

出國報告(出國類別：受訓)

參加波音公司在新加坡辦理之 Boeing CBTA 訓練工作研討會

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出國期間：111 年 10 月 28 日至 11 月 8 日

報告日期：111 年 12 月 26 日

摘要

波音公司 CBTA 與現行華航 Recurrent Training 時採用之 EBT 概念大致相同，同樣都是利用職能表現(Competency)來進行訓練與考核之指標，而不是傳統的任務科目為導向。華航強調教師使用 Facilitation 方式引導學員，藉由自我探究缺失進而找出需改進項目之肇因，以期未來之精進。

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壹、 目的

職能訓練(CBTA -Competency Based Training and Assessment) 以美國聯邦航空總署(FAA)Advanced Qualification Program 以及國際民航組織(ICAO) Alternative Training and Qualification Program 為依據，通過定義飛行員和教師的職能(Competency)框架，進而達成飛行員的訓練和評估。

國籍航空公司之華航自 2018 年開始實施 EBT 年度複訓，成效良好。

本次偕同華航教師機師赴新加坡接受波音公司邀請主管機關及華航參加 CBTA Workshop，藉由波音公司公司設計之課程了解 CBTA 之意義及其應用。

Course Content

Global Services



貳、 行程摘要

波音公司邀請參加 Head of Training (HoT) CBTA (Competency Based Training and Assessment) Workshop

參加對象：主管機關以及航空公司教師機師

訓練地點：波音公司新加坡訓練中心

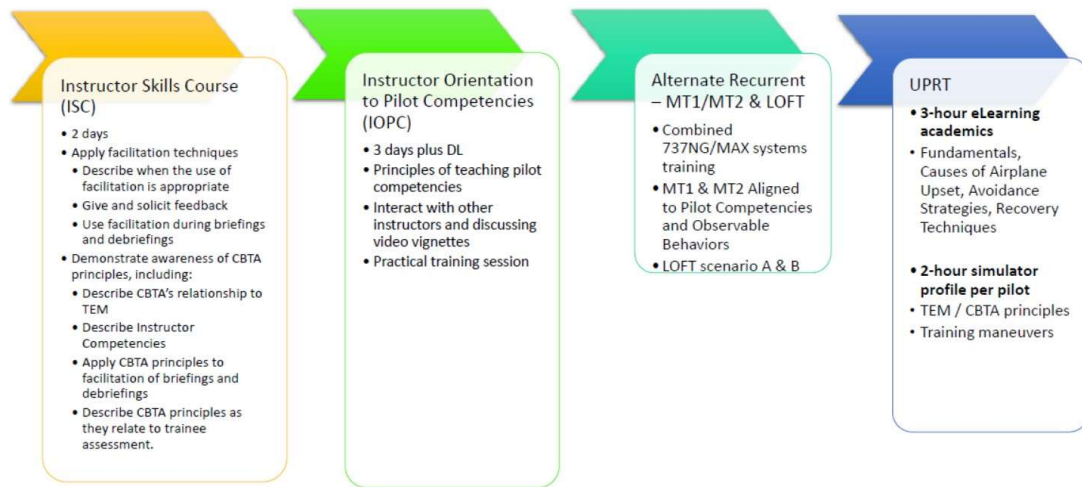
課程長度：10 天

授課時間：111 年 10 月 29 日至 11 月 8 日

課程內容：

課程內容	
2 日	ISC (地面課程)
3 日	IOPC & CGA (含地面課程及 4 小時 SIM)
1 日	休息日
3 日	Recurrent SIM (MT1, MT2, LOFT)
1 日	UPRT SIM

Fundamentals of CBTA Course



	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Instructors Needed	2	2	2	2	2	0	2	2	2	2
Sim Time	0	0	0	0	12 hrs	0	16 hrs	16 hrs	16 hrs	8 hrs
Devices Needed	0	0	0	0	1 or 2	0	1 or 2	1 or 2	1 or 2	1 or 2
Crew 1 (Instructor + 3 Students)	ISC (Classroom)	ISC (Classroom)	IOPC (Classroom)	IOPC (Classroom)	IOPC/CGA (Classroom & Sim)	Off	Recurrent MT1	Recurrent LOFT	Recurrent MT2	UPRT
Crew 2 (Instructor + 3 Students)						Off	Recurrent MT1	Recurrent LOFT	Recurrent MT2	UPRT

參、過程

10月29日 工作日誌

今日課程為第一天的教師駕駛員技巧課程(ISC Instructor Skill Course)地面課程，以及各教師及波音公司園區設備介紹。本梯次由華航與韓航(Korean Air)共同參加 Workshop。



教官技巧課程(ISC)大綱：

1. Procedure vs Technique
2. Principles of learning
3. Facilitation vs Instruction
4. Incorporating TEM into briefings

內容：

1. Procedure vs Technique
 - 名詞討論區分
2. Principles of learning

- Learning preferences
- Proactive vs Reactive learners
- Conditions needed for learning
- Qualities of effective and ineffective instructors

3. Facilitation vs Instruction

- O. R. C. A. 概念(Observe/Record/Comment/Assess)

本概念與華航現行 EBT 之 O. R. C. E. 概念類似。

藉由引導學員達到讓學員多說，教官多聽(Trainee talk most, Instructor listen)。

*TEM:Threat & Error Mitigation。

4. 將威脅管理置入提示內(Incorporating TEM into briefings)

- 介紹波音公司 TEM card，威脅(Threat)歸納為 11 類共 53 項，減輕錯誤(Error/Mitigation)分為 4 類共 9 大職能(同目前華航 EBT 之職能項目)。

BOEING TEM CARD

THREATS / MITIGATION

AIRPORT/RUNWAY	ATC	AIRCRAFT	ADVERSE WEATHER
Contamination	Clearance/Re-Routes	Systems	Visibility
Construction	Arr/Dep Amendments	Communication	Deicing
Signage	Runway Changes	Equipment	Winds
Hotspots	ATC Errors	MELs	Precipitation
NOTAMS	Language Difficulty	Automation	
	Nonstandard Phraseology	Performance	
	Radio Congestion		
	Similar Sounding Call Signs		

ENVIRONMENT

AIRLINE/OPS/DISPATCH	OPERATIONAL	GROUND/RAMP/MX
Terrain	Schedule Pressure	Time Pressure
Night	Delays	Missed Approach
Traffic	Paperwork	Flight Diversion
	Crew Scheduling	Unfamiliar Airport
	Manuals/Charts	Non-normal Conditions
	FMC Database	

PHYSIOLOGY

CABIN	CREW
Fatigue	Passengers
Stress	Interruptions
Hydration	Events/Distractions
Nutrition	Flight Attendants
	Experience
	Recency
	First Crew Flight
	Mission Familiarity

ERRORS / MITIGATION

SKILL-BASED	DECISION-BASED	PERCEPTUAL	CRM
Application of Procedures	Application of Knowledge	Workload Management	Leadership & Teamwork
Flight Path - Automation	Problem Solving & Decision Making		Communication
Flight Path - Manual			Situation Awareness

