Aircraft MIG-29M/M2



FLIGHT REFERENCE CARDS



RAC "MIG"

17.05.2017

FIRE ON THE AIRCRAFT

7 ENGINES AND AAGB FIRE

► INDICATIONS	
Master caution	Flashes
FIRE	ON
Middle MFD	LH ENG FIRE (RH ENG, AAGB)
FIRE EXTING LH (GBX, RH)	ON
VWS	'Left engine (Right engine,
► ADDITIONAL INDICA	Gearbox) fire'
External	Smoke or flame (seen in rear
	view mirrors during turn and
	reported from ground/other
	aircraft)
Cockpit	Smoke ING PARKING (TAXIING)
	Shut down immediately
Engines	Take all necessary actions to
Aircraft	stop :
Braking	Carry out emergency braking
FUEL SHUTOFF of engine	CLOSED
on fire FIRE EXTING LH (GBX,	
RH)	Press
Fire not extinguished in ~ 8	Press FIRE EXTING, LH (GBX,
sec	RH) again
Aircraft	Stop and leave it
PROCEDURES DURI	
Engines	Shut down
Aircraft	Take all necessary actions to stop
Drag chute	Deploy at speed less than 300
	km/h
Braking	Carry out emergency braking
FUEL SHUTOFF FIRE EXTING LH (GBX,	CLOSED
FIRE EXTING LH (GBX, RH)	Press
Fire not extinguished in ~ 8	Press FIRE EXTING, LH (GBX,
sec	RH) again
Aircraft	

FIRE

If: Danger of collision with obsta	cle
Aircraft	Turn away from the obstacle
Canopy	Jettison (if necessary)
LG	Retract
Batteries	OFF
If: In case of danger to life	
Aircraft	Eject
► PROCEDURES AFTER L	IFT-OFF AT AAGB FIRE
Take-off	Continue
FIRE EXTING GBX	Press
Engine mode	Do not change
Required speed and altitude	Set
Direction for ejection	Select
Fire not extinguished in ~ 8 sec	Press FIRE EXTING GBX again
If: Fire not extinguished	
Engines Aircraft	Shut down (if possible) Eject
Else if: AAGB fire extinguished	L]eot
FIRE	Goes OFF
Middle MFD	AAGB FIRE goes OFF
Additional indications of fire	No
AB	OFF
Fuel	Dump
Landing	Perform
PROCEDURES AFTER L	IFT-OFF AT ENGINE FIRE
Take-off	Continue
FIRE EXTING LH (RH)	Press
Engine mode	Do not change
Required speed and altitude	Set
Direction for ejection	Select
AB	OFF
Engine on fire	Shut down
FUEL SHUTOFF of engine on fire	CLOSED
Fire not extinguished in ~ 8 sec	Press FIRE EXTING LH (RH) again

If: Fire not extinguished	
Second engine	Shut down (if possible)
Aircraft	Eject
If: Fire extinguished	
FIRE	Goes OFF
Middle MFD	LH (RH) ENG FIRE goes OFF
Additional indications of fire	No
Fuel	Dump
Landing	Perform with single engine
LG, flaps, slats, vortex flaps	Perform emergency extension
Note	
Emergency braking in case of F	RH engine shutdown
▶PROCEDURES IN FLIGHT AT AAGI	B FIRE
AB	OFF
FIRE EXTING GBX	Press
Fire not extinguished in ~ 8 sec	Press FIRE EXTING GBX again
Aircraft	Turn for safe ejection and aircraft falling
If: Fire not extinguished	
Engines	Shut down (if possible)
Ejection	Perform
If: AAGB fire extinguished	
FIRE	Goes OFF
Middle MFD	AAGB FIRE goes OFF
Additional indications of fire	No
Fuel	Dump (if necessary)
Landing	Perform immediately
▶PROCEDURES IN FLIGHT AT ENG	INE FIRE
 АВ	OFF
TCL of engine on fire	STOP
	CLOSED

FIRE

End of procedure

Emergency braking in case of RH engine shutdown.

Note .

extension

CONTROLLED EJECTION AND GROUND EGRESS

GROUND EGRESS	
Engines	Shut down
Ejection handles	Turn forward
Locks	Open
Harness	Unfasten
Oxygen mask	Take off (if possible)
Snap hook of survival kit	Disconnect
Canopy	Open
If: Canopy fails to open	
Instrument panel	Lean over it
Canopy	Jettison
Seat	Stand up quickly
Blocks of combined services connector	Disconnect
Aircraft	Egress and go to a safe distance
If: Time allows to take survival kit	
Cockpit	Turn to face the seat
Orange belts on the rear cover of survival kit	Take hold
Harness restraint straps	Pull abruptly upward to disconnect
Survival kit	Turn in relation to trunnions to vertical position. Quickly pull upwards to throw it out of the cockpit.

CONTROLLED EJECTION

Aircraft

WARNING

Egress with survival kit

and go to safe distance

Eject immediately in emergency cases.

PROCEDURES BEFORE EJECTION IF SITUATION **ALLOWS**

Decision on ejection	Take
IFF EMERG signal	Enable

EJECTION & EGRESS

EJECTION & EGRESS

Flight direction	Towards friendly area or coastline	
Ejection area	Report	
	Climb to 6500-10000 ft (2000-	
Altitude	3000 m)/descend to 13000-	
	10000 ft (4000-3000 m)	
	Decelerate to 215-320 kt (400	
Speed	- 600 k/h) at climbing/level	
	flight	
Crash helmet visor	Lower manually	
	Take them from the pedals	
Legs	and put them in front of the	
	seat pan	
Ejection conditions	Out of clouds (if possible)	
Ejection handles (with palms	Take and pull upwards until	
inward)	the seat starts moving	
Shoulders	Press to the seat back	
Head	Press to headrest	
Elbows	Press to body	
If: Canopy fails to jettison		
Ejection handles	Lower	
	Hold with LH hand without	
	pulling	
Canopy	Jettison	
Ejection handles	Use for ejection	
► PROCEDURES AFTER DEPLOYMENT OF		
PARACHUTE CANOP		
Parachute canopy	Check proper deployment	
Crash helmet visor	Raise Take off at altitude below	
Oxygen mask	13000 ft (4000 m)	
Survival kit	Check proper deployment	
Radio beacon	Check proper deployment	
Raft	Check proper inflation	
Life belt	Check proper inflation	
► PROCEDURES BEFO		
Drift direction		
Dint difection	EValuate	
	Evaluate Evaluate	
Expected touchdown location	Evaluate	
Expected touchdown location Altitude of 500-350 ft (150-100		
Expected touchdown location	Evaluate	

WARNING

Close

(10-7 m)

If no automatic extension of raft, extend it at altitude below 3300 ft (1000 m). For that pull the plug located near RH hip; at that, raft hangs up on the line and the inflation bottle is actuated. If raft not filled, quickly pull the survival kit line to actuate the gas filling system.

Oxygen mask hose Disconnect

Hose of pressure suit bladder Disconnect

Ventilation hoses of suit and anti-g suit

Mask bladder compensator connector Disconnect

Disconnect

Combined services

connector

Disconnect

Communication and power supply bundle of crash helmet Disconnect from combined services connector

Intermediate strap of mask corrugated

hose Disconnect

Mask Throw away
Remove from locks at
Safety devices altitude of 30-20 ft

& EGRESS

sea-survival kit

OSK-2 locks triggers Press and turn forward With face down the Position wind (with the back facing the wave edge) Floats of life belt or high-altitude and Reinflate (if necessary) sea-survival kit Orange end of main line Tear apart Raft and survival kit Use Central lock Open Lock on main strap Open Release from Leg restraining straps semirings RH shoulder strap Put behind back I H float of life belt Release some air Pull it through with hand under shoulder strap Throw off from Harness system shoulders LH float of life belt Reinflate Pull Raft Get onto it from aft Survival kit Pull and draw Signals about position Transmit PROCEDURES AT WATER LANDING WITH **CONNECTED SPECIAL OUTFIT ACCESSORIES** AND UNDEPLOYED SURVIVAL KIT

Crash helmet visor Raise

Mask Take off

WARNING

- Before you take off the mask, hold your breath at the moment of water surface touchdown to prevent water suction through oxygen hoses.
- 2. When leaving the aircraft at altitudes of 1600 ft (500 m) and below, perform maximum procedures before you touch the water.
- Get disconnected from parachute canopy at the moment of water touch in all cases, irrespective of completeness of procedure performance.

Life belt floats	Inflate by gas filling plugs
Air release valve on high-altitude and sea-survival kit	Close
Position	With face down the wind (with the back facing the wave edge)
Floats of life belt or high-altitude and sea-survival kit	Reinflate (if necessary)
Parachute canopy	Disconnect
Oxygen mask hose	Disconnect
Hose of pressure suit bladder	Disconnect
	Disconnect from
Ventilation hoses of suit and anti-g suit	combined services
Modulaladar appropriate appropria	connector
Mask bladder compensator connector	Disconnect Disconnect from
Communication and power supply	combined services
bundle of crash helmet	connector
Intermediate strap of mask corrugated	
hose	Disconnect
Mask	Throw away
Line	Pull quickly
Raft	Pull by line
Raft (boat) inflation system	Start
Orange end of main line	Tear off
Lock on circular strap	Open
Central lock	Open
Leg restraining straps	Release from semirings Put behind back
RH shoulder strap LH float of life belt	Release some air
Li i float of life belt	Pull it through with
	hand under LH
	shoulder strap
	Throw off from
Harness system	shoulders
LH float of life belt	Inflate
Raft and survival kit	Use
If: It is impossible to take off the harr	ess system and get
into the raft	
5	

Hang on it

EJECTION & EGRESS

Raft

▶ UNINFLATED LIFE BELT FLOAT Uninflated float Move to chest Envelope valves of uninflated float Check opening Open (if necessary) Float Inflate

AUTONOMOUS CANOPY JETTISON

AUTONOMOUS CANOPY JETTISON		
OPY JETTISON		
Restrain		
Lower		
Tighten		
Decelerate to 215-270 kt (400-500 k/h)		
Below 13100 ft (4000 m)		
Deflect in horizontal plane with RH hand Quickly turn to yourself until stop		
To initial position after jettison		

End of procedure

POWER PLANT FAILURES

SINGLE ENGINE FAILURE

INDICATIONS

Master caution Flashes

Engines noise Changes

Longitudinal acceleration (flight speed, Decrease thrust)

Rolling and yawing Aircraft motions

AB and CM signal go Middle MFD OFF

NOT READY FOR T-O ON

Sudden drop RPM and EGT

ON LH (RH) ENG START

Middle MFD ES signal

ÖN BOOST HYD FAIL/MAIN HYD FAIL

BOOSTER Middle MFD

> HYDRAULIC SYS FAIL or MAIN HYDRAULIC

SYS FAIL

Shut down

PROCEDURES DURING TAKE-OFF RUN

Take-off Abort

Take all necessary Aircraft actions to stop

Deploy at speed below Drag chute

190 kt (300 k/h)

Shut down (if

Second engine necessary)

Note

Emergency braking in case of RH engine failure.

PROCEDURES AFTER LIFT-OFF

Rolling and yawing motions Counteract

Retract (in case of LH LG engine failure)

Failed engine

Do not increase till full Climb angle LG retraction OFF at speed of 215 kt AB (400 k/h) Circuit flight altitude Climb Fuel Dump Perform with single Landing engine Perform emergency LG, flaps, slats, vortex flaps extension Note Emergency braking in case of RH engine failure. **PROCEDURES IN FLIGHT** Rolling and yawing motions Counteract OFF AB Altitude Decrease altitude with speed increase If: Engine starts automatically Engine mode Check restoration Check by TCL Engine controllability movement Else if: Engine fails to start automatically LH (RH) ENG START Goes OFF ES signal OFF Middle MFD TCL of failed engine STOP AIR RELIGHT LH (RH) Set to ON TCL of failed engine IDLE If: Engine fails to start Maintain 270 kt (500 Speed k/h) Yawing motions Counteract Flight altitude for maximum 18000-21500 ft (5500range 6600m) Dump (if necessary) Fuel Perform with single Landing engine Perform emergency LG, flaps, slats, vortex flaps extension Note

Emergency braking in case of RH engine failure.

