找出危險與減低風險

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引言

找出危險與相關的風險，是預防風險與事故之不二法門。若飛行員無法發現風險，恐就無法洞悉風險的意涵。在航空界不幸的是，飛行員通常沒有機會從他們在判斷上的些微錯誤汲取教訓，而這些微錯誤在航空界中往往致命。為了找出風險，運用標準作業程序的助益頗大。檢查卡係用以協助飛行員於飛行前規劃時檢視所有相關要項；一項稱為PAVE的框架作為，即是以其形式所構成的指導作為。PAVE的組成要件如下：

P即Pilot-in-command，主控飛行員；

A即Aircraft，飛機；

V即enVironment，環境；

E即External pressure，外在壓力。

使用PAVE，有助於離場前找出風險，並輔助飛行員執行處置決定程序(如圖3-1)。

使用PAVE檢查卡，飛行員即可循此簡便方式回憶以上各類要件，在每次航班前檢查風險所在。當飛行員找出某次航班的風險時，他就能決定單一或多項風險是否能安全順利地管控。若無法處置，即決定取消航班。若飛行員執意出勤，他就應擬出降低風險的對策。讓飛行員得以管控風險的一種方式是針對每種風險類別中各分項設定個人低限。飛行員可其就經驗與熟練程度律定出個人獨特的限度。

P，主控飛行員

主控飛行員 (pilot in command, PIC)(如圖3-2)是航班勤務的風險因素之一。飛行員必須從經驗、飛行時數與身心狀況著眼，自問：「我準備好飛此趟旅程了嗎?」

飛行員健康狀況

飛行員降低風險的良方之一，就是進行自我評量，以確認其健康狀況良好。評估健康狀況一種標準方法，即運用IMSAFE(直譯為「我是安全的」)檢查卡(如圖3-3)方式。採用這種檢查方式能輕鬆有效地用於檢查飛行員身心狀況是否適航，並對飛行員是否處於良好狀態進行完整評估。

一、I，即**Illness**，疾病：我生病了嗎?生病顯然是項飛行員的風險。

二、M，即**Medication**，藥物：我是否服用任何會影響我的判斷能力或讓我產生睡意的藥物?

三、S，即**Stress**，壓力：我有承受工作上的心理壓力嗎?我有金錢、健康與家庭問題嗎?壓力會使注意力與表現出現問題。儘管法規列舉必須停飛的用藥情況，承受壓力不在其中。飛行員應該考量壓力對本身表現的影響。

四、A，即**Alcohol**，酒類：我在過去8小時或24小時內有飲酒嗎?1盎斯的烈酒、一罐啤酒或4盎斯的紅酒即足以影響飛行技術。酒精會使飛行員更易於產生空間迷向與缺氧的情況。

五、F即**Fatigue**，疲勞：我是否疲倦並沒有適當休息?疲勞依舊是最詭譎的飛安危險之一；疲勞的影響，恐在飛行員鑄下大錯前仍不以為意。

六、E即**Emotion**，情緒：我是否遭逢任何令我情緒低落的事件?

壓力管理

人們在任何時刻都有某種程度的壓力。有壓力其實是件好事，因為如此可讓人們保持戒心，避免過度自滿。壓力的影響是會累積的，而且如果飛行員無法適當因應，最後就會變成無法承受之重。在壓力產生與壓力高峰的初期，通常能夠激發效能，但是當壓力超過個人能力負荷時，效能就會急轉直下。壓力會損及飛行時良好處置決定的能力。壓力分為兩類：急性與慢性。壓力因素能影響飛行員處置決定的技巧，增加他們在座艙內出錯的風險(如圖3-4)。

舉例而言，試想1架「富豪」(Bonanza)型機在晴朗無雲的白天，爬升到1,500呎時艙門突然開啟的情形會如何?這可能會使飛行員大吃一驚，但是當發現這個情形顯然沒有那麼危險時，心緒壓力會逐漸消退。然而，若是在儀飛氣象條件(instrument meteorological condition, IMC)下艙門打開的話，儘管這兩種場景差距不大，其構成壓力的程度會高出許多。因此，結論是我們對問題的認知(以及其產生之壓力)，與問題發生時的環境有關。

另一個例子是，所有飛行員都曾碰到過夜間發生的機械問題似乎都比較麻煩。壓力管理的關鍵是，在下結論前要停下來、思考與分析。下結論前，通常都有能夠思考的時間。

有幾種技巧可以幫助管理生活中的壓力累積，避免壓力過荷。例如，為幫助紓解壓力程度，每天排出時間來放鬆自己，或維持一個體能訓練的計畫。為避免壓力過荷，學習更有效率地管理時間，以避免因為逾期或無法在期限內完成所產生之壓力。

