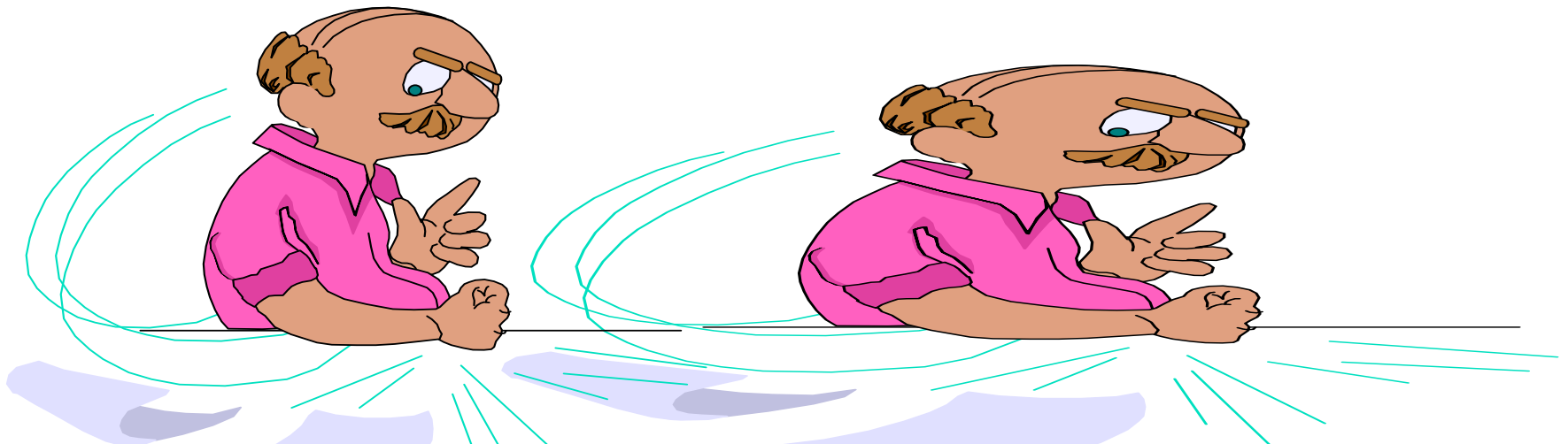


CREW RESOURCE MANAGEMENT TRAINING



(DGCA Ops Circular 03 of 2004 , Advisory Circular 08 of 2009
and CAR Sect 8, Series 'F', Part II, dated 01 May 13)



DELHI FLYING CLUB PRESENTATION

www.delhiflyingclub.org

GROUND RULES



- **QUESTIONS AND COMMENTS**
- **OPEN MIND**
- **USE SKILLS DISCUSSED**





“No one was ever really taught by another; each of us has to teach him self. The external teacher offers only the suggestion which rouses the internal teacher to work to understand things.”

Swami Vivekananda

Scope of Training (Appendix 5 of the CAR)



- **Human Error, Reliability, Error chain, Error Prevention, Error Detection and Human Performance Limitations.**
- **Stress, Stress Management, Fatigue & Vigilance.**
- **Information acquisition, Situational Awareness, Workload Management & Decision Making.**
- **Communication and co-ordination.**
- **Leadership and team behaviour**
- **Automation philosophy**

Discussion Schedule



Day - 1

1000-1100

Introduction to CRM

1115-1200

Error Chain Concept

1200-1300

Team Effectiveness Markers

1400-1500

Decision Making Process

1515-1800

Fatigue, Stress

Day - 2

1000-1100

Effective Communication

1115-1200

Automation

1200-1300

CFIT

1400-1600

Case Studies

1600-1700

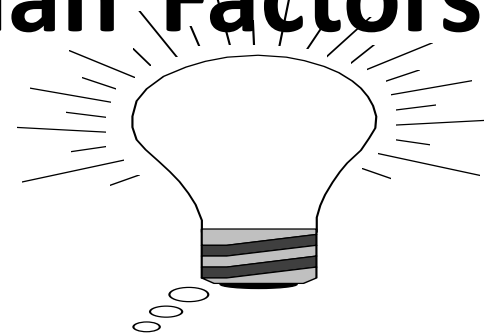
Discussion /Feed-back

Command/Leadership/Resources

Training



“United began C/L/R training in 1981, after a DC-8 ran out of fuel and crashed near Portland in the USA. In that crash, the captain repeatedly ignored crew concerns regarding the low fuel state expressed by the first officer and the flight engineer. This accident was the result of a Human Factors problem.”



