

IBAC Technical Report Summary

Subject: Flight Recorders

Meeting: ICAO FLIRECP GWHL/2, 23-27 April 2007, Beijing

IBAC File:

Reported by: Peter R. Ingleton

Summary: P. Ingleton (IBAC- nominated Panel Member) accompanied by G. Bowles (Adviser- GAMA), participated at, and presented five Working Papers (WPs) during the Second Meeting of the Working Group of the Whole of the ICAO Flight Recorder Panel. The Panel has been tasked by the ICAO Air Navigation Commission to develop proposals for the amendment of the Flight Recorder provisions in Annex 6 Parts I, II & III. (see Attachment A for Background).

The amendment proposals developed are by the most far reaching in almost two decades and will impact aeroplanes currently engaged, and to be engaged in the future, in either or both commercial and non-commercial operations.

The structuring of the proposals, and thus the impact is tiered as to the party(ies) impacted viz

1. Aeroplanes for which a Type Certificate is first issued after [date] i.e. future designs
2. Aeroplanes for which the Individual C of A is first issued after [date] i.e. current production
3. All aeroplanes after [date] i.e. retrofit

The thrust of all five WPs was an attempt to 'roll back' initial amendment proposals for Annex 6 Part I developed during WGH WHL/1, at which time IBAC was not represented, as well as to 'set the scene' for the WG to commence the development of amendment proposals for Annex 6 Part II.

While, to its credit, the WG did review the amendment proposals for Annex 6 Part I agreed at its' first meeting, it would not countenance further changes to differentiate business aviation and ameliorate the very significant and costly impact that its proposals, if adopted, will have on the commercial operations conducted by this sector, notably as regards retrofit and, to a lesser extent forward fit.

The proposals developed for the amendment of Annex 6 Part II, had considerable regard to advice from IBAC and are considered to be not unreasonable and broadly acceptable.

The proposals for Data Link recorders are **not 'new'**, inasmuch as equivalent ICAO standards [Indiv acft C of A from 1 January 2005 and all aircraft (retrofit) by 1 January 2007] for Annex 6 Parts I & II were adopted in March 2001, became Applicable November 2001 and **have not been implemented by airlines/operators, nor have States regulatory authorities adopted these Standards!** In this respect, the new amendment proposals offer very considerable relief.

It is noted that the WG proposals introduce, for the first time, ICAO provisions pertaining to Airborne Image Recorders (AIR) (aka Cockpit Video Recorders).

In all significant cases the Applicability Dates for the proposed amendments were deferred from 1 January 2012 and/or 2014 as previously proposed, to 1 January 2016.

None of the proposals developed by the WG for the amendment of the ICAO provisions have

been the subject of cost impact assessment or cost -benefit analysis. While ICAO has an obligation in this regard, paradoxically this is not within the remit of the Panel!

In view of the extensive nature and complexity of the WG proposals for the amendment of ICAO provisions, they are elaborated in Attachment B to this summary.

Attachment C provides a tabular synopsis of the proposed changes.

Attachment D, compiled by Mr. G. Bowles/GAMA, is a comprehensive compilation of the amendment proposals.

Implication for Business Aviation:

1. Most serious and costly impact (retrofit, forward fit and new designs) will be for business aircraft engaged exclusively or occasionally in commercial operations, or are otherwise operated under an AOC.
2. Second most significant and costly impact will be for business aircraft engaged in non-commercial operations (retrofit by 1 January 2016).

These are 'high level' assessments only....refer Attachment B for specifics.

Decisions Required:

1. **IBAC POC (July 2007) to conduct in-depth review of amendment proposals.**
2. **Cost impact assessment to be developed by IBAC, in conjunction with GAMA.**
3. **Completion date for IBAC action approx 1 Oct 2007**
4. **IBAC MAs to brief ICAO ANC Members prior to ICAO ANC Preliminary review Q4/2007 of the FLIREC proposals.**

This report contains material for the sole information of IBAC Members and no guarantee or undertakings are given, or should be assumed, as to their accuracy. The content is under the copyright of the author and IBAC, and may not be distributed to third parties without specific agreement of the IBAC Director General.

Background

FLIRECP Members are flight recorder experts from Accident Investigation Authorities, with three exceptions ...Members nominated by IBAC, ICCAIA and IFALPA. The only Panel Member at GWHL2 to be accompanied by a representative of a regulatory authority was the US-nominated Panel Member.
(This can be traced to IBAC and NBAA initiatives)

Accident investigation Authorities have no statutory responsibility for safety regulations...they typically submit 'recommendations' from investigations to safety regulatory authorities.

