International Civil Aviation Organization

Regional Aviation Safety Group - Middle East

Fifth Meeting (RASG-MID/5)
(Doha, Qatar, 22-24 May 2016)

Agenda Item 3: Regional Performance Framework for Safety

MID–RAST ACTIVITIES (FOCUS AREAS AND EMERGING RISKS)

(Presented by RAST Rapporteur)

SUMMARY

This paper describes the activities and progress achieved on the implementation of SEIs and DIPs for the key safety focus areas identified by the Annual Safety Report Team (ASRT) report edition 3 , namely; Runway Safety (RS) which will be covered by separate working paper , Loss of Control In Flight (LOC-I) and Controlled Flight Into Terrain (CFIT). In addition the emerging risk in the Region identified as Focus Areas, (System/Component Failure or Malfunction (SCF), and near miss (Airprox/TCAS Alert or Loss of Separation) which if not addressed properly could lead to mid-air collisions.

Action by the meeting is at paragraph 3.

REFERENCES

- RASG-MID /4 meeting
- RSC/4 meeting

1. INTRODUCTION

1.1 The MID-RAST is one of three RASG-MID working groups, it has been established at the first meeting of the RASG–MID Steering Committee (RSC/1) held in Cairo in 18-20 June, 2012 and is responsible for identifying and developing Safety Enhancement Initiatives (SEIs) and associated DIPS for each of the three top risk areas identified by the annual safety report that includes: Controlled Flight into Terrain (CFIT); Loss of Control In-Flight (LOC-I) and Emerging Risks.

2. DISCUSSION

2.1 RASG-MID tasked the LOC-I Coordinator and the MID-RAST to coordinate with the stakeholders and develop SEI’s and related DIPs and explore the way forward to address LOC-I accidents.

2.2 The MID-RAST submitted the following safety enhancement initiatives and associated Detailed Implementation Plans (DIPs) to RASG-MID and was granted approval for the following identified data-driven risk areas:

Loss of Control In-Flight (LOC-I):

2.3 Loss of Control In-flight (LOC-I) remains one of the most significant contributors to fatal accidents in MID Region. While few in number (2 Accidents between 2010-2014), LOC-I accidents are almost always catastrophic.

2.4 3 streams have been identified through the DIPS to address the LOC-I accidents.

2.5 **1st Stream covered by RAST-MID/LOC-I/1** addresses aircraft system modification; to alert flight crew of aircraft low airspeed by installing Low airspeed alerting.

- To determine the status of MID operators with regards to provisions of Low speed alerting indications on board aircraft, IATA compiled preliminary statistical data from different sources to identify the number of operators and their fleet in MID Region, followed by consultation with the manufacturers of Boeing, Airbus, and Embraer aircraft to determine the status and provisions for low speed alerts in their fleets.

- There are 1481 aircraft registered in the MID Region of which:

  - 949 New Generation aircraft with glass cockpit having the provision of low speed alert. This figure represents 64% compliance rate.
  - 217 Classic western built aircraft representing 15 % of the total fleet in MID Region.
  - 123 Regional Jets representing 8%.
  - 124 Eastern built aircraft representing 8%, mainly in Iran, Libya and Sudan.
  - 68 Turbo Prop aircraft representing 5 %.

- The results of analysis and recommendations are included in a draft Safety Advisory at **Appendix A**.

2.6 **2nd Stream covers Crew Awareness and SOP Adherence** RAST-MID/LOC-I/2:

- A draft Safety Advisory at **Appendix B**; issued to improve flight crew adherence to SOPs and reduce the risk of lost awareness of airplane state, the airlines are requested to review, and update as needed, current SOPs for consistency with the manufacturers recommendations, focusing on completeness for all phases of flights and improved awareness and response during operations that are more prone to issues that result in high fatality risk (LOC and CIFT…). In addition airlines and regulators should ensure that their training/standardization and monitoring programs emphasize the importance of adherence to SOPs and identify the rationale behind those procedures.

3rd Stream covers Training and Workshops

2.7 IATA with the support of Boeing and Airbus held a "Loss of Control Inflight" Workshop in Dubai 3 March 2016.the Workshop was hosted by Emirates Airlines. 50 participants from 21 airlines and 2 CAAs attended the Workshop.