POWER PLANT SURGE

POWER PLANT SURGE	
► INDICATIONS	
Air intakes or engines	Noises
Engines thrust	Sudden change (longitudinal kicks)
RPM	No increase with temperature increase at acceleration
Steady TCL settings	RPM decrease
	EGT increase
LH (RH) ENG START	ON
Middle MFD	ES signal
DECELERATE LH (RH) ENG	ON (possible)
Middle MFD	LEFT (RIGHT) ENGINE OVERHEAT (possible)
VWS	'Left (right) engine overheat. Reduce left (right) engine' (possible)
▶ PROCEDURES	
Rolling and yawing motions	Counteract
AB	OFF
External conditions for surge	Eliminate
	STOP if surge not

sec.

Air intake ramps Check position

Note

eliminated within 5-8

If ramp in 100% position, Mach > 1.15, decelerate to Mach < 1.15, set ramp to 0% position:

Set RAMP LH RH - EMERG RETR to EMERG RETR till the end of flight.

At that: LEFT/RIGHT AIR INTK FAIL on MFD, 'Left/right air intake failure' on VWS.

TCL

PROCEDURES

WARNING

If none of the engines starts till altitude of 6500ft (2000 m) eject.

Note

Available time of aircraft equipment operation from storage batteries is 10 min.

RPM below 45%	Both TCL to STOP
	Start simultaneously
Engines	(possible successive
	start)
Mission	Abort
Landing	Perform at the nearest airfield

ENGINES AIR START

- ► AUTOMATIC START
- ► AT RPM LESS THAN 50%

LH (RH) ENG START ON Middle MFD ES signal within 20 sec Increase depending on RPM and EGT

TCL position

recommended altitude

► AT ANTI-SURGE SYSTEM ACTUATION

LH (RH) ENG START ON ES signal within 8 sec Middle MFD

AT WEAPON EMPLOYMENT

LH (RH) ENG START ON

ES signal within 8 sec Middle MFD

AT RUNDOWN AT RPM NOT LESS THAN 30% AND AUTOROTATION RPM MORE THAN 12%

SEMI-AUTOMATIC START

Perform in case of automatic start failure.

Reach the

and speed limits STOP position for 2 sec

TCL or more From IDLE to MAX

LH (RH) ENG START ON Middle MFD ES signal within 20 sec

If:

Aircraft

IDLE or higher for 20 TCL sec

LH (RH) ENG START ON Middle MFD ES signal

Engine RPM Increase slowly **EGT** More than 800 °C

▶ PROCEDURES

STOP for 2-3 sec or TCL more

Increase by ~ 80-100 Speed

kt (150-185k/h) Start Perform again

► RPM NOT LESS THAN 30 RPM MORE THAN 12% ► MANUAL START	0% AND AUTOROTATION
Perform in case of semi-automatic start failure	
LH (RH) ENG START	STOP Set to ON Check ON ES signal IDLE
AIR RELIGHT LH (RH)	OFF, but not later than in 100 sec after activation
Note)
RPM less than 30% can ca	use jamming of HPR.
If: zero RPM and hydraulic syste	m pressure in red area
► PROCEDURES	· · · · · · · · · · · · · · · · · · ·
Speed	Hold IAS = 240-270 kt (450-500 k/h) for 2-8 min for HPR cranking
RPM autorotation	Increase to more than 12% From STOP to any
TCL	position (from IDLE to MAX)
Engine start	Check (reach RPM of mode selected by TCL and within EGT limits)
Engine controllability If:	Check by TCL movement
Start	
RPM	Increase slowly (during start)
EGT	More than 800 °C
MFD	SHUT OFF LEFT (RIGHT) ENGINE (except for manual air start)
TCL LH (RH) ENG START MFD	IDLE or higher for more than 20 sec ON ES (except for manual air start)

PROCEDURES

TCL STOP for 2-3 sec and more Increase by 80-100 kt

Speed (150-185k/h)
Start Perform again

Note

- Maximum engine start time: 70 sec. Start time
 decreases in proportion to flight altitude decrease,
 increase of flight speed and RPM at startup. RPM may
 not change or may slightly reduce for a short time
 near minimum flight speed limit at initial section of
 TCL movement.
- Start considered completed when TCL IDLE, RPM not less than 70% at max EGT of 500°C and engine controllability. If start was with TCL in position higher than IDLE, start considered completed when engine reaches mode that complies with TCL position.
- 3. Possible anti-surge system actuation during start above 39400 ft (12000 m), that results in short-term RPM reduction with start continuation.
- 4. Oxygen reserve provides 5 air starts taking into account 5 ground starts of turbine starter.

If: Normal operation of one engine and other engine fails to start

PROCEDURES

TCL of failed engine STOP

AIR RELIGHT LH (RH) Set to OFF

Landing Perform with single engine

FAILURE OF ENGINE OIL SYSTEM

▶ INDICATIONS

Master caution Flashes

DECELERATE LH (RH) ENG ON

Middle MFD VWS	LEFT (RIGHT) ENGINE OIL OVERHEAT LEFT (RIGHT) ENGINE OIL PRESSURE LOW LEFT (RIGHT) ENGINE CHIPS IN OIL 'Left (Right) engine oil temperature. Reduce left (right) engine' 'Left (Right) engine oil pressure low. Reduce left (right) engine' 'Chips in left (right) engine oil. Reduce left (right) engine'	
► PROCEDURES		
AB	OFF	
Engine	Decelerate till removal of failure signals	
If: Indication of failure signals rem	ains	
Engine Fuel Landing LG, flaps, slats, vortex flaps	Shut down Dump (if necessary) Perform with single engine Perform emergency extension	
Note		
Emergency braking in case of RH engine failure.		
 FAILURE OF ELECTRONICS OF ENGINE AUTOMATIC CONTROL SYSTEM INDICATIONS 		
Master caution Middle MFD	Flashes LEFT (RIGHT) ENGINE ON STBY SYS	

VWS	Left (right) engine on standby control system. Monitor engine speed and temperature'	
RPM and EGT	Reduction (in relation to initial value) LEFT (RIGHT) ENGINE	
Middle MFD	REHEAT PROHIBITED (possible)	
vws	'Left (right) engine reheat prohibited' (possible)'	
Middle MFD	AB goes OFF without TCL movement	
▶ PROCEDURES		
Altitude	Below 46000 ft (14000m)	
Middle MFD		
VWS		
Middle MFD	AB goes OFF	
▶ PROCEDURES		
AB	OFF, do not use again	
If:		
MFD	Absence of LEFT (RIGHT) ENGINE REHEAT PROHIBITED	
► PROCEDURES		
Engine mode	AB with setting to ON/OFF	
TCL	Avoid abrupt movement	
Mission	Abort	
FAILURE OF BARK-42 LIMITATION AND ADJUSTMENT PROGRAMS.FUEL FLOW, NOZZLE THROAT AREA		
► INDICATIONS		
► ENGINE IN MAX AND A	B MODES	
RPM fluctuations	More than 1%	

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М	砬

More than 20° EGT fluctuations Fluctuations duration More than 10 sec TCL position Constant Failure indication No Does not change at Engine mode TCL movement TCL SETTING BETWEEN IDLE AND MAX EGT fluctuations More than 20° Fluctuations duration More than 10 sec TCL position Constant Failure indication No Does not change at Engine mode TCL movement PROCEDURES ENG SYS LH (RH) MAN - STBY STBY Below 46000 ft Altitude (14000m) Avoid abrupt TCL movement Mission Continue Note AB is not OFF when engine control system is changed to STBY. Change to STBY at TCL setting between IDLE and 2. MAX causes RPM decrease by ~7-8%, in MAX and AB - by ~4%. AFTERBURNING FAILURE

► INDICATIONS	
Middle MFD	AB goes OFF
	Rapid deceleration
Aircraft	Rolling and yawing
	motions
Middle MFD	LEFT (RIGHT)
	ENGINE REHEAT
	PROHIBITED
	(possible)
VWS	'Left (right) engine
	reheat prohibited'
	(possible)

PROCEDURES

Rolling and yawing motions Counteract

Both TCL MAX

AB EMERG OFF EMERG OFF

AB Do not use again
Mission Abort

Landing Perform at the nearest airfield

FUEL BOOST PUMP FAILURE

► INDICATIONS

Master caution Flashes
NO FUEL BOOST or

MFD LEFT (RIGHT) FUEL PRESSURE LOW

VWS 'No fuel boost. Switch off reheat'

PROCEDURES

Mission Abort

AB OFF

Engines mode Decelerate

Flight altitude Below 16500 ft (5000m)

Negative and near-zero g-loads Prevent

Landing Perform

INCREASE OF ENGINE RPM, FUEL PRESSURE

INDICATIONS

Master caution Flashes
DECELERATE LH (RH) ENG ON

Middle MFD LEFT (RIGHT) ENGINE VIBRATION

'Left (right) engine VWS overspeed. Reduce left (right) engine'.

Middle MFD

LEFT (RIGHT) FUEL
PRESSURE EXCESSIVE

'Left (right) engine fuel

VWS

pressure abnormal.

Reduce left (right) engine'

Engine mode

▶ PROCEDURES	
AB	OFF
Engine	Decelerate till removal
	of failure signals
If: Indication of failure signals remain	
Engine	Shut down
Fuel	Dump (if necessary)
l andina	Perform with single
Landing	engine at the nearest airfield
	Perform emergency
LG, flaps, slats, vortex flaps	extension
Note	
Emergency braking in case o	f RH engine failure
Emergency braking in case o	i itti eligilie ialiare.
INCREASE OF DIFFERENT	TIAL PRESSURE AT
ENGINE FUEL FILTER	
► INDICATIONS	
Master caution	Flashes
DECELERATE LH (RH) ENG	ON
Middle MFD	LEFT (RIGHT) ∆P
	FUEL ABNORMAL∆
	'Left (right) engine fuel
VWS	pressure abnormal. Reduce left (right)
	engine'
► PROCEDURES DURING TAKE-OFF RUN	
Take-off	Continue
	Continue (if after
Flight	Continue (if after WoffW MFD
Flight	WoffW MFD indications disappear
	WoffW MFD
Flight PROCEDURES IN FLIGHT AB	WoffW MFD indications disappear

Decelerate till removal

of failure signals

If: Indication of failure signals remains

Fuel Shut down

Fuel Dump (if necessary)

Perform with single

Landing engine at the nearest

LG, flaps, slats, vortex flaps

Airfield

Perform emergency extension

Note

Emergency braking in case of RH engine failure.

7 INCREASE OF ENGINE VIBRATIONS

INDICATIONS

Master caution Flashes

DECELERATE LH (RH) ENG ON

Middle MFD LEFT (RIGHT)
ENGINE VIBRATION

VWS 'Left (right) engine vibration. Reduce left (right) engine'

PROCEDURES

AB OFF

Failed engine mode

Decelerate till removal of failure signals

If: Indication of failure signals remains

Engine Shut down

Fuel Dump (if necessary)

Perform with single

Landing engine

LG, flaps, slats, vortex flaps Perform emergency extension

Note

Emergency braking in case of RH engine failure.