WHY CRM?



“Analysis of the major accidents indicates that most of these could have been avoided had the crew taken appropriate/timely corrective action.”

“The crew failed to take correct action because certain critical information, relevant to their final decision was not made available by other crew members.”

Development of CRM (Cockpit/Crew/Company Resource Management) Concepts.

Purpose of CRM



Stop accidents.

Stop loss.

Stop injuries.

**(Avoid, Detect and
Manage Mistakes)**



Transasia ATR- 72 Accident on 04 Feb 15



- **Flight 235 took off from Taipei at 1051 h and turned right, climbed to 1350 ft. At this stage, it started turning left and losing ht & speed. At 1053 h crew declared Mayday reporting “Engine Failure”. It then turned right followed by turn to left with bank reaching 90 deg. The plane came to stop on impacting Keelung River.**
- **FDR data revealed that right engine flamed out 2 minutes after takeoff and the left engine was thereafter switched off manually.**

ATR72 Accident at Taipae Feb 15

Correct Procedure

- All actions on engine failure happen automatically. So the PM (Pilot Monitoring) simply verifies that the correct things have happened and verbalizes that to keep the PF (Pilot-Flying) in the loop,
- "right engine auto feather, left engine up trim, bleeds and packs are faulted".
- At that PF would be targeting V2 and if 100' AAL then ideally engaging the autopilot as that will hold speed spot on.
- ATR72-600's also have an auto rudder trim incorporated into the autopilot, so they are well equipped to handle the aircraft single engine.
- While PF is doing this , the PM will put out a brief radio call such as "Mayday , Mayday , Mayday, call sign, engine flameout, standby".

- **Highlights (all times in local time):**

- ***10:52:38 After climbing through 1,200 ft. master warning sounded. Engine and Warning Display (EWD) showed “ENG2 FLAME OUT AT TAKE OFF” procedures.***

- ***10:52:41 PF disengaged autopilot while the flight climbing through 1,300 ft.***

- ***10:52:43 PF announced “I will pull back engine one throttle” and PM replied “wait a second cross check”. At this moment ENG1 PLA (Power Lever Angle) record indicated a reduction from 75 deg. to 66 deg.***

- ***10:53:00 PM replied “okay engine flameout check” and continued announcing “check up trim yes auto feather yes.”***

- ***10:53:06 PF said “pull back number one” and ENG1 PLA record showed a reduction to 49 deg. Meanwhile PM said “okay now number two engine flameout confirmed.”***

- ***10:53:09 PF replied “okay” ; however ENG1 PLA remained at 49 deg. The aircraft reached its highest altitude of 1,630 ft. and started to descend at 102 knots.***

What causes a Catastrophic Accident (or a smaller accident)?