TAKEOFF BRIEFING

THREATS (PM, PF) / MITIGATION

BASIC PLAN

- Taxi Path, Runway, Intersection
- Route: Clearance, Flight Plan, FMC RTE crosscheck
- Return to the Airport: Emergency, Takeoff Alternate
- Takeoff Performance: Data Valid, Appropriate for Conditions, Configuration

CONSIDERATIONS

- Specific PM Duties, Noise Abatement, Takeoff Engine Failure Plan
- Review as Needed

APPROACH BRIEFING

THREATS (PM, PF) / MITIGATION

BASIC PLAN

- Weather, FMC Programming, NOTAMS
- Flaps, VREF and Bugs, STAR and Routing
- Automation: Approach Mode, Minimums, MCP ALT Handling, Missed Approach, Alternate, Fuel
- Landing Runway, Landing Distance Assessment, Touchdown Point, Exit, Taxi
- Autobrakes

CONSIDERATIONS

- Specific PM duties, Arrival Missed Approach Plan

DEBRIEFING

- Safety: Were margins of safety compromised anytime?
- Standards: Were standards, policies, tasks compromised?
- Unresolved Questions: What events prompted questions in pilots' minds that were never adequately answered?
- Opportunities for Improvement: In which areas could pilots have performed at a higher level?

Figure 16: Boeing TEM Card

- 波音公司實行 CBTA 相當注重 TEM 項目，和目前華航相同，均將 TEM 提示納入模擬機與線上飛行提示，唯波音公司之 TEM 項目更廣泛，因此波音公司設計的提示時間為兩小時，更能深入提示 TEM，並強調 TEM 提示應放在提示最後面做以增加印象。
- 和華航現行相比，CBTA 提示更加著重威脅及錯誤面之提示，藉由重新檢視飛行上的威脅，以及是否因此產生錯誤，檢視該如何使用 9 大職能經由 Predictive/Reactive Monitoring 來消除威脅。

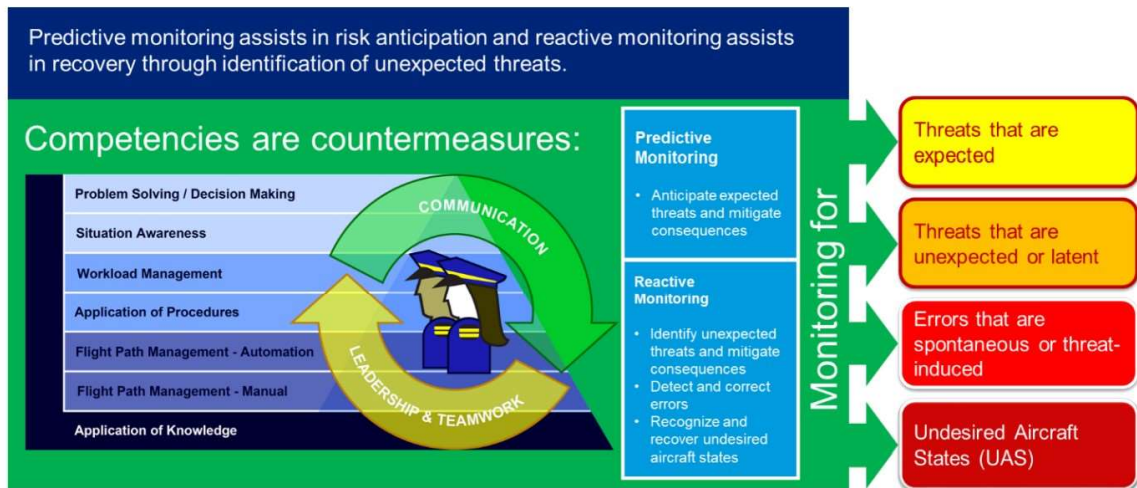


Figure 14: Competencies as Countermeasures

- 使用 FLY / FOCUS / ACT 概念來處置 Startle/Surprise。

對比 Aviate / Navigate / Communicate，更加強化描述如何航行(Aviate)的部分。

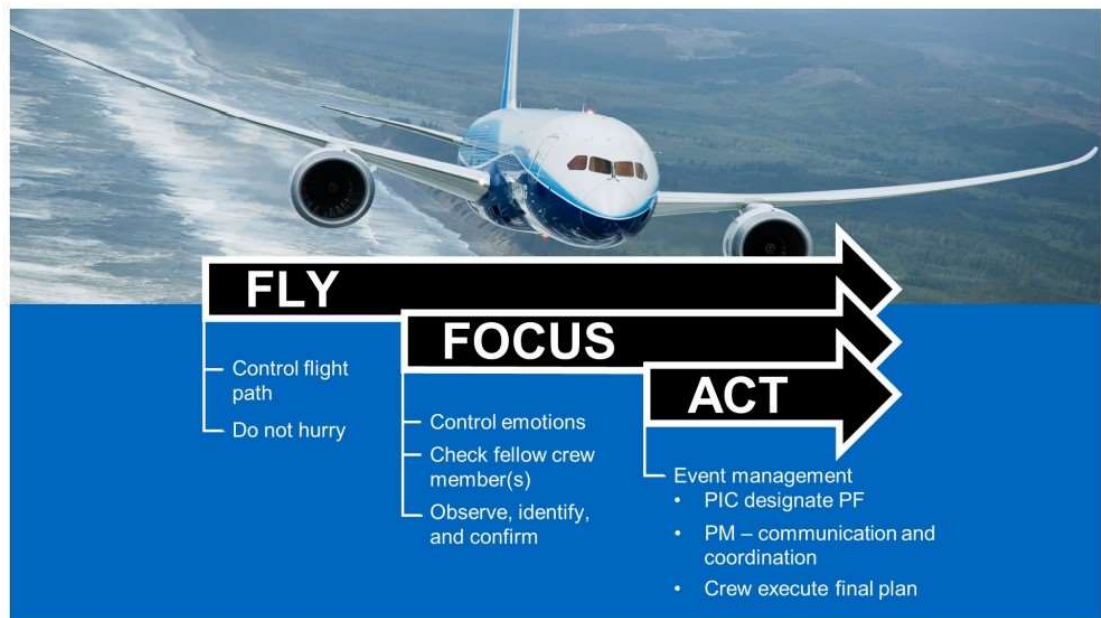


Figure 17: Managing Startle Events: FFA

- TEM 架構

整套 TEM 除了 TEM 提示卡(TEM Briefing card)外，還有執行提示時，用 9 大職能 Predictive/Reactive Monitoring 來消除威脅以及如何使用 FLY-FOCUS-ACT 來處置錯誤，藉以達成飛航安全。

