长龙航空
LOONGAIR

To Promote continuous safety with systematic thinking

—Thinking and Strategy Sharing of Loong Airlines System to Prevent CFIT

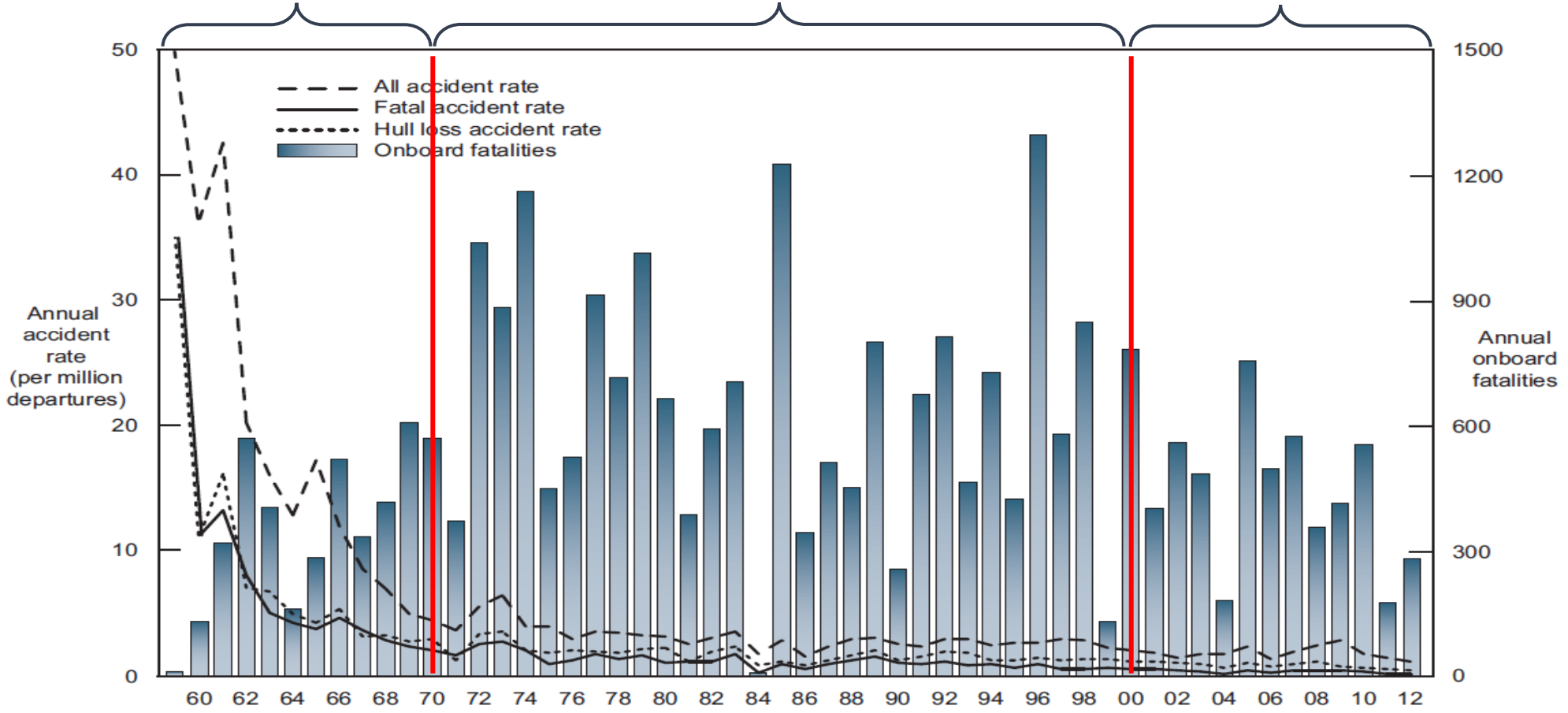
content

Human factors and system defects