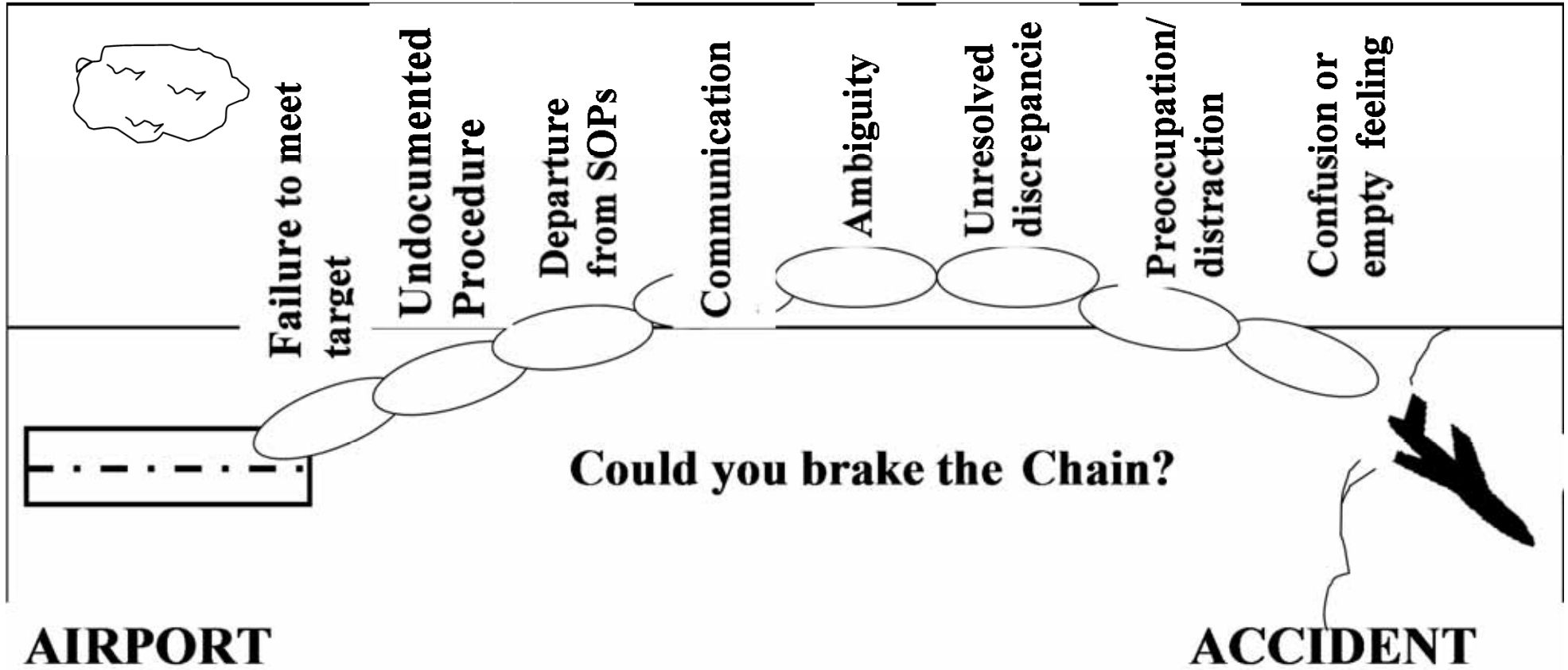


They result from lots
of **SMALL errors** with
poor timing not big
errors.



ERROR CHAIN

- **Seven to ten errors made in each flight**
- **Each error can form a link in the accident chain**
- **Forge enough links, the accident will happen**
- **Break enough links, the accident will NOT happen**



Accident Involving Ecureuil AS 350 B3 on 30 Apr 11



- **At 0936h, the heptr landed at Tawang to pick up VIP party.**
- **At 0950h, asked for start up after testing fuel, refuel 140 ltr, start up, position at 30 end and pick up VIP party (in 14 min).**
- **Picked up and landed thrice to off-load a passenger, two bags and properly close/lock the door. No passenger manifest.**
- **Sela Pass was partially visible and hill tops were covered with clouds. Crew decided to proceed via Sela Pass and not Bhutan valley, which was against company policy.**
- **At 1006h, crew reported over Sela and confirmed “Sela partially clear, break through is there.”**
- **At 1010, confirmed 15 miles clear of Sela, over to valley freq.**
- **After crossing Sela Pass crew proceeded NE side rather than SE and hit a hill top while in clouds.**
- **A case of CFIT**

NASA – TEM (Team Effectiveness Markers)



