

行政院所屬各機關因公出國人員報告書
(出國類別：實習)

S-76B 型直昇機模擬機複訓報告書

服 務 機 關：民用航空局

出 國 人 職 稱：約聘人員

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出國地區：美國 佛州

出國期間：89.12.18 - 89.12.24

報告日期：90.02.15

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S-76B 型直昇機模擬機複訓報告書目次

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- 二、模擬機訓練課程概要。(共 5 頁)
- 三、座艙資源管理 (CRM) 參考資料。(共 4 頁)
- 四、飛行任務提示、歸詢卡。(共 2 頁)
- 五、防止可控情況撞及地障 CFIT (共 4 頁)

S-76B 型直昇機模擬機複訓報告書

壹、目的：

自從我國民用航空局於民國八十五年起，陸續聘請美國聯邦航空總署退休之有經驗航、機務查核員三員，仿照該署之查核員制度，建立國內之查核員制度以來，受聘之航務查核員，依據民航法規航空人員檢定規則第六條第二項第一款規定，駕駛員檢定證有效期限為一年，本人因持有 S-76B 型直昇機機種檢定證，為保持其機型檢定證以有效執行飛航監理及駕駛員之檢定考驗任務，依規定實施複訓。

貳、過程：

- 一、奉准於八十九年度內運用本局編列之航務檢查員複訓經費，接受 S-76B 型直昇機模擬機複訓。
- 二、協洽美國佛州 FlightSafety 訓練中心安排受訓事宜，並確認 89.12.20 至 89.12.24 之受訓期程。
- 三、複訓課程包含地面學科及術科（模擬機）訓練二部分：
 - （一）學科：合計 18.5 小時

1. 直昇機各系統解說（含一般簡介、發動機系、燃油

系、電力系、滅火系、警告系、傳動系、液壓系、
旋翼系、飛行操縱系（含自動飛操）、航電系、及
附屬裝備等）。

2. 載重與平衡。

3. 飛機性能資料。

4. 飛行計畫。

5. 飛行手冊

6. CFIT 防止可控情況撞及地障。

7. 座艙資源管理。

8. 飛機各項系統解說（含一般簡介、發動機系、電力
系、滅火系、警告系、傳動系、液壓系、旋翼系、
飛行操縱系、航電系及附屬裝備等）。

9. 學科測驗。

10. 飛行前任務提示。

（二）術科（模擬機訓練）：合計 4.5 小時

1. 一般操作：含滯空及正常起降課目。

2. 特殊場地操作：閉塞區及峰頂起降。

3. 緊急課目操作：包含單、雙發動機失效、火警、自

動飛操失效、尾旋翼失效、液壓失效、電力失效、
等課目。

4. 儀器飛行：包含小轉彎、不正常動作改正、ILS 進
場等課目。

參、心得：

一、小班制教學：本班次本人為唯一學員，教官與本人面對
面對課程充分研討及經驗交流以加強學習效果。

二、專業之教學方式：全中心所聘之教官資深且學識、經驗
均極為豐富之飛行教師，以其專業之素養，將學理結合
於實際操作情況及實物教學，能讓學員容易充分瞭解並
融會貫通。

三、授課內容精緻化：為期僅四日之複訓課程，能透過精密
的課程設計並能對學員施以有系統且完整之密集訓練。

四、任務提示與歸詢之詳實：每於模擬機飛行前、後，教官
均能針對當日所操作之課目，實施詳細之解說、教授操
作技巧與講評、檢討。

五、模擬效果佳：模擬機之訓練可執行實體機無法真實實施
之飛行課目，因實體機如對飛行手冊所列之各項緊急課

目，予以實際操作，因該等動作不常真實操作，有其相當之危險度，此可從無模擬機之機種訓練時，所造成的失事案例得到印證，其在訓練過程中造成之失事次數要比真實發生緊急情況所造成之失事事件要多得多，因此部分之緊急課目，則不宜也不可輕率實施，如要熟悉該等課目之操作技巧，針對實體機難以或無法模擬之特定或緊急狀況（如天候突變、裝備故障等）實施訓練，則透過模擬機之模擬情況訓練，可得到訓練效果也可減低訓練所負出之成本，並可以強化飛行員之緊急處置能力。

六、服務態度良好：該訓練中心配合學習提供參考資料。

肆、建議：

- 一、本局航空隊現有 S-76B 型直昇機二架，常有執行高級長官之行政專機任務，其飛航駕駛員雖為部隊退役後任用之經驗豐富駕駛員，但因部分緊急課目無法定期實施複訓，其操作技能恐有生疏之虞，模擬機之訓練經費預算編列，又常因預算不足而遭刪除，執行任務中如不幸發生該不常操作之緊急情況，則恐危及長官

之生命，建請該型直昇機如要派遣出任長官之行政專機任務，其駕駛員之模擬機之訓練經費，則應予寬列並定期送國外模擬機訓練，否則考量儘量減少派遣執行高級長官之行政專機任務。