A，飛機

那就飛機而言呢?飛機對這趟航程構成什麼限制?試問你自己以下幾項問題：

- 這是適合這次航程的飛機嗎?
- 我熟悉與曾經飛過這型飛機嗎?飛機性能數據與飛機飛行手冊(aircraft flight manual, AFM)是依據專業試飛員使用嶄新飛機的情況下所撰，在評估個人與飛機效能時要謹記此點。
- 這架飛機有此次航程必要的裝備嗎?相關的儀表呢?燈光設備呢?導航與通信裝備是否足夠?
- 這架飛機能在這趟航程條件下適當安全範圍內，使用相關跑道嗎?例如，一架飛機的飛行手冊指出其側風分量最大顯示值(maximum demonstrated crosswind component)是15節。這對飛行員的意義為何?其實這是飛機製造廠試飛員進行該型機適航認證時的最大側風值(如圖3-5)。
- 這架飛機能承運計畫中的酬載量嗎?
- 機上裝備是否作用正常?
- 這架飛機有無這次航程與中降所需之足夠燃油存量，以及備油?
- 燃油存量是否正確?我是否檢查(請謹記大部分飛機製造時的標準係要求當燃油為滿油量時，燃油存量顯示器指示必須正確)?

使用PAVE檢查卡作為，有助於凸顯飛行員在準備或已經在航程中可能面臨的風險所在。

V，環境

天氣

天氣是一個重要的環境考量要件。當飛行員律定其個人的底限時，他們應針對特定的航程，依據下列項目來評估天氣情況：

- 目前的雲幕高與能見度為何?在山區地形，考量將雲幕高與能見度的底限提高一點，尤其是針對不熟悉的地形。
- 考量實際天氣與氣象預報不同的可能性。擬定備用計畫，萬一發生出乎預料的變化，準備好轉航。
- 考量機場的風向，以及側風分量的強度(如圖3-5)。
- 若在山區飛行，考量當地是否有懸浮強風。山區地形的強風能構成嚴重亂流與下洗氣流，就算無其他特別天候，這仍對飛機十分危險。
- 刻正有無雷雨或相關預報?
- 若為多雲天氣，刻正有無結冰或相關預報?露點溫度差(temperature-dew point spread)與目前巡航高度的溫度為何?在全程航線上可以安全下降嗎?
- 若有結冰現象，飛行員對操作飛機除冰或防冰裝備有無經驗?相關裝備的狀況與作用是否良好?如果飛機經過結冰驗證的話，其承受結冰情況之等級為何?

地形

評估地形是分析飛行環境的另一項要件。

- 避免接近地形與障礙，尤其是在夜間或能見度低之情況下；在飛行前規劃時，依據目視飛行規定(visual flight rules, VFR)與儀表飛行規定(instrument flight rules, IFR)律定之高度限制，預先決定安全高度。
- 使用最大海拔高度(maximum elevation figures, MEF)(如圖3-6)，以及其他易於取得的資料，以降低飛行撞山或障礙物的機率。

機場

- 目的地機場與備降機楊的燈光設備為何(例如：目視進場下滑指示器(visual approach slope indicator, VASI)、精確進場路徑指示器(precision approach path indicator, PAPI)、儀器降落系統(instrument landing system, ILS)、下滑引導)?(如圖3-7)終點機

場是否有前述設備?設備功能是否正常?飛行員需要使用無線電才能啟動機場燈光設備嗎?

- 檢查飛航公告(Notices to Airmen, NOTAM)相關機場與跑道有無關閉。注意有無燈號熄滅的跑道、信標燈設備，附近塔臺等。
- 明智選擇航路。發動機若發生任何故障，鄰近的機場就顯的格外重要。
- 目的地機場與備降機場是否腹地較小或有障礙物?

空域

- 若航程中要飛越偏遠地區，機上是否備有適當的衣物、飲用水與救生裝備，以因應萬一迫降時所需?
- 若航程中包括飛越恐會失去目視地平線的水面或無人居住地區，飛行員要對儀表飛行作好準備。
- 檢查空域以及有在航路上有無任何臨時飛行限制(temporary flight restriction, TFR)。

夜間

夜間航行必須格外注意。

- 若航程中包括夜間飛越恐會失去目視地平線的水面或無人居住地區，飛行員要對儀表飛行作好準備。
- 飛行條件是否容許在夜間安全地緊急降落?
- 針對夜航，起飛前檢查飛機內外所有燈光系統。攜帶至少兩支手電筒；一支用於機外之飛行前檢查，準備較小，亮度可調整的另一支放在就手處(如圖3-8)。

機外亮度比機艙儀表板的亮度昏暗的情況下，人類肉眼無法看清機外景象。在夜航時，儘可能將機內燈光調暗。當飛機起飛，肉眼適應黑暗時，機內燈光還要調得更暗，有助於維持對機外的視野。若機內燈光無法調整，就會限制飛行員對機外的視野，進而增加風險，也許這就不是夜航的時機。

視線幻覺

雖然天氣、地形、機場狀況與日、夜航行的差別等都會構成不同的挑戰，總體而言，這些因素是會影響飛行員的感官知覺。這些因素會在不知不覺的情況下產生視線幻覺，並產生空間迷向，對飛行員構成不預期的挑戰(如圖3-9)。就算是最訓練有素的飛行員，有時也會遭遇到已經來不及安全完成航程的情況下，才發現問題所在。