- 1. Briefings**
- 2. Acknowledgement**
- 3. Inquiry/Advocacy/Assertion**
- 4. Communication/Decisions**
- 5. Leadership/followership/concern for tasks**
- 6. Preparation/Planning/Vigilance**
- 7. Workload Distribution/Distractions Avoided**
- 8. Conflict Resolution**
- 9. Self-Critique (Debriefing)**
- 10. Interpersonal Relationships/Team Climate**

Suggested Procedure of Flight Crew Communication



- Captain, I am concerned about-----
- Captain, I am uncomfortable with-----
- Captain, I believe the situation is unsafe.
- If still no response from Captain, the First Officer is required to take over the aircraft.

Note. Flight crew should preferably address each other by first name

Error is Inevitable



We are DOOMED!!!!



How do we help ourselves?



- Inquiry
- Advocacy
- Assertion



Follow SOP!!
Any of the TEM will help

Go Around Following Unstabilised Approach

Operation Circular 15/2010



- **Subtle incapacitation is associated with non-response to particular stimuli, as the crew is deeply involved in a particular manoeuvre.**
- **To assist in identifying subtle incapacitation during an unstabilised approach, the Pilot Monitoring (PM) is to**
 - **First call – “Approach not stabilised” (By 500 ft AAL)**
 - **If no response, second call “ Go Around Captain:**
 - **Still no response from Captain, PM shall announce loudly “ My Controls Captain”, inform ATC & initiate appropriate go around procedure safely with all available automation. (Unstabilised approach not to continue below 200 ft AAL)**

Most Important Factor in CRM Training



“Indoctrination in principles of flight-deck management with particular emphasis on the merits of participative management for captain and assertiveness training for other crew members.”

RESOLVING ABNORMAL SITUATION



- **Silent Cockpits are unsafe**
- **Standard and Predictable Pattern of Communications.**
 - 1.Situational Assessment**
 - 2.Form Plan of Action**
 - 3.Share Information**
 - 4.Prioritize Tasks and Delegate**
 - 5.Re-assess Situation**

Decision-Making

For

General Aviation Crew



Considerations for Good Pilot Judgement



Good pilot judgment requires

- **Problem solving training**
- **Flight experience**
- **Risk management**
- **Mental attitude**
- **Resource management**

How you handled an in-flight problem?



- A. Used a process of elimination**
- B. Used a similar past experience**
- C. Used a step-by-step process**
- D. Made an immediate decision, without thinking**

Strategy for Handling In-flight Problems



- 1. Think through the situation**
- 2. Form accurate judgments.**
- 3. Execute the right decisions.**
- 4. Anticipate future events.**

Methods for Maintaining Situational Awareness?



- A. Scan the entire environment**
- B. Focus on specific details.**
- C. A combination of A and B.**

Problem Solving Strategy



- **Aviation Decision Model used by Some Operators:-**
 - 1. F – Collect all FACTS**
 - 2. O – Consider all OPTIONS**
 - 3. R – Evaluate RISKS for each option**
 - 4. D – Select a DECISION**
 - 5. E – EXECUTION**
 - 6. C – CROSS-CHECK**