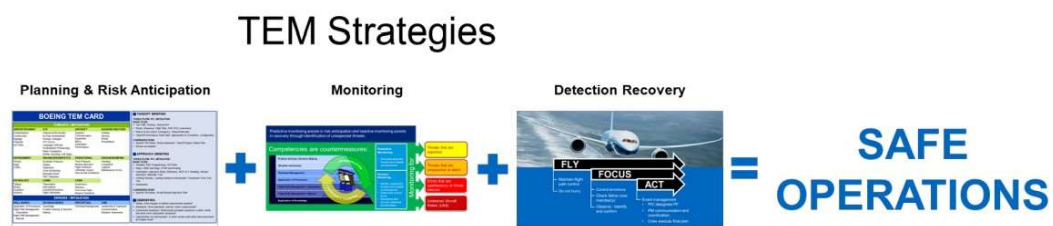


Figure 15: TEM Framework

10 月 30 日 工作日誌

今日課程為第二天的 ISC (Instructor Skill Course)地面課程。

ISC 課程大綱：

1. CBTA overview
2. Debriefing
3. CBTA Instructor Competencies

內容：

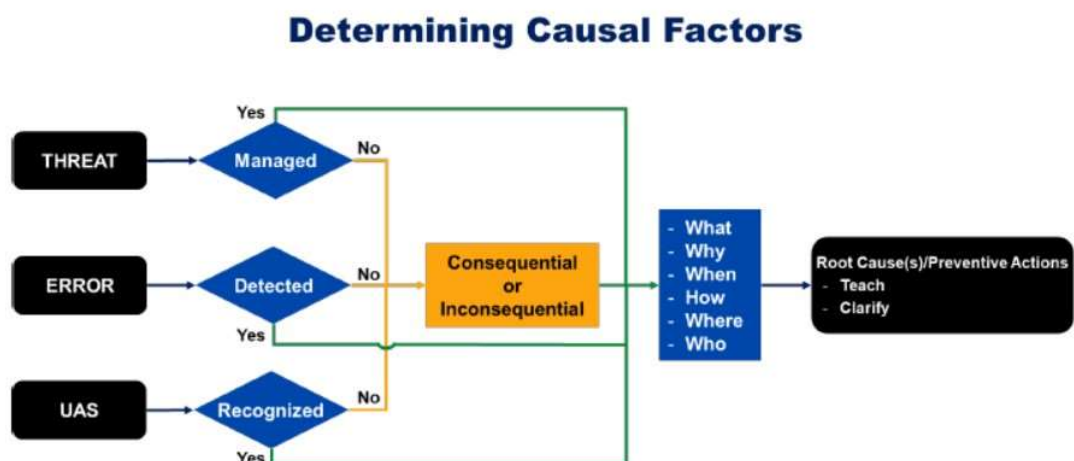
1. CBTA overview
 - What is a resilient pilot?
 - What is competency?

- CBTA and TEM relationship

2. 訓後提示(Debriefing)

- 肇因分析(Root cause analysis)

結合 TEM 逐步探討是否有執行威脅管理？偵測錯誤？並運用 5 個 W 幫助學員自行探究出肇因(root cause)，以期未來能更精進。



- Delivering feedback
- Basic communication style
 - Aggressive
 - Passive-aggressive
 - Passive
 - Assertive

3. CBTA 課程的教師職能 (CBTA Instructor Competencies)

除了飛行員該具備的 9 大職能外，波音公司也明確定義出教師該有的 5 大職能，以及每項職能的 OB (Observed Behavior-請參閱頁附件)，以及其評分 Rubric 方法，可做為檢視教師是否具備這些職能的客觀標準，更是教師訓練時的依據。華航目前於 IM General Part CH.4 已有相當清楚的指引，未來可參考此五項職能及內容做為教師訓練時之輔助教材。

10 月 31 日 工作日誌

今日課程為教師駕駛員職能導向課程(IOPC -Instructor Orientation to Pilot Competencies) 的第一天地面課程。

IOPC 課程：

1. Competence (K-S-A-V): 一位專業的全職能的教師駕駛員須包含學識、技巧、態度及價值(Competencies are the composite of a professional pilot, they are a combination of Knowledge, Skill, Attitude, and Value required to perform flight operation.) 其中價值(Value)是波音公司的新觀念。

2. 9 大職能可區分為三類：程序(Procedural)，(技術)Technical，及人為因素(Human Factors)，從最基本的 Procedure 開始發展，進而 Technical，最後進展 Human Factors.

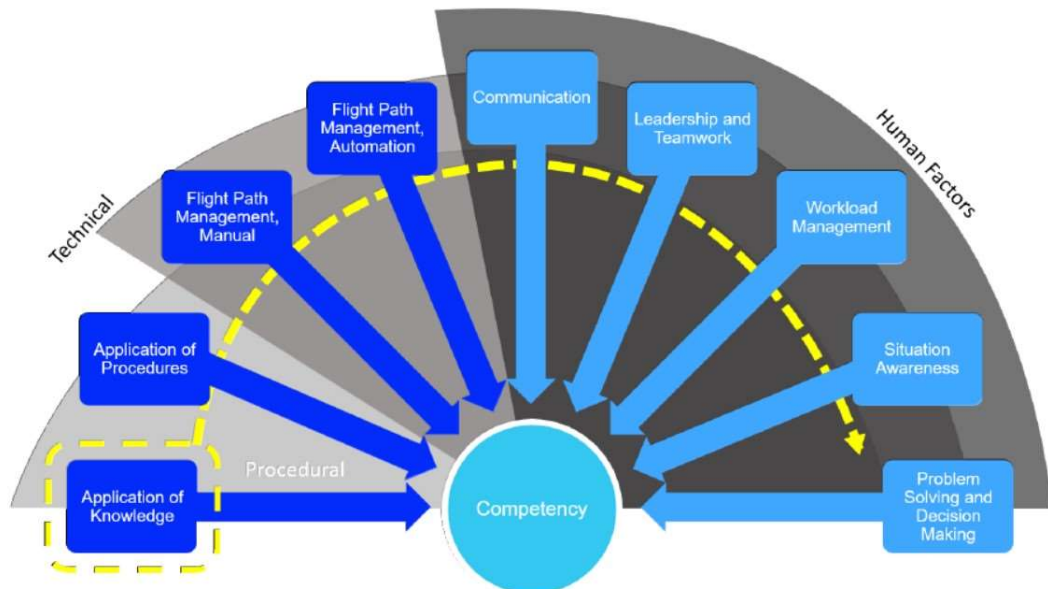


Figure 11: Pilot Competencies Require Technical/Procedural and Human Factors Skills

3. CBTA 評量：

教師利用 OB (Observable Behaviors-請參閱附件) 來協助學員發展職能的過程為 Observe performance，Assess Performance，重點在飛行訓練後做提示時加強自我分析，引導學員自行找出肇因進而持續進步，此過程為 RCA Model (Root Cause Analysis)。

How Instructors Use Observable Behaviors to Develop Pilot Competencies



Figure 20: Instructor RCA Model of Trainee TEM Performance

目前華航 EBT 評分採用 Venn Methodology，經由 How Well？How Often？How Many？Outcome？來綜合評分。而 CBTA 採用概念上非常類似的 Rubric Scale，經由 How Many？How Often？Outcome？How Well？同樣在職能部分都是綜合考量而評分，而不會因為單一科目好壞來評分。

Table 17: Pilot Core Competencies – Rubric Using 5-Point Scale

Four Elements of Performance Quality				Step 5 Assessment
Step 1 Does the trainee demonstrate applicable OBs? If so, all of them, or none of them, or somewhere in-between?	Step 2 How often?	Step 3 Potential Impact to Safety or Outcome	Step 4 How well?	
All	Always	Heightened safety and effectiveness	Exemplary manner	5 - Excellent
Most, almost all	Almost always	Well managed, safe	Proficiently, effectively	4 – Above Standard
Many	Usually, regularly	Safe	Adequately	3 - Standard
Some	Occasionally	Overall, not unsafe	Minimally acceptable	2 - Requires Improvement
Few, hardly any	Rarely	Unsafe	Ineffectively	1 - Unacceptable

此外 CBTA 因為是 Type Rating 導向，除了評分 9 大職能外，仍會對個別科目進行評分，因此評分上會同時出現科目分數和職能分數。CBTA 機型檢定考驗 (Type Rating) 每一課模擬機都會針對數項職能作為是否能繼續下一課訓練的要求。

5.3 Five Point Grading Scale

Both tasks and competencies are graded on a 5-point scale as noted in the example in Figure 27.