E，外在壓力

外在壓力是對航班構成的外在影響，而對完成航班勤務構所成某種壓力，通常都會付出犧牲飛安的代價。能夠構成外在壓力的因素如下：

- 在機場等候班機抵達的某人
- 某位飛行員不想得罪的旅客
- 想要展現飛行員夠格的飛行技術
- 想要讓某人印象深刻(在航空界最危險的三個字就是「看我的!」)
- 想要滿足個人特定目標(不計代價要抵達終點(get-home-itis)、不計代價要抵達目的地(get-there-itis)、不計代價要出發(let's-go-itis))
- 飛行員通常具備的達成目標之性格取向
- 飛行員清楚自已實際經歷與技術恐有所不及，隨之而來的情緒壓力(驕傲可以是一個有力的外在因素，譯注：此即為「信心大過能力」)

管理外在壓力是風險管理上一項最重要的關鍵，因為這是一項風險因素類別，會使飛行員忽視其他所有的風險因素。外在壓力對飛行員構成時間上的壓力，是大多數事故的肇因之一。

直升機緊急醫療服務(helicopter emergency medical service, HEMS)作業因為其任務緊急之本質而顯獨特，這項作業適足以例證為何外在壓力會影響飛行員。緊急醫療服務(emergency medical service, EMS)飛行員通常運送的是重症傷患，飛行員是使命必達。為減輕在此情形下的壓力影響，許多EMS從業人員不會向EMS飛行員透露傷患的病情，僅能轉達傷患接運的地點，以將飛行員處置決定限縮在「該處能否將傷患安全接運至醫療中心?」的問題上。為了救一條生命，而讓另外3至4個人冒著風險，不是個安全的作法。

運用個人專屬的標準作業程序(standard operating procedure, SOP)是一種管理外在壓力的方式。其目的係在航程中釋放外在壓力。這些程序包括下列項目，但並不止於此：

- 容許航程中有時間為額外加油進行中降，或能因天氣所致，進行不預期的落地。
- 為班次延誤擬定備用計畫，或為必須抵達終點的班機旅客預訂備援航空公司的機位。
- 針對非常重要的航程，規劃及早離場，(譯注：如遇突發狀況)因此仍有時間驅車前往目的地。
- 班機可能延誤時，提醒在目的地等待的人員。遭遇班機延誤時，要知道如何通報他們。
- 管理旅客的預期心理。讓旅客知道他們有可能不會按照既定時刻表抵達機場；若他們必須在特定的時

間內抵達，他們應該要有備案。

- 消除返家的壓力，即使是一般日間的航班也要帶著過夜的用品，包括藥品、隱形眼鏡清洗液、衛生用品，或其他每日航班必備物品。

管理外在壓力的關鍵在於為接受班機延誤的情況，並作好準備。謹記人們搭飛機與開車、搭公車一樣都可能會延誤。飛行員的目標是管理風險，不是提高風險。

摘要

運用PAVE與IMSAFE檢查卡作法，可發現並降低風險。事故資料適足說明為何飛行員運用風險管理來提高航班的安全程度。

圖3-1 PAVE 檢查卡

圖3-2 對飛行員而言，最高的風險就是自己，所以必須採取特別的反省分析作法

圖3-4 IMSAFE檢查卡

I'M SAFE (我是安全的) 檢查卡

I. 疾病：我有任何病徵嗎?
M. 藥物：我在服用藥物或成藥嗎?
S. 壓力：我有承受工作上的精神壓力嗎?我會擔心財務狀況、健康問題或家庭不和的情形嗎?
A. 酒精：我在過去8小時內有飲酒嗎?24小時內呢?
F. 疲勞：我感到疲憊嗎或沒有適當休息嗎?
E. 情緒：我有情緒不安的情況嗎?

圖3-5體系中的壓力因素會產生嚴重衝擊，特別是在工作負荷高的時候。

壓力因素

環境
與環境相關的情況，例如極端溫、溼度情況、噪音、震動與缺氧。

生理壓力
生理狀況，例如疲倦、體能不佳、缺乏睡眠、誤餐(導致低血糖情況)與疾病。

心理壓力
社交或情緒因素，例如家中有喪事、離婚、小孩生病，或被降職。這種壓力也可能與心理負荷有關，例如解析問題、導航飛機或在處置決定時。

圖3-6飛行員可容易地將預劃航行高度，與所有目視飛行區域航圖上標示的最低海拔高度，一下就能估算出航行標高。最低海拔高度是標高資訊上一種最佳訊息來源不論在飛行計劃時或實際航行時皆可派上用場。

