТ) selector switch
- CAPTURE (ЗАХВАТ)
- operate the MHz and kHz knobs to select the localizer operating frequency

NOTE: If the KVPC-МІ VOR/ILS system is not used in VOR mode for homing to the aerodrome, tune both semi-sets of the system to the localizer frequency simultaneously.

(3) Landing course deg - Set to HSI. Copilot, Captain

The Copilot and the Captain make sure a landing course of deg is set to their respective horizontal situation indicators

(4) ADF 1 - Outer marker

ADF 2 - Inner marker. Copilot

The Copilot must make sure ADF 1 is tuned to the landing aerodrome outer marker frequency and ADF 2 is tuned to the landing aerodrome inner marker frequency, and the call signs are heard.

(5) ПН-6 and ПН-5 control panels - Ready. Copilot

NOTE: In case of change of the landing course or the runway, read this checklist once again.

The Copilot must make sure the LANDING PREP (ПОДГОТ ПИСАДКА) and COMMAND BARS (СТРЕЛКИ КОМАНД) switches on the ПН-5 control panel are on.

Depress the FD (СТУ) and AUTOHROTTLLE (AT) buttons on the ПН-6 control panel to test the autopilot system, the autothrottle and the GO-AROUND (УХОД) switch.

NOTE: Do not switch on the COMMAND BARS (СТРЕЛКИ КОМАНД) switch when executing the landing approach in the РСН or ОСН modes.

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4.8.3.8. Before Base Turn or at a Distance of 25 to 20 km.

(1) Spoilers - Retracted. Captain

The Captain must make sure the spoilers are retracted and their control handle is in the foremost position and locked, the OUTBD (CPEДH) and INBD (BHVTB) annunciators are off.

(2) Horizontal stabilizer selector - Set according to CG position. Captain

The Captain must make sure the horizontal stabilizer selector is set correctly by seeing the elevator and horizontal stabilizer position indicators pointers within the same color segments in horizontal flight at a speed of 400 km/hr, with the airplane trimmed out in pitch by trimming the elevator.

(3) LG - Down, three green lights on, control valve lever neutral. Copilot.

The Copilot must make sure the LG is extended, the three green lights on the central instrument panel illuminate, the LG control valve is in neutral position, the hydraulic power systems pressures are within the specified limits.

(4) Radio altimeters - On, selector at m. Copilot, Captain

The Copilot compares the radio altimeter readings with those of the pressure-actuated altimeter, and, if there are no discrepancies, sets the selector to the decision height.

The Copilot compares his radio altimeter readings with those of the Captain's radio altimeter.

4.8.3.9. Before Interception of Glide Slope

(1) Wing high-lift devices - Extended, flaps deg. Copilot, Captain

The Copilot and the Captain must read the indicators and observe the illuminating annunciators to make sure the wing high-lift devices are extended, the flaps are set to deg, and the SLATS EXTND (ИПЕДКР ВЫЛВН) annunciator is on.

(2) Horizontal stabilizer - deg. Copilot

The Copilot must read the respective indicator to make sure the horizontal stabilizer is in the harmonized position at deg.

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(3) Artificial feel units - Disengaged. Copilot, Captain.

The Copilot and the Captain make sure that the RUD & ELEV ENROUTE FEEL selector switch is set to AUTO.

Seeing the TOL ELEV (B3MET HOC PB) and TOL RUD (B3MET HOC PH) annunciators illuminating the Copilot and the Captain make sure the enroute artificial feel units are disengaged.

(4) Lights - Extended. Captain

The Captain makes sure the lights are extended.



FLIGHT MANUAL

NORMAL PROCEDURES - List of Acceptable Failures

4.9. LIST OF ACCEPTABLE FAILURES

4.9.1. Conditions for Usage of List

- (1) The present list determines the failures and malfunctions of the Ty-154M airplane with which it is allowed to continue flight up to the nearest scheduled aerodrome, execute departure to the base aerodrome (with multiple landings, if necessary) or carry out flight missions up to the moment of performing the next maintenance (check B or check 1).

In this case the flight safety is not compromised.

- (2) Employment of this list is a forced measure and therefore upon detection of failures (malfunctions) the maintenance personnel must in the first instance take all necessary measures to eliminate them. It is allowed to use the list in cases when a failure (malfunction) cannot be eliminated or this operation is inexpedient at a stopover (base) airport due to shortage of time required for its elimination or importance and urgent nature of the flight mission.
- (3) Never apply this list to aircraft being cleared for flight from the base aerodromes after maintenance to check 1.
- (4) The present list allows clearance for flight of an airplane with two failures in a single system not related functionally to each other, provided the total number of failures per airplane does not exceed three, these failures also not related to each other.
- (5) Upon receiving a report on the airplane failures, the Captain takes the decision to proceed to flight without elimination of the failures basing on the requirements of the present list. The Captain has also the right to delay flight if he considers that the departure and landing conditions do not ensure the safety of flight with the detected failures. In this case he must prepare a written report stating his reasons for refusal from application of this list.
- (6) In case of application of this list the engineering service must do the following:
 - precisely determine the area and reason (nature) of failure;
 - make sure each (any) failure (malfunction) has no effect on other failures (malfunctions) in the same system;
 - make sure a given failure (malfunction) has no effect on operation of other systems, units and equipment of the airplane;

(cont'd)

- take decision to allow operation until carrying out maintenance checks B or 1 only at the base airport;
- prepare, together with the crew, documentation for application of the present list (aircraft Log Book and indent) for flight clearance.