7 ENGINE OVERHEAT		
► INDICATIONS		
Master caution	Flashes	
DECELERATE LH (RH) ENG	ON	
Middle MFD	LEFT (RIGHT) ENGINE OVERHEAT WATCH T4 LEFT (RIGHT) ENGINE	
VWS	'Left (right) engine overheat. Reduce left (right) engine'.	
► PROCEDURES		
AB	OFF	
Failed engine mode	Decelerate till removal of failure signals	
If: Indication of failure signals remains		
Engine	Shut down	
Fuel	Dump (if necessary)	
Landing	Perform with single engine	
LG, flaps, slats, vortex flaps	Perform emergency extension	

Note

extension

Emergency braking in case of RH engine failure.

End of procedure

AAGB FAILURE

► TOTAL FAILURE OF AAGB (BOTH REDUCTION GEARS)

INDICATIONS

Master caution Flashes

Master caution Flashes Middle MFD (at the same time LEFT GEARBOX VIBRATION, RIGHT or separately) GEARBOX VIBRATION. LEFT GEARBOX OIL PRESSURE LOW. RIGHT GEARBOX OIL PRESSURE LOW. LEFT GEARBOX OIL OVERHEAT, RIGHT **GEARBOX OIL** OVERHEAT 'Left gearbox vibration, Right gearbox vibration' 'Left gearbox oil pressure low, Right VWS (at the same time or gearbox oil pressure separately) low' 'Left gearbox oil temperature, Right gearbox oil temperature' BOOST HYD FAIL, MAIN HYD ON FAIL Pressure in both hydraulic systems in Middle MFD critical zone BOTH EMERGENCY Middle MFD **PUMPS** IN USE 'Both emergency **VWS** pumps in use' **BATTERIES OPERATION WATCH** LH MFD TIME 'Operation from batteries. Watch **VWS** voltage. Flight time 10 minutes' PROCEDURES DURING TAKE-OFF RUN

Abort

Take-off

TCL	IDLE	
Braking	Carry out emergency	
Drag chute	braking Deploy	
	Shut down after	
Engines	taxiing	
▶ PROCEDURES AFTER LIFT-		
LG	Do not retract	
Pressure indicator (booster		
system)	In normal zone	
LH MFD	BOTH EMERGENCY	
	PUMPS IN USE	
VWS	'Both emergency	
V V V S	pumps in use'	
AB	OFF at speed above	
AD	160 kt (300 k/h)	
Engines mode	Decelerate	
Approach/landing	Use the shortest	
	route	
Pressure in hydraulic systems	Monitor	
If: Both hydraulic systems fail, refer to procedures for Both		
hydraulic systems failure		
If normal		
Fuel	Dump (if possible)	
Landing	Perform	
TCL	IDLE during landing	
Enginee	Shut down after	
Engines	taxiing	
► PROCEDURES IN FLIGHT		
AB	OFF	
Engines mode	Decelerate	
Mission	Abort	
Pressure indicator (booster	In normal zone	
system)		

Pressure in hydraulic systems	Monitor
If: Both hydraulic systems fail, refer to	

If: Both hydraulic systems fail, refer to procedures for Both hydraulic systems failure

If: Pressure in booster hydraulic system

Fuel	Dump (if necessary)
Landing	As soon as possible
LG, flaps, slats, vortex flaps	Perform emergency extension
TCL	IDLE during landing
Braking	Carry out emergency braking
Drag chute	Deploy
Engines	Shut down

Note

- 1. If pressure in both hydraulic systems drops, provide required conditions for ejection and eject.
- 2. If only one emergency pump is started (EMERGENCY PUMP IN USE on MFD and 'Emergency pump unit in use' on VWS), enter the controlled ejection area and eject.
- 3. At night flight, set LIGHT to LAND on landing heading at altitude of 330-260 ft (100-80 m).

► FAILURE OF ONE AAGB REDUCTION GEAR

INDICATIONS

Master caution	Flashes
MFD (at the same time or separately)	LEFT (RIGHT) GEARBOX VIBRATION LEFT (RIGHT) GEARBOX OIL PRESSURE LOW LEFT (RIGHT) GEARBOX OIL OVERHEAT

vibration' 'Left (right) gearbox oil VWS (at the same time or pressure low' separately) 'Left (right) gearbox oil temperature' BOOST HYD FAIL / MAIN ON **HYD FAIL** Pressure in booster MFD (main) hydraulic system in critical zone PROCEDURES DURING TAKE-OFF RUN Take-off Abort Engines Shut down Carry out emergency Braking braking PROCEDURES AFTER LIFT-OFF LG Do not retract Approach/landing Use the shortest route OFF at speed above AB 160 kt (300 k/h) Engines mode Decelerate Pressure in hydraulic systems Monitor Fuel Dump Perform emergency LG, flaps, slats, vortex flaps extension Shut down on landing Engine with failed AAGB run Note In case of failure of RH engine AAGB reduction gear, carry out emergency braking. PROCEDURES IN FLIGHT Engines mode Decelerate

'Left

(riaht)

gearbox

Mi	ssion	Abort
Pr	essure in hydraulic systems	Monitor
Fu	el	Dump (if necessary)
La	nding	As soon as possible
LG	G, flaps, slats, vortex flaps	Perform emergency extension
En	gine with failed AAGB	Shut down on landing run

Note

In case of failure of RH engine AAGB reduction gear, carry out emergency braking.

- 1. In case one AAGB reduction gear fails and it does not cause failures of hydraulic systems, perform extension of LG and wing high-lift devices according to the standard procedure.
- 2. In case of 'Left (right) gearbox vibration' voice warning and LEFT (RIGHT) GEARBOX VIBRATION (more than the permissible value by RPM n2 = 70% 79%) message on the MFD, set RPM of the corresponding engine to more than 80%, and continue flight if these signals disappear. It is permitted to have short-term repeated messages on the increased vibration of this AAGB by RPM n2 = 70% 79%. RPM n2 = 70% 79% must be used as transient values.

7 FAILURE OF AIR INTAKES GOVERNOR

► INDICATIONS	
Master caution	Flashes
	AIR INTK SCREEN
	FAIL
MFD	SCREEN
	SCREEN symbol
	(continuously)
	'Air intake screen
VWS	failure.
	Mach limit point seven'
▶ PROCEDURES	
Speed	Maintain below 260 kt
	(480 k/h)
Aircraft	Circuit flight and

landing

Aircraft



► INDICATIONS	
Master caution	Flashes
MFD	LEFT (RIGHT) AIR INTK FAIL
vws	'Left (Right) air intake failure'
Ramp of LH (RH) air intake	Locked
LH (RH) ramp	Locked in failed position
► PROCEDURES	
Mission	Abort
TCL of engine with failed air intake	IDLE
Speed	Decelerate to 430 - 485 kt (800 - 900 k/h)
RAMP LH (RH) - EMERG RETR	EMERG RETR at Mach < 1.2 till the end of flight
RPM	Increase at pre-surge condition (engine rumble)
Speed	Subsonic
TCL operation	Without limitations
Mission	Abort

End of procedure

LG FAILURES

BLOWN MLG TIRE

► INDICATIONS

Aircraft Heavy buffeting
Rolling and yawing
motions

PROCEDURES AT TAKE-OFF BEFORE NLG WHEELS LIFTING

Aircraft Prevent turning

Take-off Abort

Drag chute Deploy

Braking Carry out normal braking

Engines (RH engine) Shut down (if necessary)

Braking Carry out emergency braking

PROCEDURES AFTER NLG WHEELS LIFTING WHEN SAFE TAKE-OFF ABORTION IS IMPOSSIBLE

Aircraft Prevent turning

Take-off Continue

After aircraft lift-off Brake the wheels

LG Do not retract

Landing Perform with minimum

fuel reserve

PROCEDURES DURING LANDING RUN

Aircraft Prevent turning

Drag chute Deploy

Braking Carry out normal braking

Engines (RH engine) Shut down (if necessary)

Braking Carry out emergency

braking

FAILURE OF ONE MLG TO EXTEND

INDICATIONS

MFD FLAPS fragment

MLG extended position indicator light OFF

LG intermediate position indicator light	ON or flashes	
PROCEDURES AT NORMAL HUDRAULIC SYSTEM	. PRESSURE IN MAIN	
LG selector switch	RETR	
LG	Check retraction	
Speed	Set 240-270 kt (450-500 k/h)	
G-load	Negative 0.5 – 1.0	
LG selector switch	EXT	
LG	Check extension	
If: MLG extended		
LG extended position indicator light	ON	
LG intermediate position indicator light	OFF	
Pressure in main hydraulic system	Increases	
Landing	Perform normal landing	
Else if: MLG extended position indicator light OFF		
Aircraft	Fly over the airfield control center at altitude of 150-300 ft (50-100 m)	
Flight controller	Confirms extension of all LG from the ground	
If: All LG are extended		
LG selector switch	Leave in EXT position	
Wing high-lift devices	Check extension	
Landing	Perform with minimum fuel reserve	
Else if: MLG not extended		
LG intermediate position indicator light	Flashes	
Flight controller	Confirms one MLG failure to extend	

LG	Retract
All LG	Up and locked
Suspended weapons and external fuel tanks	Jettison in a safe place
Harnesses	Restrain and lock
NLG	Perform emergency extension
NLG extension	Check on FLAPS fragment
FLAPS-RETR-AUTO-LDG- T/O	LAND
Flaps and slats extension	Check on FLAPS fragment
Engines	Shut down before landing
Landing	On the unpaved runway on NLG and fuselage with minimum fuel reserve
Drag chute	Deploy after landing
Batteries	OFF

Note

Do not flare out at high altitude during landing.

If one MLG is locked in the intermediate position, eject.

FAILURE OF NLG TO EXTEND

INDICATIONS	
MFD	FLAPS fragment
NLG extended position indicator light	OFF
LG intermediate position indicator light	ON or flashes

► PROCEDURES		
Pressure in common hydraulic system	Check	
Extension	Repeat 2-3 times	
Alternating g forces	Apply below 320 kt (600 k/h)	
LG selector switch	From RETR to EXT not earlier than in 15 sec	
If: NLG not extended		
LG	Retract	
Emergency extension	Perform	
Else if: NLG extended but not dow	n and locked	
Alternating g force	Apply	
If: NLG not extended or not down	and locked	
Landing	Permitted at nearest airfield on MLG with non-extended NLG	
Runway	Concrete	
Ejection	Provide conditions and eject	
If: Decision taken to land on concrete runway		
Suspended weapons and external fuel tanks	Jettison in a safe place	
Harnesses LG selector switch	Restrain and lock EXT	
Approach and landing	Normal with minimum fuel reserve	
Engines	Shut down after landing	
Control stick	Hold completely pulled till aircraft stops	
Braking	Carry out emergency braking when aircraft touches concrete runway	
Batteries	OFF when aircraft stops	
Aircraft	Stops	

LG EMERGENCY EXTENSION

► PROCEDURES	
Speed	Set speed below 270 kt (500 k/h)
LG EMERG EXT	Pull until stop
NLG extension	Check on FLAPS fragment
LG EMERG EXT	Move to the right until stop Pull until stop
MLG, wing high-lift devices, vortex flaps extension	Check on FLAPS fragment
LG selector switch	EXT
Approach and landing	Perform
LG EMERG EXT	Leave in pulled position till engines shutdown
If: Any MLG fails to extend duri extension	ng emergency
Ejection	Perform

FAILURE OF DC POWER SUPPLY

DC GENERATOR FAILURE

INDICATIONS

Master caution Flashes

Middle MFD LEFT/RIGHT DC GENERATOR FAIL

PROCEDURES

Voltmeter 28-29 V, in both positions of V (LH, RH)

selector switch

Mission Continue

BOTH DC GENERATORS FAILURE

INDICATIONS

Master caution Flashes

MFD BOTH DC

GENERATORS FAIL

PROCEDURES

Voltmeter

Mission

25-28 V, in both

positions of V (LH, RH)

selector switch

Abort and proceed to

landing

FAILURE OF TWO DC GENERATORS AND RECTIFIER

WARNING

DO NOT set DC GEN LH, RH switches to OFF and ON again.