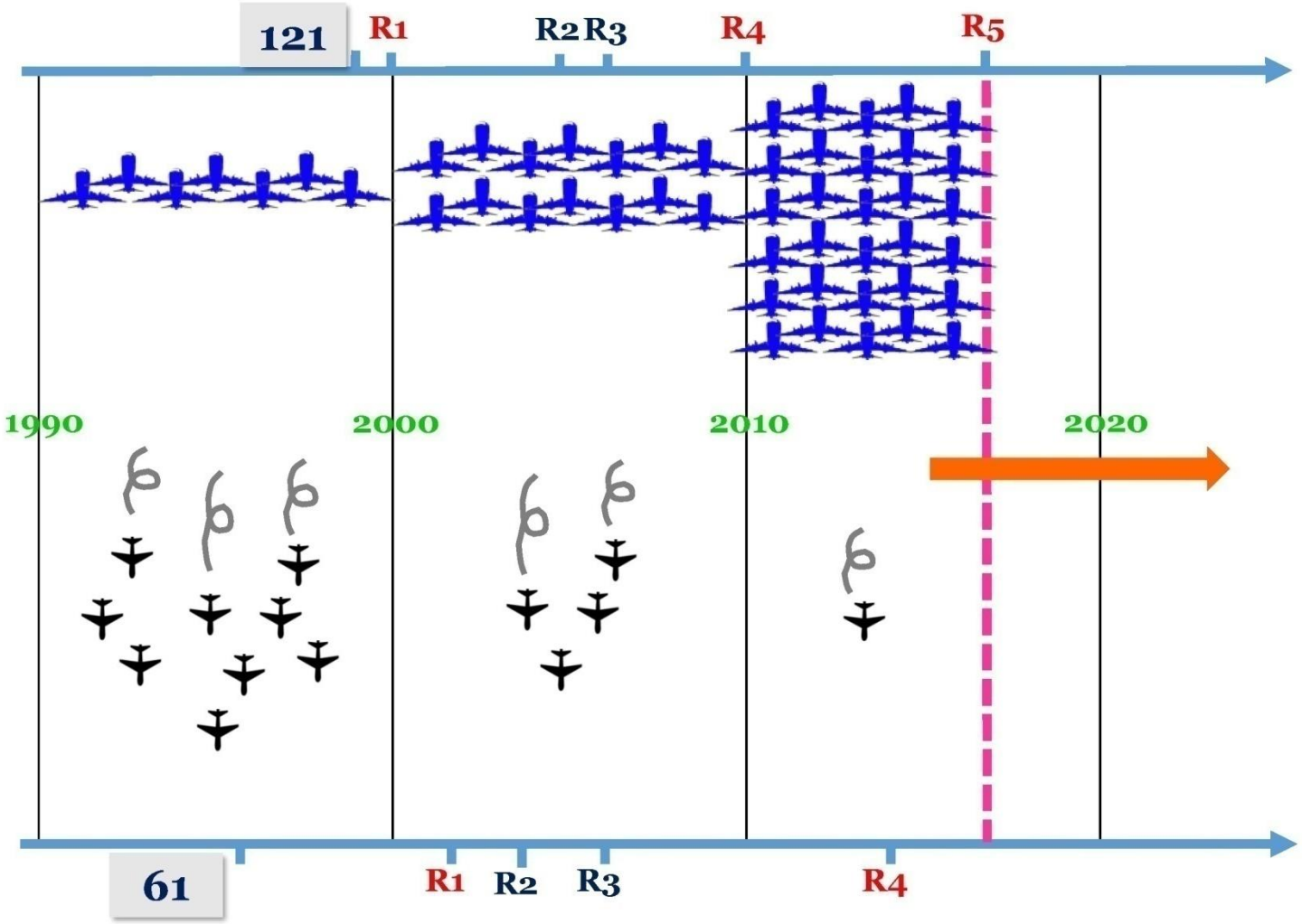
Systematic thinking to prevent CFIT risk

Decreased civil aviation accident rate

Aviation Technological improvements The establishment of laws and regulations The application of systematic thinking