2.8 The Workshop aimed at raising safety awareness for accidents and incidents related to loss of control inflight and provided airlines with tools to enhance safety and develop prevention measures to address LOC-I. The main subjects covered during the Workshop include:

- An in-depth Accident Analysis report 2010 – 2014 presented. The report analyzed the 38 LOC-I accidents that occurred during the reported period, which included 37 fatal accidents and caused 1,242 out of 2541 (43% of fatalities) caused by LOC-I accidents.

- IATA has developed a Loss of Control Inflight (LOC-I) webpage to provide a single-point-of consultation where all relevant LOC-I materials will be available including IATA's program for Upset Prevention and Recovery Training (UPRT). Airlines are encouraged to consult the web site and develop UPRT program.

- A presentation provided and examined the historical role of pilots in the outcomes of specific LOC-I accidents. It then looked at the evolutionary pathways leading to LOC-I conditions, and puts the spotlight on airline organizational management, aircraft design and manufacture and the certification standards that shape the aircraft and their behavior.

- The major contributing factors for such accident types were highlighted .The role of Manufacturers and Civil Aviation Authorities in mitigating such safety risks was also discussed during the Workshop.

- Crew loss of State awareness and what mitigation measures needed to keep the pilot engaged and aware of aircraft configuration. The proficiency issues and how to keep pilots current with basic (manual) flying skills without relying on automation was also identified.

- Emirates Airlines (EK) shared their experience and challenges of developing and implementing UPRT program. EK followed the EASA model program which included prevention, recovery, recurrent training; instructor qualification and conversion programmes. During the implementation four challenges identified; information processing, Fitting it in; Doing the right thing – AURTA or what? And the Quality assurance process.

2.9 RAST-MID/LOC-I/3: ASA-Training-Flight Crew Training Verification and Validation:

- A draft Safety Advisory at **Appendix C** issued to improve flight crew proficiency in handling issues that can lead to loss of airplane State awareness (ASA). The advisory called for Air carriers to review, incorporate, and adopt the best practices recognized by the aeronautical community with regards to upset prevention and recovery training, furthermore air carriers are required to verify and validate the quality and consistency of training, with emphasis on externally provided training. This should include examining both the content and conduct of training.

2.9.1 Distributed guidance material contained in the manual on airplane upset prevention & recovery (Doc 10011) and promoted best practices to all MID operators.

Controlled Flight Into Terrain (CFIT); *RAST-MID/CFIT/1:*

2.10 The key to avoiding CFIT is diligence in maintaining situational awareness throughout flight, and using the appropriate tools to do so. The implementation of BPN approach procedures to all runways not currently served by precision approach procedures would enhance safety of flight operations and reduce the risk of CFIT.

2.11 PBN procedures have been implemented/(or in final approval) on three runways included in priority list; namely OMRK 16/34 ;ORMM 14/32 and ORNI 10. The remaining runways and progress of implementation is being monitored by PBN TF.

2.12 IATA conducted Workshops on runway safety for flight crew and safety staff of two Mid Operators (RJ & MEA).

2.13 The status of progress achieved on DIPs (RAST-MID/LOC-I/2; RAST-MID/LOC-I 2, RAST-MID/LOC-I/3and RAST-MID/CFIT/1) is at **Appendix D**.

2.14 The Emerging Risks Area identified include the In-Flight-Damage (IFD), which is related to related to Wildlife and FOD as contributing factors will be addressed by the RGS WG.

2.15 The other identified emerging risks area is related to System/Component Failure or Malfunction (SCF) and Near Mid-air Collision (NMAC). No progress achieved of this activity. The RAST rapporteur was informed that the champion for the emerging risks is no longer involved in safety matters.

2.16 During the last RSC/4 meeting it was agreed that Boeing will be the champion for the SCF with the support of IATA and ICAO. Boeing will coordinate with Airbus and Embraer to provide data and guidance related to SCF.

2.17 The current success of the work programme developed by the MID-RAST is slow. In order to ensure the success and expedite implementation of DIP activities, active participation by all stakeholders is needed.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) encourage State and industry stakeholders to actively participate and provide additional resources by assigning experts to assist MID-RAST;

b) note the Detailed Implementation Plans (DIPs) status and time lines in the **Appendix D**; and

c) endorse Safety Advisories in **Appendices A, B and C**.

