1. UNRELIABLE AIRSPEED

A. Unreliable Airspeed In-flight

Indication:

- Pitch attitude, thrust setting or external noise not consistent with indicated airspeed.
- Large airspeed differences shown between primary flight displays and/or standby instrument.
- Loss of multiple airspeed indication.
- **STALL FAIL**, **EFIS COMP MON**, **EFIS COMP INOP** caution messages and/or red IAS flag.

If above minimum safe altitude:

(1) Autopilot .....Disengage

(2) FDs .....Deselect

(3) Use ISI.

CAUTION

Respect stall warning/stick shaker.

(4) Proceed to step (7).

If below minimum safe altitude:

(1) Autopilot .....Disengage

(2) FDs .....Deselect

(3) Use ISI.

(4) Pitch/N_1 .....10 degrees/TO

(5) Airplane .....Go-around, clean up and climb above minimum safe altitude

Above 15000 feet:

(6) Pitch/N_1 .....5 degrees/CLB

CAUTION

Respect stall warning/stick shaker.

(7) Set and monitor pitch and roll using PFD.

(8) Pitch/N_1 .....Set as per Table A to achieve approximate level flight.

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Table A – Level Flight Cruise – FLAPS 0								
ALT (ft)	Target	Weight kg (lb)					Expected Indicated Airspeed/ Mach	
		23133 (51000)	24948 (55000)	27216 (60000)	29484 (65000)	31751 (70000)	KIAS/M	
40000	Pitch (degree)	0.0	0.5	1.0	1.5	1.5	210 to 245	.70 to .79
	N_1 (%)	81.1	82.6	84.1	85.5	85.5		
35000	Pitch (degree)	0.0	0.0	0.0	0.5	0.5	230 to 270	.67 to .79
	N_1 (%)	79.7	80.6	81.2	81.9	83.0		
30000	Pitch (degree)	–1.0	–0.5	–0.5	0.0	0.0	255 to 300	–
	N_1 (%)	78.7	79.3	79.8	80.3	80.8		
25000	Pitch (degree)	–1.0	–1.0	–0.5	0.0	0.0	255 to 300	–
	N_1 (%)	76.2	76.9	77.4	77.9	78.4		
20000	Pitch (degree)	–1.0	–1.0	–0.5	0.0	0.0	250 to 290	–
	N_1 (%)	70.6	71.3	71.9	72.7	73.4		
15000	Pitch (degree)	–1.0	–1.0	–0.5	0.0	0.0	250 to 290	–
	N_1 (%)	67.2	67.9	68.5	69.2	69.9		
10000	Pitch (degree)	1.0	1.0	1.5	2.0	2.5	200 to 235	–
	N_1 (%)	56.1	57.1	58.0	58.9	59.8		
5000	Pitch (degree)	1.0	1.0	1.5	2.0	2.5	210 to 230	–
	N_1 (%)	52.9	53.9	54.8	55.7	56.5		
If any indicated speed is outside the expected indicated airspeed range, it should be considered UNRELIABLE.								

Table A – Level Flight Cruise – FLAPS 0 (continued)								
ALT (ft)	Target	Weight kg (lb)					Expected Indicated Airspeed/ Mach	
		34019 (75000)	36287 (80000)	38555 (85000)	40823 (90000)	41730 (92000)	KIAS/M	
40000	Pitch (degree)	–	–	–	–	–	210 to 245	.70 to .79
	N_1 (%)	–	–	–	–	–		
35000	Pitch (degree)	1.0	1.5	1.5	1.5	1.5	230 to 270	.67 to .79
	N_1 (%)	84.3	85.3	87.0	87.4	87.7		
30000	Pitch (degree)	0.5	0.5	1.0	1.0	1.5	255 to 300	–
	N_1 (%)	81.4	82.0	82.7	83.4	83.8		
25000	Pitch (degree)	0.5	0.5	1.0	1.0	1.5	255 to 300	–
	N_1 (%)	78.9	79.5	80.0	80.7	81.0		
20000	Pitch (degree)	0.5	0.5	1.0	1.0	1.5	250 to 290	–
	N_1 (%)	74.1	74.8	75.5	76.1	76.3		
15000	Pitch (degree)	0.5	0.5	1.0	1.0	1.5	250 to 290	–
	N_1 (%)	70.6	71.3	72.0	72.6	72.8		
10000	Pitch (degree)	3.0	3.5	4.0	4.0	4.0	200 to 235	–
	N_1 (%)	60.9	62.1	63.5	64.9	65.5		
5000	Pitch (degree)	3.0	3.5	4.0	4.0	4.0	200 to 235	–
	N_1 (%)	57.5	58.6	59.8	61.0	61.4		
If any indicated speed is outside the expected indicated airspeed range, it should be considered UNRELIABLE.								