圖3-7雖然有些跑道有不必多作解釋的簡單語文標示(如圖示)，清楚瞭解飛航環境中使用的跑道指示器仍十分重要。

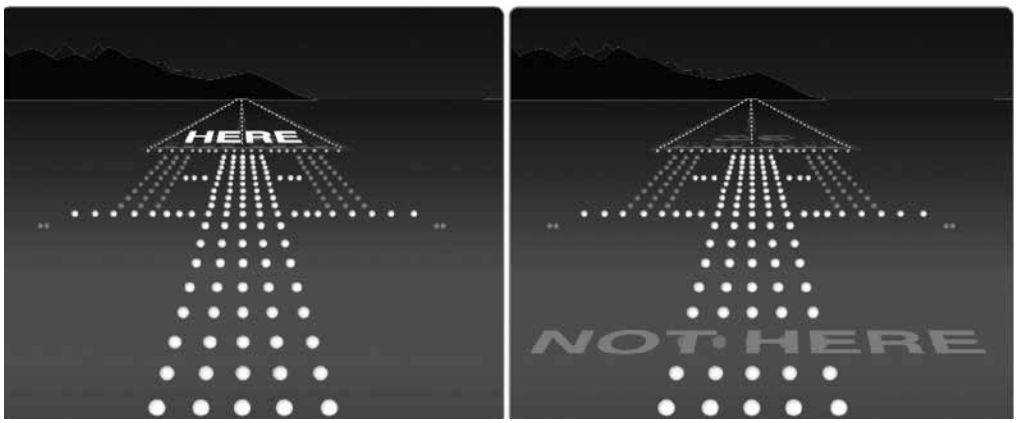
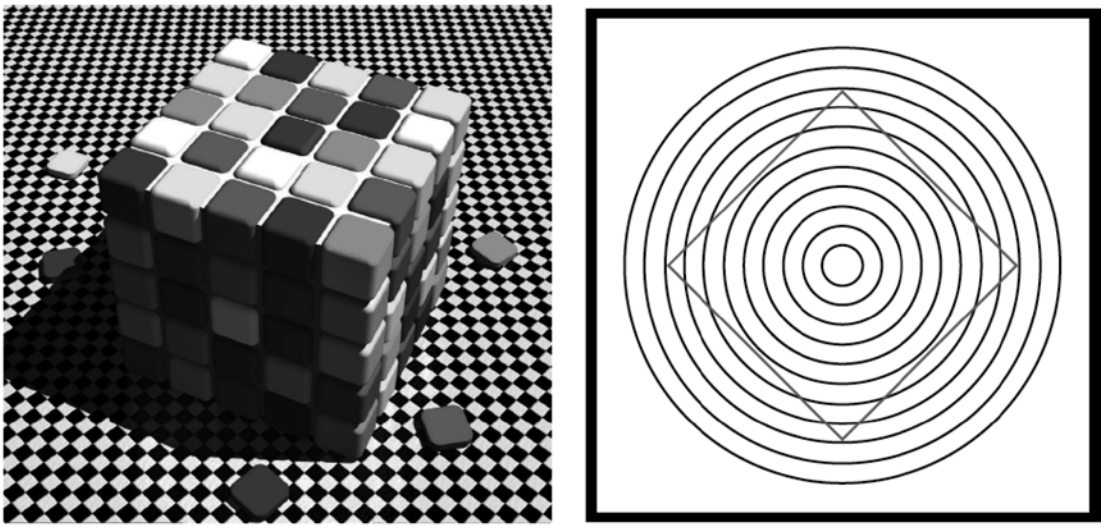


圖3-8 機上備有化學螢光棒，在夜航時相當有用。其發光的顏色、強度與持續時間各有不同，並能為儀表板提供適當照明。但此物品並不能取代攜帶手電筒的必要性。

圖 3-9視線幻覺能從上圖輕易瞭解。左圖顯示的是大腦處理顏色時產生之幻覺。魔術方塊頂上的「咖啡色」方塊，與前側的「橘色」方塊其實是同一種顏色。右圖產生的幻覺是紅線會彎曲，其實它們是直線。以上圖示代表的是我們每日生活上可見之幻覺，有時我們會太晚才發現它們的真實面貌。瞭解視線幻覺的存在，是準備因應風險的良方。



譯自 FAA Risk Management Handbook

Identifying Hazards and Mitigating Risk

Introduction

Identifying hazards and associated risk is key to preventing risk and accidents. If a pilot fails to search for risk, it is likely that he or she will neither see it nor appreciate it for what it represents. Unfortunately in aviation, pilots seldom have the opportunity to learn from their small errors in judgment because even small mistakes in aviation are often fatal. In order to identify risk, the use of standard procedures is of great assistance. One guide in the form of a checklist that helps the pilot examine areas of interest in his or her preflight planning is a framework called PAVE. Elements of PAVE are:

Pilot-in-command (PIC)

Aircraft

En**V**ironment

External pressures

Using PAVE helps to identify risk before departure and assists the pilot's decision-making process. *[Figure 3-1]*

With the PAVE checklist, pilots have a simple way to remember each category to examine for risk prior to each flight. Once a pilot identifies the risks of a flight, he or she needs to decide whether the risk or combination of risks can be managed safely and successfully. If not, make the decision to cancel the flight. If the pilot decides to continue with the flight, he or she should develop strategies to mitigate the risks. One way a pilot can control the risks is to set personal minimums for items in each risk category. These are limits unique to that individual pilot's current level of experience and proficiency.