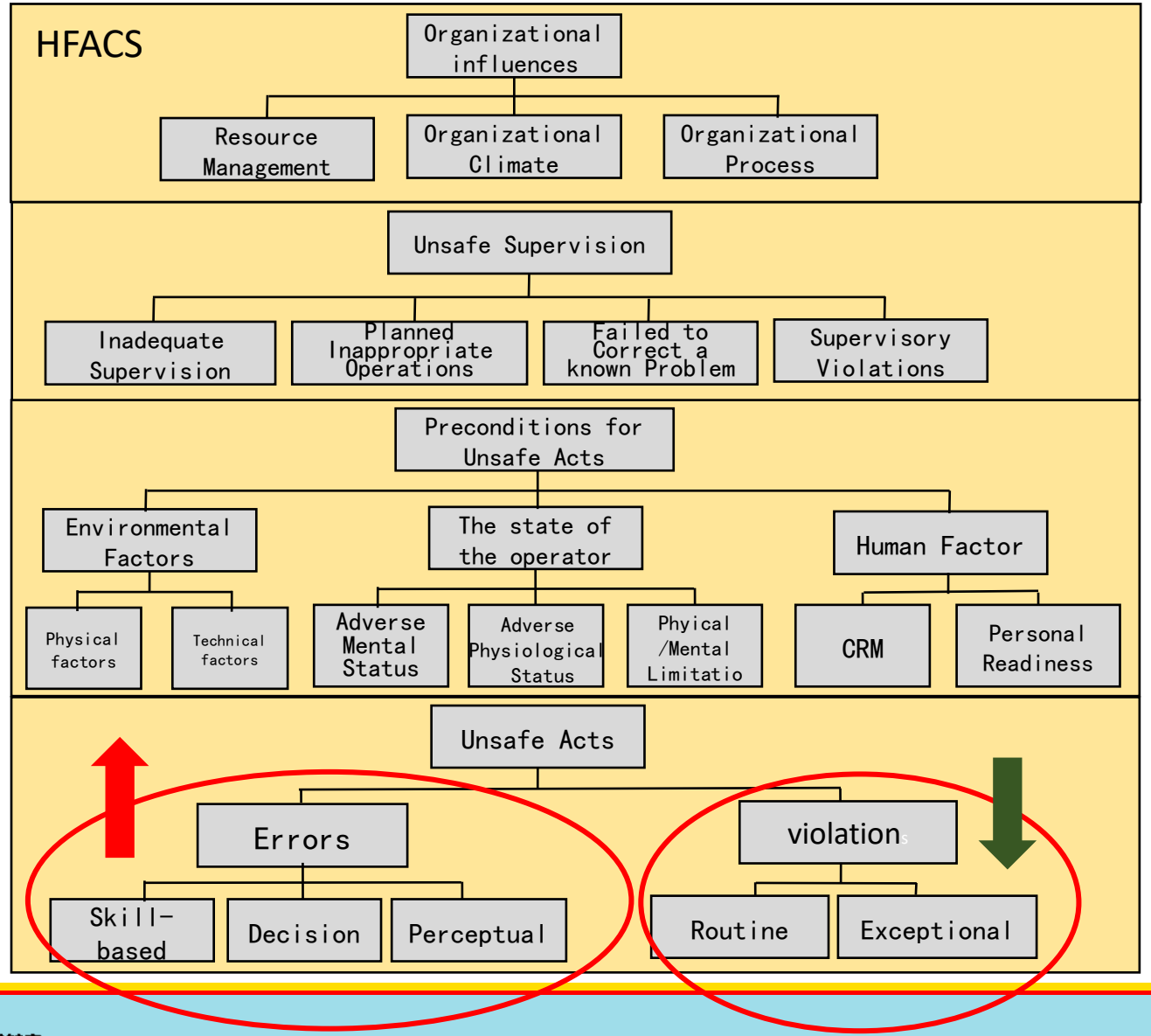
Human factors are still the focus of management



Liveware (human in the workplace) are the core of the system

But it is also the most unstable factor in the system

Focus on “ wrong, forget and leak” of human factors



- The frequency of unsafe events caused by violations was significantly reduced due to the increase of awareness of laws and regulations. However, the proportion of unsafe event caused by human negligence has increased.

Hence, how to Prevent " wrong, forget and leak “of human factor becomes the Key Point and difficulty of Civil Aviation Safety Management.

The root cause and measures of the error

Lack of knowledge

Insufficient techniques

Lack of consciousness

"Three bases" construction

Scattered ideology

Construction of working style

Organization defect

Systematic thinking

Common Organizational Defects: Potential Error Options

On March 16th, 2018, during the stop-over in Chongqing of our company's flight, the front Handset failed suddenly. During the troubleshooting process, the release engineer of Chongqing Airport and our company's technical supporting engineers incorrectly followed the "A320 release deviation guide (DDG -MEL and CDL)" MEL23-51-03A" project to release the aircraft, resulting in the fact that the aircraft did not meet the MEL release conditions.