Safety regulatory authorities are invariably obliged to consider cost impact and cost-benefit in their regulatory proposals.

In the FLIRECP, the flight recorder experts can be mindful of costs, their pre-occupation lies with the tools available for the investigation of accidents and serious incidents, improving the rigor, timeliness and containing the cost of accident investigation.

The ICAO Air Navigation Commission (ANC), to whom the FLIRECP reports, has an obligation to consider cost impact and cost-benefit in putting forward for consideration by States proposals for the amendment of ICAO provisions.

It appears that the ICAO Secretariat will have responsibility for preparing and presenting cost impact and cost-benefit justification of the FLIRECP developed amendment proposals. The Secretariat will look to the Panel more or less informally for assistance in this task.

The proposals developed by FLIRECP GWHL2 will likely be presented to the ANC for preliminary review in Q4/2007 and without the convening of a formal meeting of the Panel.

While ICAO Annex 6 provisions pertain to International Operations, they typically require incorporation in State's regulations. In the interest of harmonization, many States adopt ICAO provisions in regulations/rules applicable to domestic operations. This is not however always the case. In some States e.g. the USA there are some significant differences between current FARs for flight recorders and the current ICAO provisions. This means that the point of reference for gauging the real world impact of the FLIRECP proposals is equipage per States rules vice the current ICAO provisions and is further complicated by not knowing the extent to which the FLIRECP GWHL proposals , if adopted by ICAO, will subsequently be incorporated States' regulations.

Suffice it to say that in developing the proposals, the GWHL2 was mindful of merging and emergent FAA and EASA rule making relating to flight recorders.

Summary of Key Amendment Proposals

Aeroplanes engaged in International Commercial Operations (Annex 6 Part I)

1. Dual redundant flight recorder systems (CVR/FDR/DLR/AIR)
2. Dual Combi recorder retained as option for CVR+FDR
3. New TC after 1 January 2016 and >5,700 Kgs ...dual redundant FDR+CVR
4. Addition of AIR
5. CVR – Independent power source
6. 30 min CVR to be replaced by 2 hour CVR by 1 January 2016
7. Mag tape/wire CVRs to be replaced by 1 January 2016...recommended for 1 January 2010.
8. DLK recorder...scope of application significantly abridged of current Standard and major relief on compliance date.

Aeroplanes engaged in International General Aviation Operations (Annex 6 Part II)

1. CVR – Independent power source
2. 30 min CVRs to be replaced by 2 hour CVR by 1 January 2016
3. Mag tape/wire CVRs to be replaced by 1 January 2016... recommended for 1 January 2010.
4. New TC after 1 January 2016 and >5,700 Kgs ...dual redundant FDR+CVR
5. Dual Combi recorder retained as option for CVR+FDR & for <5,700 Kgs multi-engine turbine powered = single combi
6. a recommendation for <5,700 Kgs turbine powered and all recipes >9 seats AIR Class C as an option in lieu of recommended FDR
7. DLK recorder...scope of application significantly abridged of current Standard and major relief on compliance date.

Attachment C

The proposed amendments summarized in this table are reference the current Annex 6 Parts I & II provisions. Current, unchanged provisions are **not** shown in the table.

**This table has been compiled as a guide to assist in assimilating and comparing the proposals. The reader is cautioned that while every care has been taken in compiling the table from the texts of the amendment proposal, this is a complicated presentational task inevitably subject to some distortion as well as possibly inducing ambiguity problems for the reader
....the definitive information is in the draft proposed texts!
Copy available upon request from the author pingleton@ibac.org**

Effective 1 January 2016 ¹								
			Int'l Commercial Ops			Int'l Genav (i.e. non-commercial)		
		MCTOM Kgs	<5,700	5,700 - 27,000	>27,000	<5,700	5,700 - 27,000	>27,000
		Turbine	Yes	Yes	Yes	Yes	Yes	Yes
		Recip	> 9 pax seats by TC			> 9 pax seats by TC		
CVR ²³ 2 hour duration Dual installation Independent power source			Required Required	Required Required Required for Indiv C of A >1/1/2016		Required Not required Required for Indiv C of A >1/1/2016		Required Not required Required for Indiv C of A >1/1/2016
FDR ⁴ Type I								
		Type IA						
		Type II				Recommended Type II ⁵		
		Type IIA						
		Dual Installation	Not required	Required		Not required		Not required

¹ Unless indicated otherwise, this date applies to:
Aeroplanes Type Certificated after,
aeroplanes for which the C of A is first issued after, and
in the case of all aeroplanes, retrofit

² Magnetic tape CVRs to be discontinued by 1 January 2016, recommended that they be discontinued by 1 January 2010.