二、 本次之受訓期程四天，另加奉核之三天路程，是對受訓人員體能的一大考驗，本人從十二月十八日晚由台北出發，經十四小時三十分之飛行到達洛杉磯轉國內線等機時間三個半小時，轉機飛行至佛州 TAMPA 再至 WEST PALM BEACH 共花六個半小時，接著就是四天密集的課程，行程時間加時差問題，確實是一個極其受罪的差事，建請寬給行程日數，到達目的地後有一至二日之休息調養時差及熟悉環境時間，否則將影響訓練效果。

附件：

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FlightSafety

international

COURSE OUTLINE ~ S-76 Pilot Recurrent

<u>Lesson</u>	<u>Topic</u>	<u>Hours</u>
<u>A. Classroom Training</u>		18.5
1.	Course Structure, Overview, and Outline	
2.	Aircraft General	
3.	Electrical	
4.	Lighting/Master Warning	
5.	Fuel	
6.	Powerplant	
7.	Ice and Rain Protection	
8.	Fire Protection	
9.	Environmental	
10.	Main Rotor	
11.	Tail Rotor	
12.	Hydraulics	
13.	Landing Gear and Brakes	
14.	Flight Controls	
15.	Powertrain	
16.	Automatic Flight Control System	
17.	Avionics	
18.	Kits and Accessories	
19.	Performance	
20.	Weight and Balance	
21.	Flight Planning	
22.	Rotorcraft Flight Manual (RFM)	
23.	Windshear Training (if required)	
24.	Crew Resource Management	
25.	Systems Review, Examination, and Critique	

Optional training requirements will be determined by the customers installed aircraft equipment. Pilots who are seeking an ATP in the simulator will be required to complete optional systems classroom lessons on EFIS and DAFCs.

<u>B. Systems Integration</u>	1.0
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Used to familiarize the pilot with the aircraft cockpit configuration and to reinforce classroom learning, procedures, and knowledge.

<u>C. Crew Resource Management</u>	
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Each pilot will be exposed to CRM concepts throughout the entire training curriculum. A CRM seminar will be scheduled during the week.

2

<u>D. Simulator Training</u>	4.5
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Tuesday

WEEK 51		DATE 12/19/00		TUESDAY		REV2							
CUSTOMER & COURSE		GROUND SCHOOL		SIMULATOR									
NAME	CRS	RM#	IN	OUT	INSTRUCTOR	BLK	CPT	BRIEF	IN	OUT	ID	INSTRUCTOR	
CORPORATE JETS	EMS	204	1300	1700	MCCANN	2		0800	0900	1200	A	MORAN	A SIM
FAA	RA							1100	1200	1600	A	HANLEY	
FSI-NEWMAN								1500	1400	1600	A	UNRUH	B SIM
OMAN	TOUR								1430	1530	C+	WELCH/JS	C SIM RG
FSI-GROUP A	PHI	209	0800	1130	LEDERFINE	1							
JS,BJ,EW,KL		209	1230	1700	LEDERFINE	2							
FSI-GROUP B	PHI	209	0800	1130	LEDERFINE	1							
JH,ES,WN,BW		209	1230	1700	LEDERFINE	2							

see last page for legend

Confirm your start time the day prior to your start date @ 1- 800-769-6763

Wednesday

WEEK 61			DATE: 12-20-00			WEDNESDAY REV 2						
CUSTOMER & COURSE			GROUND SCHOOL			SIMULATOR						
NAME	CRS	RM#	IN	OUT	INSTRUCTOR	BLK	CPT	BRIEF	IN	OUT	ID	INSTRUCTOR
CORPORATE JETS	EMS	204	1000	1200	MCCANN	C						
FAA	RA	204	1000	1200	MCCANN	C						
		208	1300	1700	HANLEY	2						

see last page for legend

Confirm your start time the day prior to your start date @ 1-800-769-6763

Thursday

WEEK 51		DATE 12-21-00		THURSDAY		REV2						
CUSTOMER & COURSE		GROUND SCHOOL		SIMULATOR								
NAME	CRS	RM#	IN	OUT	INSTRUCTOR	BLK	CPT	BRIEF	IN	OUT	ID	INSTRUCTOR
CAA - TAIWAN	RB	204	1000	1200	MCCANN	C						
		208	1330	1730	HANLEY	2						
CAA	RA							0800	0900	1200	1200	HANLEY
												55
FSI-NEWMAN	IA+	209	0800	1000	UNRUH			1200	1300	1500	1500	UNRUH
FSI - SPILLMAN	135							1400	1500	1700	A+	NORWOOD
FSI - GROUP A	PHI							0700	0730	0930	C+	LEDERFINE
JS,BJ,EW,KL								1015	1045	1215	C+	LEDERFINE
FSI - GROUP B	PHI							1345	1400	1600	C+	LEDERFINE
JH,ES,WN,BW								1645	1715	1845	C+	LEDERFINE

see last page for legend

Confirm your start time the day prior to your start date @ 1- 800-769-6763

Friday

WEEK 51		DATE 12-22-00		FRIDAY		REV2							
CUSTOMER & COURSE		GROUND SCHOOL		SIMULATOR									
NAME	CRS	RM#	IN	OUT	INSTRUCTOR	BLK	CPT	BRIEF	IN	OUT	ID	INSTRUCTOR	
													A SIM
CAA - TAIWAN	RB							0800	0900	1100	B	NEWMAN	B
FSI-NORWOOD	135							1200	1300	1500	B	SPILLMAN/RU	B
CENTER MEETING		217	1500	1600	KNOTT								C SIM RG

see last page for legend Confirm your start time the day prior to your start date @ 1-800-769-6763

