Improving SMS – Lessons learnt from Metroliner Trim Runaway

Presented by Dennis Hill

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AVIATION AUDITORS

Introduction

- Dennis Hill
  - Owner Aviation Auditors & Aviation Educators
  - Commercial Pilots Licence
  - Instructor rating
  - Diploma Audio Engineering
  - Graduate Certificate Aviation Safety and Risk Management
  - Graduate Diploma Accident Investigation - Aviation
  - Principal Auditor
  - Contracted Quality & Safety Manager for CASR Part 145 MRO’s

Aim of today

Case Study: Metroliner Trim Runaway

SMS Limitations: Influencing change

SMS Bubble: Limited to the organisation

Improving safety beyond the organisation itself, beyond the SMS Bubble.

Context

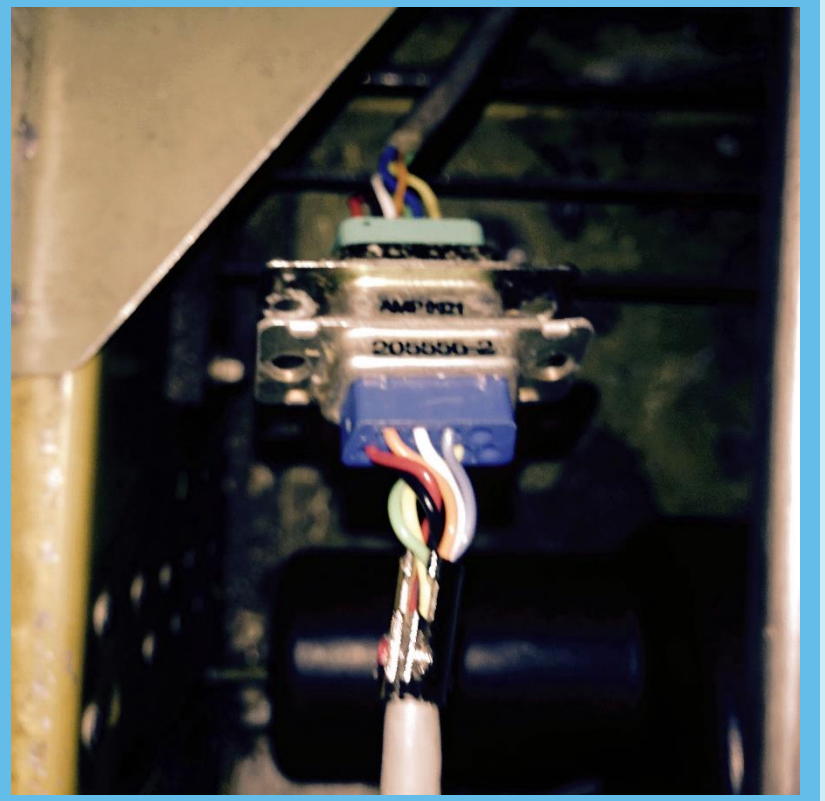
- The Organisation is no longer in operation
- Was an Aerial Work AOC
- Had its own CASR 145 MRO
- Mixed fleet of Metro aircraft, AC, DC, CC
- Experienced one accident
- Experiencing around 34 SMS reports monthly

The Incident

- Late 2014
- Routine flight, freight only, single pilot
- Auto pilot engaged ALT HOLD, resulted in trim down runaway
- Trim was operating in reverse sense