EFB's quick search function

长龙航空 LOONGAIR A320 最低设备清单

MEL 项目
23 –通讯
23 - 51 – 音频管理

23-51-01	选择呼叫功能

适用于: ALL

23-51-01A

修复期限	安装数量	放行所需数量	是否挂牌
C	1	0	否

可以不工作。

23-51-02	吊杆耳机

适用于: ALL

23-51-02A

修复期限	安装数量	放行所需数量	是否挂牌
D	3	–	否

★在驾驶舱执行任务的机组成员，其吊杆话筒必须工作正常，任何超出以上要求的吊杆话筒可以不工作。

23-51-03	手提话筒

适用于: ALL

23-51-03A

修复期限	安装数量	放行所需数量	是否挂牌
C	3	0	是

一个或多个可以不工作，或丢失，或被拆除。

Wrong MEL Clause : MEL23-51-03A

长龙航空 LOONGAIR A320 最低设备清单

MEL 项目
23 –通讯
23-73 -客舱内话数据系统
23-73-06 -手持话筒

23-73-06-01	驾驶舱手持话筒

适用于: ALL

23-73-06-01A

修复期限	安装数量	放行所需数量	是否挂牌
C	1	0	是

可以不工作，但要求将驾驶舱音频控制面板（ACP）用作驾驶舱和客舱间的通讯。

23-73-06-02	客舱手持话筒

适用于: ALL

23-73-06-02A

修复期限	安装数量	放行所需数量	是否挂牌
C	3	2	是

(o) 一个或多个可以不工作，但要求每对客舱门处至少有一个手持话筒正常工作的。

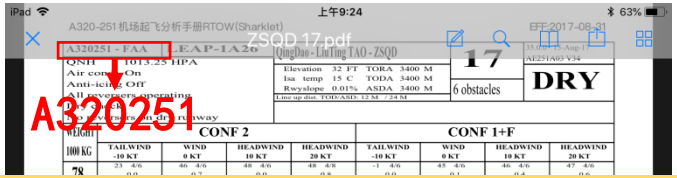
参考

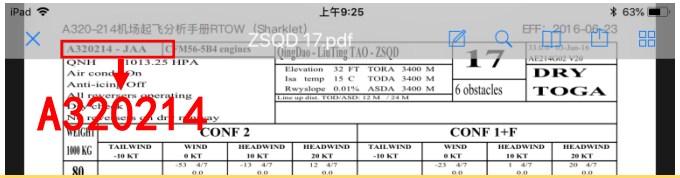
(o) *参考操作程序23-73-06-02A 客舱手持话筒*

Correct MEL Clause: MEL 23-73-06-02

Common Organizational Defects: Potential Error Options

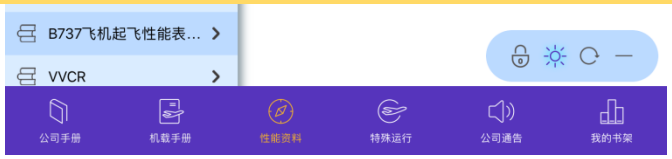
- Loong Airline is going to introduce the A320 NEO aircraft, which may confuse NEO and CEO models when querying the Regulatory Take Off Weight Chart through EFB.



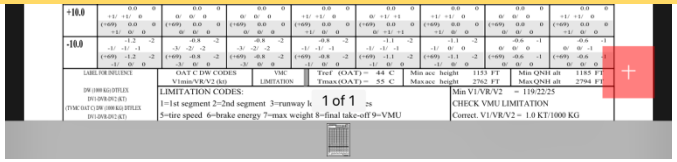


The measures of our company:

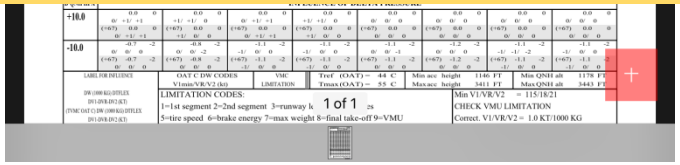
Associate the Regulatory Take Off Performance Chart in the EFB with the aircraft number so that the aircraft of the corresponding model can only see the correct one.