INDICATIONS

Master caution Flashes

BATTERIES

MFD OPERATION WATCH

TIME

VWS	'Operation from batteries. Watch voltage. Flight time 10 minutes' Voltage decrease to 24
Voltmeter	V
► PROCEDURES	
AB	OFF
Mission	Abort
Landing	As soon as possible
LG, flaps, slats, vortex flaps	Perform emergency extension
Note)
Time of safe fligh	t is 9-10 min.
At night, set LIGHT selector s heading at altitude of 50	

FAILURE OF AC POWER SUPPLY

AC INTEGRATED GENERATOR FAILURE

▶ INDICATIONS

Master caution Flashes

Middle MFD LEFT/RIGHT AC GENERATOR FAIL

PROCEDURES

Aircraft equipment Check serviceability

Mission Continue

BOTH AC INTEGRATED GENERATORS FAILURE

WARNING

Do not set AC GEN LH, RH switches to OFF and ON again.

INDICATIONS

Master caution Flashes

Middle MFD BOTH AC

GENERATORS FAIL

PROCEDURES

INV inverter Check setting to ON

Mission Abort

HYDRAULIC SYSTEM FAILURES

BOOSTER HYDRAULIC SYSTEM FAILURE

Flashes
ON
BOOSTER HYDRAULIC
SYS FAIL
HYDRO fragment

System pressure in critical zone

'Booster hydraulic system

VWS failure. Wheels and flaps emergency extension at speed 270 kt (500 k/h)

LH air intake ramp Locked

PROCEDURES

Mission Abort

TCL of LH engine IDLE

Max AOA of 15°

Aircraft Decelerate to 430 - 485 kt

(800 - 900 k/h)

RAMP LH-EMERG RETR

Set to EMERG RETR till the end of flight at Mach < 1.2

WARNING

In case of emergency ramp retraction, LEFT AIR INTK FAIL – on MFD and 'Left air intake failure' – on VWS.

Subsonic after ramn

Speed	retraction
TCL operation	Without limitations
Air brake	Do not use (interlocked)
Extra maneuvers	Do not make
Landing	Perform at the nearest airfield
Landing	as soon as possible
LG, flaps, slats, vortex flaps	Perform emergency
LO, hapo, olato, voltox hapo	extension

MAIN HYDRAULIC SYSTEM FAILURE **INDICATIONS** Master caution Flashes ON MAIN HYD FAIL MAIN HYDRAULIC SYS FAIL **HYDRO** fragment MFD System pressure in critical zone 'Main hydraulic system failure. Wheels and **VWS** flaps emergency extension at speed 500' Locked RH air intake ramp ▶ PROCEDURES Abort Mission TCL of RH engine IDLE Max AOA of 15° Aircraft Decelerate to 430 - 485 kt (800 - 900 k/h) Set to EMERG RETR till the end of flight at Mach RAMP RH-EMERG RETR

WARNING

< 1.2

In case of emergency ramp retraction, RIGHT AIR INTK FAIL – on MFD and 'Right air intake failure' – on VWS.

Speed	Subsonic after ramp retraction
TCL operation	Without limitations
Air brake	Do not use (interlocked)
	Perform at the nearest
Landing	airfield as soon as
	possible
LG, flaps, slats, vortex flaps	Perform emergency
LO, haps, slats, voitex haps	extension
Braking	Carry out emergency
Braking	braking during landing run

BOTH HYDRAULIC SYSTEMS FAILURE

BOTTITI DRAULIC 3131	LIVIO I AILUIL
► INDICATIONS	
Master caution	Flashes
BOOST HYD FAIL	ON
MAIN HYD FAIL	ONI
	BOOSTER HYDRAULIC
	SYS FAIL
	MAIN HYDRAULIC SYS
Middle MFD	FAIL
	HYDRO fragment
	System pressures in
	critical zone
	'Booster/main hydraulic
\/\/\C	system failure. Wheels
VWS	and flaps emergency
	extension at speed 270 kt
Damps of both air intokes	(500k/h) Locked
Ramps of both air intakes	Locked
▶ PROCEDURES	
Mission	Abort
Middle MFD	BOTH EMERGENCY
VWS	Both emergency pumps
If One or both emergency number	in use
If: One or both emergency pumps	
EMERG HYD PUMP	
TCLs	IDLE
A1 6	Max AOA of 15°
Aircraft	Decelerate to 430 - 485 kt
	(800 - 900 k/h)
RAMP LH, RH-EMERG RETR	Set to EMERG RETR till the end of flight at Mach <

WARNING

- In case of emergency ramp retraction, LEFT (RIGHT)
 AIR INTK FAIL on middle MFD and 'Left (Right) air
 intake failure' on VWS.
- 2. Protective screens of air intakes remain retracted at landing.

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Speed	Subsonic after ramp retraction
RPM	Above 80%
Air brake	Do not use (interlocked)
Extra maneuvers	Do not make
Landing	Perform at the nearest airfield as soon as possible
LG, flaps, slats, vortex flaps	Perform emergency extension
TCLs	IDLE during landing run
Braking	Carry out emergency braking
Drag chute	Deploy
Engines	Shut down after taxiing from runway

Note

- 1. If no pressure increase in booster or hydraulic system, provide necessary conditions for ejection (at that, prevent quick rudders deflection) and eject.
- 2. If only one emergency pump started (EMERGENCY PUMP IN USE on MFD, 'Emergency pump unit in use' on VWS), enter controlled ejection area and eject.

PNEUMATIC SYSTEM FAILURES

MAIN PNEUMATIC SYSTEM FAILURE

INDICATIONS

Triangle index mark in MFD SYS page red sector of pressure scale with M placard

PROCEDURES

Pressure in main pneumatic system Check
Differential pressure and its variation Check
Cockpit altitude and its variation Check

If: Flying above 26000 ft (8000 m) and in case of cockpit depressurization, follow procedures for Cockpit depressurization at altitude above 39000 ft (12000 m)

Mission Abort

Note

If main pneumatic system fails, it is impossible to control fuel system shut-off valves, canopy control and pressurization system, emergency retraction of air intake ramps (failure of drag chute deployment is possible), emergency extension of refueling probe.

Landing Perform

Drag chute Deploy after landing (if there is pressure)

Taxiing Perform to parking

EMERGENCY PNEUMATIC SYSTEM FAILURE

INDICATIONS

Triangle index mark in

MFD SYS page red sector of pressure
scale with E placard

PROCEDURES

Pressure in emergency pneumatic system Check

Mission Abort and proceed to landing

Note

If emergency pneumatic system fails, it is impossible to perform emergency extension of LG, slats, flaps, vortex flaps and carry out emergency braking after landing as well as MLG parking and towing braking.

7 BOTH PNEUMATIC SYSTEMS FAILURE

INDICATIONS

Triangle index mark in red sector in pressure scales with M and E placards

PROCEDURES

Pressure in main pneumatic system

Check

Pressure in emergency pneumatic
system

Check

Check

Check

Check

Cockpit altitude and its variation

Check

Check

If: Flying above 26000 ft (8000 m) and in case of cockpit depressurization, follow procedures for Cockpit depressurization at altitude above 39000 ft (12000 m)

Mission Abort

Note

- 1. If main pneumatic system fails, it is impossible to control fuel system shut-off valves, canopy control and pressurization system, emergency retraction of air intake ramps (failure of drag chute deployment is possible), emergency extension of refueling probe.
- 2. If emergency pneumatic system fails, it is impossible to perform emergency extension of LG, slats, flaps, vortex flaps and carry out emergency braking after landing as well as MLG parking and towing braking.

Landing	Perform
Drag chute	Deploy after landing (if
	there is pressure)
Taxiing	Perform to parking

LIFE SUPPORT SYSTEM FAILURES

COCKPIT DEPRESSURIZATION AT ALTITUDES ABOVE 39000 FT (12000 M)

INDICATIONS

Flashes Master caution

LIFE SUPPORT SYSTEM fragment

Middle MFD **COCKPIT ALTITUDE**

> LIMIT signal Pressure difference

index moves down

quickly

COCKP scales Cockpit altitude index

> moves up outwards the normal zone

Cockpit Mist possible
High-altitude pressure suit bladder

Pressure created chambers

'Switched on emergency **VWS** oxygen. Descend'

▶ PROCEDURES

With maximum possible Descent vertical speed

Below 26500 ft (8000 m) Cockpit altitude Cockpit altitude index Shifts to normal zone

OPEN Front AIR handle

Oxygen system operation Keep monitoring Oxygen consumption Keep monitoring

PROCEDURES AT CANOPY GLASS BREAKAGE OR HINGED PART SEPARATION

Immediately set below Speed 270 kt (500 k/h)

Crash helmet visor Lower

To cockpit altitude below Descent

26500 ft (8000 m) Cockpit altitude index Shifts to normal zone

Fly to the nearest airfield Landing

If: Decompression symptoms appear above 23000 ft (7000 m) in the cockpit

Cockpit altitude Below 23000 ft (7000 m)

Note

Possible decompression symptoms above 23000 ft (7000 m) in the cockpit.

Descend below 23000 ft (7000 m) in the cockpit.

FAILURE OF SYSTEM OF AUTOMATIC CONTROL SYSTEM OF COCKPIT TEMPERATURE

PROCEDURES

Temperature in the cockpit Sudden increase or decrease

PROCEDURES

WARNING

Do not open/partially open canopy in flight.

If: Hot in the cockpit

COCKPIT TEMP COLD position for a

short time Then to OFF

Else if: Cold in the cockpit

COCKPIT TEMP HOT position for a short

time

Then to OFF position

If required Repeat in 2-3 min

RPM Increase for faster

heating

If: High temperature in cockpit remains

Descent Below 36000 ft (11000

m)

AIR handle CLOSED

If: Extremely unsatisfactory temperature mode remains

Aircraft Decelerate

Cockpit Depressurize

Further steps Depending on situation

till canopy jettison

CONDENSATION OR ICING OF THE COCKPIT CANOPY GLASS

PROCEDURES

Front AIR handle OPEN
Canopy pressurization Check

Rear AIR handle CANOPY

WSHLD DEFOG-OFF WSHLD DEFOG

HOT for a short time

COCKPIT TEMP Repeat the procedure, if required

If: Condensation or icing removed

COCKPIT TEMP Within 18°C - 20°C

WSHLD DEFOG-OFF OFF

Else if: Condensation remains

Vertical speed Decrease during descending

RPM Increase

Air brake Extend (if necessary)

SMOKE IN THE COCKPIT

WARNING

Do not open/partially open canopy in flight.