ERROR PREDISPOSING FACTOR



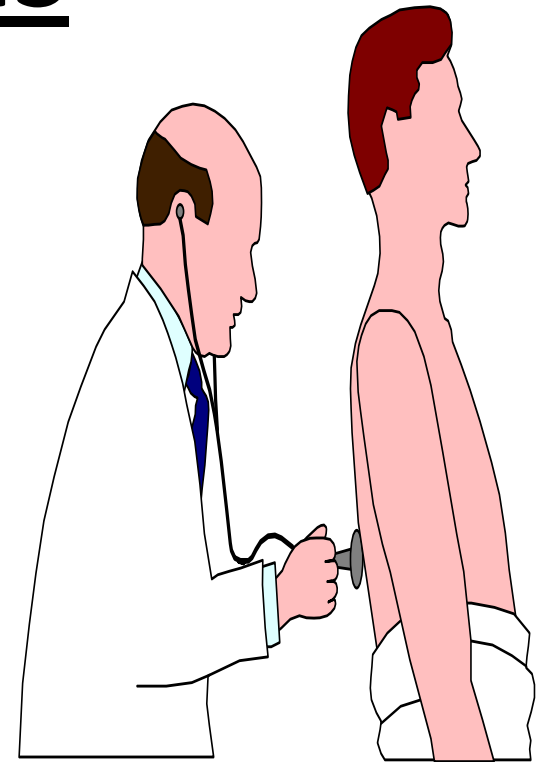
- FATIGUE
- -INADEQUATE STRESS RESISTANCE
LEADS TO CONFUSION





FATIGUE SYMPTOMS

- **Forgetful**
- **Poor Judgement**
- **Less Vigilant**
- **Slowed Reaction Time**
- **Increased Stimulus for action**



COUNTERMEASURES



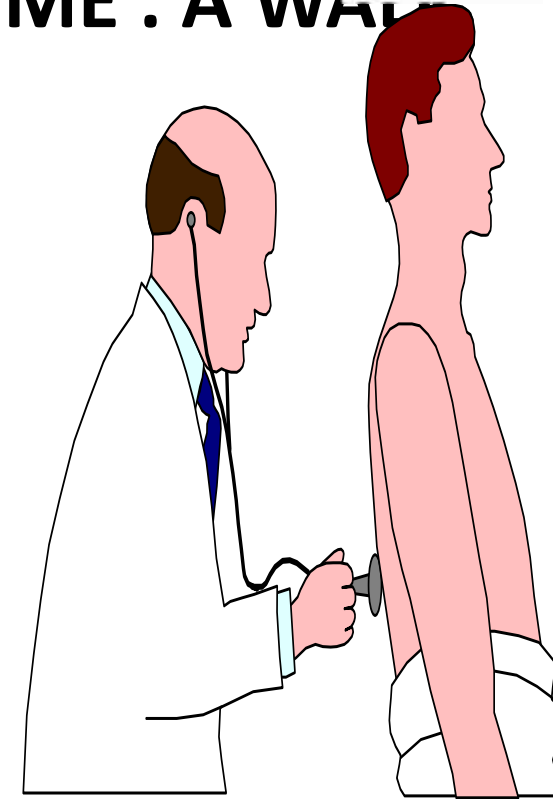
- **No Sleep Debt**
- **Pre-plan for Disruptions**
- **Proper Diet and Health**
- **Reduce Stress**
- **Good Ear Protection**
- **Restrict Use of Artificial Stimulants**