EFB Regulatory Take Off Performance Chart query page



A320 NEO Take Off Performance Chart



A320 CEO Take Off Performance Chart

Common Organizational Defects: Potential Error Options

A320 Cockpit

content

Human factors and system defects

Systematic thinking to prevent CFIT risk

Typical CFIT accidents recently

China Henan Airlines "8.24" Yichun air crash

Cause of the accident: crew skills

South Korean AirAsia 214 flight crash

Cause of the accident: crew skills

China Taiwan TransAsia Airways GE222 flight

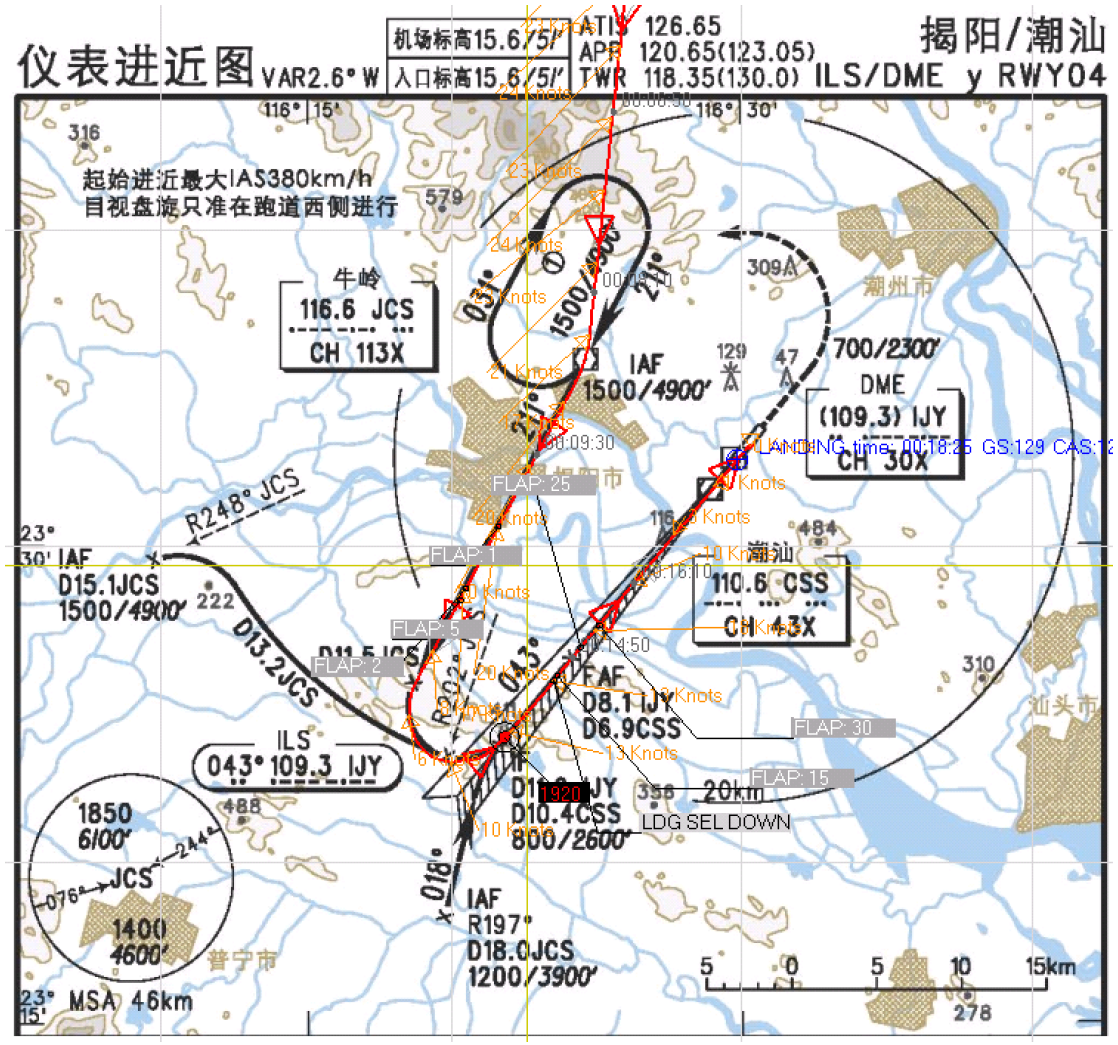
Cause of the accident: The crew turns off the engine Incorrectly

Loong Airline's CFIT risk

More than 70% of the routes operated by Loong Airlines are special airports or Plateau Airports.

- CFIT risk is one of the major safety risks of the company

Company's Case: Event Overview



The company's B737-300 Aircraft (Cargo) had three terrain warning events during the approach of No.04, at Jieyang Airport, Shantou, Guangdong, on December 20, 2017, January 11, 2018, and February 9, 2018 respectively. The QAR decoding survey showed that the flight crew did not violate the relevant flight procedures during the three warning events, and the locations where the warnings were triggered were basically the same.