APPENDIX A

RASG-MID SAFETY ADVISORY – 09

(RSA-09)

May 2016

MID-Region

Airplane States Awareness (ASA) – Low Speed Alerting

Date of Issue:	May 2016
Revision No:	First Edition
Document Ref. No.:	RASG-MID/MIDRAST/LOC-I/1

Owner:	RASG-MID

Disclaimer

This document has been compiled by members of the aviation industry to provide guidance for air operators and other stakeholders to have low airspeed systems that alerts flight crews when airplane reaches its minimum maneuvering speed in order to reduce the risk of Loss of Control In-flight (LOC-I) accidents. It is not intended to supersede or replace existing materials produced by the National Regulator or in ICAO SARPs. The distribution or publication of this document does not prejudice the National Regulator's ability to enforce existing National regulations. To the extent of any inconsistency between this document and the National/International regulations, standards, recommendations or advisory publications, the content of the National/International regulations, standards, recommendations and advisory publications shall prevail.

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Airplane States Awareness (ASA) – Low Speed Alerting

1. INTRODUCTION

1.1 A CAST study of 18 loss-of-control accidents and incidents showed that, in many situations, the flight crew failed to properly respond to and recover with how they had been trained from an unexpected upset, approach to stall, or stall situation resulting from flight crew loss of Airplane State Awareness (ASA).

1.2 The purpose of flight crew alerts on airplanes is to attract the attention of the Flight crew and to inform them of specific abnormal airplane system conditions or certain abnormal operational events that require their awareness, and, in modern alerting systems, to advise them of possible actions to address these conditions.

1.3 The purpose of this Safety Advisory is to reduce the risk of loss-of-control accidents by having low airspeed systems that alerts flight crews when airplane reaches its minimum maneuvering speed.

2. DESCRIPTION

2.1 Loss of Control In-flight (LOC-I) refers to accidents in which the flight crew was unable to maintain control of the aircraft in flight, resulting in an unrecoverable deviation from the intended flight path. LOC-I can result from engine failures, icing, stalls or other circumstances that interfere with the ability of the flight crew to control the motion of the aircraft. It is one of the most complex accident categories, involving numerous contributing factors that act individually or, more often, in combination.

2.2 Loss of Control In-flight was identified as a high risk category for MID Region to be addressed within the framework of RASG-MID due to its high non-survivability. One of the precursors for Loss of Control – In-flight was identified as low airspeed alert.

2.3 To improve flight crew awareness of low airspeed, manufacturers should develop and regulators should ensure implementation of systems that alerts flight crews when airplane reaches its minimum maneuvering speed.

2.4 On airplanes with no flight envelope protection, in order to improve early flight crew awareness of decreasing energy State, manufacturers should develop and implement multisensory low speed alert at the caution level in existing airplanes, as practical and feasible.

2.5 IATA consulted with manufacturers of Boeing, Airbus, Embraer and Bombardier aircraft to determine the status of their fleet with regards to low airspeed alert.

Boeing Fleet

2.6 Low airspeed alerting is basic on the 787, 777, 747-8, 767-400 {with the Large Format Display Systems (LFDS)} and 747-400.

2.7 It is an option on the 737-600/700/800/900 and there is a service bulletin available (SB 737-34A2292). The SB adds an aural Caution ("AIRSPEED LOW") from EGPWS to the amber visual indications (box around airspeed flashes amber) on the Primary Flight Display (PFD).

2.8 It is not basic, not an option, and no service bulletin is available for the 757, 727, MD-90, MD-80, 737-100/200/300/400/500 or the 767 airplanes (with the exceptions noted above).

Airbus Fleet

2.9 Low airspeed alerting is basic on the Fly by Wire aircraft (A320 family, A330, A340, A350 and A380). The Flight Envelop Protections implemented in these aircraft have been judged as compliant with the new requirements. Furthermore, these aircraft are already fitted with a "Speed, Speed, Speed" aural alert based on the energy of the aircraft.

2.10 It is not basic on Non Fly by Wire aircraft (A300 & A310). The discussions with the FAA are ongoing to determine if the current design of these aircraft (in particular the aircraft with alpha-floor function capability) is compliant with the new requirements.