PROCEDURES

Oxygen mask Tighten
Handle for emergency (continuous)

oxygen supply ON

Front AIR handle CLOSED

If: Overpressure is created in the mask and cockpit altitude is equal to 39000 ft (12000 m)

Descent With max possible vertical speed

Cockpit altitude

Below 26500 ft (8000 m)

If: Smoke in the cockpit remains

Aircraft Decelerate
COCKPIT DEPRESS/PRESS DEPRESS

Further steps Depending on situation till canopy jettison

FOG IN THE COCKPIT	
► PROCEDURES	
COCKPIT TEMP	HOT position for a short time. Then to OFF. Repeat (if necessary)
If: The fog clears away	
Cockpit temperature	Within 18°C - 20°C
OXYGEN EQUIPMENT FAIL	LURE
► INDICATIONS	
Master caution	Flashes
Middle MFD	OXYGEN SYSTEM FAIL signal
VWS	'Oxygen system failure'
Middle MFD	LIFE SUPPORT SYSTEM fragment
Oxygen-rich gas mixture	Not supplied to mask
Oxygen supply pointer	No response to deep inhalation and exhalation
Middle MFD	EMERG OXYGEN ON signal
VWS	'Switched on emergency oxygen supply. Descend'
Oxygen-rich gas mixture	Not supplied to the mask
If: Cockpit depressurization at altitu	ude above 39000 ft

If: Cockpit depressurization at altitude above 39000 ft (12000 m)

High-altitude pressure suit	No oxygen supply to chambers
Oxygen mask	Overpressure not created

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PROCEDURES	
Handle for emergency (continuous) oxygen supply	ON
If: Indicator does not show oxygen supply start and at that jet supply o mixture is not felt	
EMERG OXYGEN on ejection seat oxygen system	Pull
Descent	With maximum possible speed
Altitude	Below 13000 ft (4000m)

NAVIGATION SYSTEMS FAILURE

AIR DATA SYSTEM FAILURE

► INDICATIONS	
Master caution	Flashes
Middle MFD	ADS FAIL
VWS	'Air data system failure. Refer to ISIS'
HUD and MFD	Not information about altitude and speed parameters. Significant disagreement of readings.
vws	No voice warning when reaching limit IAS and Mach
Power plant	Unstable operation (possible)
Air intake ramps	Locked in failed position
Middle MFD	LEFT AIR INTK FAIL RIGHT AIR INTK FAIL
VWS	'Left air intake failure' 'Right air intake failure'
► PROCEDURES	
Mission	Abort
Aircraft	Flying by ISIS data
Speed	Below 325 kt (600 k/h)
TCL	IDLE
RAMP LH – EMERG RETR, RAMP RH – EMERG RETR	EMERG RETR till the end of flight
RPM	Increase at pre-surge condition (engine rumble)
TCL operation	Without limitations
Landing	Perform at the nearest airfield

7 INS1 FAILURE	
► INDICATIONS	
Master caution	Flashes
Middle MFD	INS1 FAIL
VWS	'First INS failure'
▶ PROCEDURES	
Change to INS2 information	Performed automatically Check INS1 indication
MFD PLD page Mission	change to INS2 Check possibility to continue
7 INS2 FAILURE	Continue
► INDICATIONS	
Master caution	Flashes
Middle MFD	INS2 FAIL
VWS	'Second INS failure'
► PROCEDURES	
Change to INS1 information	Performed automatically
MFD PLD page	Check INS2 indication change to INS1
Flight mission	Check possibility to continue
7 BOTH INS FAILURE	
► INDICATIONS	
Master caution	Flashes
Middle MFD	BOTH INS FAIL
VWS	'Both INS failure. Refer to ISIS'
MFD and HUD	Roll, pitch, heading do not correspond to aircraft attitude

Flight mission

Aircraft

Aircraft

Flying by ISIS data and radio altimeter

Flying

To landing airfield

Maintain by ISIS

heading information and by bearing request.

Check as per ground references and astronomic objects.

INS ACCURACY DEGRADATION

► INDICATIONS

Middle MFD LOW INS 1
ACCURACY/
LOW INS 2

ACCURACY Yellow 'φ / λ INS1'

MFD PLD page flashing placard
Yellow 'φ / λ INS2'
flashing placard

PROCEDURES

Mission Continue

INS operation Keep monitoring

'CYCLING' OF INS ALGORITHMS

INDICATIONS

Master caution Flashes

MFD RESTART INS1 / RESTART INS2

PROCEDURES

Aircraft Level flight

Power supply of INS that has cycling OFF and ON (in 3 sec minimum)

MFD PLD page and HUD ALN INS1 or ALN INS2

Straight level flight Maintain within 4 min

Flight parameters limitations	Zero roll angles ±3° +4° pitch angle ±3° Deviation from heading ±1°max Vertical speed ± 16.4 ft/s (5 m/s) Speed ±9.7
PRE ALN SNS1 (2) page	kt (18 k/h) Check GPS + GLS state in the 2nd line of MFB SNS TYPE
HUD	Time counter '04:00' sets to zero and goes OFF
S-turn	Make
MFD PLD page and HUD	ALN INS1 (2) message goes OFF in ≤10 min (if no INS operation)
Mission	Continue

Note

If assigned parameters of level flight not maintained within the first 4 min of mode or if S-turn fails, alignment time increases and accuracy of INS output parameters degrades.

VIM-95 FAILURE AT LANDING AT AIRFIELD EQUIPPED WITH ILS

INDICATIONS

Master caution Flashes

Middle MFD ILS FAIL

PROCEDURES

If: Fuel reserve sufficient

Approach and landing

Perform nearest alternative airfield equipped with radiobeacon landing system If: Fuel reserve not sufficient and required to land at airfield equipped with ILS

Visual approach Perform

Descent speed Check from PrNK, radio

altimeter, ISIS

Altitude Check from PrNK, radio altimeter, ISIS

PITOT-STATIC TUBE FAILURE

► INDICATIONS

Master caution Flashes

MAIN PITOT HEATING

OFF

Middle MFD or

STBY PITOT HEATING

OFF

VWS 'Main pitot heating off'

Speed on HUD, MFD and ISIS

Not correspond to flight and engine modes

Mach on MFD and ISIS

Not correspond to flight

and engine modes

Not correspond to

Altitude on HUD and MFD readings of ADI on ISIS

and flight mode

Not correspond to

readings of ADI on ISIS and flight mode

and flight mode

Altimeter and vertical speed indicator reading

on ISIS

Vertical speed indicator on MFD

Not correspond to readings of ADI on ISIS and flight mode

PROCEDURES

ANTI ICE WSHLD PITOT Check that ON.

Set to ON if it was OFF.
Speed, altitude, vertical

HUD, MFD and ISIS Speed must restore in 2-

3 min

PITOT selector switch STBY

If: Readings restored

Mission Continue

System operation	Check in 2-3 min		
PITOT	MAIN		
If: Serviceability of devices not	restored by standby and		
operating pitot-static systems			
AP OFF button	Press		
AP button	Check that goes OFF		
Mission	Abort		
AB	OFF		
	Decelerate to subsonic		
Speed	speed and proceed to		
	landing.		
Air intake ramps	Perform emergency		
	retraction (if necessary) Monitor by AOA		
Crand	indicator, pitch angles		
Speed	on HUD, MFD, ISIS and		
	by RPM		
	Monitor by information		
	from control center and		
A total	at altitude below 3300 ft		
Altitude	(1000 m) – by radio		
	altimeter and		
	information from		
N	approach controller		
Note			
Pitot-static tube heating is checked automatically.			

Before take-off, if ANTI ICE WSHLD PITOT is not on, SWITCH ON PITOT HEAT signal is shown on middle MFD.

End of procedure

MFD FAILURE

INDICATIONS

MH)	1 3	
IVII D	indication mode	
MED	Not illuminated (OFF)	

MFD Not illuminated (OFF)

No page of selected

Do not change at button MFD operating modes framing control Illuminated, but there is MFD screen no information **PROCEDURES** Set indication mode Serviceable MFD required at this flight stage Continue Mission PROCEDURES WITH ONE SERVICEABLE **ENGINE** Set indication mode Serviceable MFD required at this flight : stage Take decision Further mission Fly by HUD and ISIS if Aircraft A/S page selected on

PROCEDURES AT THREE MFD FAILURE

Mission : Abort

Aircraft : Fly using HUD and ISIS

: Check by ISIS data,

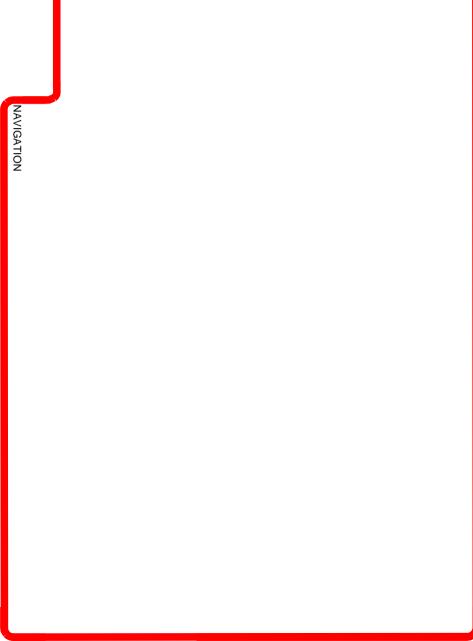
Aircraft systems state : light indicators and

: VWS

serviceable MFD

WARNING

Before landing check position of LG and wing high-lift devices as per flight controller's information obtained by visual observation of aircraft from ground during flying over the runway.



REFUELING POD FIRE

*, = = = = = = = = = = = = = = = = =	
► INDICATIONS	
Master caution	Flashes
REFUELING POD FIRE	ON
MFD	REFUELING POD FIRE. SWITCH OFF REFUELING POD
VWS	'Refueling pod fire. Switch off refueling pod. Release refueling pod'
MFD	REFUELING POD symbol HOSE-DROGUE signs APPROACH AREA frames – any Yellow circle of REFUELING POD symbol flashes
► PROCEDURES	
Refueling pod control panel	Set DISCON to ON
0	D'anna and the same all a fall

Command to receiver aircraft Disconnect immediately

REFUELING POD - ON Set to OFF

Press VDT/RP button JETT TANKS control panel



REFUELING POD FAILURE

INDICATIONS (AT HYDRAULIC PUMP FAILURE)

Master caution	Flashes
REFUELING POD FAILURE	ON
	REFUELING POD
MFD	FAILURE, RETRACT
	DROUGE
	'Refueling pod failure.
VWS	Switch on disconnection

lights. Retract drogue'

REFUELING POD symbol
HOSE-DROGUE signs
APPROACH AREA frames – any
Yellow circle of

PROCEDURES

Mission Abort

Refueling pod control panel Set DISCON to ON

REEL IN – INIT- REEL OUT REEL IN

ABNORMAL IN-FLIGHT REFUELING MODE

▶ INDICATIONS

Flow metering part No estimation of received fuel quantity

Fuel supply At low rate

Fuel reserve readings

Increase in tank 1, 2, 3
and VDT

▶ PROCEDURES

Report To tanker crew and

disconnect

Connect to other unified

Aircraft refueling pod.

If impossible, again connect to same

REFUELING POD symbol flashes

If: Again indications of abnormal mode

Decision Take on further refueling

If: Decision taken on further refueling

Note

If fuel reserve > 1600 kg, there can be fuel in wing tanks and tanks 3A.