COMPENSATING SLEEP LOSS

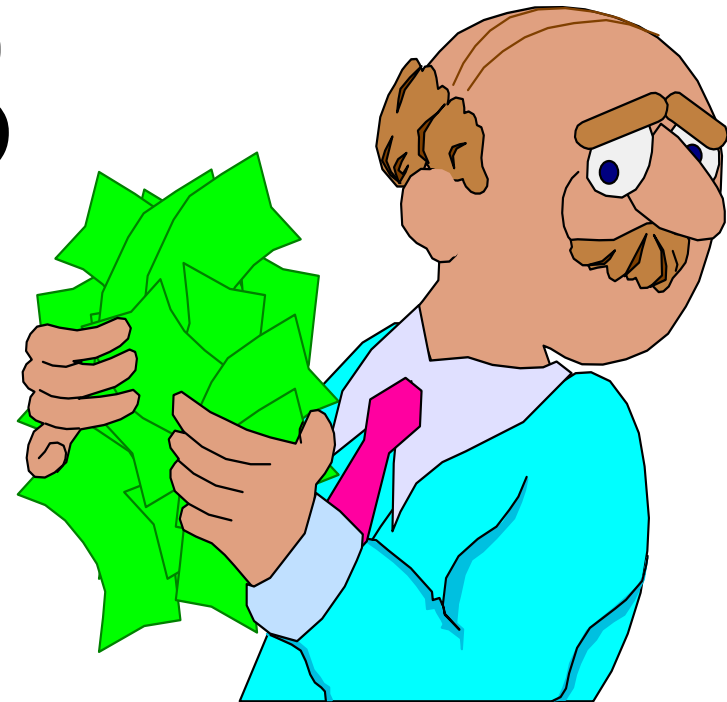


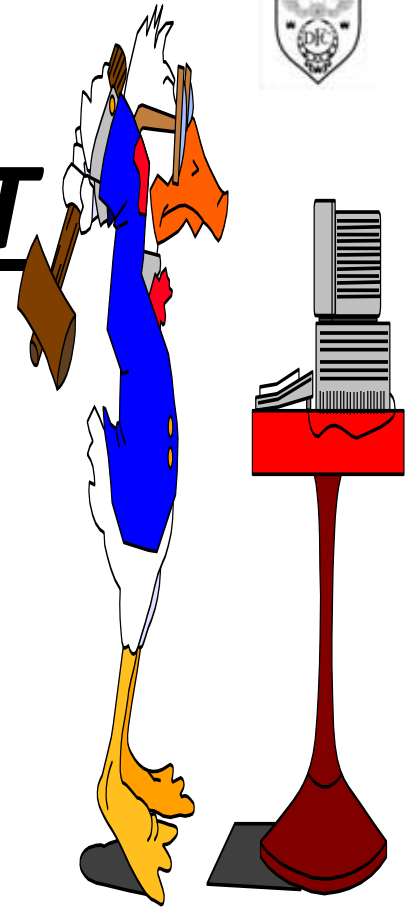
- **LIGHT MEAL TWO HOURS BEFORE BED TIME . A WATER HELPS.**
- **INCREASE FLUID INTAKE .**
- **AVOID LONG EXPOSURE TO SUN**
- **MILK IS A TENSION REDUCER**
- **AVOID ALCOHOL**
- **AVOID SMOKING**
- **REGULAR CARDIOVASCULAR EXERCISE , YOGA, MEDITATION**