(cont'd)

4.9.2. List of Acceptable Failures

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
4.9.2.1. Airframe								
(1) Damaged baggage compartment floors	Visually			+	-	-	+	Provided the airplane framework structural components are not damaged and detected damage does not affect the flight safety.
(2) Damaged baggage compartments walls and ceiling panels	Visually			+	-	-	+	Provided the units and lines located behind these components are not damaged. No baggage or cargo must be placed in the area of damage.
(3) Cracking of surface coating of the flight compartment canopy electrically-heated window pane	Visually	3	1	+	-	-	+	Provided the pilots do not claim deteriorated vision.

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4.9.3

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(4) Damage to and breaking of some of tie-down rings in the baggage compartments	Visually		30 %	+	+	-	+	Tie-down of cargo shall meet the flight safety requirements.
(5) Faulty pilots' seats adjustment mechanisms	Visually	2	2	+	+	+	+	Provided convenience of piloting is not disturbed and the seats can be positively locked.
(6) Presence of smooth dents at the fuselage skins, up to 5 mm in depth	Visually			+	+	+	+	Provided the framework is not damaged and the skins are free from cracks.
(7) Presence of smooth dents at the fin, horizontal stabilizer and wing leading edges	Visually			+	+	+	+	Provided the dents do not exceed 15 mm in depth.
(8) Presence of scratches on the skins	Visually			+	+	+	+	Provided the scratches do not exceed 0.2 mm in depth on the skins,

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4.9.5

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(9) Sparking at the electrically-heated window panes	Visually	3	1	+	-	-	+	1.2 to 1.5 mm thick and 0.3 mm deep, on the skins more than 1.5 mm thick. De-energize the electric heater of the faulty window pane.
(10) Inoperative windshield wiper	Visually	2	2	+	-	-	+	Provided weather forecast for the landing aerodrome is favourable.
(11) Broken spring of the door locking mechanism inside handle lever	Spring fails to actuate	3	1	+	-	-	+	After closing the door, pull the lever out of the handle and fix it in this position (by twine, scotch tape, herringbone tape or insulation tape).
(12) Cracking of one structural window pane (intermediate or inside)	Visually	3	1	+	-	-	+	If the defect does not obstruct the pilots' vision.



NORMAL PROCEDURES - List of Acceptable Failures

FLIGHT MANUAL

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying unit carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(13) Exfoliation of skins on the honeycomb components of the elevator and rudder	Visually and by tapping			+	+	+	+	The total area of exfoliation must not exceed 2500 sq.cm on the elevator and 35 % of the rudder external area.
4.9.2.2. Powerplant								
(1) The engines fail to start off the APU	Failure of the engines to start	3	3	+	+	+	+	Provided there are ground pneumatic power sources in the enroute airports.
(2) Jamming of the thrust reverser doors in the direct thrust position	Failure of the doors to deploy	2	1	+	-	-	+	Employment of reverse thrust of one engine on the aerodrome whose runway provides an adequate landing distance.
(3) Failure of the thrust reverser doors to retract from the reverse thrust position to the direct thrust	Failure of the doors to retract	2	1	+	-	-	+	Retract the thrust reverser doors manually. Continue flight without employment of reverse thrust during landing roll. The runway length

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying unit car-rying out main-tenance to check B	Flying until car-rying out main-tenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
position during landing roll								must be adequate for provision of a required landing distance.
(4) Failure of the tachometer of one of the engine rotors	Visually	3	1	+		-	+	In case of failure of the HP rotor tachometer compare the LP rotor tachometer readings with those of the serviceable tachometers.
(5) Failure of the fuel flow rate indicator	Visually	3	1	+	-	-	+	-
(6) Failure of the engine three-pointer indicator	Visually	3	1	+	-	-	+	-
(7) Failure of the engine annunciators:	Visually, by observing the instruments and annunciators			+	-	-	+	Use the serviceable annunciators for monitoring operation of the engine.
- LO OIL LEVEL (УРОВЕНЬ МАСЛА)		3	1					
- OIL PRESS (Р МАСЛА)		3	1					

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4.9.7

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
- FUEL PRESS (P ТОПЛИВА)		3	1					
- CHIPS IN OIL (СТРУЖКА В МАСЛЕ)		3	1					Provided the filter-detector and the magnetic plugs are free from chips.
- FLTR CLOG (ФИЛЬТР ЗАСОРЕН)		3	1					
- HI VIBR (ВИБРАЦИЯ ВЕЛИКА)		3	1					Monitor the vibration level by reading the vibration indicator every 5 to 10 minutes
(8) Failure of the HP rotor tachometer indicator installed on the pilot's central instrument panel	Visually, by reading the tachometer indicator	3	3	+	+	-	+	-
(9) Failure of the fuel flow totalizer indicator	Visually	1	1	+	-	-	+	-

(cont'd)

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(10) Failure of the air mass delivery rate regulator of two lines	Visually	2	2	+	+	-	+	-
4.9.2.3. APU and Air Intakes								
(1) The APU fails to start	Failure to start	1	1	+	-	-	+	Provided ground pneumatic power sources are available at the enroute airports, and the electric power system and the hydraulic power systems are free from troubles.
(2) Presence of smooth dents at the air intakes lips	Visually	3	3	+	+	+	+	Provided the dents do not exceed 15 mm in depth.
(3) Broken heads of rivets in the air intakes ducts	Visually	3	3	+	+	+	+	The maximum acceptable number of broken heads is 20, provided there are not more than 5 broken heads adjacent to each other.

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4.9.9

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(4) Jamming of the APU air intake or exhaust door in the open position	Visually	2	2	+	-	-	+	In-flight start of the APU is forbidden. The ground pneumatic power sources must be available at the enroute airports. Before flight, open the jammed door manually. The electric power system and hydraulic power system must be free from troubles.
4.9.2.4. Flight Control System								
(1) Failure (disengagement) of channel 1 or 2 of the flight control follow-up system	Visually	2	1	+	-	-	+	During takeoff and landing account for two-fold increase of the flap extension (retraction) cycle duration.
(2) Failure of the annunciators of both flap control channels to operate in the automatic mode	Visually	1	1	+	-	-	+	Proceed to manual mode of control.