▼

NOTE

Procedures for **EFIS COMP MON, EFIS COMP INOP, STALL FAIL,** and **RUD LIMITER** caution messages and/or red IAS flag are incorporated in this procedure.

(9) STALL PTCT, PUSHER switch (left or right) .....OFF

(10) Autopilot or FD .....PTCH/ROLL

NOTE

1. Pitch/Thrust settings will give approximate level flight, and may result in slight climb or descent. Adjust pitch to stop climb/descent; if displayed, VSI can be used.
2. Airspeed trend vector may be erroneous.
3. If overspeed warning sounds, select the affected AUDIO WARNING switch to DISABLE.
4. Altitude, Mode C and TCAS may be in error by up to 600 feet.
5. Groundspeed indication may be unreliable.
6. FMS cruise time and fuel predictions may be incorrect.
7. Mach trim may be inoperative or operate erratically. Disengage Mach trim if erratic stabilizer motion is observed.
8. Using the FD/autopilot in PTCH, ALT, HDG and ROLL modes will help reduce workload.
9. Rudder Travel Limiter (RTL) display on EICAS synoptic will display actual RTL limits unless the RTL goal posts are amber. If the RTL goal posts are amber, the synoptic may be incorrect. These RTL limits may be inappropriate for the phase of flight.

CAUTION

1. Do not use any FD/autopilot SPEED mode.
2. Rudder travel limits may be inappropriate for phase of flight. For cruise and descent flight, excessive rudder input may result in unacceptable handling characteristics or exceedence of structural limits. For approach, landing and go-around flight, rudder authority may be limited. Differential thrust and aileron input may be required to assist in maintaining directional control. Select a runway with minimum cross-wind.

▼

(11) When the airplane is stabilized, proceed to **EVALUATION** within this section to regain use of PFD / airspeed if possible.

EVALUATION

(1) AIR DATA source selector .....Select to NORM

(2) Both PFDs and ISI ..... Compare airspeed

(3) Determine which of the following conditions apply:

- If no indicated airspeed is considered reliable, proceed to **CONDITION D**.
- If both PFDs agree and the indicated airspeed is considered reliable, proceed to **CONDITION A**.
- If one PFD and ISI agree and the indicated airspeed is considered reliable, proceed to **CONDITION B**.
- If only one indicated airspeed is considered reliable, proceed to **CONDITION C**.

WARNING

An airspeed should be considered reliable only if it is consistent with pitch, thrust and external noise and is consistent with the expected airspeed from Table A.

CONDITION A – If both PFDs agree and the indicated airspeed is consistent with pitch, thrust and external noise, and the expected airspeed from Table A:

(4) Use airspeed/altitude information per normal operations.

(5) Accomplish remaining CAS messages.

– END –

CONDITION B – If one PFD and ISI agree and the indicated airspeed is consistent with pitch, thrust and external noise, and the expected airspeed from Table A:

(4) Autopilot .....Disengage

(5) FDs .....Deselect

(6) AIR DATA source selector .....Select to reliable side.

(7) FDs .....Engage, if desired.

(8) Autopilot .....Engage, if desired.

▼

(9) Use airspeed/altitude information per normal operations.

(10) Accomplish remaining CAS messages.

– END –

CONDITION C – If only one indicated airspeed is consistent with pitch, thrust and external noise, and the expected airspeed from Table A:

WARNING

Do not rely on only one airspeed unless it is in agreement with the expected airspeed column in Table A.

ISI is identified as reliable airspeed source:

Yes

(4) Use airspeed/altitude information per normal operations.

(5) Accomplish remaining CAS messages.

– END –

No

One PFD is identified as reliable airspeed source:

(4) Autopilot .....Disengage

(5) FDs .....Deselect

(6) AIR DATA source selector .....Select to reliable side.