WEEK 51		DATE 12/28/00		SATURDAY		REV2							
CUSTOMER & COURSE		GROUND SCHOOL		SIMULATOR									
NAME	CRS	RM#	IN	OUT	INSTRUCTOR	BLK	CPT	BRIEF	IN	OUT	ID	INSTRUCTOR	
													A SIM
CAA - TAIWAN	RB							0800	0900	1030	B	NEWMAN	B SIM
													C SIM RG

see last page for legend

Confirm your start time the day prior to your start date @ 1- 800-769-6763

sunday

WEEK 51		DATE: 12-24-00		SUNDAY		REV2						
CUSTOMER & COURSE		GROUND SCHOOL		SIMULATOR								
NAME	CRS	RM#	IN	OUT	INSTRUCTOR	BLK	CPT BRIEF	IN	OUT	ID	INSTRUCTOR	
												A SIM
												B SIM
												C SIM
												RG

LEGEND:

Confirm your start time the day prior to your start date @ 1-800-769-6763

I(A) = Initial (A model) R(A) = Recurrent (A model) ALTA = Alternate (A model) Curriculum R/B=Recurrent/Instrument (B model) (5 days) HIR = Helicopter Instrument Refresher EM = Emergency Medical Services (generic) OPS = Rotorcraft Ops Mgt * = D.O.S. Monitored	D = DDFCS/EFIS E = EMS Ground School I = IIDS/Kratos 1 = Block 1, 2, etc. T = Technical Systems Review A/P = Airmanship / Performance Charts A/C = Airmanship / Crew Resource Management
CENTER WEEKEND SUPERVISORS	
PROGRAM MGR:	SPILLMAN
SIM TECH :	AS ASSIGNED
	885-6888 PAGER 515-2853 CELL PHONE

RECURRENT SK-76 SIMULATOR TRAINING COURSE OUTLINE

Day 1 - CPT: Systems Integration

Lesson Objective

This lesson will provide the pilot with a review of normal starting procedures, system checks and tests and certain abnormal and emergency conditions and procedures, utilizing either the S-76 cockpit procedures trainer (CPT) or simulator.

Text Reference

S-76 Rotorcraft Flight Manual
FSI S-76 Training Checklist

Lesson Content

Briefing on use of the simulator and cockpit configuration
Normal procedures and checklist review
Before starting engines
Engine fire extinguisher test
Starting engines
Fuel priming
Flotation system test
Checks - Taxi, Pre-takeoff, Takeoff, Climb/cruise, Pre-landing,
Pre-shutdown, Shutdown & Post shutdown
Abnormal and emergency procedures

- Fuel pressure warning, Fuel flow meter beyond limits
- Anti-ice caution light
- Rotor brake caution light
- Malfunctioning servo shutoff valve
- Engine fire after shutdown
- Baggage compartment fire
- Master warning/caution advisory panel failure
- Windshield hot warning light
- Single engine ditching procedure, Emergency entrance and exit
- Electrical fire, Smoke and fume elimination
- Use of emergency equipment

Debriefing

Completion Standards

The instructor will determine through observation of the pilot's actions that the pilot is proficient in the performance of the maneuvers and procedures contained in this lesson.

Day 1 - Simulator: Normal Procedures and Malfunctions

Lesson Objective

This lesson will provide the pilot with a review of normal maneuvers including takeoffs, landings, hovering, and taxiing. In addition, emergency procedures are reviewed including single-engine procedures, engine control and electrical malfunctions.

Text Reference

S-76 Rotorcraft Flight Manual
FSI S-76 Training Checklist

Lesson Content

Preflight briefing
 Review of lesson and course completion standards
 Performance planning - Max gross takeoff weight & power available
 Review takeoff and landing profiles
 Review dynamic rollover, ground resonance and settling with power
 Electrical system - Battery & Generator failures, Inverter failure
 Minimum equipment list
Review and practice
 Takeoffs & Landings --Category A and B, normal and crosswind
 Pinnacle and Confined area operations
 Hovering flight
 Single engine failures

- Hover
- Takeoff
- Landing
- Cruise
- Ditching

- Engine control malfunctions
- Engine compartment fire
Debriefing

Completion Standards

The pilot will demonstrate a working knowledge of the use of the S-76 Rotorcraft Flight Manual to determine aircraft limits and performance. The pilot will demonstrate proficiency in the performance of all normal flight maneuvers and maintain flight parameters as established in the appropriate pilot practical test standards. The pilot will be able to recognize and effectively manage all abnormal/emergency conditions introduced during the lesson.