(cont'd)

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(3) Failure of one pointer of the flap position indicator to move	Visually	2	1	+	-	-	+	Before takeoff and landing make sure the positions of both flaps are symmetrical.
(4) Failure of one control channel of the slat electric actuator	Visually	2	1	+	-	-	+	Account for two-fold increase of the slat retraction-extension cycle duration.
(5) Disturbed setting of the slat operating system limit switch unit	During extension (retraction) the SLATS EXTND (ПРЕДКР ВЫПУСК) annunciator continues blinking for more than 30 seconds.	1	1	+	-	-	+	Proceed to manual mode of control. Control the slats as instructed in 8.10.3.2(2).
(6) Failures of the annunciators displaying released position of the spoilers locks	Visually	1	1	+	-	-	+	Provided the spoiler control system is free from troubles.

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4.9.11

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(7) Failure of the inboard spoilers to extend automatically	Information of the engineering service	1	1	+	+	+	+	Landing with the use of the midwing spoilers on the aerodromes whose runways provide an adequate landing distance
(8) Failure of the elevator main manual trimming system	Upon depression of the ELEV FEEL (ЗАПРЯЖАТЕЛЬ PB) buttons by the pilots to NOSE DWN (ШНК) or NOSE UP (КАБ), the control column forces are not removed.	1	1	-	-	-	+	Proceed to emergency control of the elevator trimming.
(9) Failure of the elevator enroute artificial feel unit automatic engagement system. The enroute artificial feel unit	The ELEV TO LAND (БЗЛЕТ I НОС PB) annunciator illuminates steadily	1	1	-	-	-	+	Proceed to manual mode of control.

(cont'd)

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total quantity of instruments in airplane	Acceptable quantity of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
fails to engage during takeoff after retraction of the flaps (with the possibility of manual engagement retained).								
(10) Failure of the rudder trimming system. Passive (without runaway) failure of the rudder trimming mechanism.	To directional control pedal forces fail to trim out upon depression of the RUD TRIM (ТРМММРО-БАВЛЕ PH) selector switch.	1	1	-	-	-	+	Proceed in accordance with the instructions of subsection 5.7.
(11) Failure of the rudder enroute artificial feel unit automatic	The RUD TO LAND (БЗЛЕТ ИОС PH) annunciator:	1	1	-	-	-	+	Proceed to manual mode of control.

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4.9.13

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes crew's actions
engagement system. The enroute artificial feel unit fails to engage during takeoff after retraction of the flaps (with the possibility of manual engagement retained)	(a) illuminates steadily (b) blinks and does not go out for more than 30 seconds after retraction of the flaps							
(12) Failure of the aileron trimming system. Passive (without runaway) failure of the aileron trimming mechanism	The control wheel fails to turn upon depression of the AIL TRIM (ТРИММИРОВАНИЕ ЭЛЕРОН) selector switch	1	1	-	-	-	+	Proceed in accordance with the instructions of subsection 5.7

(contin'd)

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until car-rying out maintenance to check B	Flying until car-rying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes crew's actions
4.9.2.5. Landing Gear								
(1) Failure of the parking brake	No braking, as reported by the engineering service	1	1	+	-	-	+	With the main and emergency braking systems OK, use the chocks while in the parking area
(2) Broken grounding cable of the main LG unit	Visually	2	1	+	-	-	+	
(3) Damaged main LG wheel tyre	Visually	12	1	+	+	-	+	Punctures and through cuts in the tread provided they do not penetrate deeper than the fourth fabric ply. Local worn-out areas not deeper than the second fabric ply
(4) Leaky wheel brake unit	Visually	12	Two on one of the bogies	+	-	-	+	Blank the respective brake AMT-10 hydraulic fluid supply pipe. Account for the runway condition. Request flooding of the wheel with water after landing

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4.9.15

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check	Continued flight to nearest scheduled airport	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes crew's actions
(5) Leakage of hydraulic fluid at the steering control and shimmy damper cylinder	Visually	1	1	+	-	-	+	Acceptable provided leakage flow rate does not exceed 2 cu.cm/min at a pressure of 210 kgf/sq.cm Check before flight
(6) Leakage of hydraulic fluid at the main LG door cylinder push rod	Visually	2	1	+	-	-	+	Acceptable provided leakage flow rate does not exceed 1 cu.cm/min at a pressure of 210 kgf/sq.cm
(7) Droplet leakage of hydraulic fluid at the LG hydraulic system swiveling joints	Visually	2	1	+	-	-	+	-
(8) Broken steering control and shimmy damper cover attachment bolt	Visually	12	1	+	-	-	+	Check the remaining bolts before each flight if there is no hydraulic fluid leakage
(9) Scratches on the main and nose LG shock struts rods	Visually	3	3	+	+	-	+	Scratches up to 0.2 mm in depth are acceptable. Dress the sharp edges of scratches with a fine emery cloth

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4.9.16

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(10) The red annunciator of the left or right main LG illuminates after retraction of the LG (with the selector switch in the RETR (УБОРКА) position	Visually	2	1	-	-	-	+	After keeping the LG selector switch at RETR (УБОРКА), set it neutral. Having made sure visually the LG is up and the doors are closed, continue flight
(11) After retraction of the LG (the selector switch at RETR (УБОРКА)), the nose LG red annunciator illuminates	Visually, by observing the indicators	1	1	-	-	-	+	Extend the LG. Repeat the retraction cycle. Continue flight after the red annunciator goes out
4.9.2.6. Fuel System								
(1) Failure of the single-point fueling system	The tanks fail to be fueled	1	1	+	+	-	+	Provided the overwing fueling procedure is used and amount of fuel is checked by the stick gauges and fuel contents gauges

(cont'd)