Embraer Fleet

2.11 EMBRAER 170/175/190/195:
No Low Speed Alert available, either factory-original or via SB. Stall protection is provided first by a stick shaker, and then by alpha protection (through fly-by-wire system), both based on angle-of-attack and not purely airspeed. These features are factory-original and equip all aircraft delivered.

2.12 ERJ 135/140/145:
No Low Speed Alert available, either factory-original or via SB. Stall protection is provided first by a stick shaker, and then by a stick pusher, both based on angle-of-attack and not purely airspeed. These features are factory-original and equip all aircraft delivered.

Bombardier Fleet, ATR Fleet, Eastern Built Aircraft

2.13 No data available.

2.14 IATA compiled preliminary statistical data from different sources to identify the number of operators and their fleet in MID Region. The attached table "MID States Airlines & Fleet tracking sheet" outlines the breakdown of the airlines and the number of aircraft in Middle East based carriers including the non-IATA members. The table shows that there are 1481 aircraft registered in the MID Region of which:

- 949 New Generation aircraft with glass cockpit having the provision of low speed alert .This figure represents **64% compliance** rate.
- 217 Classic western built aircraft representing 15 % of the total fleet in Mid Region.
- 123 Regional Jets representing 8%.
- 124 Eastern built aircraft representing 8%,
- 68 Turbo Prop aircraft representing 5 %.

3. RECOMMENDED ACTION

3.1 Operators to incorporate existing service bulletins from manufacturers that provides low speed alert functionality.

3.2 States' to review and verify the registered operators and their fleet provided in the table "MID States Airlines & Fleet Tracking Sheet" and provide IATA with feedback to continue with the DIP milestones.

3.3 IATA will track implementation of its member airlines and report progress to MID-RAST.

References:

RAST-MID/LOC-1/1
FAA AC 25.1322-1; Flight crew alerting

APPENDIX B

RASG-MID SAFETY ADVISORY – 07

(RSA-07)

May 2016

MID-Region

Standard Operating Procedures Effectiveness and Adherence

Date of Issue:	May 2016
Revision No:	First Edition
Document Ref. No.:	RASG-MID/MIDRAST/LOC-I/2

Owner:	RASG-MID

Disclaimer

This document has been compiled by members of the aviation industry to provide guidance for air operators and other stakeholders on Standard Operating Procedures (SOPs) in order to reduce the risk of Loss of Control In-flight (LOC-I) accidents. It is not intended to supersede or replace existing materials produced by the National Regulator or in ICAO SARPs. The distribution or publication of this document does not prejudice the National Regulator's ability to enforce existing National regulations. To the extent of any inconsistency between this document and the National/International regulations, standards, recommendations or advisory publications, the content of the National/International regulations, standards, recommendations and advisory publications shall prevail.

Regional Safety Advisory

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STANDARD OPERATING PROCEDURES
EFFECTIVENESS AND ADHERENCE

1. INTRODUCTION

1.1 The purpose of this RASG-MID Safety Advisory (SA) is to ensure that all airline operators publish and enforce clear, concise and accurate flight crew Standard Operating Procedures (SOPs) to reduce the risk of LOC-I accidents.

1.2 In a Commercial Aviation Safety Team (CAST) study of 18 LOC-I accidents and incidents, insufficient adherence to SOPs was a factor in 15 events.

1.3 The Commercial Aviation Safety Team (CAST) was founded in 1998 with a goal to reduce the commercial aviation fatality rate in the United States by 80 percent by 2007. To achieve this goal, the CAST developed and started implementing a comprehensive Safety Enhancement Plan. By 2007, CAST was able to report that, by implementing the most promising safety enhancements, the fatality rate of commercial air travel in the United States was reduced by 83 percent. CAST continues to develop, evaluate and add Safety Enhancements to the CAST Plan for continuing accident rate reduction.

2. DESCRIPTION

2.1 Many aviation safety organizations including the FAA have recently reaffirmed the importance of SOPs. For many years the National Transportation Safety Board (NTSB) has identified deficiencies in standard operating procedures as contributing causal factors in aviation accidents. Among the most commonly cited deficiencies involving flight crews has been **their non-compliance** with established procedures; another has been the **non-existence of established procedures** in some manuals used by flight crews.