(7) FDs .....Engage, if desired.

(8) Autopilot .....Engage, if desired.

(9) Use airspeed/altitude information per normal operations.

(10) Accomplish remaining CAS messages.

– END –

CONDITION D – If no indicated airspeed is consistent with pitch, thrust and external noise, and the expected airspeed from Table A:

(4) Airspeed indications ..... Disregard

(5) Pitch/N_1 ..... Maintain

(6) Land at the nearest suitable airport.

NOTE

1. If environmental conditions (heavy rain, icing, ice crystals, volcanic ash, etc) are suspected to have caused unreliable airspeed, exit conditions as soon as possible, including descent, if required.
2. Plan to recover to an airfield with an ILS, under Visual Meteorological Conditions if possible.
3. The following may be unreliable:
   - Enhanced ground proximity warning,
   - Windshear detection,
   - Flap overspeed,
   - **NOSE DOOR OPEN** warning message
   - Automatic function of passenger signs.

CAUTION

If at any time down to and including minimum safe altitude, it is suspected that a reliable airspeed source may be available, restart the **Unreliable Airspeed In-flight** procedure in order to confirm airspeed.

(7) Actual landing distance ..... Increase

Without Thrust Reversers	With Thrust Reversers
1.25 (25%)	1.20 (20%)

(8) When ready for descent, proceed to **RECOVERY TO AN AIRPORT** within this section.

– END –

RECOVERY TO AN AIRPORT

When ready to commence descent:

CAUTION

Rudder travel limits may be inappropriate for phase of flight. For cruise and descent flight, excessive rudder input may result in unacceptable handling characteristics or exceedence of structural limits. For approach, landing and go-around flight, rudder authority may be limited. Differential thrust and aileron input may be required to assist in maintaining directional control. Select a runway with minimum cross-wind.

(1) Pitch ..... Adjust as per Table B, and continue to adjust pitch during descent:

Table B – Descent – FLAPS 0 – IDLE									
Altitude (ft)	0	5000	10000	15000	20000	25000	30000	35000	40000
Pitch (degree)	–2.0	–2.0	–2.0	–2.5	–3.0	–3.0	–3.0	–3.0	–3.0

(2) Thrust levers .....IDLE

NOTE

With anti-ice ON, increase N_1 if required to obtain the minimum N_2 of 75%

- For an N_1 increase of 5%, add 0.5 degree to the pitch from Table B.
- For an N_1 increase of 10%, add 1.0 degree to the pitch from Table B.
- For an N_1 increase of 15%, add 1.5 degree to the pitch from Table B.

CAUTION

Do not extend flaps until directed later in the procedure. The range of airspeeds possible in Table B could result in a significant flap overspeed and flap damage. The aircraft must be leveled off and slowed down before flaps can be extended.

NOTE

Plan to intercept a long final to allow time to re-configure for approach/landing and set pitch/N_1.

Intermediate level off is required during the descent:

▼

(3) Pitch/N_1 .....Set as per Table C, then adjust pitch to stop climb/descent.

Table C – Level Flight – Cruise FLAPS 0

ALT (ft)	Target	Weight kg (lb)					Expected Indicated Airspeed/ Mach	
		23133 (51000)	24948 (55000)	27216 (60000)	29484 (65000)	31751 (70000)	KIAS/M	
35000	Pitch (degree)	0.0	0.0	0.0	0.5	0.5	210 to 245	.70 to .79
	N_1 (%)	79.7	80.6	81.2	81.9	83.0		
30000	Pitch (degree)	–1.0	–0.5	–0.5	0.0	0.0	230 to 270	.67 to .79
	N_1 (%)	78.7	79.3	79.8	80.3	80.8		
25000	Pitch (degree)	–1.0	–1.0	–0.5	0.0	0.0	255 to 300	–
	N_1 (%)	76.2	76.9	77.4	77.9	78.4		
20000	Pitch (degree)	–1.0	–1.0	–0.5	0.0	0.0	255 to 300	–
	N_1 (%)	70.6	71.3	71.9	72.7	73.4		
15000	Pitch (degree)	–1.0	–1.0	–0.5	0.0	0.0	250 to 290	–
	N_1 (%)	67.2	67.9	68.5	69.2	69.9		

If any indicated speed is outside the expected indicated airspeed range, it should be considered UNRELIABLE.