Day 2 - Simulator: IFR Training

Lesson Objective

This lesson will provide the pilot with a review of instrument flight procedures and S-76 systems abnormal/emergency procedures.

Text Reference

S-76 Rotorcraft Flight Manual
FSI S-76 Training Checklist
Instrument approach and enroute charts.

Lesson Content

Preflight briefing
 Pilot/Crew responsibilities
 Brief and discuss emergency procedures for this flight
 Brief communications failure
 Brief subtle pilot incapacitation
Review and Practice
 Instrument Takeoff
 Steep turns
 Unusual attitudes
 VOR and NDB intercept, tracking and enroute navigation
 VOR and/or NDB holding
 VOR approach and missed approach
 ILS approaches - Normal, Manually controlled OEI, Missed approach OEI
 NDB approaches
 Instrument abnormal/emergency procedures
 Partial panel
Debriefing

Completion Standards

The pilot will understand and be able to perform IFR maneuvers without assistance and maintain selected airspeed within the FAA Practical Test Standards. The pilot will be able to recognize and accomplish any emergency procedures from previous lessons without assistance and recognize the emergency procedures introduced in this lesson and take appropriate action with assistance.

(NOTE: Successful course completion requires meeting FAA Commercial IFR Practical Test Standards (PTS). Successful completion of a FAR 61.58 (PIC) check is to the standards for the *rating held by the pilot*. FSI Pro Card standards are FAA ATP PTS.

Day 3 - Simulator: Powertrain and Autorotations

Lesson Objective

This lesson will provide the pilot with a review of dual engine failures, tail rotor emergencies, and selected procedures as required to demonstrate proficiency.

Text References

S-76 Rotorcraft Flight Manual
FSI S-76 Training Checklist

Lesson Content

Preflight briefing
 Normal operations
 Emergency procedures
Review and practice
 Hydraulic malfunctions
 Transmission emergencies
 Tail rotor emergencies
 Dual engine failures
 Selected procedures as required
Debriefing

Completion Standards

The pilot will be able to recognize and effectively manage in-flight tail rotor failures and dual engine failures. All procedures required for course completion will be or will have been demonstrated to proficiency at the level required by the appropriate practical test standards.

COURSE COMPLETION STANDARDS

MANEUVER	COURSE COMPLETE	PRO CARD
Takeoff	Hdg +/- 10; A/S +/- 10	Hdg +/- 5; A/S +/- 5
Rejected Takeoff	N/A	Exhibits Knowledge Can Perform Maneuver
OEI Continued	N/A	Maintains alignment with Takeoff path; Hdg +/- 5; Airspeed +/- 5 kts
Enroute	Hdg +/- 10; Airspeed +/- 10 kts; Alt +/- 100 ft	Same
OEI cruise	Same as above	Same
Steep Turns	Bank angle +/- 5; Rollout w/I 10; Airspeed w/I 10 kts; Alt w/I 100 ft	
Holding	Same as Enroute standards	
VOR/NDB prior to FAF	Hdg +/- 10 or full scale CDI A/S +/- 10 kts; Alt +/- 100 ft	Hdg +/- 5; A/S +/- 5 kts Alt +/- 100 ft
VOR/NDB after FAF	¼ scale CDI; MDA +100 ft / -0 ft	½ Scale CDI; A/S +5/-0 kts MDA +50/-0 ft
ILS prior to FAF	Hdg +/- 10; A/s +/- 10; Alt +/- 100 ft	Hdg +/- 5; A/S +/- 10 kts Alt +/- 100 ft
ILS after FAF	¼ scale Localizer or GS; A/S +/- 10	¼ scale loc or GS; A/S +/- 5 kts
Missed Approach	Hdg +/- 10; A/S +/- 10 kts; Alt +/- 100 ft	Hdg +/- 5; A/S +/- 5 kts Alt +/- 100 ft
OEI Landing	Hdg +/- 10; A/S +/- 10 kts; Alt +/- 100 ft	Hdg +/- 5; A/S +/- 10 kts Alt +/- 100 ft

COURSE COMPLETION:

The pilot must be able to easily perform the procedure or maneuver, and "...be the obvious master of the aircraft, with the successful outcome of the maneuver never seriously in doubt."

PRO CARD

The pilot must be able to easily perform the procedure or maneuver, and "...be the obvious master of the aircraft, with the successful outcome of the maneuver never in doubt." Additionally, the pilot must exhibit sound CRM skills and possess exceptional aircraft systems knowledge.

Crew Performance Standards

SITUATIONAL AWARENESS

- a. Accomplishes appropriate pre-flight planning.
- b. Sets and monitors targets.
- c. Stays ahead of the aircraft by preparing for expected or contingency situations.
- d. Monitors weather, aircraft systems, instruments, and ATC communications.
- e. Shares relevant information with the rest of the crew.
- f. Uses advocacy/inquiry to maintain/regain situational awareness.
- g. Recognizes error chain clues and takes action to break links in the chain.
- h. Communicates objectives and gains agreement when appropriate.
- i. Uses effective listening techniques to maintain/regain situational awareness.