2.2 In general, effective SOPs are the product of healthy collaboration among managers and flight operations people, including flight crews. A safety culture promoting continuous feedback from flight crews and others, and continuous revision by the collaborators distinguishes effective SOPs at airlines.

2.3 To improve flight crew adherence to SOPs and reduce the risk of lost awareness of airplane state, airline operators should:

1. Review, and update as needed, current SOPs for consistency with the manufacturers recommendations , focusing on completeness for all phases of flights and improved awareness and response during operations that are more prone to issues that result in high fatality risk (e.g. rushed and/or un-stabilized approaches, go-arounds, transfer of control, automation interaction, pilot flying/pilot monitoring duties).

2. Consult with manufacturers to check that SOPs are consistent with current manufacturer recommendations with regards to LOC-I

3. Review SOPs for compatibility with the most current ATC procedures, paying attention to airports where data show higher rates of un-stabilized approach or excessive bank angles.

4. Develop training programs to provide pilots with rationale for SOPs, focusing on those with lower adherence rates.

5. Airlines/operators and regulators should ensure that their training/standardization and monitoring programs emphasize the importance of adherence to SOPs and identify the rationale behind those procedures.

6. Airlines/operators should implement Flight Operational Quality Assurance (FOQA) programs to identify systemic procedural deviations and unsafe trend.

7. Airlines/operators incorporate processes to periodically review and update SOPs, other policies, and training based on results of monitoring programs for SOP adherence.

2.4 This Safety Advisory identifies the above broad topics that should be addressed in Standard Operating Procedures effectiveness and adherence. Only a specific air operator and the respective airplane manufacturer know what is best for particular circumstances.

References:

FAA Advisory Circular (AC) 120–71A, Standard Operating Procedures for Flight Deck Crewmembers
CAST Plan (located on Skybrary: http://www.skybrary.aero/index.php/Portal:CAST_SE_Plan)
CAST Safety Enhancement (SE) 2 — Standard Operating Procedures
CAST SE 11 – Crew Resource Management Training
CAST SE 26 – Policies and Procedures - Standard Operating Procedures (SOPs)
CAST SE 60 – Pilot Training – One Project: SOPs, CRM
FAA Order 7110.65, Air Traffic Control

APPENDIX C

RASG-MID SAFETY ADVISORY – 08

(RSA-08)

May 2016

MID-Region

Airplane States Awareness (ASA) – Training –Flight Crew training (Approach to stall & Up set recovery) Verification and Validation

Date of Issue:	May 2016
Revision No:	First Edition
Document Ref. No.:	RASG-MID/MIDRAST/LOC-I/3

Owner:	RASG-MID

Disclaimer

This document has been compiled by members of the aviation industry to provide guidance for air operators and other stakeholders to conduct effective upset prevention and recovery training, including approach-to-stall, in realistic scenarios, using qualified flight simulator training devices in order to reduce the risk of Loss of Control In-flight (LOC-I) accidents. It is not intended to supersede or replace existing materials produced by the National Regulator or in ICAO SARPs. The distribution or publication of this document does not prejudice the National Regulator's ability to enforce existing National regulations. To the extent of any inconsistency between this document and the National/International regulations, standards, recommendations or advisory publications, the content of the National/International regulations, standards, recommendations and advisory publications shall prevail.

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2. DESCRIPTION 4

AIRPLANE STATES AWARENESS (ASA) – TRAINING –FLIGHT CREW TRAINING (APPROACH TO STALL & UP SET RECOVERY) VERIFICATION AND VALIDATION

1. INTRODUCTION

1.1 A CAST study of 18 LOC-I accidents and incidents showed that, in many situations, the flight crew failed to properly respond to and recover with how they had been trained from an unexpected upset, approach to stall, or stall situation resulting from flight crew loss of Airplane State Awareness (ASA). In some of these events, a review of the accident report indicated proficiency issues with the pilot even after checking and qualification, particularly when training had been provided by an external training organization.

1.2 The purpose of this Safety Advisory is to reduce the risk of LOC-I accidents by having Air Carriers conduct effective upset prevention and recovery training, including approach-to-stall, in realistic scenarios, using qualified flight simulator training devices.