Task-based Assessment Paradigm	Tasks	Assessment
	Taxiing	5
	Takeoff	4
	Rejected Takeoff	4
	Go Around	3
Competency-based Assessment Paradigm	Focus Competencies	Assessment
	Leadership and Teamwork	5
	Flight Path Management, Automation	4
	Application of Procedures	3
	Communication	3

Figure 27: Task and Competency Grading

CBTA 和華航現行 EBT 評分標準略有不同，同樣分為 5 分制，最大差別在 4 分、5 分之定義。4 分為 Above Standard (Well managed, safe operation)，5 分為 Excellent (Heightened safety, effectiveness, efficiency)。據波音公司統計，大部分評分結果會落在 3 或 4 分。

此外針對 Task 任務的評分，波音公司的 CBTA 會以最後的職能表現 (Last Attempt) 評分，和目前華航以第一次的職能表現 First

Attempt 不同。

Table 22: Exit Standard Instructor Actions

Grade	Definition	Outcome	Instructor Action
5	Excellent	Heightened safety, effectiveness, efficiency	None
4	Above Standard	Well managed, safe operation	None, instructor discretion
3	Standard	Safe operation	Debriefing
2	Requires Improvement	Overall, not unsafe	Enhancement training
1	Unacceptable	Unsafe	Enhancement training, and re-check

針對教師職能(請參閱頁 13)波音公司亦制定了類似的評分方式。

Table 40: Instructor Competencies – Rubric Using Five Point Scale

Four Elements of Performance Quality				Assessment
Does the instructor demonstrate applicable OBs? If so, all of them or none of them, or somewhere in-between?	How often?	Potential Impact to Safety or Outcome?	How well?	
All	Always	Heightened efficiency and training effectiveness	Exemplary manner	5 Excellent
Most, almost all	Almost always	Well-managed, effective training	Proficiently, effectively	4 Above Standard
Many	Usually, regularly	Effective training	Adequately	3 Standard
Some	Occasionally	Requires improvement	Minimally acceptable	2 Requires Improvement
Few, hardly any	Rarely	Unacceptable training	Ineffectively	1 Unacceptable

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Boeing Proprietary - Not Subject to EAR or ITAR

11 月 01 日 工作日誌

今日課程為第二天的 IOPC (Instructor Orientation to Pilot Competencies)地面課程，除接續前一日課程外，再經由幾部 RTO、Unreliable airspeed、ENG failure after takeoff 短片，經由練習讓教師能有一致的評分標準(Inter rater reliability-IRR)，以及訓後提示(debriefing)技巧。

模擬組員在當下立即經過提事後，第 2 次撥放的短片，再次進行 IRR 評分。波音公司說明應以最後的職能表現(Last attempt)來評分。



11 月 02 日 工作日誌

今日課程為第三天的 IOPC (Instructor Orientation to Pilot Competencies)，進行的方式為輪流擔任教師的任務，進行模擬機執教以及用 B737MAX 機型擔任操控駕駛員(PF)。

波音公司設計了八個科目，分別為：

1. RTO
2. V1 CUT
3. GUSTY CROSSWIND TAKEOFF
4. WINDSHEAR
5. WHEEL WELL FIRE
6. APPROACH TO STALL
7. ONE ENG INOP GO AROUND
8. ONE ENG INOP VISUAL APPROACH

依前四天所學之 CBTA 概念進行訓前提示(Briefing)及訓後提示(Debriefing)，輪流擔任教師帶飛及操控駕駛員。波音公司制定了完整的投影片以及訓練課目(Training syllabus)，課程著重在利用 CBTA 概念以 TEM 來執行提示，提示時找出肇因並且審視 TEM 是否成功？是否仍產生錯誤？未來該如何避免？最後檢視學員是否達到每堂課程設計之三項職能，以判斷是否能繼續訓練亦或需要加課練習。

BOEING TEM CARD			
THREATS / MITIGATION			
AIRPORT/RUNWAY	ATC	AIRCRAFT	ADVERSE WEATHER
Contamination Construction Signage Hotspots NOTAMS	Clearance/Re-Routes Arr/Dep Amendments Runway Changes ATC Errors Language Difficulty Nonstandard Phraseology Radio Congestion Similar Sounding Call Signs	Systems Communication Equipment MELs Automation Performance	Visibility Deicing Winds Precipitation
ENVIRONMENT	AIRLINE/OPS/DISPATCH	OPERATIONAL	GROUND/RAMP/PMX
Terrain Night Traffic	Schedule Pressure Delays Paperwork Crew Scheduling Manuals/Charts FMC Database	Time Pressure Missed Approach Flight Diversion Unfamiliar Airport Non-normal Conditions	Handling Congestion Logbook Maintenance Errors
PHYSIOLOGY	CABIN	CREW	
Fatigue Stress Hydration Nutrition	Passengers Interruptions Events/Distractions Flight Attendants	Experience Recency First Crew Flight Mission Familiarity	
ERRORS / MITIGATION			
SKILL-BASED	DECISION-BASED	PERCEPTUAL	CRM
Application of Procedures Flight Path - Automation Flight Path - Manual	Application of Knowledge Problem Solving & Decision Making	Workload Management	Leadership & Teamwork Communication Situation Awareness

TAKEOFF BRIEFING
THREATS (PM, PF) / MITIGATION
BASIC PLAN

- Taxi Path, Runway, Intersection
- Route: Clearance, Flight Plan, FMC RTE crosscheck
- Return to the Airport: Emergency, Takeoff Alternate
- Takeoff Performance: Data Valid, Appropriate for Conditions, Configuration

CONSIDERATIONS

- Specific PM Duties, Noise Abatement, Takeoff Engine Failure Plan
- Review as Needed

APPROACH BRIEFING
THREATS (PM, PF) / MITIGATION
BASIC PLAN

- Weather, FMC Programming, NOTAMS
- Flaps, VREF and Bugs, STAR and Routing
- Automation: Approach Mode, Minimums, MCP ALT Handling, Missed Approach, Alternate, Fuel
- Landing Runway, Landing Distance Assessment, Touchdown Point, Exit, Taxi
- Autobrakes