³ 30 minute CVRs to be replaced by 2 hour CVR by 1 January 2016.

⁴ Magnetic tape FDRs to be discontinued by 1 January 2016. Recommended that Magnetic tape FDRs to be discontinued by 1 January 2010. The use of analogue FDRs using frequency modulation(FM) to eb discontinued by 1 January 2012.

⁵ Date is 1 January 2018, also AIR Class C is an alternative

Combi Recorders (FDR/CVR)	One combi as an option ⁶	Two combis as an option	One combi as an option ⁷	Two combis as an option
DLKR	Aeroplanes equipped with CVR + utilizing ATN compliant DLK <u>or</u> when retrofit/ upgraded to ATN compliant		Aeroplanes equipped with CVR + utilizing ATN compliant DLK <u>or</u> when retrofit/ upgraded to ATN compliant	
AIR ⁸ Class A		Recommended for: Indiv Cof A >1/1/ 2016 and, all aeroplanes > 1/1/18		Recommended for; Indiv Cof A >1/1/16 and, all aeroplanes > 1/1/18
Class C				Recommended, <u>or</u> acceptable as alternative to FDR Type II

⁶ Applies to multi-engine turbine-powered

⁷ Applies to multi-engine turbine-powered

⁸ Airborne Image Recorder

Class A = required to capture general cockpit area including data supplemental to conventional flight recorders

Class C = required to capture instruments and control panel to be considered as means for recording flight data where is not practical or is prohibitively expensive to record on FDR, or where an FDR is not required.

FDR (2016 Requirements)

	Airplanes (27000kg+)	Turbine (5700-27000kg)	Turbine (Less than 5700kg)	Piston (Over 5700kg)	Piston (Less than 5700kg)
New TC:	Redundant Type 1A FDR^{4 5}	Redundant Type 1A FDR^{4 5}	Type II FDR^{4 5}	Type 1A FDR ^{4 5}	Type II FDR or Class C AIR ^{3 4 5}
New Production:	Type 1 FDR	Type 1A FDR	Type II FDR or Class C AIR	Type 1A FDR	Type II FDR or Class C AIR ³
Retroactive:	Type 1A FDR ¹	Type 1A FDR ¹	Type II FDR or Class C AIR²	Type 1A FDR ¹	Type II FDR or Class C AIR ^{2 3}

The use of analogue FDR using frequency modulation (FM) shall be discontinued by 1 January 2010

Magnetic tape recording prohibited after 1 January 2016

Discontinue use of magnetic tape recording by 1 January 2010³

Notes:

1 - A/W after 1 January 2005

2 - Effective 1 January 2018

3 - Recommended practice

4 - Must sample Normal, Lateral & Longitudinal Accelerations every 0.0625 seconds

5 - Must sample primary control positions every 0.125 seconds

Type I FDRs must retain 25hrs of data, Type II must retain 30 minutes of data

Class C AIR = Airborne Image Recorder which captures flight path and speed parameters displayed to pilot

See ED-112 MOPS for crashworthiness requirements

CVR (2016 Requirements)

	Airplanes (27000kg+)	Turbine (5700-27000kg)	Turbine (Less than 5700kg)	Piston (Over 5700kg)	Piston (Less than 5700kg)
New TC:	Redundant Class I CVR⁴	Redundant Class I CVR⁴	Class I CVR⁴	Class I CVR⁴	Class I CVR ^{3 5}
New Production:	Class I CVR⁴	Class I CVR⁴	Class I CVR⁴	Class I CVR¹	Class I CVR ^{3 5}
Retroactive:	Class I CVR⁵	Class I CVR⁵	Class I CVR⁵	Class I CVR^{2 5}	Class I CVR ^{3 5}

All airplanes over 5700kg shall have a Class 3 CVR installed

Magnetic tape recording prohibited after 1 January 2016

Discontinue use of magnetic tape recording by 1 January 2010³

Notes:

1 - A/W after 1 January 2003

2 - More than 9 passenger seats

3 - Recommended practice

4 - Must have dedicated 10 minute backup power supply (RIPS)

5 - RIPS recommended

Class I CVR = 2 hours of recording

Class III CVR = 30 minutes of recording

Two combination recorders may be used in place of redundant CVR/FDR recorders

AIR (2016 Requirements)

	Airplanes (27000kg+)	Turbine (5700-27000kg)	Turbine (Less than 5700kg)	Piston (Over 5700kg)	Piston (Less than 5700kg)
New TC:	Class A AIR ³	Class A AIR ³	None	Class A AIR ³	None
New Production:	Class A AIR ³	Class A AIR ³	None	Class A AIR ³	None
Retroactive:	Class A AIR ^{3 1}	Class A AIR ^{3 1}	None	Class A AIR ^{3 1}	None