STRESS

- a. Recognizes symptoms of stress in self and others.
- b. Maintains composure, calmness, and rational decision making under stress.
- c. Adaptable to stressful situations/personalities.
- d. Uses stress management techniques to reduce effects of stress.
- e. Maintains open, clear lines of communication when under stress.
- f. Manages low stress situations to prevent complacency and boredom.

COMMUNICATION

- a. Establishes open environment for interactive communications.
- b. Conducts adequate briefings to convey required information.
- c. Recognizes and works to overcome barriers to communications.
- d. Operational decisions are clearly stated to other crew members and acknowledged.
- e. Crewmembers are encouraged to state their own ideas, opinions and recommendations.
- f. Crewmembers are encouraged to ask questions regarding crew actions. Decisions and answers are provided openly and non-defensively.
- g. Assignment of blame is avoided. Focuses on WHAT is right, not WHO is right.
- h. Keeps feedback loop active until operational goal/decision is achieved.
- i. Conducts debriefings to correct substandard/inappropriate performance and to reinforce desired performance.

SYNERGY AND CREW CONCEPT

- a. Ensures that group climate is appropriate to operational situation.
- b. Coordinates flight crew activities to achieve optimum performance.
- c. Uses effective team building techniques.
- d. Demonstrates effective leadership and motivation techniques.
- e. Uses all available resources.
- f. Adapts leadership style to meet operational and human requirements.
- g. Encourages input/participation from all crewmembers.

WORKLOAD MANAGEMENT

- a. Communicates crew duties and receives acknowledgement.
- b. Sets priorities for crew activities.
- c. Recognizes and reports overloads in self and in others.
- d. Eliminates distractions in high workload situations.
- e. Maintains receptive attitude during high workload situations.
- f. Uses other crewmember.
- g. Avoids being a "one man show."

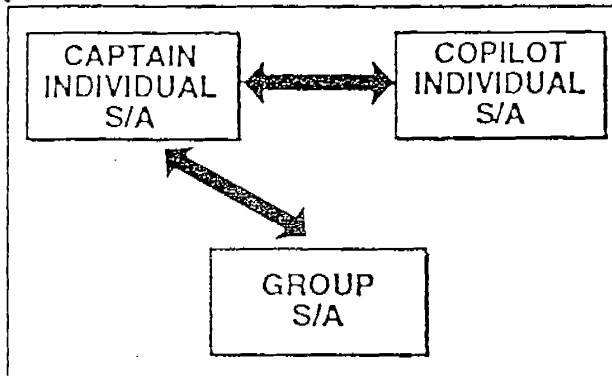
DECISION MAKING

- a. Anticipates problems in advance.
- b. Uses SOPs in decision making process.
- c. Seeks information from all available resources when appropriate.
- d. Avoids biasing source of information.
- e. Considers and weighs impact of alternatives.
- f. Selects appropriate courses of action in a timely manner.
- g. Evaluates outcome and adjusts/reprioritizes.
- h. Recognizes stress factors when making decisions and adjusts accordingly.
- i. Avoids making a decision and then going in search of facts that support it.

ADVANCED/AUTOMATED COCKPITS

- a. Follows automation related SOPs.
- b. Specifies pilot and copilot duties and responsibilities with regard to automation.
- c. Verbalizes and acknowledges entries and changes in flight operation.
- d. Verifies status and programming of automation.
- e. Selects appropriate levels of automation.
- f. Programs automation well in advance of maneuvers.
- g. Recognizes automation failure/invalid output indications.

SITUATIONAL AWARENESS IN THE COCKPIT



Remember

$$2 + 2 = 2$$

— or —

$$2 + 2 = 5$$

(Synergy)

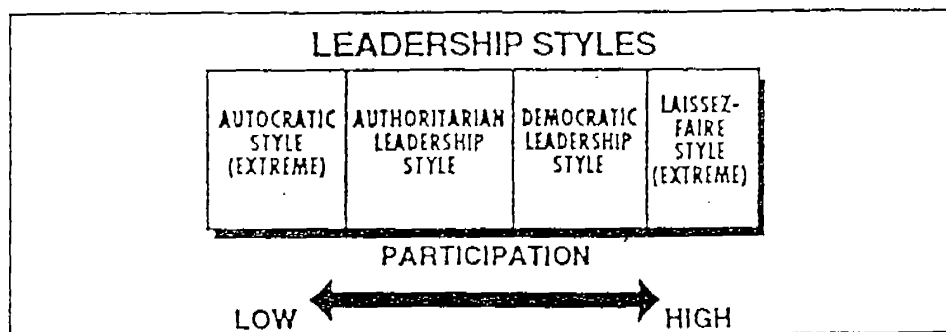
IT'S UP TO YOU!