Fuel dump Permitted through tank drain system
MFD DISCONNECT

VWS Disconnect

Full refueling	Impossible
MFD	Absence of REFUELING COMPLETED
VWS	Absence of 'Refueling completed'
MFD	CHECK FUEL QUANTITY. NO VENTRAL TANK CONSUMPTION (after refueling completion)
VWS	'Check fuel quantity. No ventral tank consumption' (after refueling completion)

FBW FAILURES

FAILURE OF ONE SUB-CHANNEL OF FBW REDUNDANCY

INDICATIONS

Reset panel One or more buttons come ON

MFD FBW status page

One or several placards on green base

Transient processes None

Flight modes All performed

▶ PROCEDURES

Aircraft Put into level flight

Failed sub-channel/channels Reset

Reset panel Press illuminated buttons one after another

Mission Continue (even if resetting failed)

FAILURE OF TWO SUB-CHANNELS OF FBW REDUNDANCY

►INDICATIONS

Master caution Flashes

Middle MFD NO F-B-W
REDUNDANCY

VWS 'No Fly-by-Wire redundancy'

Reset panel Two or more buttons come ON

MFD FBW status page

MFD status page

One or several placards on yellow base

Transient processes None

Flight modes All performed

Reset panel

MFD PLD page and HUD

Damped oscillations in pitch

▶PROCEDURES	PROCEDURES	
Aircraft	Put into level flight	
Failed sub-channels	Reset	
Reset panel	Press illuminated buttons one after another	
If: At least one button goes OFF		
Mission	Continue	
If: Buttons are still ON		
Mission	Abort	
Landing	Perform at the nearest airfield	
TOTAL FAILURE OF REDUNDANCY IN 2 AOA SENSORS		
▶INDICATIONS		
Master caution	Flashes	
Middle MFD	AOA FAIL AUTOPILOT FAIL	
VWS	'Alpha sensor failure, slats fixed' 'Alpha limiter off. Don't exceed permitted Alpha and g-load' 'Autopilot failure'	
MFD, HUD, UFCP	LIM OFF	
FBW control panel	LIM button indicator light comes ON	

Three or more buttons come ON/ There is no indication

No AOA indication

Possible

►INDICATIONS	
Master caution	Flashes
Red F-B-W caution light	Comes ON
Middle MFD	F-B-W FAIL AUTOPILOT FAIL
VWS	'Fly-by-Wire failureFly by-Wire failure' 'Autopilot failure'
Reset panel	Three or more buttons come ON
MFD FBW status page	One or several placards on red base: PITCH STICK PS ROLL STICK PS PEDAL PS
Aircraft	Degradation of controllability (down to total loss of control in

Mission Abort

failed channel)

Aircraft controllability Evaluate

If: Aircraft is not controlled in pitch

Required conditions for ejection Provide if possible

Ejection Perform

If: Aircraft is controlled in pitch

Aircraft Put into level flight

AOA 15° Do not exceed

Landing Perform at the nearest airfield

Note

Landing performance is considerably difficult

FAILURE OF FBW COMPUTERS

	INDICATIONS	
	_	

Master caution Flashes

Red F-B-W caution light Comes ON
F-B-W FAIL

Middle MFD AUTOPILOT FAIL

VWS 'Fly-by-Wire failure...Fly by-Wire failure'

'Áutopilot failure'
Reset panel Buttons come ON

One or both placards on

MFD FBW status page red base: FCx4

FCSD

Aircraft Possible degradation of controllability (down to

controllability (down to total control loss)

Transient processes Possible

PROCEDURES

Mission Abort

Aircraft controllability Evaluate

If: Aircraft is not controlled

Required conditions for ejection Provide if possible

Ejection Perform

If: Aircraft is controlled

Aircraft Put into level flight

AOA 15° Do not exceed

Landing Perform at the nearest airfield

Landing performance is considerably difficult

FAILURE OF SERVO DRIVE OF ONE HORIZONTAL STABILIZER

HORIZONTAL STABILIZER	τ
► INDICATIONS	
Master caution	Flashes
Red F-B-W caution light	Comes ON
Reset panel	All buttons come ON
Middle MFD	F-B-W FAIL LEFT STAB FAIL and (or) RIGHT STAB FAIL AUTOPILOT FAIL
vws	'Fly-by-Wire failure…Fly by- Wire failure' 'Autopilot failure'
MFD FBW status page	One or both placards on red base: ST SD (LH and (or) RH stabilizer
Aircraft	Possible degradation of controllability (down to total control loss)
Transient processes	Possible
► PROCEDURES	
Mission	Abort
Aircraft controllability	Evaluate
If: Aircraft is not controlled in pitch	
Required conditions for ejection	Provide if possible
Ejection	Perform
If: Aircraft is controlled in pitch	
Aircraft	Put into level flight
AOA 15°	Do not exceed
	Perform at the nearest airfield

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FAILURE OF SERVO DRIVE OF ONE OF THE RUDDERS INDICATIONS

► INDICATIONS	
Master caution	Flashes
Red F-B-W caution light	Comes ON
Middle MFD	F-B-W FAIL LEFT RUDDER FAIL and (or) RIGHT RUDDER FAIL AUTOPILOT FAIL
vws	'Fly-by-Wire failureFly by-Wire failure' 'Left rudder failure' and (or) 'Right rudder failure' 'Autopilot failure'
Reset panel	Three or four buttons come ON
MFD FBW status page	One or both placards on red base: RD SD (LH and (or) RH rudder)
Aircraft	Degradation of controllability in heading
► PROCEDURES	
Mission	Abort
Controllability in heading	Evaluate
Aircraft	Put into level flight
AOA 15°	Do not exceed
Landing	Perform at the nearest
Note	

Landing performance is considerably difficult

FAILURE OF SERVO DRIVE OF ONE AILERON

INDICATIONS		
► INDICATIONS		
Master caution	Flashes	
F-B-W caution light	Comes ON	
Middle MFD	F-B-W FAIL LEFT AILERON FAIL and (or) RIGHT AILERON FAIL AUTOPILOT FAIL	
VWS	'Fly-by-Wire failureFly by- Wire failure' 'Left aileron failure' and (or) 'Right aileron failure' 'Autopilot failure'	
Reset panel	Three or four buttons come ON	
MFD FBW status page	One or both placards on red base: AL SD (LH and (or) RH aileron)	
Aircraft	Degradation of controllability in roll (down to total control loss)	
PROCEDURES		
Controllability in roll	Evaluate	
If: Aircraft is not controlled in	roll in ailerons channel	
Required conditions for ejection Ejection	Provide if possible Perform	
If: Aircraft is controlled in roll	1	
Mission	Abort	

Note

Put into level flight

Perform at the nearest

Landing performance is considerably difficult

FAILURE OF MAIN MODE IN ONE OF FBW PRESSURE CONTROL CHANNELS

INDICATIONS

INDICATIONS	
Master caution	Flashes
Middle MFD	STBY PITCH STBY ROLL
	STBY RUDDER
	'Standby pitch channel
	control'
VWS	'Standby roll channel control'
	'Standby yaw channel
	control'
	'Autopilot failure'
Reset panel	Buttons come ON
FBW control panel	STBY placard
HUD MFD	
·····	One of placards on red
	base:
MFD FBW status page	Wz
	Wx Wy
	• • • • • • • • • • • • • • • • • •
	Placards on yellow base:
MFD FBW status page	STBY PITCH
	STBY ROLL STBY RUDDER
Aircraft	Possible degradation of
	controllability
Transient processes ▶ PROCEDURES	Possible
Mission	Abort
Aircraft controllability	
Aircraft	Put into level flight
AOA 15°	Do not exceed
	Perform at the nearest
Landing	airfield

Note

Landing performance is considerably difficult

FAILURE OF FBW PRESSURE SENSORS

INDICATIONS	
Master caution	Flashes
NA'LU. NAED	F-B-W- ON FIXED NB
Middle MFD	AUTOPILOT FAIL
	'Fly-by-Wire on fixed
/WS	numbers'
	'Autopilot failure'
Reset panel	Buttons come ON ADPS placard on red
MFD FBW status page	base
Aircraft	Possible degradation of
	controllability
ransient processes	Possible
PROCEDURES	A.b. a. et
Mission	Abort
Aircraft	Put into level flight
4OA 15°	Do not exceed
f: At altitude below 15600	
Flight	Continue
Speed	Below 270 kts (500 kmh)
f: At altitude 15600-17000	ft (4800-5200 m)
Aircraft	Put into level flight
NOA 15°	Do not exceed
	Below 245-270 kts (450-
Speed	600 kmb)
	'Fly-by-Wire on fixed
/WS	numbers. Flying'
Flight	Continue
Altitude	Below 17000 ft (5200 m)
Speed	Below 270 kts (500 kmh)
f: At altitude above 17000	
	245-270 kts (450-500
Speed	kmh)
	15600-17000 ft (4800-
Altitude	5200 m)
	'Fly-by-Wire on fixed
/WS	numbers. Flying'
Flight	Continue
Altitude	Below 17000 ft (5200 m)
Speed	Below 270 kts (500 kmh)
_anding	Perform at the nearest
-	airfield

'Flv-bv-Wire on fixed numbers, Landing' during NLG extension

Note

- Before setting speed of 245-270 kts (450-500 kmh) and altitude of 15600-17000 ft (4800-5200 m), decelerate to 400 kts (740 kmh) to reduce possible oscillations on fixed numbers.
- Setting to LANDING fixed numbers level is carried out 2. automatically at NLG extension.

FAILURE OF AUTOPILOT

INDI	CAT	ONS
	•	

Buttons come ON Reset panel VWS 'Autopilot failure' Middle MFD **AUTOPILOT FAIL** Ny placard on red base MFD FBW status page Possible degradation of Aircraft controllability Possible

PROCEDURES

Transient processes

Mission Abort

Put into level flight

Perform at the nearest Landing

Flashes

airfield

AUTOTHROTTLE FAILURE

INDICATIONS

Master caution

AUTOTHROTTLE FAIL Middle MFD

VWS 'Autothrottle failure'

Buttons come ON Reset panel

Nx placard on red base MFD FBW status page

tus paye
Sets to OFF. Auto throttle

Further actuation blocked

PROCEDURES	
Mission	Continue
Auto throttle	Do not switch on
7 FAILURE OF SIDE	SLIP ANGLE SENSORS
INDICATIONS	
MFD FBW status page	BETA FAIL on red base
Transient processes	None
► PROCEDURES	
Mission	Continue
FAILURE OF FROM SENSOR	NT SIDESLIP ANGLE
► INDICATIONS	
Reset panel	Buttons come ON
MFD FBW status page	Placards on red base: FRONT BETA BETA FAIL
Transient processes	None
► PROCEDURES	
Mission	Continue
FAILURE OF REAL SENSOR	R SIDESLIP ANGLE
► INDICATIONS	
Reset panel	Buttons come ON
MFD FBW status page	REAR BETA on red base
Transient processes	None
▶ PROCEDURES	
Mission	Continue
FAILURE OF ONE AOA SENSOR	
► INDICATIONS	

Flashes

Master caution

AOA FAIL Middle MFD I IM OFF 'Alpha sensor failure, slats fixed' **VWS** 'Alpha limiter off. Don't exceed permitted Alpha and g-load AOA FAIL on red base/ Three placards on red base: MFD FBW status page **AOA FAIL** AOA on the left AOA on the right Possible degradation of controllability Aircraft None Transient processes ▶ PROCEDURES Abort Mission

Put into level flight Aircraft Stores Jettison, if necessary Perform at the nearest airfield Landing

Note

Landing performance is considerably difficult

FAILURE OF ONE AOA SENSOR REDUNDANCY



INDICATIONS	
Master caution	Flashes
Middle MFD	AOA FAIL
Reset panel	Buttons come ON
MFD FBW status page	Placards on red base: AOA on the left/ AOA on the right
Aircraft	Possible degradation of controllability
Transient processes	Possible

Note

When MLG are retracted, availability of heating of airflow-angle probe vanes is checked. In case of failure (lack) of heating, the corresponding placards of airflow-angle probe are indicated on FBW status page and button of the fourth redundancy channel comes ON on reset panel.