2. DESCRIPTION

2.1 To improve flight crew proficiency in handling issues that can lead to loss of Airplane State Awareness (ASA). Air carriers should review, incorporate, and adopt the best practices recognized by the aeronautical community with regards to upset prevention and recovery training, including the following:

a) Qualification of flight simulation training devices to satisfactorily represent aircraft characteristics for proposed scenarios. Air carriers should coordinate with airplane and simulator manufacturers to ensure that training devices satisfactorily represent aircraft characteristics for proposed scenarios.

b) Approach-to-stall training in realistic scenarios. (i.e., up to the stall warning activation):

i. approach-to-stall with the autopilot engaged (including auto-throttles disengaged, inoperative or not installed), with emphasis on the effect of autopilot trim/auto-trim and combinations of auto-flight modes that can lead to low energy state (e.g., use of vertical speed modes in climb near the airplane's performance ceiling);

ii. a demonstration of recognition and recovery from initial improper response to approach-to-stall;

iii. high-altitude approach-to-stall (service ceiling for the weight) to include recognition of low and high speed buffet, performance capabilities of the engines and flight control sensitivity;

iv. low-altitude approach-to-stall (terrain critical) and recovery with ground proximity warning system (GWPS) alerts; and

v. air data system failures that can present as, or lead to, stall.

c) Upset prevention and recovery training (UPRT) realistic scenarios including but not limited to:

i. Upsets encountered with and without auto-flight engaged;

ii. Upsets occurring in instrument meteorological conditions (IMC); and in VMC with no external reference (e.g. taking-off at night over the sea/unlighted terrain)

iii. Sub-threshold roll (imperceptible roll rate) in IMC;

iv. Pilot-induced upsets; and

v. Air data system failures (e.g., unreliable airspeed), with emphasis on subtle or intermittent types of failures that can be particularly difficult to recognize or diagnose.

2.2 Air carriers should verify and validate the quality and consistency of training, with emphasis on externally provided training. This should include examining both the content and conduct of training. Training verification and validation should include improving surveillance of and communication with third-party training providers. To accomplish this, air carriers should:

a) implement a process to ensure their aircrew training program, including any externally provided training, is consistent with current airline and manufacturer policy and procedures.

b) implement a process to validate the qualification and currency of trainers, including third-party training providers.

c) validate contractor training by periodically observing training and/or checking events and auditing records to ensure consistency of aircrew training and pilot proficiency.

References:
CAST SEI 95
FAA Order 8900.1
FAA Information for Operators InFO 13003

APPENDIX D

28 /05/2016

LOC-I & CIFT DIPs Status

DIP	Description	Output	Deadline	Status	Comments
LOC-I/1	Airplane State Awareness (ASA)-Low Airspeed Alerting	1. Consulted with airframe manufacturers on status of mod on aircraft. 2. Track implementation	29 Sept.2016	1 & 2 Completed On going	Draft Safety Advisory issued
LOC-I/2	Standard Operating Procedures effectiveness and adherence	1. Ensure Air Carriers SOPs updated. 2. Assessments by air carriers to determine level of adherence current SOP	31 Jan. 2016 31 March 2017	Completed On going	Draft Safety Advisory issued
LOC-I/3	ASA-Training-Flight Crew Training Verification and Validation	1. IATA to organize a seminar to promote and roll-out LOC-I programme 2. Air carrier standard operating procedures (SOP) reviewed, and updated as needed,	30 June 2016 31 July 2018	Seminar postponed On going	1. Seminar organized on 3rd March 2016 in Dubai 2. Draft Safety Advisory issued 3. Provided advanced maneuvers manual to MENA air operators
CIFIT/1	The implementation of BPN Approach procedures to all runways not currently served by precision approach procedures	1. Identify and prioritize the airports/runways which require specific PBN approaches. 2. Concerned States, CANSO, IATA and ICAO to establish a Work Force to develop an appropriate detailed action plan for the implementation of PBN approaches at the identified airports/runways. 3. Implementation of PBN approach procedures at the identified airports /runways in accordance with their associated action plans.	Long Term	1.Completed 2.on going 3. on going	**Runway priorities** 1. OMRK. Completed. Published with effective AIRAC 05/2016 28 April 2016. 2. OIMM 13 3. OISS 11 /29 4. HEBA 14 5. ORMM 14/32 (in progress) 6. ORNI 10 (in progress)

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