One of the most important concepts that safe pilots understand is the difference between what is "legal" in terms of the regulations, and what is "smart" or "safe" in terms of pilot experience and proficiency.

P = Pilot in command

The pilot in command (PIC) *[Figure 3-2]* is one of the risk factors in a flight. The pilot must ask, "Am I ready for this trip?" in terms of experience, currency, physical, and emotional condition.

The Pilot's Health

One of the best ways pilots can mitigate risk is a self-evaluation to ensure they are in good health. A standardized method used in evaluating health employs the IMSAFE checklist. *[Figure 3-3]* It can easily and effectively be used to determine physical and mental readiness for flying and provides a good overall assessment of the pilot's well being.

1. Illness—Am I sick? Illness is an obvious pilot risk.
2. Medication—Am I taking any medicines that might affect my judgment or make me drowsy?
3. Stress—Am I under psychological pressure from the job? Do I have money, health, or family problems? Stress causes concentration and performance problems.

While the regulations list medical conditions that require grounding, stress is not among them. The pilot should consider the effects of stress on performance.

4. Alcohol—Have I been drinking within 8 hours? Within 24 hours? As little as one ounce of liquor, one bottle of beer, or four ounces of wine can impair flying skills. Alcohol also renders a pilot more susceptible to disorientation and hypoxia.

5. Fatigue—Am I tired and not adequately rested? Fatigue continues to be one of the most insidious hazards to flight safety, as it may not be apparent to a pilot until serious errors are made.
6. Emotion—Have I experienced any emotionally upsetting event?

Stress Management

Everyone is stressed to some degree almost all of the time. A certain amount of stress is good since it keeps a person alert and prevents complacency. Effects of stress are cumulative and, if the pilot does not cope with them in an appropriate way, they can eventually add up to an intolerable burden. Performance generally increases with the onset of stress, peaks, and then begins to fall off rapidly as stress levels exceed a person's ability to cope. The ability to make effective decisions during flight can be impaired by stress. There are two categories of stress—acute and chronic. Factors referred to as stressors can affect decision-making skills and increase a pilot's risk of error in the flight deck. *[Figure 3-4].*

For instance, imagine a cabin door that suddenly opens in flight on a Bonanza climbing through 1,500 feet on a clear sunny day? It may startle the pilot, but the stress would wane when it became apparent that the situation was not a serious hazard. Yet, if the cabin door opened in instrument meteorological conditions (IMC), the stress level would be much higher despite little difference between the two scenarios. Therefore, one can conclude that our perception of problems (and the stress they create) is related to the environment in which the problems occur.

Another example is that mechanical problems always seem greater at night, a situation that all pilots have experienced. The key to stress management is to stop, think, and analyze before jumping to a conclusion. There is usually time to think before drawing conclusions.

There are several techniques to help manage the accumulation of life stress, and prevent stress overload. For example, to help reduce stress levels, set aside time for relaxation each day or maintain a program of physical fitness. To prevent stress overload, learn to manage time more effectively to avoid pressures imposed by getting behind schedule and not meeting deadlines.

A = Aircraft

What about the aircraft? What limitations will the aircraft impose upon the trip? Ask yourself the following questions:

- Is this the right aircraft for the flight?
- Am I familiar with and current in this aircraft? Aircraft performance figures and the aircraft flight manual (AFM) are based on a new aircraft flown by a professional test pilot, factors to keep in mind while assessing personal and aircraft performance.
- Is this aircraft equipped for the flight? Instruments? Lights? Are the navigation and communication equipment adequate?
- Can this aircraft use the runways available for the trip with an adequate margin of safety under the conditions to be flown? For instance, consider an AFM for an aircraft that indicates a maximum demonstrated crosswind component of 15 knots. What does this mean to a pilot? This is the maximum crosswind that the manufacturer's test pilot demonstrated in the aircraft's certification. *[Figure 3-5]*
- Can this aircraft carry the planned load?
- Can this aircraft operate with the equipment installed?
- Does this aircraft have sufficient fuel capacity, with reserves, for trip legs planned?
- Is the fuel quantity correct? Did I check? (Remember that most aircraft are manufactured to a standard that requires the fuel indicator be accurate when the fuel quantity is full.)

Using the PAVE checklist would help elevate risks that a pilot may face while preparing and conducting a flight.