Mission Continue

FAILURE OF 2 CHANNELS OF QUAD-REDUNDANT FBW COMPUTERS

►INDICATIONS

Master caution Flashes

Reset panel Two or more buttons

come ON

Middle MFD NO F-B-W REDUNDANCY

VWS 'No Fly-by-Wire redundancy'

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One or both placards on yellow base: FCx4

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Transient processes None

Flight modes All performed

▶ PROCEDURES

Aircraft Put into level flight

Failed sub-channels Reset

Reset panel Press illuminated buttons one after

another

If: Failure indication is not changed

Mission Abort

Landing Return to airfield

FAILURE OF 2 SUB-CHANNELS OF AUTOPILOT COMPUTERS

▶INDICATIONS

Reset panel Button comes ON

VWS 'Autopilot failure'

MFD FBW status page FCx2 on yellow base

▶PROCEDURES

Aircraft Put into level flight

Failed sub-channels Reset Press illuminated Reset panel buttons one after another Mission Continue FAILURE OF FBW COMMUNICATION WITH AIMING AND NAVIGATION SYSTEM **►INDICATIONS** AOA indication None MIL STD placard on red MFD FBW status page base 'Autopilot off. Manual **VWS** control' when automatic control is ON Transient processes Possible **▶ PROCEDURES** Disturbance at automatic control Counteract switch OFF Mission Abort Put into level flight Aircraft Abrupt maneuvers Do not make Perform at the nearest Landing airfield **FAILURE OF TWO REDUNDANT CHANNELS OF THE** AIRCRAFT CONTROL SURFACES DRIVES **►INDICATIONS** Flashes Master caution Two or more buttons Reset panel come ON NO F-B-W Middle MFD REDUNDANCY 'No Fly-by-Wire redundancy' **VWS** One or several placards on yellow MFD FBW status page base: ST SD,AL SD.RD SD

Possible

All performed

Transient processes

Flight modes

Failed sub-channels Reset

Reset panel Press illuminated buttons one after another

If: Failure indication is not changed

Mission Abort

Landing Return to airfield

7 FAILURE OF ONE ENGINE AUTO THROTTLE

INDICATIONS

Reset panel Two or more buttons come ON

One of placards on yellow base:

MFD FBW status page

AT RIGHT

AT LEFT

AT LEFT
Transient processes None

Flight modes All performed

▶ PROCEDURES

Aircraft Put into level flight

Failed sub-channels Reset

Reset panel Press illuminated buttons one after another

Mission Continue

FAILURE OF SENSORS OF ONE OF THE TRIMMERS POSITIONS

►INDICATIONS

Master caution Flashes

Reset panel Buttons come ON

Middle MFD AUTOPILOT FAIL

VWS 'Autopilot failure'

MFD FBW status page

One or several placards on red base:

ST TRIM PS AL TRIM PS RD TRIM PS

Transient processes

Possible at automatic control (autopilot) switching OFF

▶ PROCEDURES

Disturbances at automatic control switch OFF Counteract

Aircraft Control manually
FBW automatic modes Do not switch on

If: Position sensors of trim actuators fail

Trim actuators control Maintained



FAILURE OF TWO ENGINES AUTO THROTTLE

►INDICATIONS

Master caution Flashes

Reset panel One or more buttons come ON

· Come On

Middle MFD AUTOTHROTTLE FAIL

VWS 'Autothrottle failure'

One or several placards

MFD FBW status page on red base:

AT RIGHT AT LEFT

Transient processes None

▶ PROCEDURES

Mission Continue

Auto throttle Do not switch on

Engine thrust Control manually

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FAILURE OF ONE OR TWO REDUNDANT CHANNELS OF AIRBRAKE POSITION SENSOR

►INDICATIONS

Master caution Flashes

Reset panel

One or two buttons come ON

Stabilizer

Oscillations during airbrake extension

MFD FBW status page

BRK PS placard on green or yellow base

▶ PROCEDURES

Mission Continue

If: Stabilizer oscillations during airbrake extension

Airbrake Retract Do not extend again.



FAILURE OF AIRBRAKE POSITION SENSOR

▶INDICATIONS	
Master caution	Flashes
Reset panel	Three or four buttons come ON
Stabilizer deflection compensation to diving	None
MFD FBW status page	BRK PS placard on red base
▶PROCEDURES	
Mission	Continue

Counteract manually

Moment of pitch down to pitch up

FAILURE OF TRIM ACTUATORS (DURING PRE-FLIGHT TEST)

INDICATIONS

Master caution **Flashes**

MFD FBW status page NOT READY FOR T-O

STAB TRIM FAIL Middle MFD AIL TRIM FAIL

RUD TRIM FAIL

Possible pressing or pulling forces in pitch or

in roll

▶ PROCEDURES

Control stick (or pedals)

Flight performance possibility Estimate

Trim control possibility Estimate

If: Flight performance is possible

FBW automatic modes Do not switch on

If: Voice warning system ready for operation

'Stabilizer trimmer failure'

VWS 'Aileron trimmer failure'

Rudder trimmer failure'

FAILURE OF POSITION SENSORS OF LH OR RH SLATS SECTION

►INDICATIONS

Master caution Flashes

SLATS CHAN FAIL Middle MFD

Unsymmetrical indication of extended

FLAPS fragment on MFD SYS page position of one section of slats (root or end)

MFD FBW status page MFD FBW status page Transient processes Possible PROCEDURES Mission AOA 15° Mission AOA 15° AOA 15° AOA 15° FAILURE OF LH AND RH SLATS SECTIONS CONTROL PINDICATIONS Master caution FLAPS fragment on MFD SYS page FLAPS fragment on MFD SYS page FLAPS fragment on MFD SYS page WWS Slats failure. Slats fixed' 'Slats failure. Flaps emergency extension' Reset panel MFD FBW status page PROCEDURES Mission AOA 15° AOA 15° AOA 15° AOA 15° ADA 15° Outline of failed slat in red and SLATS END on red base Possible PROCEDURES Mission ADOR ADO	VWS	'Slats failure. Slats fixed'/ 'Slats failure. Flaps emergency extension'
Mission Abort AOA 15° Do not exceed till emergency extension of slats Wing high-lift devices (slats) Perform emergency extension Landing Perform at the nearest airfield FAILURE OF LH AND RH SLATS SECTIONS CONTROL ►INDICATIONS Master caution Flashes Middle MFD SLATS CHAN FAIL Unsymmetrical indication of extended position of one section of slats (root or end) 'Slats failure. Slats fixed'/ 'Slats failure. Flaps emergency extension' Reset panel Buttons come ON Outline of failed slat in red and SLATS END on red base Transient processes Possible ►PROCEDURES Mission Abort Do not exceed till emergency extension		Outline of failed slat in red and (or) SLAT PS placard on red base
Mission AOA 15° Do not exceed till emergency extension of slats Wing high-lift devices (slats) Perform emergency extension Perform at the nearest airfield FAILURE OF LH AND RH SLATS SECTIONS CONTROL ►INDICATIONS Master caution Flashes Middle MFD FLAPS fragment on MFD SYS page FLAPS fragment on MFD SYS page WWS SLATS CHAN FAIL Unsymmetrical indication of extended position of one section of slats (root or end) 'Slats failure. Slats fixed'/ 'Slats failure. Flaps emergency extension' Reset panel MFD FBW status page Transient processes Possible ▶PROCEDURES Mission Abort Do not exceed till emergency extension		Possible
AOA 15° Do not exceed till emergency extension of slats Wing high-lift devices (slats) Perform emergency extension Landing Perform at the nearest airfield FAILURE OF LH AND RH SLATS SECTIONS CONTROL INDICATIONS Master caution Flashes Middle MFD SLATS CHAN FAIL Unsymmetrical indication of extended position of one section of slats (root or end) 'Slats failure. Slats fixed'/ 'Slats failure. Flaps emergency extension' Reset panel Buttons come ON MFD FBW status page Country States Transient processes Possible PROCEDURES Mission Abort Do not exceed till emergency extension		A b a mt
Landing Perform at the nearest airfield FAILURE OF LH AND RH SLATS SECTIONS CONTROL ►INDICATIONS Master caution Flashes Middle MFD SLATS CHAN FAIL Unsymmetrical indication of extended position of one section of slats (root or end) **Slats failure. Slats fixed'/ 'Slats failure. Flaps emergency extension' Reset panel Buttons come ON MFD FBW status page Transient processes Possible ►PROCEDURES Mission Abort Do not exceed till emergency extension		Do not exceed till
FAILURE OF LH AND RH SLATS SECTIONS CONTROL INDICATIONS Master caution Flashes Middle MFD SLATS CHAN FAIL Unsymmetrical indication of extended position of one section of slats (root or end) 'Slats failure. Slats fixed'/ 'Slats failure. Flaps emergency extension' Reset panel Buttons come ON Outline of failed slat in red and SLATS ROOTS/SLATS END on red base Transient processes Possible PROCEDURES Mission Abort Do not exceed till emergency extension	Wing high-lift devices (slats)	Perform emergency extension
CONTROL ►INDICATIONS Master caution Flashes Middle MFD SLATS CHAN FAIL Unsymmetrical indication of extended position of one section of slats (root or end) VWS 'Slats failure. Slats fixed'/ 'Slats failure. Flaps emergency extension' Reset panel Buttons come ON MFD FBW status page Outline of failed slat in red and SLATS ROOTS/ SLATS END on red base Transient processes Possible ▶ PROCEDURES Mission Abort Do not exceed till emergency extension	Landing	
Master caution Flashes Middle MFD SLATS CHAN FAIL Unsymmetrical indication of extended position of one section of slats (root or end) VWS 'Slats failure. Slats fixed'/ 'Slats failure. Flaps emergency extension' Reset panel Buttons come ON MFD FBW status page Outline of failed slat in red and SLATS ROOTS/ SLATS END on red base Transient processes Possible ▶ PROCEDURES Mission Abort Do not exceed till emergency extension		ATS SECTIONS
Middle MFD SLATS CHAN FAIL Unsymmetrical indication of extended position of one section of slats (root or end) 'Slats failure. Slats fixed'/ 'Slats failure. Flaps emergency extension' Reset panel Buttons come ON Outline of failed slat in red and SLATS ROOTS/ SLATS END on red base Transient processes Possible PROCEDURES Mission Abort Do not exceed till emergency extension	►INDICATIONS	
position of one section of slats (root or end) 'Slats failure. Slats fixed'/ 'Slats failure. Flaps emergency extension' Reset panel Buttons come ON MFD FBW status page Outline of failed slat in red and SLATS ROOTS/ SLATS END on red base Transient processes Possible ▶ PROCEDURES Mission Abort Do not exceed till emergency extension		
VWS fixed'/ 'Slats failure. Flaps emergency extension' Reset panel Buttons come ON	FLAPS fragment on MFD SYS page	position of one section
Reset panel Buttons come ON Outline of failed slat in red and SLATS ROOTS/ SLATS END on red base Transient processes Possible PROCEDURES Mission Abort Do not exceed till emergency extension		fixed'/ 'Slats failure. Flaps emergency extension'
Outline of failed slat in red and SLATS ROOTS/ SLATS END on red base Transient processes Possible PROCEDURES Mission Abort Do not exceed till emergency extension	Reset panel	Buttons come ON
Transient processes Possible PROCEDURES Mission Abort Do not exceed till emergency extension	MFD FBW status page	Outline of failed slat in red and SLATS ROOTS/ SLATS END on red base
Mission Abort Do not exceed till emergency extension		Possible
AOA 15° Do not exceed till emergency extension	▶PROCEDURES	
AOA 15° emergency extension	Mission	Abort
	AOA 15°	emergency extension

Perform emergency extension Wing high-lift devices (slats) Perform at the nearest Landing airfield

FAILURE OF SENSOR OF ONE OF THE

SLATS POSITION	
N INDIO ATIONO	

►INDICATIONS	
LG	Extended
Master caution	Flashes
Middle MFD	FLAP FAIL
VWS	'Control flaps manually'
Reset panel	Three or four buttons come ON
MFD FBW status page	Outline of failed slat in red and FLAP PS placard
Rolling motion	Occurs
▶PROCEDURES	
Rolling motion	Immediately counteract
FLAPS-RETR-AUTO-LDG-T/O switch	RETR
Landing	Perform with retracted flaps at the nearest airfield
If: No rolling motion	
Flaps position	Check
FLAPS-RETR-AUTO-LDG-T/O switch	LDG
Wing high-lift devices extension	Check
If: Flaps not extended by selector sw	itch
LANDING PROHIBITED light	Comes ON
Middle MFD	FLAPS NOT EXTENDED
VWS	'Flaps not extended. Wheels and flaps emergency extension'
AOA 15°	Do not exceed
Wing high-lift devices	Perform emergency extension