Table C – Level Flight – Cruise FLAPS 0 (continued)								
ALT (ft)	**Target**	**Weight kg (lb)**					**Expected Indicated Airspeed/ Mach**	
		34019 (75000)	**36287 (80000)**	**38555 (85000)**	**40823 (90000)**	**41730 (92000)**	**KIAS/M**	
35000	**Pitch (degree)**	1.0	1.5	1.5	1.5	1.5	210 to 245	.70 to .79
	N_1 (%)	84.3	85.3	87.0	87.4	87.7		
30000	**Pitch (degree)**	0.5	0.5	1.0	1.0	1.5	230 to 270	.67 to .79
	N_1 (%)	81.4	82.0	82.7	83.4	83.8		
25000	**Pitch (degree)**	0.5	0.5	1.0	1.0	1.5	255 to 300	–
	N_1 (%)	78.9	79.5	80.0	80.7	81.0		
20000	**Pitch (degree)**	0.5	0.5	1.0	1.0	1.5	255 to 300	–
	N_1 (%)	74.1	74.8	75.5	76.1	76.3		
15000	**Pitch (degree)**	0.5	0.5	1.0	1.0	1.5	250 to 290	–
	N_1 (%)	70.6	71.3	72.0	72.6	72.8		
If any indicated speed is outside the expected indicated airspeed range, it should be considered UNRELIABLE.								

For continued descent:

(3) Pitch ..... Adjust as per Table D:

Table D – Descent – FLAPS 0 – IDLE									
Altitude (ft)	0	5000	10000	15000	20000	25000	30000	35000	40000
Pitch (degree)	–2.0	–2.0	–2.0	–2.5	–3.0	–3.0	–3.0	–3.0	–3.0

At initial approach altitude:

(4) Pitch/N_1 ..... Set as per Table E, then adjust pitch to stop climb/descent.

▼

Table E – Level Flight – Approach FLAPS 0							
ALT (ft)	Target	Weight kg (lb)					Expected Indicated Airspeed KIAS
		23133 (51000)	24948 (55000)	27216 (60000)	29484 (65000)	31751 (70000)	
15000	Pitch (degree)	1.0	1.0	1.5	2.0	2.5	200 to 230
	N_1 (%)	59.8	60.8	61.7	62.6	63.4	
10000	Pitch (degree)	1.0	1.0	1.5	2.0	2.5	200 to 230
	N_1 (%)	56.1	57.1	58.0	58.9	59.8	
5000	Pitch (degree)	1.0	1.0	1.5	2.0	2.5	200 to 230
	N_1 (%)	52.9	53.9	54.8	55.7	56.5	
0	Pitch (degree)	1.0	1.0	1.5	2.0	2.5	200 to 230
	N_1 (%)	49.8	50.7	51.5	52.3	53.2	
If any indicated speed is outside the expected indicated airspeed range, it should be considered UNRELIABLE.							

Table E – Level Flight – Approach FLAPS 0 (continued)							
ALT (ft)	Target	Weight kg (lb)					Expected Indicated Airspeed KIAS
		34019 (75000)	36287 (80000)	38555 (85000)	40823 (90000)	41730 (92000)	
15000	Pitch (degree)	3.0	3.5	4.0	4.0	4.0	200 to 230
	N_1 (%)	64.5	65.8	67.5	69.2	70.0	
10000	Pitch (degree)	3.0	3.5	4.0	4.0	4.0	200 to 230
	N_1 (%)	60.9	62.1	63.5	64.9	65.5	
5000	Pitch (degree)	3.0	3.5	4.0	4.0	4.0	200 to 230
	N_1 (%)	57.5	58.6	59.8	61.0	61.4	
0	Pitch (degree)	3.0	3.5	4.0	4.0	4.0	200 to 230
	N_1 (%)	54.2	55.2	56.2	57.0	57.4	
If any indicated speed is outside the expected indicated airspeed range, it should be considered UNRELIABLE.							

NOTE

Allow sufficient time for stabilization prior to reconfiguring the airplane due to the pitch change as flaps are extended from 0 to 20.

When stabilized:

(5) FLAPS .....Select to 20.

(6) Pitch/N_1 ..... Set as per Table F, then adjust pitch to stop climb/descent.