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4.9.17

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(2) Failure of one pump in tanks 1 or 3	Audially, from information of the engineering service	5 pcs in tank 1, 3 pcs in tank 3	1	+	-	-	+	(1) De-energize the failed pump on the ground (2) Increase alertness in monitoring operation of the remaining fuel pumps. Account for incomplete fuel usage due to failure of the pump
(3) Failure of the fuel pump in tank No. 2	Audially, from information of the engineering service	2	1	+	-	-	+	De-energize the failed pump on the ground
(4) Failure of one pump in tank No. 4	Audially, from information of the engineering service	2	1	+	-	-	+	Provided the CG is retained within the specified limits. De-energize the failed pump on the ground
(5) Failure of the 311H-319 fuel pump	Fuel is not fed to the engine during starting	2	1	+	-	-	+	Never de-energize the failed pump in flight

(cont'd)

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(6) Failure of the fuel pump operation annunciators	Visually	17	1	+	-	-	+	Make sure the pumps operate (audially)
(7) Leaky integral tanks	Visually	Leakages in tanks Nos 1 and 4 causing ingress of fuel into the fuselage pressurized section is not acceptable. Leakages in the remaining integral tanks are acceptable provided they do not involve disturbance of the wing structural components as derived from the table below.						

Area of leakage	Type of leakage		
	(a)	(b)	(c)
Outside surface blown by ram air, where fuel is not accumulated (the wing upper and lower panels)	1	1	2
Semi-ventilated areas (the wing portions in front of the forward and rear spars)	1	2	
Non-ventilated inside volume where leaking fuel can accumulate (non-sealed volume adjacent to the integral tanks), where	2		
(a) <u>Perspiration</u> - slight leakage capable of moistening an area not exceeding 50 mm within two hours after wiping with cloth.			
(b) <u>Formation of stain</u> - leakage without formation of droplets spreading over an area not exceeding 150 mm in two hours.			

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
Area of leakage								Type of leakage
								(a) (b) (c)
(c) <u>Seepage</u> - leakage without formation of droplets spreading over an area not exceeding 150 mm in two hours.								
1 - Continue operation, watch to prevent further development of leakage								
2 - Continue operation, watch to prevent further development of leakage. Eliminate during check B. Carry out complex repair during check 1.								
(8) Coming-on of the FILTER CLOGGED (ФИЛЬТР ЗАСОРЕН) annunciator	Visually	3	2	-	-	-	-	Continue flight without cutting out the engine. Wash the filters after landing
(9) Failure of the pumps automatic control system	Visually	1	1	+	-	-	+	Proceed to manual mode of control
(10) Failure of proportioner	Visually	1	1	-	-	-	+	The Flight engineer must switch on the PROPORTIONER MAN SELECT (ПРИНУДИТ. ВКЛ. ПРОПОРЦИОНЕРА) switch or periodically set the

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(11) Failure of the fuel management system	Visually	1	1	+	-	-	+	FUEL TO TANK 1 STBY TRANSF VLVS (КРАН РЕЗЕРВНОЙ ПЕРЕКАЧКИ В БАКЕ № I) switch to OPEN-CLOSED (ОТКРЫТ-ЗАКРЫТ) to maintain the fuel quantity in the service tank within the limits of 3150 to 3300 kg Provided the fuel usage manual control system and the fuel quantity indication system of all the tanks operate normally. The Flight engineer must increase alertness in monitoring the operation of the system. Before flight, check the fuel management system by depressing the (P) and (H) test buttons and comparing its readings with those of the stick gauges

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4.9.21

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(12) Failure of the fuel quantity indicator	Visually	8	1	+	-	-	+	In case of failure of the fuel quantity measuring circuit of only one tank, except for tank No. 1, normal operation of the fuel system automatic devices and checking of the fuel contents in the tanks before flight by means of the stick gauges
(13) Failure of the equalizer	Visually, proceeding from the flight data	1	1	+	-	-	+	Provided the fuel quantity indication system operates normally and differences in the fuel quantities in the like left and right tanks can be eliminated by manual control
(14) Failure of the overflow valve	Visually	4	4	+	+	-	+	Fuel the airplane through the overwing necks

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(15) Magnetic stick gauges are not available or produce incorrect readings	Visually	6	6	+	+	+	+	Provided the fuel contents gauges operate normally
4.9.2.7. Hydraulic Power System								
(1) Failure of the remote-reading pressure gauge of one hydraulic power system	Visually	3	1	+	-	-	+	Provided the hydraulic power system is in serviceable condition and hydraulic fluid level in the system is periodically checked
(2) Droplets of hydraulic fluid running from one of the hydraulic power systems	Visually	3	1	+	-	-	+	The amount of hydraulic fluid must be monitored in flight. The total leakage flow rate on the ground must not exceed 1 drop per minute at a system pressure of 210 kgf/sq.cm.

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(3) Cross-flowing of hydraulic fluid from one system into another	Visually	3	1	+	-	-	+	The Flight engineer must increase alertness in monitoring the operation of the systems. The cross-flow rate must not exceed 1 liter per hour in flight
(4) Failure of the low-pressure annunciator of one of the hydraulic power systems	Visually	3	1	+	+	-	+	Before flight, check the hydraulic fluid level in the oil tank and the system pressure read by the pressure gauges
(5) Hydraulic pump of hydraulic power system 3 fails to develop pressure due to shearing of the pump quillshaft	Visually, by reading the pressure gauge	1	1	+	-	-	+	Make sure hydraulic power system 3 is free from chips. Use the HC-46 electrically-driven pumping unit of hydraulic system 3 during takeoff and landing