V = Environment

Weather

Weather is a major environmental consideration. As pilots set their own personal minimums, they should

evaluate the weather for a particular flight by considering the following:

- What are the current ceiling and visibility? In mountainous terrain, consider having higher minimums for ceiling and visibility, particularly if the terrain is unfamiliar.
- Consider the possibility that the weather may be different from forecast. Have alternative plans and be ready and willing to divert should an unexpected change occur.
- Consider the winds at the airports being used and the strength of the crosswind component. *[Figure 3-5]*
- If flying in mountainous terrain, consider whether there are strong winds aloft. Strong winds in mountainous terrain can cause severe turbulence and downdrafts and be very hazardous for aircraft even when there is no other significant weather.
- Are there any thunderstorms present or forecast?
- If there are clouds, is there any icing, current or forecast? What is the temperature-dew point spread and the current temperature at altitude? Can descent be made safely all along the route?
- If icing conditions are encountered, is the pilot experienced at operating the aircraft's deicing or anti-icing equipment? Is this equipment in good condition and functional? For what icing conditions is the aircraft rated, if any?

Terrain

Evaluation of terrain is another important component of analyzing the flight environment.

- To avoid terrain and obstacles, especially at night or in low visibility, determine safe altitudes in advance by using the altitudes shown on visual flight rules (VFR) and instrument flight rules (IFR) charts during preflight planning.
- Use maximum elevation figures (MEF) *[Figure 3-6]* and other easily obtainable data to minimize chances of an inflight collision with terrain or obstacles.

Airport

- What lights are available at the destination and alternate airports (e.g., visual approach slope indicator (VASI), precision approach path indicator (PAPI) or instrument landing system (ILS), glideslope guidance)? *[Figure 3-7]* Is the terminal airport equipped with them? Are they working? Will the pilot need to use the radio to activate the airport lights?
- Check the Notices to Airmen (NOTAMS) for closed runways or airports. Look for runway or beacon lights out, nearby towers, etc.
- Choose the flight route wisely. An engine failure gives the nearby airports supreme importance.
- Are there shorter or obstructed fields at the destination and/or alternate airports?

Airspace

- If the trip is over remote areas, are appropriate clothing, water, and survival gear onboard in the event of a forced landing?
- If the trip includes flying over water or unpopulated areas with the chance of losing visual reference to the horizon, the pilot must be prepared to fly IFR.
- Check the airspace and any temporary flight restrictions (TFRs) along the route of flight.

Nighttime

Night flying requires special consideration.

- If the trip includes flying at night over water or unpopulated areas with the chance of losing visual reference to the horizon, the pilot must be prepared to fly IFR.
- Will the flight conditions allow a safe emergency landing at night?
- Preflight all aircraft lights, interior and exterior, for a night flight. Carry at least two flashlights—one for exterior preflight and a smaller one that can be dimmed and kept nearby. *[Figure 3-8]*

The human eye will see nothing outside that is dimmer than the flight deck lighting. Always fly at night with the interior lights as dim as possible. As the flight progesses and the eyes adjust to the darkness, usually the interior lights can be dimmed further, aiding the outside vision. If the interior lights will not dim, that would

increase the risk factors by restricting the pilot's outside vision—probably not the time for a night flight.

Visual Illusions

Although weather, terrain, airport conditions, and night versus daylight flying each produce unique challenges, together these factors conspire against a pilot's senses. It is important to understand that unwittingly these factors can create visual illusions and cause spatial disorientation producing challenges the pilot did not anticipate. *[Figure 3-9]* Even the best trained pilots sometimes fail to recognize a problem until it is too late to complete a flight safely.

E = External Pressures

External pressures are influences external to the flight that create a sense of pressure to complete a flight—often at the expense of safety. Factors that can be external pressures include the following:

- Someone waiting at the airport for the flight's arrival
- A passenger the pilot does not want to disappoint
- The desire to demonstrate pilot qualifications
- The desire to impress someone (Probably the two most dangerous words in aviation are "Watch this!")
- Desire to satisfy a specific personal goal ("get-home-itis," "get-there-itis," and "let's-go-itis")
- A pilot's general goal-completion orientation
- The emotional pressure associated with acknowledging that skill and experience levels may be lower than a pilot would like them to be. (Pride can be a powerful external factor.)

Management of external pressure is the single most important key to risk management because it is the one risk factor category that can cause a pilot to ignore all other risk factors. External pressures place time-related pressure on the pilot and figure into a majority of accidents.

Helicopter Emergency Medical Service (HEMS) operations, unique due to the emergency nature of the mission, are an example of how external pressures influence pilots. Emergency medical services (EMS) pilots often ferry critically ill patients, and the pilot is driven by goal completion. In order to reduce the effect of this pressure, many EMS operators do not to notify the EMS pilot of the prospective patient's condition, but merely confine the location of the patient pickup and restrict the pilot's decision-making role to the response to the question "Can the pickup and transportation to the medical care center be made safely?" Risking three or four lives in an attempt to save one life is not a safe practice.