CONSIDERATIONS

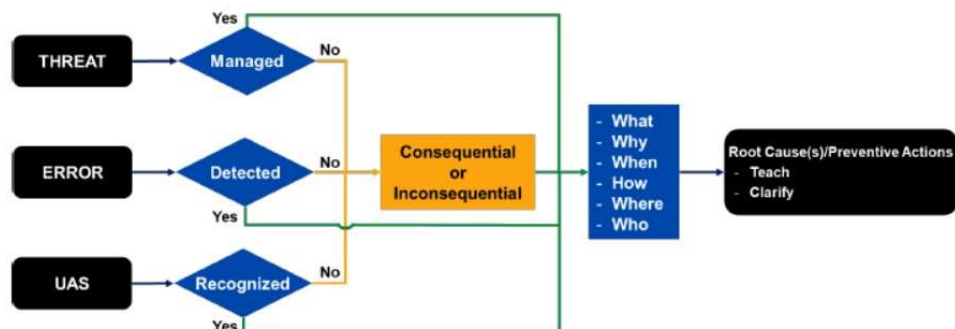
- Specific PM duties, Arrival Missed Approach Plan

DEBRIEFING

- Safety: Were margins of safety compromised anytime?
- Standards: Were standards, policies, tasks compromised?
- Unresolved Questions: What events prompted questions in pilots' minds that were never adequately answered?
- Opportunities for Improvement: In which areas could pilots have performed at a higher level?

Figure 16: Boeing TEM Card

Determining Causal Factors



11月04日 工作日誌

今日課程為 B737MAX 型機進行 CBTA 年度複訓 (Recurrent

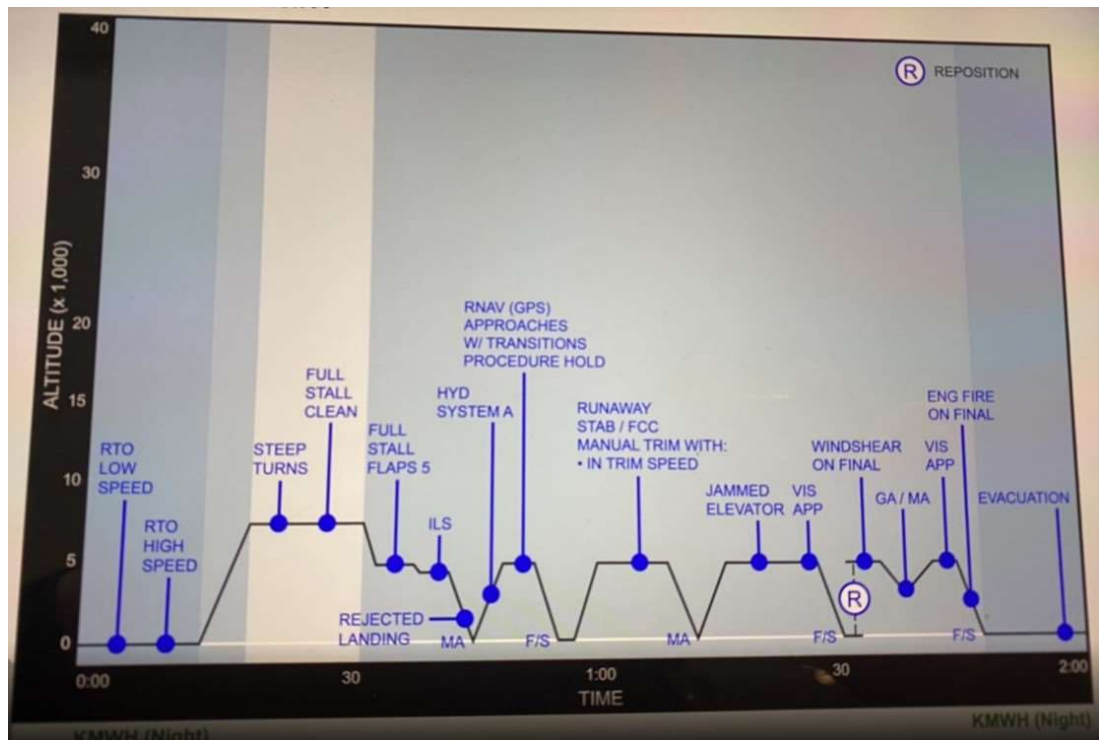
Training)，進行的方式為兩位學員輪流擔任教師及操控駕駛員，訓前提示(Briefing)時間為 2 小時、模擬機 4 小時、訓後提示(Debriefing) 1 小時。

波音公司設計科目如下，分別為：

1. LOW SPEED RTO
2. HIGH SPEED RTO
3. STEEP TURN
4. FULL STALL CLEAN
5. FULL STALL FLAP5
6. ILS APPROACH / REJECTED LANDING
7. HYD SYSTEM FAIL
8. RNAV(GPS) APPROACH
9. RUNAWAY STAB
10. JAMMED ELEVATOR
11. WINDSHEAR
12. VISUAL APPROACH
13. ENG FIRE
14. EVACUATION



波音公司制定了完整的訓練課綱，課綱著重在利用 CBTA 概念，以 TEM 提示方式，並找出肇因及審視 TEM 是否成功？是否仍產生 ERROR？未來該如何避免？最後檢視學員是否達到本課程設計之職能，以判斷是否能繼續訓練亦或需要加課練習。



11 月 05 日 工作日誌

今日課程為 B737 MAX CBTA LOFT(Line-Oriented Flight training)，以兩位學員輪流擔任教師及操控駕駛員的方式進行，訓

前提示(Briefing)時間為 2 小時、模擬機 4 小時及訓後提示

(Debriefing) 1 小時。

LOFT 課程以拉斯維加斯(KLAS)及舊金山(KSFO)場站天氣，及 MEL/DD

科目：A/T ARM Switch inop，如同華航現有的 EBT LOFT 課程，學

員不會知道要出什麼科目，教師依據教師駕駛員大綱(IP GUIDE)給

予系統故障(System Malfunction)課目及航管員指示，期許能利用

CBTA 概念，以 TEM 提示方式找出威脅並且避免錯誤。

提示時利用 RCA (Root Cause Analysis)概念 引導學員探討是否發

現了那些威脅？產生了哪些錯誤？並引導找出 root cause 及審視

TEM Briefing 是否成功？未來該如何避免？最後檢視學員是否達到

本課程設計要求之 9 項職能(APK /KNO / FPM / FPA / COM / LTW /

WLM / SAW / PSD)，以判斷是否能繼續訓練亦或需要加課練習。

APK-Application of Knowledge

KNO-Application of Procedures

FPM-Flight Path Management Manual

FPA-Flight Path Management Automation

COM-Communication

LTW-Leadership and Teamwork

WLM-Workload Management

SAW-Situation Awareness

PSD-Problem Solving and Decision Making

Profile A - Lesson Data

Route of Flight	
Origin	Las Vegas Harry Reid International Airport (KLAS)
Gate	A19
Runway	26R
Route	LOHSA__ JASYN, BTY, OAL MOD SFO
Departure	LOHSA__Departure
Destination	San Francisco International Airport (KSFO)
Flight Number	737-8: Boeing 38 737-800: Boeing 33