Notes:

1 - A/W after 1 January 2018

3 - Recommended practice

Class A AIR = Airborne Image Recording of the general cockpit area

Recording duration shall match that of the required CVR

Data-Link Recording (2016 Requirements)

	Airplanes (27000kg+)	Turbine (5700-27000kg)	Turbine (Less than 5700kg)	Piston (Over 5700kg)	Piston (Less than 5700kg)
New TC:	Data-Link Messages	Data-Link Messages	Data-Link Messages	Data-Link Messages	
New Production:	ATN Compliant Messages	ATN Compliant Messages	ATN Compliant Messages	ATN Compliant Messages	
Retroactive:	ATN Compliant Messages ¹	ATN Compliant Messages ¹	ATN Compliant Messages ¹	ATN Compliant Messages ¹	

Notes:

1 - Data-link system modified after 1 January 2016

Class B AIR is an acceptable method to collect information

Class B AIR = Airborne Image Recording of the data-link system

Recording duration shall match that of the required CVR

Where it is not feasible to record an entire message or dataset, data for ground correlation is acceptable

Aeroplanes engaged General Aviation Operations

FDR (2016 Requirements)

	Airplanes (27000kg+)	Turbine (5700-27000kg)	Turbine (Less than 5700kg)	Piston (Over 5700kg)	Piston (Less than 5700kg)
New TC:	Redundant Type 1A FDR ¹	Type IA FDR ²	Type II FDR or Class C AIR ³	Type IA FDR ²	Type II FDR or Class C AIR ^{4 3}
New Production:	Type 1 FDR ¹	Type IA FDR ²	Type II FDR or Class C AIR ³	Type IA FDR ²	Type II FDR or Class C AIR ^{4 3}
Retroactive:	Type 1 FDR ¹	Type IA FDR ²	Type II FDR or Class C AIR ^{4 3}	Type IA FDR ²	Type II FDR or Class C AIR ^{4 3}

The use of analogue FDR using frequency modulation (FM) shall be discontinued by 1 January 2010

Magnetic tape recording prohibited after 1 January 2016

Discontinue use of magnetic tape recording by 1 January 2010³

Notes:

1 - A/W after 1 January 1989

2 - A/W after 1 January 2005

3 - Recommended practice

4 - A/W after 1 January 2018

5 - More than 9 passenger seats

Type I FDRs must retain 25hrs of data, Type II must retain 30 minutes of data

Class C AIR = Airborne Image Recorder which captures flight path and speed parameters displayed to pilot

See ED-112 MOPS for crashworthiness requirements

Combination recorder can be used in place of CVR/FDR

CVR (2016 Requirements)

	Airplanes (27000kg+)	Turbine (5700-27000kg)	Turbine (Less than 5700kg)	Piston (Over 5700kg)	Piston (Less than 5700kg)
New TC:	Class I CVR ¹	Class I CVR ¹	None	Class I CVR ¹	None
New Production:	Class I CVR ¹	Class I CVR ¹	None	Class I CVR ¹	None
Retroactive:	Class I CVR ¹	Class I CVR ¹	None	Class I CVR ¹	None

All airplanes over 5700kg shall have a Class 3 CVR installed

Magnetic tape recording prohibited after 1 January 2016

Discontinue use of magnetic tape recording by 1 January 2010³

Notes:

1 - A/W after 1 January 2003

2 - More than 9 passenger seats

3 - Recommended practice

4 - Must have dedicated 10 minute backup power supply (RIPS)

5 - RIPS recommended

Class I CVR = 2 hours of recording

Class III CVR = 30 minutes of recording

Data-Link Recording (2016 Requirements)

	Airplanes (27000kg+)	Turbine (5700-27000kg)	Turbine (Less than 5700kg)	Piston (Over 5700kg)	Piston (Less than 5700kg)
New TC:	Data-Link Messages	Data-Link Messages	Data-Link Messages	Data-Link Messages	
New Production:	ATN Compliant Messages	ATN Compliant Messages	ATN Compliant Messages	ATN Compliant Messages	
Retroactive:	ATN Compliant Messages ¹	ATN Compliant Messages ¹	ATN Compliant Messages ¹	ATN Compliant Messages ¹	

Notes:

1 - Data-link system modified after 1 January 2016

Class B AIR is an acceptable method to collect information

Class B AIR = Airborne Image Recording of the data-link system

Recording duration shall match that of the required CVR

Where it is not feasible to record an entire message or dataset, data for ground correlation is acceptable