If: Flaps fail to extend

Landing Perform at the nearest airfield

Note

For emergency extension of wing high-lift devices (with LG extended):

-pull LG EMERG EXT handle until stop, move it to the right until stop and again pull it until stop. Flaps, slats should extend to landing position and vortex flaps should extend. -check visually extension of wing high-lift devices and vortex flaps

If: Flaps extended and slats not extended

Landing at the airfield Permitted

AOA more than 10° DO NOT INCREASE

If: Flaps and slats not extended

Landing Perform at the nearest airfield

If: Landing at the airfield is not possible

Necessary conditions for ejection Provide

Ejection Perform

AUTOPILOT MODES FAILURE FAILURE OF FLIGHT DIRECTOR CONTROL

►INDICATIONS

Master caution

Middle MFD FLIGHT DIRECTOR

Flashes

Middle MFD CONTROL OFF

VWS 'Flight director control off'

Transient processes Possible

▶ PROCEDURES

Mission Continue

Director mode Do not switch on

Approach for landing

FAILURE OF AUTOPILOT

Perform in manual control mode

▶INDICATIONS

Master caution Flashes

Activated automatic control mode Switch OFF

VWS 'Autopilot off. Manual control'

Transient processes Possible

▶ PROCEDURES

NUDIC ATIONS

Current g-load 4

Landing

Disturbances at automatic control switch OFF

Aircraft

Counteract

Control manually

FBW automatic modes

Do not switch on



FAILURE OF LSS

	PINDICATIONS	UN5	
	Master caution	Flashes	
	MFD	Indications of max permissible parameters disappear	
•	MFD	LIMIT SIGNAL SYS FAIL	
	vws	'Limit signal system failure'	
,	Aircraft maneuvering	Degrades	
	▶PROCEDURES		
	Aircraft	Put into level flight	
•	Speed	243-270 kts (450-500 kmh)	
•	Current AOA 15°	Do not exceed	

Do not exceed

airfield

Perform at the nearest

EMERGENCY LANDING OUTSIDE AIRFIELD

EMERGENCY LANDING OUTSIDE AIRFIELD WITH OPERATING ENGINES

▶ CONDITIONS

Landing site

Landing site

Examined and estimated from air

With extended LG
On NLG and airframe

PROCEDURES

Decision and place of landing

External fuel tanks and suspended weapons

LG

Wing high-lift devices

Altitude

Speed

Report to flight controller or control center

Jettison in a safe place

Extend

Check automatic extension

Below 16500 ft (5000 m)

Speed

215-270 kt (400-500 km/h)

Lean against instrument

Position in cockpit Lean against instrume panel

Canopy Perform emergency jettison

Shoulder straps Lock in restrained position
Engines Shut down before landing
Drag chute Deploy after landing

Storage batteries Set to OFF

If: Landing with extended LG

Braking Carry out emergency braking

End of procedure

RADIO COMMUNICATION AND RADIO AIDS FAILURES

RADIO FAILURE

COM1 FAILURE

► INDICATIONS

Master caution Flashes

RH MFD COM1 FAIL

RCP and UFCP FAIL message in COM1

line

If: COM1 provided operation of data exchange channel

Group actions mode Switches OFF

MFB D/L Deactivates and displayed in dark grey

MFB GRA Removed from indication

Note

Data exchange is performed via COM1 if D/L mode is ON, when voice communication is established via COM2.

PROCEDURES

If: COM2 did not provide operation of data exchange channel

RCP/UFCP Set required channel for COM2

Radio communication Establish via COM2

Mission Continue

If: COM2 provided operation of data exchange channel

Further steps

Activated MFB D/L Press to set D/L mode to

OFF....

RCP and UFCP Communication channel is shown instead of

DATA LINK message Set required channel in

RCP/UFCP COM2 line

Radio communication Establish via COM2 TX 1 – 2 on TCL to 2

Report to team leader (control agency) and

proceed as per

instructions

COM2 FAILURE INDICATIONS Master caution Flashes COM2 FAIL RH MFD FAIL message in COM2 RCP and UFCP line If: COM2 provided operation of data exchange channel Group actions mode Switches OFF Deactivates and MFB D/L displayed in dark grey MFB GRA Removed from indication **PROCEDURES** If: COM1 did not provide operation of data exchange channel Set required channel to Channel continue communication via COM1 Radio communication Establish via COM1 Continue Mission If: COM1 provided operation of data exchange channel Press to set D/L mode to Activated MFB D/L OFF Communication channel RCP and UFCP shown instead DATA LINK message Set required channel in RCP/UFCP COM1 line Establish via COM1 Radio communication TX 1 – 2 on TCL to 1 Report to team leader (control agency) and

TWO RADIO FAILURE

Further steps

▶ INDICATIONS

Master caution Flashes

proceed

instructions

as

per

COM1 FAIL and COM2 **RH MFD** FAIL FAIL message in COM1 RCP and UFCP and COM2 lines

If: COM1 or COM2 provided operation of data exchange channel Group actions mode Switches OFF Deactivates and MFB D/L displayed in dark grey Removed from MFB GRA indication PROCEDURES Mission Abort Radio communication Establish via HF If: VHF communication required for mission Report to team leader (control agency) if Further steps possible Mission Abort Landing Return to landing airfield Continue in VHF and HF band in established Transmission places HF RADIO FAILURE INDICATIONS Flashes Master caution HF FAIL message RH MFD FAIL message in HF RCP and UFCP radio line If: HF radio provided data exchange mode Switches OFF Mode **PROCEDURES** COM1-COM2-HF-NAV-ICS- -HF position EMER1-EMER2 Set different channel, then return to required Channel one, in 1 min set other

channel again

If: HF communication required for mission and radio failure remains

VHF radio

Use for communication

If possible report to team leader (control agency) and proceed as per instructions

If: Impossible to report to team leader (control agency)

 Mission	Abort
Landing	Return to landing airfield
 Transmission	Continue in VHF and HF band in established places

RCP FAILURE

INDICATIONS

Master caution Flashes

RH MFD in both cockpits RCP FAIL (RCP1 or RCP2) message

RCP screen Goes OFF

PROCEDURES

Mission Continue

Radio communication Establish

Transmission mode Check by self-listening availability
From UFCP COM page or from cockpit with serviceable RP

Intercom control Not performed from cockpit with failed RCP

Note

Operation for transmission is carried out via radio, from which data was transmitted for the last time prior to failure. For that set TX 1 – 2 button on TCL in any position.

NO DATA EXCHANGE VIA MUX BUS BETWEEN BKS-29E AND MC

INDICATIONS

UFCP CONTR RCP message instead of parameters

RCP FAIL (RCP1 or

RH MFD in both cockpits

RCP2) message

RCP screen Goes OFF

If: COM2 provided operation of data exchange channel

Group actions mode Switches OFF

MFB D/L Deactivates and displayed in dark grey

MFB GRA Removed from indication

COM2 Sets to voice mode

Communication channel is RCP shown instead of DATA LINK message

PROCEDURES

Radios Controlled from RCP

WS No voice warnings about navigation system failures

If: There are failures of radios, RCP, ICS, VWS

MFD VOICE WARNING SYS FAIL message (if any)

Check state by messages

Navigation systems on RH MFDs, information on MFD, instruments

Check state by information on RCP and available

communication with control agency and other aircraft

If: Mission requires group action mode

Further steps Report to team leader (control agency) and proceed as per instructions

If: No communication with team leader (control agency)

Mission Abort

FAILURE OF SDC OF DIGITAL INTEGRATED COMMUNICATION MODULE	
► INDICATIONS	-
Master caution	Flashes
RH MFD	SDC TsIMS FAIL
RCP	message SDC message
UFCP	CONTR RCP message
If: COM1 or COM2 provided operat	instead of parameters
channel	non or data exchange
Group actions mode	Switches OFF
MFB D/L	Deactivates and
MED ODA	displayed in dark grey Removed from
MFB GRA	indication
COM1 (COM2)	Sets to voice mode Communication channel
RCP	is shown instead of
	DATA LINK message
▶ PROCEDURES	
Radios	Controlled from RCP
RCP	No indication of
KUP	reception/transmission of radios
Listening volume control	Not performed
Intercom control	Not performed
BKS-29E with MC Control from UFCP	No communication Not carried out
Data exchange mode	Not available
	No voice warnings
VWS	about navigation system failure
If: There are failures of radios, RCP, ICS, VWS	

VOICE WARNING SYS

state

on

by RH

FAIL message (if any)

MFDs, information on MFD, instruments

Check

messages

MFD

Navigation systems

Radio

Check state by information on RCP and available communication with control agency and other aircraft

If: Mission requires group action mode

Further steps

Report to team leader (control agency) and proceed as per instructions

If: No communication with team leader (control agency)

Mission Abort

FAILURE OF INTERNAL COMMUNICATION SYSTEM

► INDICATIONS

Master cautionFlashesRH MFDICS TsIMS FAIL
messageRCPICS message

UFCP CONTR RCP message

instead of parameters

No adjustment of

VWS listening volume of warnings

I/C and radios No self-listening

Transmission on the air No listening

RCP (UFCP) No TX symbol indication

Data exchange No capability
Radio communication in HF band No capability

Intercom No control

PROCEDURES

Lower handle of COM1-COM2-HF- EMER1 or EMER2 NAV-ICS- -EMER1-EMER2 position

EMER1 Select to control COM1
RCP EMER1

UFCP EMER1 instead of

COM1

If: COM1 provided operation of data exchange channel		
Group actions mode	Curitohaa OFF	
MFB D/L	Deactivates	
COM1	Sets to voice mode	
RCP/UFCP	Set required channel for COM1	
Radio communication	Establish in standard mode Press TX 1 – 2 button on TCL	
EMER2	Select to control COM2	
RCP	EMER2	
UFCP	EMER2 instead of COM2	
If: COM2 provided operation of data exchange channel		
Group actions mode	Switches OFF	
MFB D/L	Deactivates	
COM2	Sets to voice mode	
RCP/UFCP	Set required channel for COM2	
Radio communication	Establish in standard	
	mode	
	Press TX 1 – 2 button on TCL	
If: Mission does not require group action mode or radio		
communication via HF radio		
Mission	Continue	
If: Mission requires group actions mode		
Further steps	Report to team leader (control agency) and proceed as per instructions	
If: Mission requires radio communication in HF band		
	Report to team leader	
Further steps	(control agency) and proceed as per	
	instructions	

VWS FAILURE

INDICATIONS

Master caution Flashes

RH MFD VWS TsIMS FAIL

RCP VWS in failures line

No 'Voice warning

vws system OK' test warning and emergency voice

warnings when VWS button pressed

PROCEDURES

Mission Continue

Monitor by messages
Failures on MFD, lights and instruments

End of procedure

MISCELLANEOUS

SPATIAL DISORIENTATION

▶ PROCEDURES		
LVLNG button on control stick	Press immediately	
MFD, HUD and UFCP	Check that LVLNG placard comes ON	
Pedals	Set to neutral position and keep them in it	
Altitude and speed	Evaluate	
Recovery from spatial disorientation or ejection	Take decision	
If: Decision taken on recovery from spatial disorientation		
Attitude	Determine by data on MFD PLD page, HUD and ISIS	
Engines mode	Select required	
Mission	Abort after aircraft leveling and recovery from spatial disorientation	
Landing	Proceed to landing airfield	
Note		

Note

During recovery from spatial disorientation, it is recommended to interfere in the aircraft control without waiting for leveling completion.

WARNING

If recovery from spatial disorientation fails before reaching altitude that is higher than safe altitude by 6500 ft (2000 m), eject.

Note

Safe altitude is calculated as per instrument flight rules depending on type of flight performed.