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(6) Failure of one hydraulic power system	Visually, by reading the instruments. The hydraulic actuators are inoperative	3	1	-	-	-	+	Proceed in accordance with the instructions of subsection 8.4.3
4.9.2.8. Oil System								
(1) Failure of the single-point oil servicing system	Visually	1	1	+	+	+	+	Fill oil immediately into the tank. Check the oil level by reading the oil tank stick gauge
(2) Failure of the oil contents gauge	Visually	3	3	+	+	+	+	Monitor the oil level in the oil tank by means of the stick gauge, in flight by reference to the oil temperature and pressure indicators

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4.9.25

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
4.9.2.9. Anti-Icing System								
(1) Failure of the HOR STAB (СТАБИЛИЗАТОР) or WING (КРЫЛО) air temperature indicator	Visually	1	1	+	+	-	+	-
(2) Failure of the wing and stabilizer heating system LH or RH cutoff valve	Visually, from information of the engineering service	2	1	+	-	-	+	Provided the valve fails closed
(3) Failure of the heater of the CO-121 icing detector	Visually	1	1	+	-	-	+	Switch on the anti-icing system heaters referencing to the IGV ICING (ОБЛЕДЕНЕНИЕ ВНА) annunciator
(4) Failure of the annunciator operated by the CO-121 icing detector	Visually	1	1	+	-	-	+	Operate the wing and horizontal stabilizer leading edges heaters referencing to the IGV ICING (ОБЛЕДЕНЕНИЕ ВНА) annunciator

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(5) Failure of the ДQ-206 icing detector or the БА-137 unit	Visually	3	1	+	+	-	+	-
(6) Failure of the slat heaters:	Visually, by reading the instruments							
- leading edge heat strip		2	2	+	+	+	+	De-energize the failed programmer element
- heating sections		16	16	+	+	+	+	De-energize the failed programmer element
- programmer		1	1	+	+	+	+	Switch off two ICE PROTECTION - WING - HOR STAB (ПРОТИВО-ОБЛЕДЕНЕНИЕ КРЫЛО СТАБИЛИЗАТОР) circuit breakers АЗСТК-5 on the right CB panel
(7) Failure of the windshield heater (power supply circuit)	Visually	3	1	+	-	-	+	Do not energize the failed heater

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
4.9.2.10. Fire-Protection System and Inert Gas System								
(1) Failure of the inert gas system	Visually	1	1	+	-	-	+	-
(2) Discharge of one shot fire extinguishers	Visually	3	1	+	-	-	+	Relocate the bottles before flight so as the discharged bottle is connected to the third shot line
(3) Failure of the engine nacelles and APU fire detectors	Visually	63	One group per engine nacelle	+	-	-	+	-
(4) Failure of the smoke detection system	Visually	1	1	+	+	-	+	-

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (w) multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
4.9.2.11. Pressurization, Heating and Ventilation								
(1) Failure of the turbine cooler	Visually	2	1	+	+	-	+	Provided the ambient temperature does not exceed 30 °C on the ground
(2) Failure of the air flow distributor	By reading the instruments	3	1	+	-	-	+	Only failure in the closed position is acceptable
(3) Failure of the pressurization valve	By reading the instruments	2	1	+	-	-	+	Only failure in the closed position is acceptable
(4) Failure of the pressure differential regulator	By reading the instruments	1	1	+	-	-	+	The Flight engineer must ensure monitoring of the air temperature
(5) Failure of the PTA-36T-27T air temperature regulator	Visually	3	3	+	+	-	+	Provided the air temperature manual control system operates normally and the air temperature in the passenger compartments is monitored

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4.9.29

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(6) Failure of the PTA-36T-30T air temperature regulator	Visually	2	2	+	+	-	+	Provided the air temperature manual control system operates normally and the air temperature is monitored by reading the TV3-48 air temperature indicator
(7) Failure of the individual ventilation spouts	No air delivery	93 to 104 passengers 136 passengers 149 passengers 159 passengers	+	+	-	-	+	Up to 25 % in each passenger compartment Up to 10 % in each passenger compartment Up to 5 % in each passenger compartment
(8) Failure of the passenger and flight compartment air temperature indicator	Visually	2	2	+	+	-	+	Provided the air conditioning system operates normally and the TV3-48 air temperature indicator is OK

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(9) Failure of the temperature switch	The temperature switch fails to operate in the automatic mode	5	3	+	+	-	+	Provided the air temperature manual control system operates normally and the air temperature is monitored by reading the instruments
(10) Droplets of oil running from the turbine cooler oil systems	Visually	2	1	+	+	-	+	Provided the turbine cooler is completely serviced with oil and this condition is checked at the end of day's flying
(11) Failure of the 3308B unit installed in the air-to-air cooler bypass line	The air temperature fails to be controlled	2	1	+	-	-	+	Close the line
(12) Failure of the 3308B unit in the turbine cooler bypass line air bleed line	The air temperature fails to be controlled	2	1	+	-	-	+	Provided the ambient temperature does not exceed 30 °C. Close the line if it proves impossible to reduce the air temperature

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4.9.31

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(13) Breaking of the pipes in one of the pressurization lines	Visually	2	1	+	-	-	+	Provided the broken pipes are downstream of the 3308B unit and the 3308B unit is closed
(14) Breaking of the pipes in one of the ventilation lines	Visually	2	1	+	-	-	+	-
(15) Malfunction of the pressurized compartment depressurization warning system	Visually	1	1	+	-	-	+	With the system OK
(16) Malfunction of the pressure regulator	The cabin pressure fails to be controlled	2	1	+	-	-	+	-
(17) Malfunction of the outflow valve	The cabin pressure fails to be controlled	4	1	+	-	-	+	The valve shall be only in the closed position