CLUES TO IDENTIFYING:

- Loss of Situational Awareness
- Links In the Error Chain

OPERATIONAL	1. FAILURE TO MEET TARGETS 2. UNDOCUMENTED PROCEDURE 3. DEPARTURE FROM SOP 4. VIOLATING MINIMUMS OR LIMITATIONS 5. NO ONE FLYING AIRPLANE 6. NO ONE LOOKING OUT WINDOW
HUMAN	7. COMMUNICATIONS 8. AMBIGUITY 9. UNRESOLVED DISCREPANCIES 10. PREOCCUPATION OR DISTRACTION 11. CONFUSION OR EMPTY FEELING
	12.

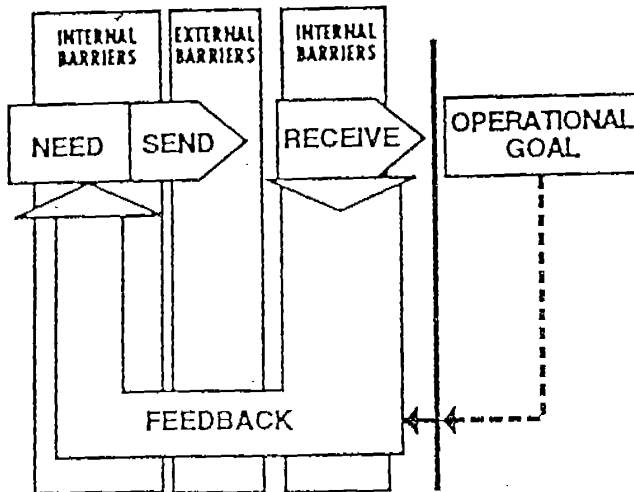
COMMAND AND LEADERSHIP



Command — Designated by Organization
 — Cannot be Shared

Leadership — Shared among Crewmembers
 — Focuses on "What's right," not "Who's right"

COMMUNICATION PROCESS



THINK:

- Solicit and give feedback
- Listen carefully
- Focus on behavior, not people
- Maintain focus on the goal
- Verify operational outcome is achieved

ADVOCACY: to increase others' S/A

- State Position
- Suggest Solutions
- Be Persistent and Focused
- Listen Carefully

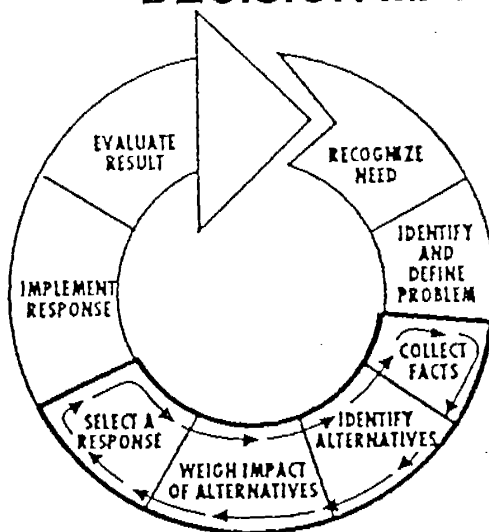
INQUIRY: to increase your own S/A

- Decide What, Whom, How to ask
- Ask Clear, Concise Questions
- Relate Concerns Accurately
- Draw Conclusions from Valid Information
- Keep an Open Mind

— REMEMBER —

Questions enhance communication flow
Don't give in to the temptation to ask questions when Advocacy is required
Use of Advocacy or Inquiry should raise a "red flag".

DECISION MAKING PROCESS



HINTS:

- Identify the problem:
 - Communicate it
 - Achieve agreement
 - Obtain commitment
- Consider appropriate SOP's
- Think beyond the obvious alternatives
- Make decisions as a result of the process
- Resist the temptation to make an immediate decision and then support it with facts

BRIEFING GUIDE

INTRODUCTION/OVERVIEW

- **Technical Objectives**
- **Human Factors Objectives**
- **Personal Objectives**
- **Establish Realism**

DESCRIBE FLIGHT PROFILE

- **Basic Flight Scenario**
- **Flight Data**
 - **Route and Approaches**
 - **Weather**
 - **Passenger Load**
 - **Fuel Requirements**

INTEGRATE TECHNICAL AND NON-TECHNICAL ASPECTS OF FLIGHT

- **Relate System/Procedure to Flight Profile**
- **Relate System/Procedure to CRM Performance**
- **Use Guided Discussion**

ESTABLISH ACTION PLAN

- **Review Objectives**
- **Gain Commitment to Perform (Client and Instructor)**
- **Set Positive Tone**

CREW FLIGHT PLANNING

- **TOLD Card**
- **File Flight Plan**
- **Order Fuel**
- **Crew Briefing**

DEBRIEFING GUIDE

ESTABLISH DEBRIEFING AGENDA

- **Set Time Limits**
- **Agree on Topics**

ASK FOR SELF-APPRAISAL/DISCOVERY

- **What Went Well?**
- **What Needs Improvement?**
- **Guide Discussion to Self-Discovery**
- **Stress the Positive**

INTEGRATE TECHNICAL & NON-TECHNICAL (CRM)

- **Use Maps and Video to Organize and Illustrate**
- **Use ATP Practical Test Standards**
- **Use CRM Crew Performance Standards**
- **Use CRM Posters**