The use of personal standard operating procedures (SOPs) is one way to manage external pressures. The goal is to supply a release for the external pressures of a flight. These procedures include, but are not limited to:

- Allow time on a trip for an extra fuel stop or to make an unexpected landing because of weather.
- Have alternate plans for a late arrival or make backup airline reservations for must-be-there trips.
- For really important trips, plan to leave early enough so that there would still be time to drive to the destination.
- Advise those who are waiting at the destination that the arrival may be delayed. Know how to notify them when delays are encountered.
- Manage passenger expectations. Ensure passengers know that they might not arrive on a firm schedule, and if they must arrive by a certain time, they should make alternative plans.
- Eliminate pressure to return home, even on a casual day flight, by carrying a small overnight kit containing prescriptions, contact lens solutions, toiletries, or other necessities on every flight.

The key to managing external pressure is to be ready for and accept delays. Remember that people get delayed when traveling on airlines, driving a car, or taking a bus. The pilot's goal is to manage risk, not increase it.

Summary

Risk can be identified and mitigated by using checklists such as PAVE and IMSAFE. Accident data offers the opportunity to explain how pilots can use risk management to increase the safety of a flight.

Figure 3-1. The PAVE checklist.

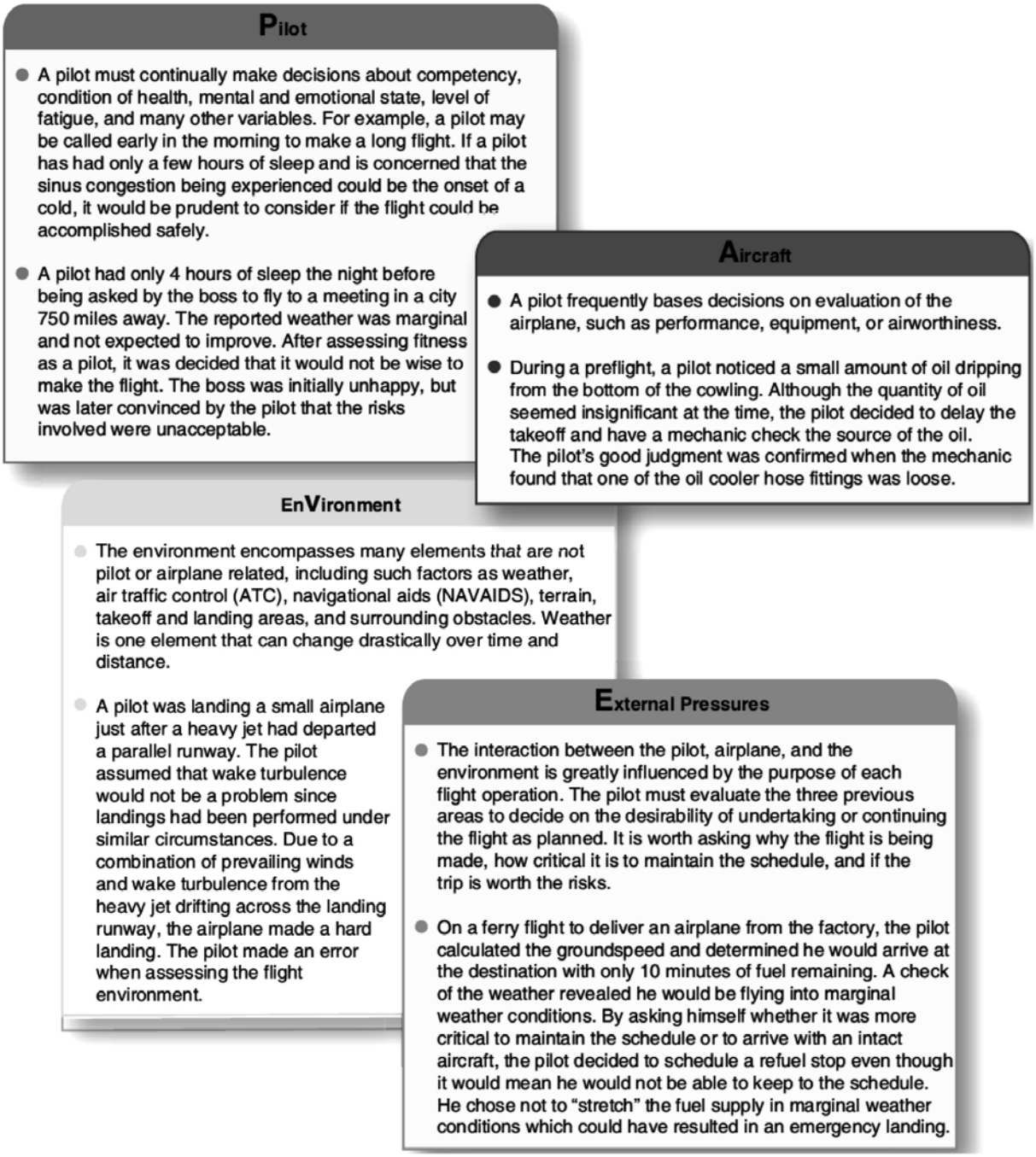


Figure 3-2. The highest risk for the pilot is self, and requires special introspective analysis.

Figure 3-3. IMSAFE checklist.

Figure 3-4. System stressors have a profound impact, especially during periods of high workload.