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(18) Failure of the cutoff valve	The cabin pressure fails to be controlled	1	1	+	1	-	+	Provided the ejection system line is free from leaks
(19) Failure of the TV9-48 air temperature indicator	Visually	1	1	+	-	-	+	With the automatic air temperature regulators OK
(20) Failure of the primary air-to-air cooler	Too high air temperature in the lines	3	1	+	-	-	+	Do not bleed air from the engine if the respective air-to-air cooler has failed
(21) Failure of the air bleed valve	The valve fails to open	3	1	+	-	-	+	Provided the valve fails to be closed
(22) Failure of the 3161 shutter installed in the APU compartment heating system	Visually, by reading the instruments	1	1	+	-	-	+	Heat the APU compartment before starting

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4.9.33

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
4.9.2.12. Electrical System								
(1) Failure of one of the main AC generators	Visually	3	+	+	-	-	+	Provided the APU generator is OK. Switch off the failed generator. If the failure involves damage to the generator, remove it from the engine
(2) Failure of the rectifier	By reading the instruments	3	1	+	-	-	+	-
(3) Failure of the 200/36 V transformer	By reading the instruments	2	1	+	-	-	+	-
(4) Failure of the taxi/landing lights	Visually	4	2	+	-	-	+	For landing on an illuminated runway
(5) Failure of the flashing beacon	Visually	2	2	+	-	-	+	For day time flying
(6) Failure of the APU generators (generator)	By reading the instruments	2(1)	2(1)	+	-	-	+	-

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total quantity of units (instruments) in airplane	Acceptable quantity of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(7) Failure of the frequency meter	By reading the instruments	1	1	+	-	-	+	-
(8) Failure of the AC mains ammeter	By reading the instruments	1	1	+	-	-	+	-
(9) Malfunction of the doors and hatches position indication system	By reading the instruments			+	-	-	+	Before flight, make sure all the doors and hatches are closed
(10) Failure of the passenger compartment general lighting	Visually			+	-	-	+	With the standby lighting OK
(11) Malfunction of the passenger compartment standby lighting	Visually			+	-	-	+	-
(12) Malfunction of individual lights in the passenger compartments	Visually			+	+	-	+	-

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(13) Failure of the navigation light	Visually	3	3	+	-	-	+	For daytime flying
(14) Failure of the cabin attendant's call annunciator	Visually	3	1	+	+	-	+	-
(15) Malfunction of the static discharger	Visually	4	2	+	-	-	+	With the adjacent static discharger OK
(16) Malfunction of the passenger compartment lights	Visually	1	1	+	-	-	+	-
(17) Malfunction of the service compartments lights	Visually			+	+	-	+	-
(18) Failure of the NO SMOKING, FASTEN SAFETY BELTS lighted sign	Visually			+	-	-	+	-

(cont'd)

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(19) Failure of the chokes in the fluorescent lighting system	Visually	Up to	20%	+	-	-	+	Remove the lamp, if on the ground. Switch off the group of lamps, if in flight
4.9.2.13. Radio Equipment								
(1) Failure of the weather radar	No display on the indicator	1	1	+	-	-	+	Upon authorization of the ATC service with no thunderstorms on the route
(2) Failure of the radar main or standby transceiver	-	2	1	+	-	-	+	-
(3) Failure of the radar antenna gyrostabilizer channel	-	1	1	+	-	-	+	Provided the antenna manual control system is OK
(4) Failure of the HF transceiver	Failure to establish communication	2	1	+	+	-	+	For flying over the routes providing overlapping of the VHF communication

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(5) Failure of both HF transceivers	Failure to establish communication	2	2	+	-	-	+	-
(6) Failure of the VHF transceiver	Failure to establish communication	2	1	+	-	-	+	With the HF ММКРОН transceiver OK
(7) Failure of the ADF	Visually	2	1	+	-	-	+	With the KVPC-MI VOR/ILS system OK
(8) Failure of the radio altimeter	Visually	2	1	+	-	-	+	-
(9) Failure of the Doppler radar	Visually	1	1	+	-	-	+	Provided the air data computer is OK
(10) Failure of the DME	Visually	2	2	+	-	-	+	For flying over the USSR domestic routes
(11) Failure of the АРФА-МБ public entertainment magnetic tape recorder	Visually	1	1	+	-	-	+	-
(12) Failure of the CO-70 ATC transponder	Visually	1	1	+	-	-	+	Upon authorization of the ATC service

Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(13) Failure of one semi-set of the KVPC-MII VOR/ILS system	Visually	1	1	+	-	-	+	Provided the second semi-set of the KVPC-MII VOR/ILS system and the ADF are OK, and the actual weather condition on the aerodrome is not worse than the OCH landing system minimum
(14) Failure of the MAPC-8BM cockpit voice recorder	Visually	1	1	+	-	-	+	With the flight data recorder OK
(15) Failure of the public address system	No information heard	1	1	+	-	-	+	-
(16) Failure of the head-set	No reception available	5	2	+	-	-	+	-
(17) Failure of the electric megaphone	No transmission available	2	1	+	-	-	+	-

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(18) Failure of the intercom circuit intended for communication with the ground maintenance personnel	No reception available	1	1	+	-	-	+	-
(19) Failure of the OMEGA navigation system	Visually	2	1	+	-	-	+	Provided the automatic direction finders are OK
4.9.2.14. Instrumentation								
(1) Failure of the vertical speed indicator	Visually	2	1	+	-	-	+	Provided the Captain's vertical speed indicator is OK
(2) Failure of the BMΦ altimeter	Visually	2(1)	1(1)	+	-	-	+	-
(3) Failure of the airspeed indicator	Visually	3	1	+	-	-	+	-
(4) Failure of the outside air thermometer	Visually	2	1	+	-	-	+	-