PROVIDE INSTRUCTOR OBSERVATIONS

- **Objective and Performance-Oriented**
- **Clarify Any Questions**

PROVIDE SUMMARY OF LEARNING

- **Summarize Key Lessons**
- **Progress Report**
- **Action Items for Next Flight**



Flight Safety Foundation

CFIT Checklist

Evaluate the Risk and Take Action

Printing and distribution sponsored by

FlightSafety
international

Flight Safety Foundation (FSF) designed this controlled-flight-into-terrain (CFIT) risk-assessment safety tool as part of its international program to reduce CFIT accidents, which present the greatest risks to aircraft, crews and passengers. The FSF CFIT Checklist is likely to undergo further developments, but the Foundation believes that the checklist is sufficiently developed to warrant distribution to the worldwide aviation community.

Use the checklist to evaluate specific flight operations and to enhance pilot awareness of the CFIT risk. The checklist is divided into three parts. In each part, numerical values are assigned to a variety of factors that the pilot/operator will use to score his/her own situation and to calculate a numerical total.

In *Part I: CFIT Risk Assessment*, the level of CFIT risk is calculated for each flight, sector or leg. In *Part II: CFIT Risk-reduction Factors*, Company Culture, Flight Standards, Hazard Awareness and Training, and Aircraft Equipment are factors, which are calculated in separate sections. In *Part III: Your CFIT Risk*, the totals of the four sections in *Part II* are combined into a single value (a positive number) and compared with the total (a negative number) in *Part I: CFIT Risk Assessment* to determine your CFIT Risk Score. To score the checklist, use a nonpermanent marker (do not use a ballpoint pen or pencil) and erase with a soft cloth.

Part I: CFIT Risk Assessment

Section 1 – Destination CFIT Risk Factors	Value	Score
Airport and Approach Control Capabilities:		
ATC approach radar with MSAWS	0	_____
ATC minimum radar vectoring charts	0	_____
ATC radar only	-10	_____
ATC radar coverage limited by terrain masking	-15	_____
No radar coverage available (out of service/not installed)	-30	_____
No ATC service	-30	_____
Expected Approach:		
Airport located in or near mountainous terrain	-20	_____
ILS	0	_____
VOR/DME	-15	_____
Nonprecision approach with the approach slope from the FAF to the airport TD shallower than 2 3/4 degrees	-20	_____
NDB	-30	_____
Visual night "black-hole" approach	-30	_____
Runway Lighting:		
Complete approach lighting system	0	_____
Limited lighting system	-30	_____
Controller/Pilot Language Skills:		
Controllers and pilots speak different primary languages	-20	_____
Controllers' spoken English or ICAO phraseology poor	-20	_____
Pilots' spoken English poor	-20	_____
Departure:		
No published departure procedure	-10	_____
Destination CFIT Risk Factors Total		(-) _____

Section 2 – Risk Multiplier

	Value	Score
Your Company's Type of Operation (select only one value):		
Scheduled	1.0	_____
Nonscheduled	1.2	_____
Corporate	1.3	_____
Charter	1.5	_____
Business owner/pilot	2.0	_____
Regional	2.0	_____
Freight	2.5	_____
Domestic	1.0	_____
International	3.0	_____
Departure/Arrival Airport (select single highest applicable value):		
Australia/New Zealand	1.0	_____
United States/Canada	1.0	_____
Western Europe	1.3	_____
Middle East	1.1	_____
Southeast Asia	3.0	_____
Euro-Asia (Eastern Europe and Commonwealth of Independent States)	3.0	_____
South America/Caribbean	5.0	_____
Africa	8.0	_____
Weather/Night Conditions (select only one value):		
Night — no moon	2.0	_____
IMC	3.0	_____
Night and IMC	5.0	_____
Crew (select only one value):		
Single-pilot flight crew	1.5	_____
Flight crew duty day at maximum and ending with a night nonprecision approach	1.2	_____
Flight crew crosses five or more time zones	1.2	_____
Third day of multiple time-zone crossings	1.2	_____
Add Multiplier Values to Calculate Risk Multiplier Total		
Destination CFIT Risk Factors Total × Risk Multiplier Total = CFIT Risk Factors Total (-) _____		

Part II: CFIT Risk-reduction Factors**Section 1 – Company Culture**

	Value	Score
Corporate/company management:		
Places safety before schedule	20	_____
CEO signs off on flight operations manual	20	_____
Maintains a centralized safety function	20	_____
Fosters reporting of all CFIT incidents without threat of discipline	20	_____
Fosters communication of hazards to others	15	_____
Requires standards for IFR currency and CRM training	15	_____
Places no negative connotation on a diversion or missed approach	20	_____
Company Culture Total (+) _____ *		
115-130 points	Tops in company culture	
105-115 points	Good, but not the best	
80-105 points	Improvement needed	
Less than 80 points	High CFIT risk	