STRESS
DISTORTS
OUR
DECISION MAKING

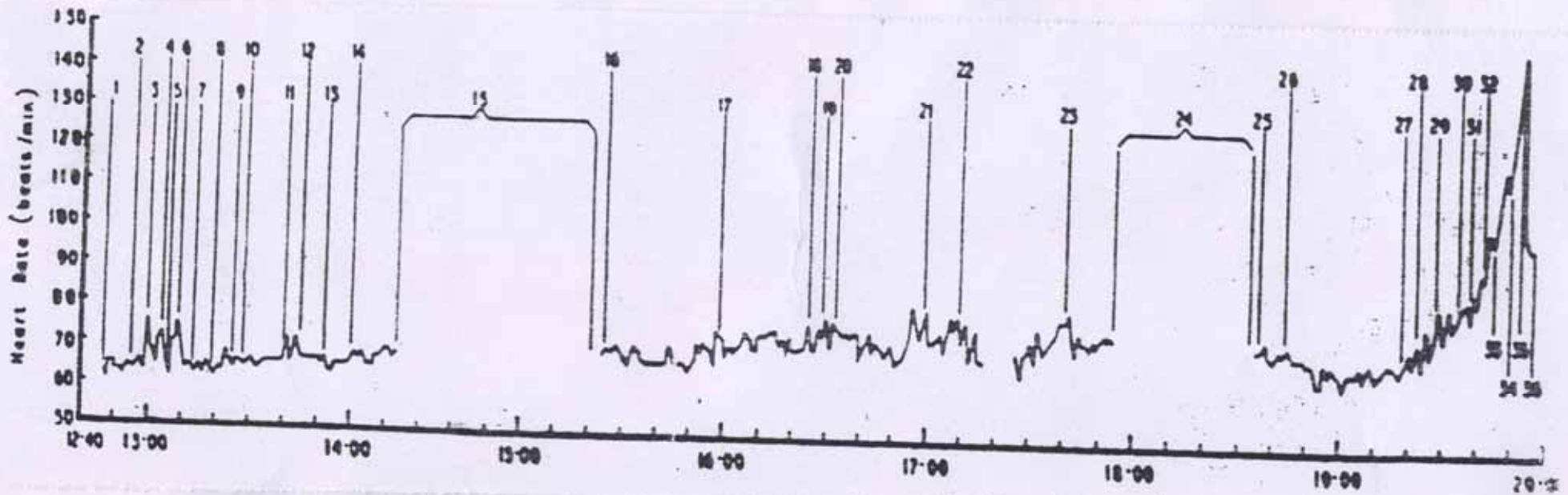




STRESS AND ITS MANAGEMENT

- **WHAT IS STRESS?**
- **NEGATIVE/ POSITIVE ASPECTS**
- **DEFINITION -PHYSIOLOGICAL RESPONSE TO PRESSURES OF DAILY WORK**

Heart rate of North Atlantic Captain taking off London, landing New York



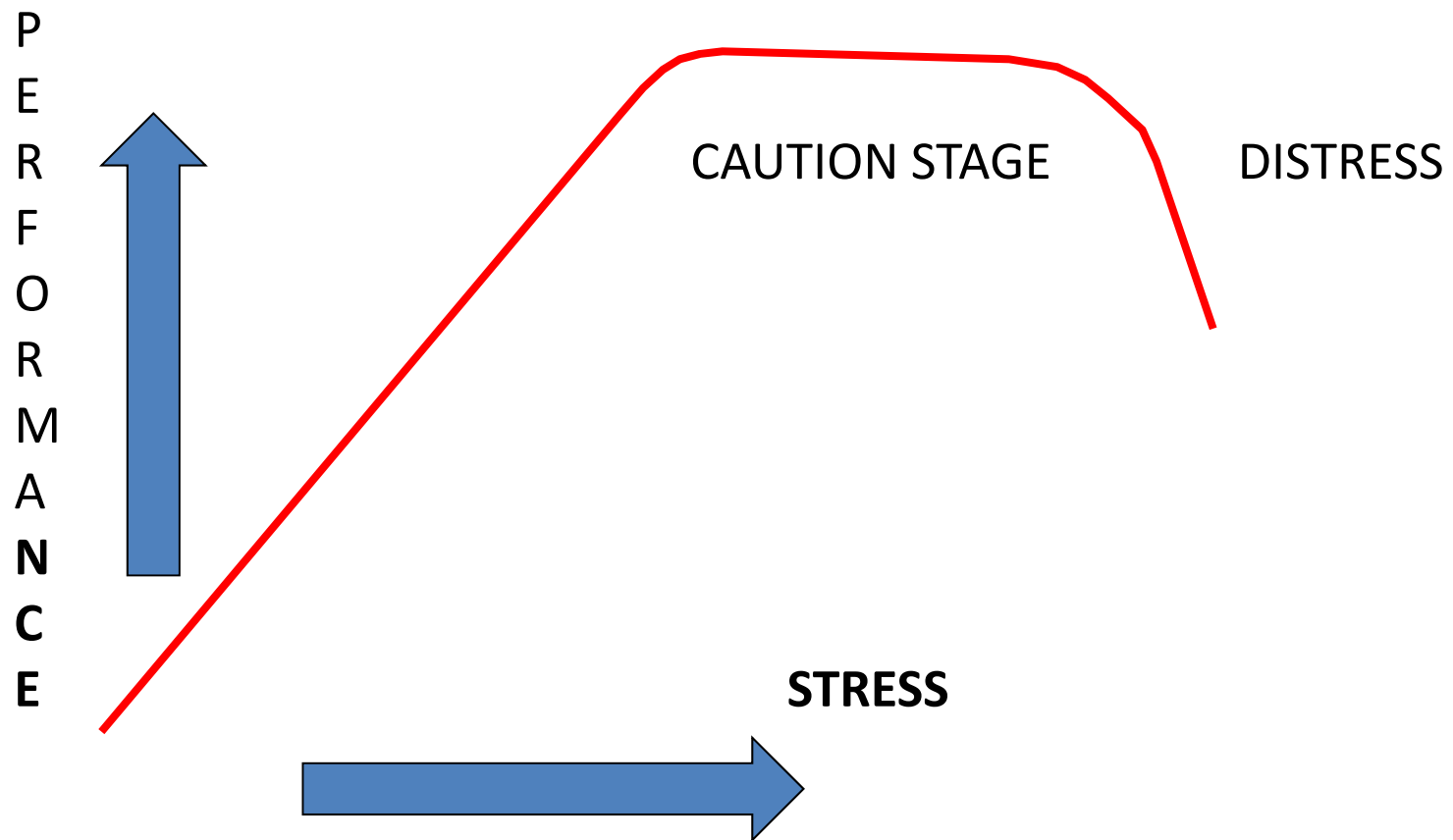
- | | | | | |
|------------------|------------------------------|-----------------------------------|----------------------|-----------------|
| 1. Door closed | 9. 26,000 feet | 17. Visitors to flight deck | 25. Tea and Sandwich | 33. 6,000 feet |
| 2. Start engines | 10. Refreshments | 18. Selcall | 26. Presque Isle | 34. On finals |
| 3. Taxi | 11. PA to passengers | 19. Captain on R/T | 27. 35,000 feet | 35. Land |
| 4. Holding point | 12. PA to passengers | 20. Tea and Sandwich | 28. PA to passengers | 36. Engines off |
| 5. Lining up | 13. Shannon | 21. First officer passes position | 29. 26,000 feet | |
| 6. Take-off | 14. 35,000 feet | 22. SCAD boundary | 30. Start decent | |
| 7. 7000 feet | 15. Captain eating | 23. On HL 562 | 31. Auto Pilot out | |
| 8. Auto Pilot in | 16. Captain passing position | 24. Captain talking | 32. 10,000 feet | |