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(5) Failure of the cabin altitude and pressure differential indicator	Visually	1	1	+	-	-	+	-
(6) Failure of the emergency descent vertical speed indicator	Visually	1	1	+	-	-	+	Provided the cabin altitude and pressure differential indicator is OK
(7) Failure of the YBO-15 altimeter	Visually	2	1	+	-	-	+	-
(8) Failure of the machmeter driven by the air data computer	Visually	1	1	+	-	-	+	-
(9) Failure of the MC-1 machmeter	Visually	1	1	+	-	-	+	-
(10) Failure of the BC-46 pressurized compartment altitude switch	Visually	1	1	+	-	-	+	-

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total g-ty of units (instruments) in airplane	Acceptable g-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(11) Failure of the cabin vertical speed indicator	Visually	1	1	+	-	-	+	-
(12) Failure of the angle-of-attack and acceleration warning unit	Visually	1	1	+	-	-	+	Provided the machmeter and the combination airspeed indicators are OK
(13) Failure of the aircraft clock	Visually	3	1	+	-	-	+	-
(14) Failure of the navigation computer	Visually	1	1	+	-	-	+	Provided both ADF and the Doppler radar or the air data computer are OK
(15) Failure of the ground proximity warning system	Visually	1	1	+	-	-	+	Upon authorization of the ATC service
(16) Failure of the KM-13 magnetic compass	Visually	1	1	+	-	-	+	Provided the compass system is OK

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(17) Failure of the main (reference) gyro unit of the compass system	Visually	1	1	+	-	-	+	Provided the reference (main) gyro unit of the compass system and the KM-13 magnetic compass are OK
(18) Failure of the air data computer (except for the altitude channel)	Visually	1	1	+	-	-	+	Provided all the pressure actuated instruments and the Doppler radar are OK
4.9.2.15. Oxygen Equipment								
(1) Failure of the BKII-5 oxygen supply unit in the flight compartment	(a) Mechanical damage to the oxygen mask (visually) (b) No oxygen supply or increase in resistance to breathing (by feeling)	5	1	+	-	-	+	Provided the portable oxygen equipment is OK With the BKO oxygen equipment unit failed, provide the Captain with the serviceable oxygen mask of the supernumerary crew member

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(2) Failure of the portable oxygen equipment - in the flight compartment - at the cabin attendants' stations - in the passenger compartment	(a) Mechanical damage to the portable oxygen equipment (visually) (b) No oxygen supply or increase in resistance to breathing (c) Failure of the pressure gage on the EKI oxygen supply unit (visually)	1 3 7	1 1 2	+ + +	- - -	- - -	+ + +	Provided all the oxygen equipment units in the flight compartment are OK. Make sure that oxygen is normally supplied from the oxygen equipment unit

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(3) Failure of the И2И-240Б indicator	Visually	2	1	+	-	-	+	Provided the pressure gages on the Y3P-1 unit are serviceable
(4) Failure of the Y3P-1 unit	Visually	2	1	+	-	-	+	Oxygen supply for prophylactic purposes is allowed only from the БКП-1-16-210 unit with the И2И-240Б indicator serviceable
(5) Failure of the МА-250К pressure gage on the oxygen charging panel	Visually	1	1	+	-	-	+	
4.9.2.16. Domestic Equipment								
(1) Failure of some electrical appliances of the buffet/galley	Visually			+	+	-	+	Provided: (1) The buffet/galley safety requirements are met. (2) The passengers are provided with food in flight. (3) The appropriate circuit breakers are off

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Nomenclature of malfunction (failure) of unit, instrument, system	Outside indication and method of determination	Total q-ty of units (instruments) in airplane	Acceptable q-ty of failed units (instruments)	Flight to base airport (with multiple landings)	Flying until carrying out maintenance to check B	Flying until carrying out maintenance to check 1	Continued flight to nearest scheduled airport	Minimum requirements to equipment, notes, crew's actions
(2) Malfunction of the lavatory	Visually	3	1	+	+	-	+	The failed lavatory must be closed before flight
(3) Leaky wash basin taps in the lavatories	Visually	3	3	+	-	-	+	If droplets are running from the tap
(4) No water heating in the lavatories	Visually	3	3	+	+	+	+	-
(5) Malfunction of the adjustment mechanisms of some passenger seats	Visually			+	+	-	+	-
(6) Malfunction of the water tank gauge	Visually	2	2	+	+	+	+	Provided the water filling system is OK.
(7) Malfunction of the fluid level indication system of the forward lavatory waste tank	Visually	1	1	+	+	-	+	Cut off water supply in the forward buffet/galley and lavatory

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4.9.2.17. AFCS and Attitude Indicators

Nos	Nomenclature of failures and malfunctions (of unit, instrument, system)	Operation of indicators on instrument panels		Cleared for flight					Recommendations, standby systems or instruments (note)
		Goes out	Comes on	to base airport	until check B	until check 1	to destination airport	to next scheduled airport	
(1)	Failure of the heading holding mode and the TURN (РАЗБОРОТ) knob control mode	ROLL AUGMENT (СТАБИЛ. БОКОВ)		+	-	-	+	+	It is allowed to execute landing approach in the flight director mode at Category I weather minimum
(2)	Failure of the altitude holding mode and the CLIMB-DESCENT (СПУСК-ПОДЪЕМ) knob control mode	PITCH AUGMENT (СТАБИЛ. ПРОДОЛ)		+	-	-	+	+	It is allowed to execute landing approach in the flight director mode at Category I weather minimum
(3)	Failure of the altitude holding mode	ALT HOLD (СТАБИЛ Н)		+	-	-	+	+	It is allowed to execute landing approach in the flight director mode at Category I weather minimum <u>NOTE:</u> Upon coming-on of the KB ОТКАЗ CB annunciator