The Investigation

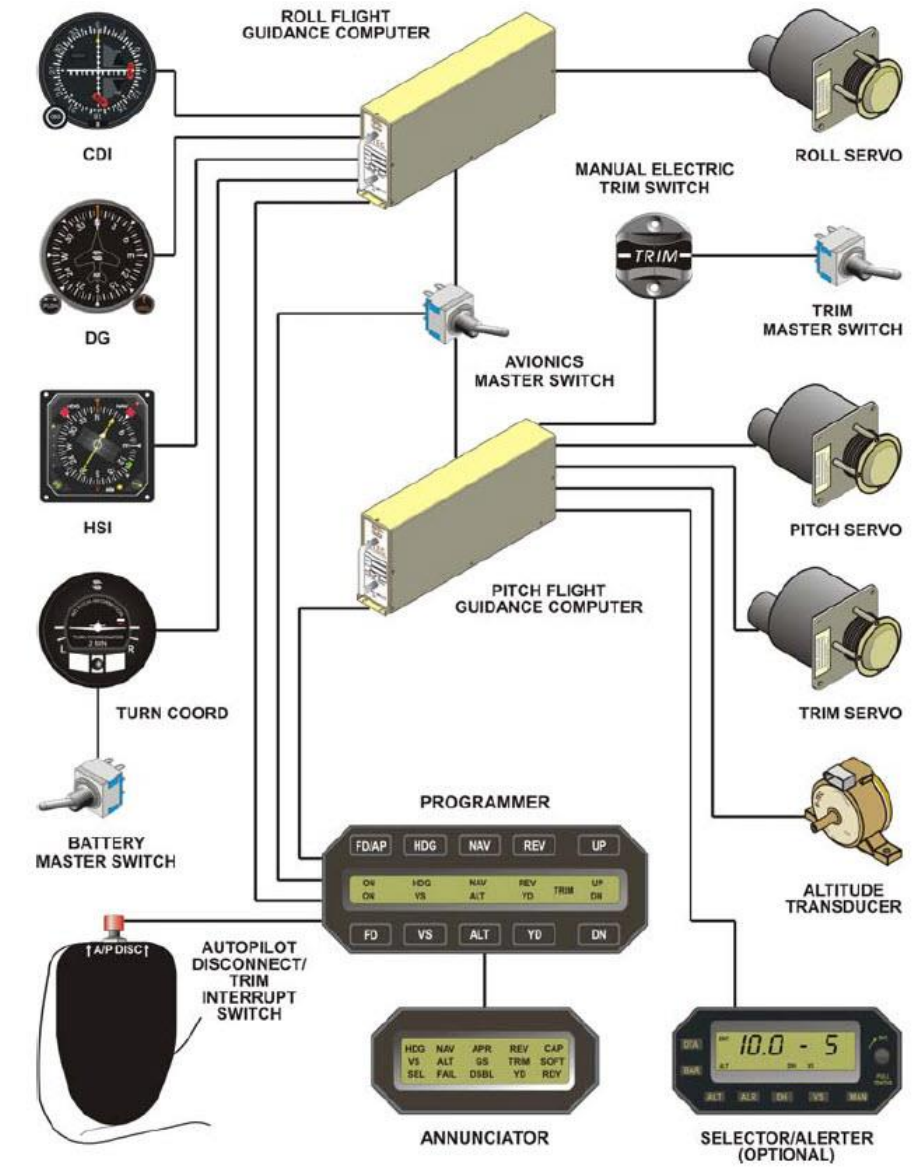
- Investigated in accordance with SMS
- Pitch servo had been replaced in previous maintenance visit
- Pitch servo found to be operating in reverse sense



Installation instructions

The servo actuator is supplied from the factory with the clutch set at 5in lbs or less, and wired to cause the capstan to rotate in a **counter-clockwise direction**, when system voltage is applied to Pin 3, and Ground to Pin 4 of the **servo connector**. Prior to installation in the aircraft, the servo clutch must be adjusted and the direction of rotation established as called out below.

Note: If the servo direction needs to be reversed from CCW to CW, reverse the corresponding wires on the servo connector.


ROLL FLIGHT GUIDANCE COMPUTER
CDI
DG
HSI
TURN COORD
BATTERY MASTER SWITCH
AUTOPILOT DISCONNECT/ TRIM INTERRUPT SWITCH
A/P DISC
ROLL SERVO
MANUAL ELECTRIC TRIM SWITCH
TRIM
TRIM MASTER SWITCH
AVIONICS MASTER SWITCH
PITCH SERVO
PITCH FLIGHT GUIDANCE COMPUTER
TRIM SERVO
ALTITUDE TRANSDUCER
PROGRAMMER
FD/AP
HDG
NAV
REV
UP
FD
VS
ALT
YD
DN
ANNUNCIATOR
SELECTOR/ALERTER (OPTIONAL)

Investigation findings

- Servo overhauled in Australia – Not the OEM
- Overhauled iaw Engineering Order
- OEM restricted access to technical data
- EO does not require rotation direction test
- Release of component in a condition that does not meet the technical data requirements
- Servo can be used on large range of installation, Citations, Metro, Chieftans etc

Investigation findings

- Restriction of access to data by OEM
- No post installation test of autopilot (65 step process)
- Installation manual was not up to date
- Current data requires aircraft wiring to be changed to change rotation

OEM data

- ICA allowed wiring change for 20 years
- When OEM changed tech data to aircraft side wiring, no communication to say so
- Revision status in document: Revised Pitch Servo Installation per drawing # 76771

Problems

- Repeatable incident
- Servos still being released without rotation direction verification
- Could have been SIL, or SB by OEM
- Could have been an alert from CASA SDR unit

OEM and SMS Investigation

- Component sent to OEM for repair
- Request was made to supply photos for investigation
- OEM did not participate in SMS Investigation

Recommendations

- Do not purchase units that had been overhauled in accordance with an EO, only if done in accordance with the CMM
- Request OEM to issue a Service Information Letter highlighting the change from servo wiring to aircraft side wiring. No response received.
- Request CASA to issue an alert to industry, AWB, AD etc. No response received.

SMS Limitations

- The OEM would not participate other than to provide a simple strip report, which added minimal value to the investigation.
- CASA SDR unit did not participate other than to ask what we had done, they did not seem to appreciate the wider impacts or potential for recurrence.
- The local overhaul shop did not want to share information, or allow us to view the EO, which may have helped identify additional problems.

SMS Bubble

- Very little reach beyond the organisation itself
- No power to influence change to third parties
- Limited ability to share with industry
- Restriction of access to data
  - No ability to demand data

Improving SMS

- Third party cooperation
- Reporting stream to CASA and ATSB where proper assessment is carried out

Thank you

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