Stressors
Environmental Conditions associated with the environment, such as temperature and humidity extremes, noise, vibration, and lack of oxygen.
Physiological Stress Physical conditions, such as fatigue, lack of physical fitness, sleep loss, missed meals (leading to low blood sugar levels), and illness.
Psychological Stress Social or emotional factors, such as a death in the family, a divorce, a sick child, or a demotion at work. This type of stress may also be related to mental workload, such as analyzing a problem, navigating an aircraft, or making decisions.

Figure 3-6. The pilot can easily assess elevations at a glance by simply comparing the intended altitude to the minimum elevation figures (MEFs) depicted on all VFR sectional charts. The MEFs are one of the best sources of elevation information and can be used during both the planning and flight phases.

Figure 3-7. Although runways that provide plain-spoken information (as shown above) would require little interpretation, it is important to understand and interpret runway indicators used in the aviation environment.

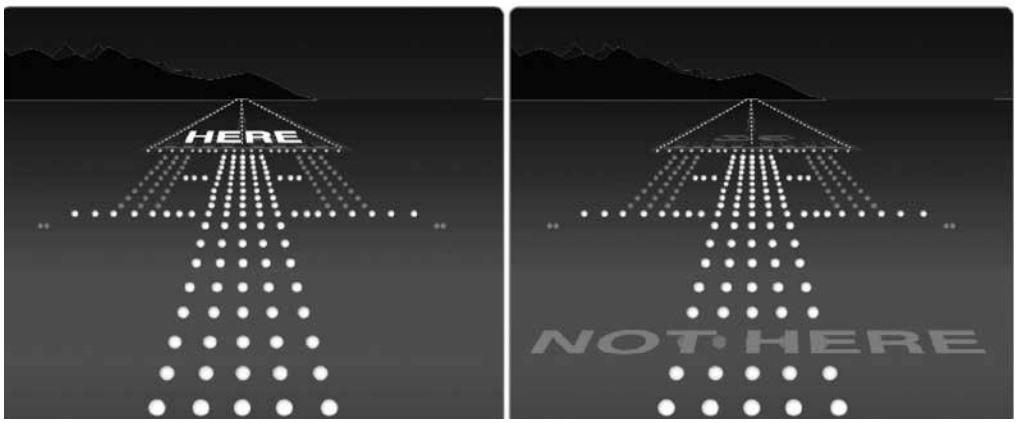
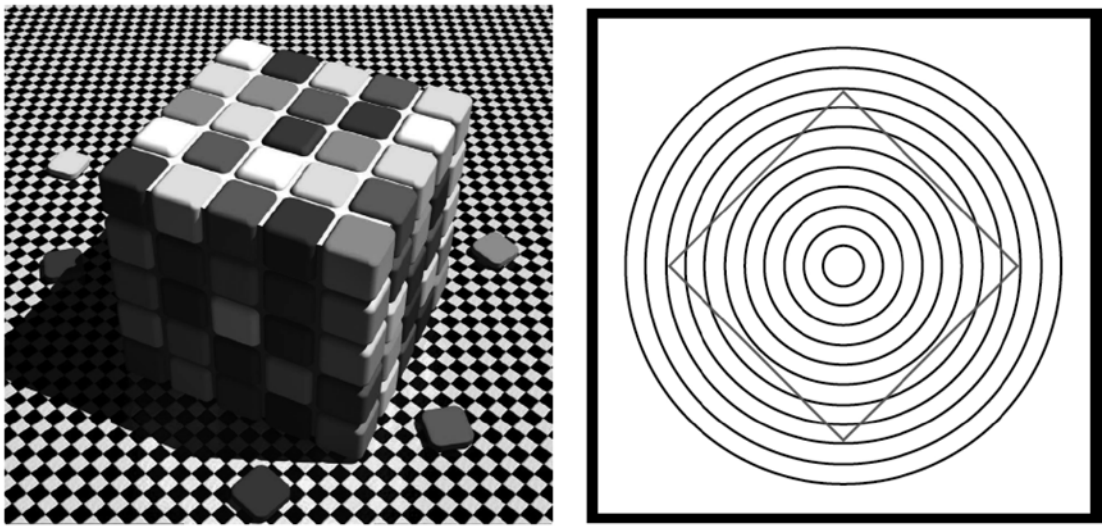


Figure 3-8. A chemical stick is useful to carry onboard the aircraft at night. It comes in various colors, intensities, and durations, and it provides ample illumination within the flight deck. This does not replace the regulatory requirement of carrying flashlights.

Figure 3-9. Visual illusions are easy to see when shown in the examples above. The illusion on the left represents how the brain processes color. The "brown" square on top and the "orange" square on the side are actually the same color. The illusion on the right appears to have red lines that curve; however, they are straight. These illusions are representative of things we see in everyday life, except we do not see them as they really are until it is sometimes too late. Understanding that visual illusions exist is a prime ingredient to being better prepared to cope with risk.



From FAA Risk Management Handbook