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Nos	Nomenclature of failures and malfunctions (of unit, instrument, system)	Operation of indicators on instrument panels		Cleared for flight					Recommendations, standby systems or instruments (note)
		Goes out	Comes on	to base airport	until check B	until check 1	to destination airport	to next scheduled airport	
(4)	Failure of the IAS or Mach holding mode with the elevator control applied	SPEED HOLD (СТАБ V) or MACH HOLD (СТАБ M)		+	-	-	+	+	Do not select this mode. It is allowed to use the pitch holding mode and operate the CLIMB-DESCENT (ВЫСХОД-ПОДЪЕМ) knob
(5)	Failure of the automatic flight mode with the use of the navigation computer inputs	NAV CMPTR (HBV)	CMPTR-VOR AUTO (HBV VOR ABTOMAT) NAV CMPTR FAIL (ОТКАЗ HBV) on the central instrument panel. LATERAL HOLD (СТАБИЛ БОКОВ) on the pilots' instrument panel	+	-	-	+	+	With the use of the standby mode <u>NOTE:</u> If the annunciator does not go out, it indicates failure of the navigation computer
(6)	Failure of both channels of the elevator load feel actuator		FALSE TRIM (ЛОЖНОЕ ТРИММИР) or LATERAL HOLD (СТАБИЛ БОКОВ) and 	-	-	-	-	+	It is allowed to execute landing approach in the flight director mode at a weather minimum of 100x1200 m

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Nos	Nomenclature of failures and malfunctions (of unit, instrument, system)	Operation of indicators on instrument panels		Cleared for flight					Recommendations, standby systems or instruments (note)
		Goes out	Comes on	to base airport	until check B	until check A	to destination airport	to next scheduled airport	
(7)	Failure of one channel of the elevator load feel actuator	-		-	-	-	-	+	The manual trimming rate reduces two-fold
(8)	Failure of the automatic landing mode localizer channel	LOC (KYPC)	 $\Delta H_A H$ below 60 m	+	-	-	+	+	It is allowed to execute landing in the flight director mode at Category I weather minimum
(9)	Failure of the automatic landing mode glide slope channel	GLS (TJMC)	 $\Delta H_A H$ below 60 m	+	-	-	+	+	It is allowed to execute landing in the flight director mode at Category I weather minimum
(10)	Failure of the flight director landing mode localizer channel	-	Flag  appears on FDI	+	-	-	+	+	It is allowed to execute landing using the CH-50 system at a weather minimum of 100x1200 m
(11)	Failure of the flight director mode glide slope channel	-	Flag  appears on FDI	+	-	-	+	+	It is allowed to execute landing using the CH-50 system at a weather minimum of 100x12000 m.

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Nos	Nomenclature of failures and malfunctions (of unit, instrument, system)	Operation of indicators on instrument panels		Cleared for flight					Recommendations, standby systems or instruments (note)
		Goes out	Comes on	to base airport	until check B	until check 1	to destination airport	to next scheduled airport	
(12)	Failure of the airspeed holding mode through autothrottle	AUTO THROTTLE (АВТ. ТЯГИ)	THRUST CONTROL (УПРАВЛ. ТЯГОЙ)	+	-	-	+	+	It is allowed to execute landing in the automatic mode at a weather minimum of 45x600 m. Control the speed manually
(13)	Failure of the automatic go-around mode	The GO-AROUND (УХОД) annunciator goes out		+	-	-	+	+	It is allowed to execute landing in the automatic or the manual mode at Category I weather minimum
(14)	Failure of one of the longitudinal control semi-channels	-		-	-	-	-	+	-
(15)	Failure of the longitudinal control system	-	PITCH CONTROL (ПРОДОЛ. УПРАВЛ.)	-	-	-	-	+	In piloting, avoid wide and sharp applications of the control column at high speeds. At low speeds the required control column travels increase considerably. It is allowed to execute landing in the automatic or the flight director mode

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Nos	Nomenclature of failures and malfunctions (of unit, instrument, system)	Operation of indicators on instrument panels		Cleared for flight					Recommendations, standby systems or instruments (note)
		Goes out	Comes on	to base air-port	until check B	until check 1	to destination airport	to next scheduled airport	
(16)	Failure of one of the lateral control subchannels	-		-	-	-	-	+	at a weather minimum of 100x1200 m
(17)	Failure of the lateral control system	-	ROLL CONT (БОКОВ. УПРАВЛ)	-	-	-	-	+	In piloting, account for increased aileron deflections required for rolling. It is allowed to execute landing in the automatic or the flight director mode at a weather minimum of 100x1200 m
(18)	Malfunction of one of the pitch damper subchannels	-		-	-	-	-	+	-
(19)	Malfunction of one of the roll damper subchannels	-		-	-	-	-	+	-
(20)	Malfunction of one of the yaw damper subchannels	-		-	-	-	-	+	-

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Nos	Nomenclature of failures and malfunctions (of unit, instrument, system)	Operation of indicators on instrument panels		Cleared for flight					Recommendations, standby systems or instruments (note)
		Goes out	Comes on	to base air-port	until check B	until check 1	to destination airport	to next scheduled airport	
(21)	Failure of the pitch damper	-	PITCH DAMPER (ДЕМПЕР ТАHTAЖ)	-	-	-	-	+	In piloting, avoid wide and sharp applications of control column at high speeds, at low speeds the required control column travels increase considerably
(22)	Failure of the roll damper	-	ROLL DAMPER (ДЕМПЕР KPEH)	-	-	-	-	+	
(23)	Failure of the yaw damper	-	YAW DAMPER (ДЕМПЕР KYPC)	-	-	-	-	+	
(24)	Malfunction of the heading holding mode and control by the TURN (PA3BOPOT) knob	The airplane to be controlled by the TURN knob	-	+	-	-	+	+	-
(25)	Malfunction of the pitch holding mode and control by the DESCENT - CLIMB (CHYCK - ПOЦEМ) knob	The airplane fails to be controlled by the DESCENT-CLIMB knob	-	+	-	-	+	+	-
(26)	Malfunction of the auto-throttle	Visually	-	+	-	-	+	+	-