Company's Case: root-cause analysis

The first warning event on December 20, 2017

- After the first Terrain Proximity Warning System event, the company immediately analyzed the QAR data of the aircraft and confirmed:

1. There is no problem with the crew operation;
2. The approach trajectory and altitude of the aircraft fully comply with the requirements of the approach procedure.

- As the result, the company believes that it may be a false alarm caused by an occasional failure of the radio altimeter, and has reported the event to the Civil Aviation Authority according to the requirements of CCAR-396.

Company's Case: root-cause analysis

The second warning event on January 11, 2018

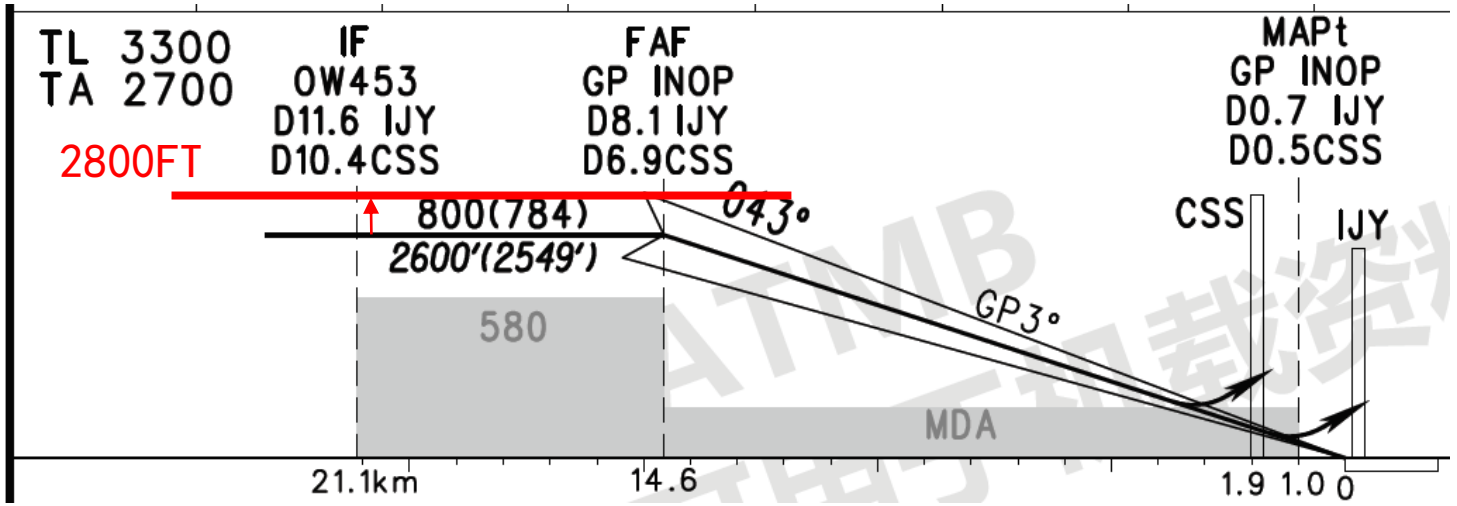
- The company conducted an in-depth investigation and analysis of the circumstances that triggered the Terrain Proximity Warning continuously at Jieyang Airport.

1. There is no problem with the crew operation.
2. The approach trajectory and altitude of the aircraft fully comply with the requirements of the approach procedure.
3. Confirm to the Jieyang Airport that there is no new obstacle near the trigger warning location;
4. Confirm to the flight program designing unit that there is no problem in the process design of the airport No. 04 runway instrument approach;
5. Technical consultation with EGPWS airborne equipment manufacturers.

- The company has identified EGPWS airborne equipment (B737-300 are outmoded aircraft) as major investigation.

Company’s Case: root-cause analysis

■ In case of failure to determine the cause of the event, in order to prevent the triggering warning and avoid the risk of CFIT, our company issued a safety notice requiring the crew to apply for an additional 200 feet on the basis of the procedural rules during the approach to the runway at Jieyang Airport No. 04. A blind drop was established in feet (the program stipulated 2,600 feet, the company required 2,800 feet) and remained at a height of 2,800 feet before 10.4 nautical miles.