Yerkes-Dawson Curve

BASIC LIVING /JOB STRESS

CAP. TO COPE





FIGHT/FLIGHT RESPONSE

- **BODY CHANGES DUE TO STRESS**
 - SHALLOW/ QUICK BREATHING**
 - ADDITIONAL ADRENALINE**
 - FASTER HEART BEAT**
 - HIGHER BLOOD PRESSURE**
 - TENSING OF MUSCLES**
 - SHARPENING OF ALL SENSES**



STRESS MANAGEMENT



- **AWARENESS AND ACCEPTANCE**
- **HOME/WORK LIFE COMPATIBILITY**
- **PROMOTE EMOTIONAL STABILITY**
- **AVOID FRETTING AND FUMING/ WORRY HABITS**

STRESS MANAGEMENT



- **ORGANISE/ PLAN - LIVE ONE DAY AT A TIME**
- **REGULAR EXERCISE, PHYSICAL FITNESS, RELAXATION**
- **HUMOUR**
- **POSITIVE ATTITUDE**
- **CONSUMERISM**



CRM TECHNIQUES



1. Philosophy

- Performance results from “SYNERGY”

2. Initial Planning and Briefing

- Set goals in relation to SOPs
- Set priorities
- Delegate responsibilities

3. Communication

- Mutual respect
- Authority Gradient
- Be clear and unambiguous
- Use standard phraseology and call-outs

CRM TECHNIQUES



4. Decision Making

- Analyse and review situation
- Hurry/Haste lead to poor decisions
- Make decisions with the help of crew

5. Basic Safety Concepts

- Use check-lists and adhere to SOPs
- Encourage team work
- Monitor own and others' actions
- Manage time, resist time-pressure
- Stay fit and adapt meals
- Manage stress, pay attention to your family
- Manage your sleep well



***BEST OF LUCK TO
YOU ALL AND***

HAPPY LANDINGS