Clearance

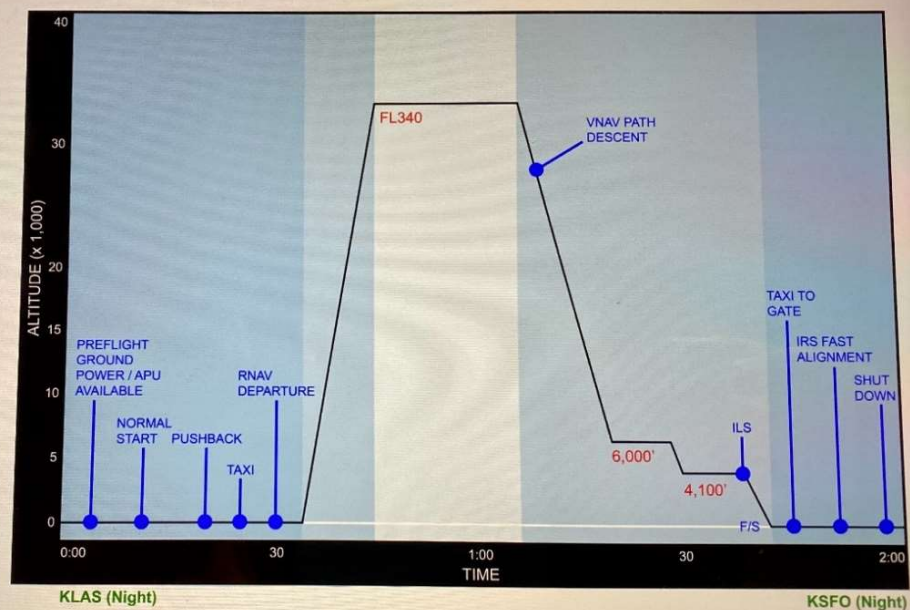
Boeing __, cleared to San Francisco International Airport via the LOHSA__Departure, JASYN as filed. Expect FL340 one zero minutes after departure. Las Vegas Departure Control frequency 125.9, squawk 1132.

Weather	KLAS	KSFO	KSMF
Wind	080/10	320/07	150/07
Visibility	10 sm	10 sm	10 sm
Sky Condition	CLR	OVE 020	CLR
Temperature	42°C	10°C	19°C
Dew Point	5°C	9°C	13°C
Altimeter	30.06 in (1018 mb)	30.05 in (1018 mb)	29.75 in (1007 mb)
	ILS RWY 26R in use.	ILS RWY 28L and 28R in use.	ILS RWY 17R in use.

MEL: Autothrottle (A/T) ARM Switch – May be inoperative provided approach minimums do not require autothrottle use.

Profile A

KLAS to KSFO



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11 月 06 日 工作日誌

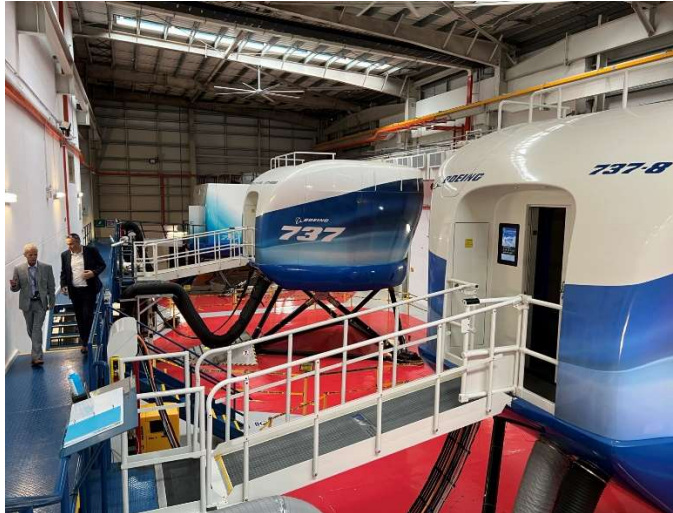
今日課程為 737 MAX CBTA Recurrent Training 2，進行的方式為兩位學員輪流擔任教師及操控駕駛員。訓前提示(Briefing)時間為 2 小時、模擬機 4 小時分為 A/B 兩套課程、訓後提示(Debriefing) 1 小時。

波音公司設計科目如下：

1. ABORTED ENG START
2. GUSTY XW T/O (from 36kts to 13kts with poor braking action)
3. ELEC MALFUNCTIONS (SOURCE OFF / ELEC DRIVE)
4. UPSET RECOVERY (NOSE LOW / HIGH)
5. STALL EXERCISE (CLEAN / BASE / FINAL)
6. TE FLAP MALFUNCTIONS (ASYMMETRY 1-5 / TE FLAP UP)
7. RNAV(GPS) MAN F/D APPROACH
8. RNAV(GPS) CIRCLING APPROACH
9. VOR CIRCLING APPROACH
10. ENG FIRE
11. ENG SEVERE DAMAGE

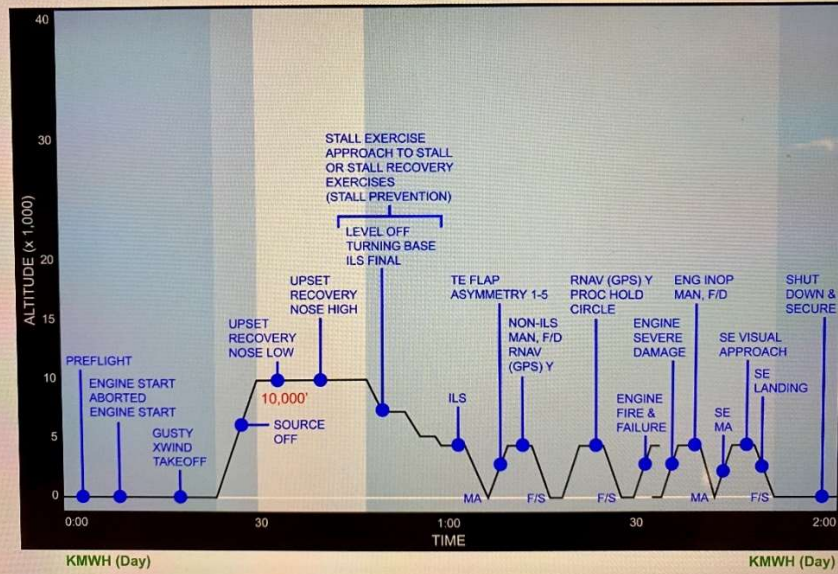
12. ONE ENG INOP MISS APPROACH

13. ONE ENG INOP VISUAL APPROACH



訓後提示(Debriefing)時引導學員探討是否發現了那些威脅？產生了哪些錯誤？並引導找出肇因及審視 TEM Briefing 是否成功？未來該如何避免？最後檢視學員是否達到本課程設計要求之職能（APK / FPA / FPM / LTW / WLM / PSD / SAW / COM），以判斷是否能繼續訓練亦或需要加課練習。