Section 2 – Flight Standards

	Value	Score
Specific procedures are written for:		
Reviewing approach or departure procedures charts	10	_____
Reviewing significant terrain along intended approach or departure course	20	_____
Maximizing the use of ATC radar monitoring	10	_____
Ensuring pilot(s) understand that ATC is using radar or radar coverage exists	20	_____
Altitude changes	10	_____
Ensuring checklist is complete before initiation of approach	10	_____
Abbreviated checklist for missed approach	10	_____
Briefing and observing MSA circles on approach charts as part of plate review	10	_____
Checking crossing altitudes at IAF positions	10	_____
Checking crossing altitudes at FAF and glideslope centering	10	_____
Independent verification by PNF of minimum altitude during stepdown DME (VOR/DME or LOC/DME) approach	20	_____
Requiring approach/departure procedure charts with terrain in color, shaded contour formats	20	_____
Radio-altitude setting and light-aural (below MDA) for backup on approach	10	_____
Independent charts for both pilots, with adequate lighting and holders	10	_____
Use of 500-foot altitude call and other enhanced procedures for NPA	10	_____
Ensuring a sterile (free from distraction) cockpit, especially during IMC/night approach or departure	10	_____
Crew rest, duty times and other considerations especially for multiple-time-zone operation	20	_____
Periodic third-party or independent audit of procedures	10	_____
Route and familiarization checks for new pilots		
Domestic	10	_____
International	20	_____
Airport familiarization aids, such as audiovisual aids	10	_____
First officer to fly night or IMC approaches and the captain to monitor the approach	20	_____
Jump-seat pilot (or engineer or mechanic) to help monitor terrain clearance and the approach in IMC or night conditions	20	_____
Insisting that you fly the way that you train	25	_____
<hr/>		
300-335 points	Tops in CFIT flight standards	
270-300 points	Good, but not the best	
200-270 points	Improvement needed	
Less than 200	High CFIT risk	
Flight Standards Total (+)		_____ *

Section 3 – Hazard Awareness and Training

	Value	Score
Your company reviews training with the training department or training contractor	10	_____
Your company's pilots are reviewed annually about the following:		
Flight standards operating procedures	20	_____
Reasons for and examples of how the procedures can detect a CFIT "trap"	30	_____
Recent and past CFIT incidents/accidents	50	_____
Audiovisual aids to illustrate CFIT traps	50	_____
Minimum altitude definitions for MORA, MOCA, MSA, MEA, etc.	15	_____
You have a trained flight safety officer who rides the jump seat occasionally	25	_____
You have flight safety periodicals that describe and analyze CFIT incidents	10	_____
You have an incident/exceedance review and reporting program	20	_____
Your organization investigates every instance in which minimum terrain clearance has been compromised	20	_____

You annually practice recoveries from terrain with GPWS in the simulator 40 _____
 You train the way that you fly 25 _____

285-315 points	Tops in CFIT training	Hazard Awareness and Training Total (+) _____ *
250-285 points	Good, but not the best	
190-250 points	Improvement needed	
Less than 190	High CFIT risk	

Section 4 – Aircraft Equipment

	Value	Score
Aircraft includes:		
Radio altimeter with cockpit display of full 2,500-foot range — captain only	20	_____
Radio altimeter with cockpit display of full 2,500-foot range — copilot	10	_____
First-generation GPWS	20	_____
Second-generation GPWS or better	30	_____
GPWS with all approved modifications, data tables and service bulletins to reduce false warnings	10	_____
Navigation display and FMS	10	_____
Limited number of automated altitude callouts	10	_____
Radio-altitude automated callouts for nonprecision approach (not heard on ILS approach) and procedure	10	_____
Preselected radio altitudes to provide automated callouts that would not be heard during normal nonprecision approach	10	_____
Barometric altitudes and radio altitudes to give automated “decision” or “minimums” callouts	10	_____
An automated excessive “bank angle” callout	10	_____
Auto flight/vertical speed mode	-10	_____
Auto flight/vertical speed mode with no GPWS	-20	_____
GPS or other long-range navigation equipment to supplement NDB-only approach	15	_____
Terrain-navigation display	20	_____
Ground-mapping radar	10	_____
175-195 points	Excellent equipment to minimize CFIT risk	Aircraft Equipment Total (+) _____ *
155-175 points	Good, but not the best	
115-155 points	Improvement needed	
Less than 115	High CFIT risk	

Company Culture _____ + Flight Standards _____ + Hazard Awareness and Training _____
 + Aircraft Equipment _____ = CFIT Risk-reduction Factors Total (+) _____

* If any section in Part II scores less than “Good,” a thorough review is warranted
 of that aspect of the company’s operation.

Part III: Your CFIT Risk

Part I CFIT Risk Factors Total (–) _____ + Part II CFIT Risk-reduction Factors Total (+) _____
 = CFIT Risk Score (±) _____

A negative CFIT Risk Score indicates a significant threat; review the sections in Part II and
 determine what changes and improvements can be made to reduce CFIT risk.

In the interest of aviation safety, this checklist may be reprinted in whole or in part, but credit must be given to Flight
 Safety Foundation. To request more information or to offer comments about the FSF CFIT Checklist, contact Robert
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