▼

Table F – Approach (Level Flight) – FLAPS 20 – Gear UP					
	Weight kg (lb)				
	23133 (51000)	24948 (55000)	27216 (60000)	29484 (65000)	31751 (70000)
Pitch (degree)	–1.5	–1.0	0.0	1.0	1.5
N_1 (%)	61.4	62.4	63.9	65.2	66.3

Table F – Approach (Level Flight) – FLAPS 20 – Gear UP (continued)					
	Weight kg (lb)				
	34019 (75000)	36287 (80000)	38555 (85000)	40823 (90000)	41730 (92000)
Pitch (degree)	2.0	3.0	3.5	4.0	4.5
N_1 (%)	67.5	68.8	70.0	71.1	71.5

NOTE

Heading and ILS/VOR course deviation indicator information on the PFD are reliable and will aid situational awareness.

(7) Final course .....Intercept

Upon intercept of final course (long final):

(8) LDG GEAR lever .....DN

(9) FLAPS .....Select to 30.

(10) Pitch/N_1 .....Set as per Table G, then adjust pitch to stop climb/descent.

Table G – Approach (Level Flight) – FLAPS 30 – Gear DN					
	Weight kg (lb)				
	23133 (51000)	24948 (55000)	27216 (60000)	29484 (65000)	31751 (70000)
Pitch (degree)	–2.0	–1.0	0.0	1.0	1.5
N_1 (%)	68.6	69.3	70.2	71.5	72.8

Table G – Approach (Level Flight) – FLAPS 30 – Gear DN (continued)					
	Weight kg (lb)				
	34019 (75000)	36287 (80000)	38555 (85000)	40823 (90000)	41730 (92000)
Pitch (degree)	2.5	3.0	4.0	4.5	5.0
N_1 (%)	74.3	75.8	77.5	79.1	79.4

CAUTION

Do not descend for final approach with flaps 30. The aircraft must remain level with gear down/flaps 30 or a flap overspeed and flap damage could result. Flaps 45 is selected at the start of the descent on the glideslope/glidepath.

At glideslope capture or descent point:

(11) FLAPS .....Select to 45.

(12) Pitch/N_1 .....Set as per Table H:

Table H – Approach – FLAPS 45 – Gear DN – 3 degree G/S						
ALT (ft)	Target	Weight kg (lb)				
		23133 (51000)	24948 (55000)	27216 (60000)	29484 (65000)	31751 (70000)
15000	Pitch (degree)	2.0	2.0	2.0	2.0	2.0
	N_1 (%)	58.8	60.7	62.9	65.0	66.9
10000	Pitch (degree)	2.0	2.0	2.0	2.0	2.0
	N_1 (%)	55.0	56.8	59.0	61.0	62.9
5000	Pitch (degree)	2.0	2.0	2.0	2.0	2.0
	N_1 (%)	51.3	53.1	55.2	57.2	59.1
0	Pitch (degree)	2.0	2.0	2.0	2.0	2.0
	N_1 (%)	47.9	49.6	51.6	53.5	55.4
This table results in airspeeds equal to V_{REF} ± 10 kts.						

Table H – Approach – FLAPS 45 – Gear DN – 3 degree G/S (continued)						
ALT (ft)	Target	Weight kg (lb)				
		34019 (75000)	36287 (80000)	38555 (85000)	40823 (90000)	41730 (92000)
15000	Pitch (degree)	2.0	2.0	2.0	2.5	2.5
	N_1 (%)	68.9	70.7	72.5	74.1	74.7
10000	Pitch (degree)	2.0	2.0	2.0	2.0	2.0
	N_1 (%)	64.9	66.6	68.3	69.8	70.5
5000	Pitch (degree)	2.0	2.0	2.0	2.0	2.0
	N_1 (%)	60.9	62.7	64.4	65.8	66.4
0	Pitch (degree)	2.0	2.0	2.0	2.0	2.0
	N_1 (%)	57.2	58.9	60.5	62.0	62.6
This table results in airspeeds equal to V_{REF} ± 10 kts.						

▼

(13) Pitch .....Set to maintain glideslope/glidepath.

(14) N_1 .....Maintain as per Table H – Approach – FLAPS 45 – Gear DN – 3 degree G/S.

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