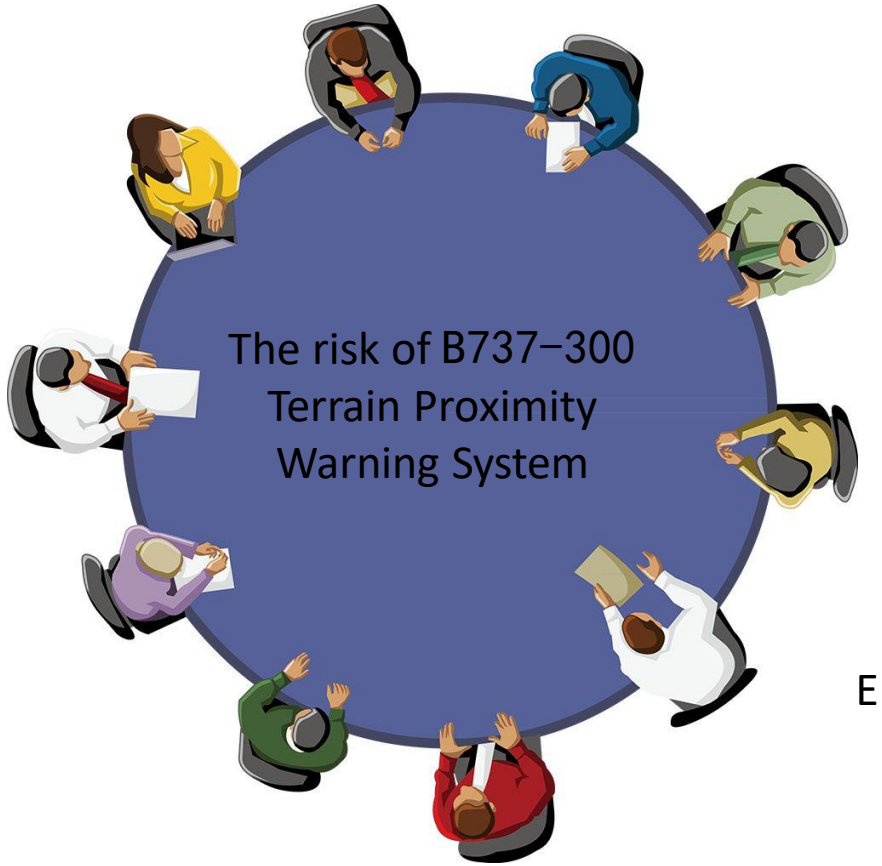
Company’s Case: root-cause analysis

The 3rd Warning Event on February 9, 2018

- While the company is still waiting for a response from the manufacturer, the third warning event occurred and it was basically the same as the previous two. However, in this event, the crew did not implement the company's risk control measures and did not apply for a blind drop of 2,800 feet. The relevant crew was penalized.
- The company once again communicated with the EGPWS airborne equipment manufacturer and received an email from the manufacturer.

1. the company A320 fleet EGPWS warning computer will not appear similar situation again;
2. The on-board EGPWS of the company's B737 fleet warned of design flaws in the computer. The main manifestation was that the trigger altitude of the Mode 2A warning was 1,250 feet, while the trigger altitude of most other models was 950 feet;
3. Airborne equipment manufacturers discovered this defect in 2005 and released SB.

Company's Case: risk control



Do you want to modify the EGPWS airborne equipment or not?

Maintenance Engineer Department

AOC

Flight Department

Safety Management Department

Holding a risk management meeting

Company's Case: risk control

Modified：
- The cost is about 700,000 $
- **950-foot warning trigger logic**

Not modified：
- Can save conversion costs
- 1250-foot warning trigger logic
- Preventing the occurrence of warnings by increasing the flight altitude

- What safety management manages is the safety risk itself, and it's not just about managing warnings!
- 1250-foot trigger warning has a higher safety margin than 950-foot trigger warning.

Company’s Case: risk control

01

Derivative risk assessment

Assessment of derivative risks from the aspects of ATC, vertical profile, programs and stabilized approach of risk control measures to improve flight altitude, and confirming that risks are controllable.

02

Similar airport combing

The company has combed all the airports and combed out 14 airports with similar risks.

03

Added risk assessment

In the new risk assessment of the B737 route, increase the EGPWS warning to focus on the assessment of the project

Systematic Thinking to Protect CFIT of Loong Airlines

- Avoid the possibility of providing wrong options from the system
- Redundancy for human error from system design
- To manage risks instead of just managing warnings
- Actively identify/report and manage risk by using SMS

summary

Human factors are specific manifestations of organizational defects

THANK YOU

Loongair wishes to work smoothly and flight safely