3.7.2 Profile - Session A



3.7 Flight Lesson - Session A

3.7.1 Flight Data

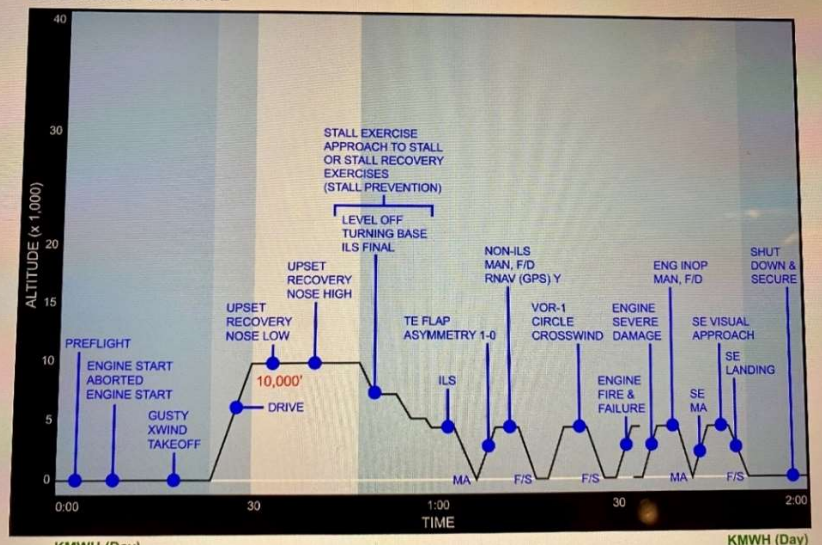
Performance	737 MAX 8	737-800
GW	147,500 lb (66,900 kg)	144,500 lb (65,500 kg)
Fuel	22,000 lb (10,000 kg)	19,000 lb (8,600 kg)
ZFW	125,500 lb (56,900 kg)	125,500 lb (56,900 kg)
Reserves	8,000 lb (3,600 kg)	8,000 lb (3,600 kg)
CRZ ALT	10,000 ft	10,000 ft
CRZ WIND	250/35	250/35
Cost Index	35	35
Runway	Dry	Dry
ISA DEV	0	0
TEMP TOC	-2°C	-2°C
N1 Limit	TO-1	TO-1
Flaps	5	5
CG	21.8%	21.8%

Route of Flight	Weather	KMWH
Origin	Wind	020/15G35
Gate	Visibility	4 sm
Runway	Sky Condition	OVC 008
Route	Temperature	15°C
Departure	Dew Point	15°C
Destination	Altimeter	29.80 in (1009 mb)
Flight Number	Remarks	ILS RWY 32R in use. Landing and departing runway 32R.

Clearance

Boeing _____ cleared to Grant County International Airport, direct EPH, as filed, Climb and maintain 10,000 ft, Grant County Departure Control frequency 126.4, Squawk 4157.

3.8.2 Profile - Session B



3.8 Flight Lesson - Session B			
3.8.1 Flight Data			
Performance		737 MAX 8	737-800
GW		147,500 lb (66,900 kg)	144,500 lb (65,500 kg)
Fuel		22,000 lb (10,000 kg)	19,000 lb (8,600 kg)
ZFW		125,500 lb (56,900 kg)	125,500 lb (56,900 kg)
Reserves		8,000 lb (3,600 kg)	8,000 lb (3,600 kg)
CRZ ALT		10,000 ft	10,000 ft
CRZ WIND		250/35	250/35
Cost Index		35	35
Runway		Dry	Dry
ISA DEV		0	0
TEMP TOC		-2°C	-2°C
N1 Limit		TO-1	TO-1
Flaps		5	5
CG		21.8%	21.8%
Route of Flight		Weather	KMWH
Origin	Grant County International Airport	Wind	020/15G35
Gate	Apron	Visibility	4 sm
Runway	32R	Sky Condition	OVC 008
Route	EPH MWH	Temperature	15°C
Departure	Direct EPH	Dew Point	15°C
Destination	Grant County International Airport	Altitude	29.80 in (1009 mb)
Flight Number	737-8: Boeing 38 737-800: Boeing 33	Remarks	ILS RWY 32R in use. Landing and departing runway 32R.
Clearance			
Boeing ___, cleared to Grant County International Airport, direct EPH, as filed. Climb and maintain 10,000 ft, Grant County Departure Control frequency 126.4. Squawk 4157.			

11月07日 工作日志

今日課程為 B737 MAX 不正常飛行姿態預防及改正訓練(UPRT)，行前先進進行 3 小時 CBT 課程及線上考試，完成後方能模擬機訓練。兩位學員輪流擔任操控駕駛員，執行訓前提示(Briefing)時間為 2 小時、模擬機 4 小時及訓後提示(Debriefing) 1 小時。

UPRT 課程依據華航教師駕駛員大綱(IP GUIDE)給予學員完整的概念，除了探討空氣動力學與三種能量交換等原理，亦詳細解說每個科目的操作要領，波音公司 UPRT 科目和目前華航所進行的大致相同，分別在中高度及高高度示範飛機特性，以及 Bounce / Balked / Rejected landing 的操作改正。除建構完整之 UPRT 概念外，亦瞭解該機型 737 MAX 操作特性。

飛完本課後，亦結束了本次 Fundamental CBTA Workshop 所有課程，結尾由波音公司原廠頒發完訓證書。



詳細科目如下：

1. T/O GUSTY XW (XW 30KTS WITH GUST 40KTS)
2. TAKEOFF FLAP STALL RECOVERY
3. MANUALLY FLOWN DEPARTURE
4. MID ALT CMD SPEED LIMITING
5. MID ALT RUDDER AUTHORITY
6. MID ALTROLL DYNAMICS
7. MID ALT A/C RECOVERY
8. MID ALT SLOW FLIGHT
9. MID ALT APPROACH TO STALL
10. MID ALT INCORRECT STALL RECOVERY

11. MID ALT FULL STALL
12. MID ALT UPRT NOSE HIGH/LOW
13. HIGH ALT MIN SPEED REVERSION
14. HIGH ALT RUDDER AUTHORITY
15. HIGH ALT HIGH MACH NO RUN
16. HIGH ALT SLOW FLIGHT
17. HIGH ALT APPROACH TO STALL
18. HIGH ALT FULL STALL
19. HIGH ALT UPRT NOSE HIGH/LOW
20. AIRSPEED UNRELIABLE BLOCKED PITOT
21. BALKED LANDING
22. REJECTED LANDING
23. BOUNCED LANDING
24. JAMMED ELEVATOR
25. WAKE TURBULENCE ON DOWNWIND
26. ENGINE FAILURE MISS APPROACH BANK ANGLE DEMO

肆、心得與建議：

波音公司 CBTA 與現行華航 Recurrent Training 時採用之 EBT 概念大致相同，同樣都是利用職能表現(Competency)來進行訓練與考核之指標，而不是傳統的任務科目為導向。華航強調教師使用 Facilitation 方式引導學員，藉由自我探究缺失進而找出需改進項目之肇因，以期未來之精進。

波音公司 CBTA 與現行華航 EBT 最大的差異在於 EBT 目前僅應用於年度複訓(Recurrent Training)，而波音公司 CBTA 除年度複訓外，還可用於機型檢定考驗 (Type Rating) 訓練，目前 FAA 雖僅核准 737MAX 單一機種進行 CBTA Type Rating Training，但預計於 111 年底將推廣至 787 及 777X 機型，並於 112 年底將實行於波音公司其他機種，未來所有的波音公司原廠檢定考驗訓練將僅提供以 CBTA 形式進行訓練。

	Type Rating	Recurrent	Other Features
CAL EBT			
Boeing CBTA			Data Analysis Video Library Virtual Aircraft

空中巴士廠家(AIRBUS)亦有 CBTA 概念之訓練，唯僅有大綱給各航空

公司參考，並不像波音公司提供完整制式化課程安排。目前國際民航組織(ICAO)已頒布 Doc 9868 Pans TRG amendment 7，各航空公司可根據 CBTA 制定訓練計畫並據以施行。

Boeing CBTA vs Airbus CBTA

Boeing CBTA provides complete type rating training package including training syllabus, video training material, grading system (CGA), and data analysis for operators.

Airbus CBTA training provides CBTA guidelines for operators to develop training materials within each individual airline.

現行國際上尚無主管機關(FAA/EASA)要求執行 CBTA 之時限，此外，CBTA 對波音公司來說也是相當新的概念，因目前僅 737MAX 機型可實施，尚無航空業者採用該訓練，綜合以上心得，華航除持續推行現行 EBT 外，亦可參考 CBTA 精神對下述方向強化精進未來訓練：

1. 原本注重之 Aviate-Navigation-Communication 概念，可以納入波音公司新的 FLY-FOCUS-ACT 觀念來處理 subtle/surprise，能更明確的指引如何航行(Aviate)。(請參閱頁 9)

2. 未來華航 TTT 教師訓練可參考波音公司教師 5 大職能，及其內容細節作為教師職能之方針：(請參閱頁 12~14)

- Pilot Competencies
- Management of the Learning Environment
- Instruction
- Interaction with the Trainee
- Assessment and Evaluation

3. 目前華航現有之 TEM 使用於 Departure/Approach briefing。

4. 波音公司除了上述使用時機外，更著重模擬機訓練時 TEM 之詳盡提示(波音公司建議 CBTA 之訓前提示(Briefing)時間為兩小時);
訓後提示(Debriefing)時使用 TEM 概念來檢視是否有成功消除 Threat，進而找出肇因，以期未來之精進。

5. 未來本局若參考國際間法規制定航空業者須實行 CBTA 之法規及執行期程，華航除了可直接採用波音公司原廠已設計之 Type Rating 課程計畫外，亦可考慮該公司內部自行設計發展 CBTA 概念之機型檢定考驗訓練課程，優點除節省經費外，也方能與空巴機隊課程概念一致化，缺點為倘自行開發設計課程，就無法有原廠提供各航空公司大數據之分析比較，了解該公司在業界之訓程度落點分析，進

而強化訓練弱點。然而，由於波音公司 CBTA 課程為制式化設計，加上需有地面課程灌輸學員 CBTA 職能導向概念，總訓練時間及成本亦比現行華航所採用的要高。

Informing Training through Data Analytics

Global Services



附件

Table 35: Instructor Competencies – Pilot Competencies

Code	Instructor Core Competencies and Observable Behaviors
Pilot Competencies	
Objective: Demonstrates all of the pilot competencies to above the Boeing standard.	
Refer to the description of pilot competencies in section 4.3	Refer to the observable behaviors in section 4.3

Table 36: Instructor Competencies – Management of the Learning Environment

Code	Instructor Core Competencies and Observable Behaviors
Management of the Learning Environment	
Objective: Ensures that the instruction, assessment, and evaluation are conducted in a suitable and safe environment.	
OB 1	Applies TEM in the context of instruction/evaluation
OB 2	Briefs on safety procedures for situations that are likely to develop during instruction/evaluation
OB 3	Intervenes appropriately, at the correct time and level (e.g., progresses from verbal assistance to taking over control)
OB 4	Resumes instruction/evaluation as practicable after any intervention
OB 5	Plans and prepares training media, equipment, and resources
OB 6	Briefs on training devices or aircraft limitations that may influence training, when applicable
OB 7	Creates and manages conditions (e.g., airspace, ATC, weather, time, etc.) to be suitable for the training objectives
OB 8	Adapts to changes in the environment while minimizing training disruptions
OB 9	Manages time, training media, and equipment to ensure that training objectives are met

Table 37: Instructor Competencies – Instruction

Code	Instructor Core Competencies and Observable Behaviors
Instruction	
Objective: Conducts training to develop the trainee's competencies.	
OB 1	References approved sources (operations, technical, and training manuals; standards; and regulations)
OB 2	States clearly the objectives and clarifies roles for the training
OB 3	Follows the approved training program
OB 4	Applies instructional methods as appropriate (e.g., explanation, demonstration, facilitation, I discover with assistance, discover without assistance)
OB 5	Sustains operational relevance and realism
OB 6	Adapts the amount of instructor inputs to ensure that the training objectives are met
OB 7	Adapts to situations that might disrupt a planned sequence of events
OB 8	Continuously assesses trainee's competencies
OB 9	Encourages the trainee to self-assess
OB 10	Allows trainee to self-correct in a timely manner
OB 11	Applies trainee-centered feedback techniques (e.g., facilitation, etc.)
OB 12	Provides positive reinforcement

Table 38: Instructor Competencies – Interaction with the Trainees

Code	Instructor Core Competencies and Observable Behaviors
Interaction with the Trainees	
Objective: Supports the trainees' learning and development. Demonstrates exemplary behavior (role model).	
OB 1	Shows respect for the trainees (e.g., for culture, language, experience)
OB 2	Shows patience and empathy (e.g., by actively listening, reading non-verbal messages, and encouraging dialogue)
OB 3	Manages trainees' barriers to learning
OB 4	Encourages engagement and mutual support
OB 5	Coaches the trainees
OB 6	Supports the goal and training policies of the Operator/ATO and Authority
OB 7	Shows integrity (e.g., honesty and professional principles)
OB 8	Demonstrates acceptable personal conduct, acceptable social practices, content expertise, a model for professional and interpersonal behavior
OB 9	Actively seeks and accepts feedback to improve own performance

Table 39: Instructor Competencies – Assessment and Evaluation

Code	Instructor Core Competencies and Observable Behaviors
Assessment and Evaluation	
Objective: Assesses the competencies of the trainee. Contributes to continuous training system improvement.	
OB 1	Complies with Operator/ATOs and Authority requirements
OB 2	Ensures that the trainee understands the assessment process
OB 3	Applies the competency standards and conditions
OB 4	Assesses trainee's competencies
OB 5	Performs grading
OB 6	Provides recommendations based on the outcome of the assessment
OB 7	Makes decisions based on the outcome of the summative assessment
OB 8	Provides clear feedback to the trainee
OB 9	Reports strengths and weaknesses of the training system (e.g., training environment, curriculum, assessment/evaluation) including feedback from trainees
OB 10	Suggests improvements for the training system
OB 11	Produces reports using appropriate forms and media