



# **Navigating Airborne Instrumentation System ATO's**

## **23rd ITEA Test Instrumentation Workshop**

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# Outline

- Problem Statement-Abstract
- Common Questions
- Instrumentation System Definition
- Challenges
- Known Concerns
- Generic Examples
- Path Forward
- Conclusion

# Abstract

DoD is continually evaluating cyber risks on a wide variety of systems. This evaluation has resulted into more systems being included in the detailed analysis of cyber threats. For many years the Aircraft Instrumentation Division at the Naval Air Warfare Center Aircraft Division (NAWCAD) Patuxent River has maintained an Authority to Operate (ATO) that covered our laboratories, shops, and all of our computer hardware and software infrastructure. This ATO did not include the airborne Instrumentation systems hardware. (e.g. Data Acquisition Units (and input sources), Recorders, Transmitters etc.). This presentation will address how the Air Vehicle Modification & Instrumentation (AVMI) at Patuxent River is attempting to balance providing the required information and doing what makes sense.

# Common Questions

- Do I really need an ATO for the Data Acquisition System?
  - Who decides?
  - We have not had this requirement in the past so why now?
  - What about currently flying aircraft that do not have an ATO?
- What information is needed?
  - Who provides requirements?
  - Who adjudicates differences of opinion in requirements?
  - How far do I need to go? Instrumentation Vs. aircraft systems
    - Roles & Responsibilities of all stakeholders, MOA/MOU?

# Instrumentation System

- Instrumentation systems typically consist of the following equipment
  - Data Acquisition Units (DAU's)
  - Data recorders
  - Telemetry transmitters
  - Avionics bus interfaces
  - Analog sensors (e.g. Strain gages, pressure transducers, accelerometers etc.)
- There is some commonality in systems, but many systems are unique
  - Unique flight clearances, unique ATO's?
- Many currently flying flight test aircraft do not have ATO's that include the Instrumentation system.

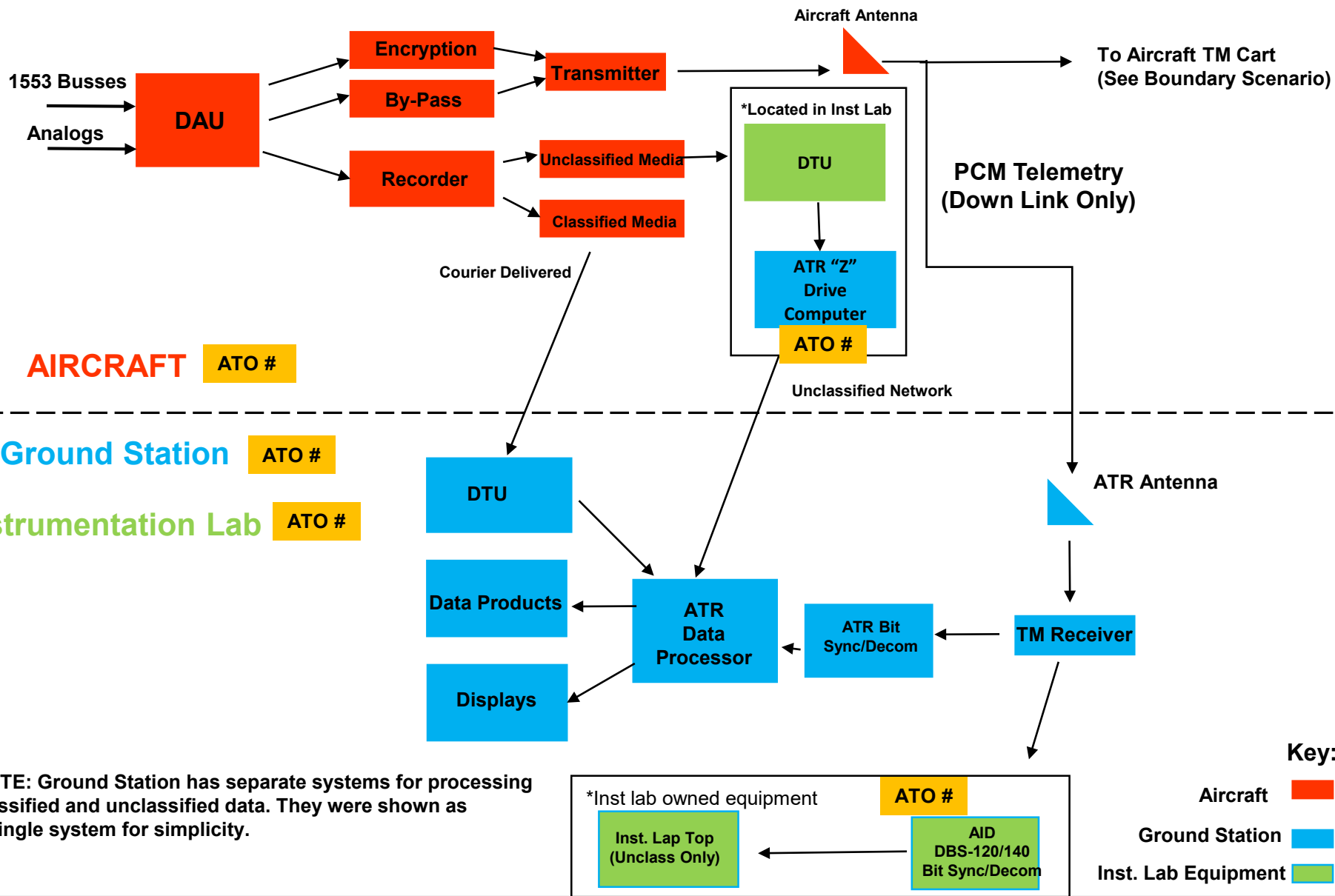
# Challenges

- Culture change
  - Instrumentation engineers/technicians have limited experience with ATO's
- Attitudes
  - We have always done it this way in the past
    - NOT a good answer
  - ATO requirement is competing with the tempo of operations "Faster.....Faster...."
  - The cyber evaluation team is not the enemy
    - Must develop a cooperative working relationship
- Lack of clear direction
- Personnel resources
  - Instrumentation organization has dedicated IT support for lab & computer ATO's, NOT aircraft ATO's

# Known Concerns

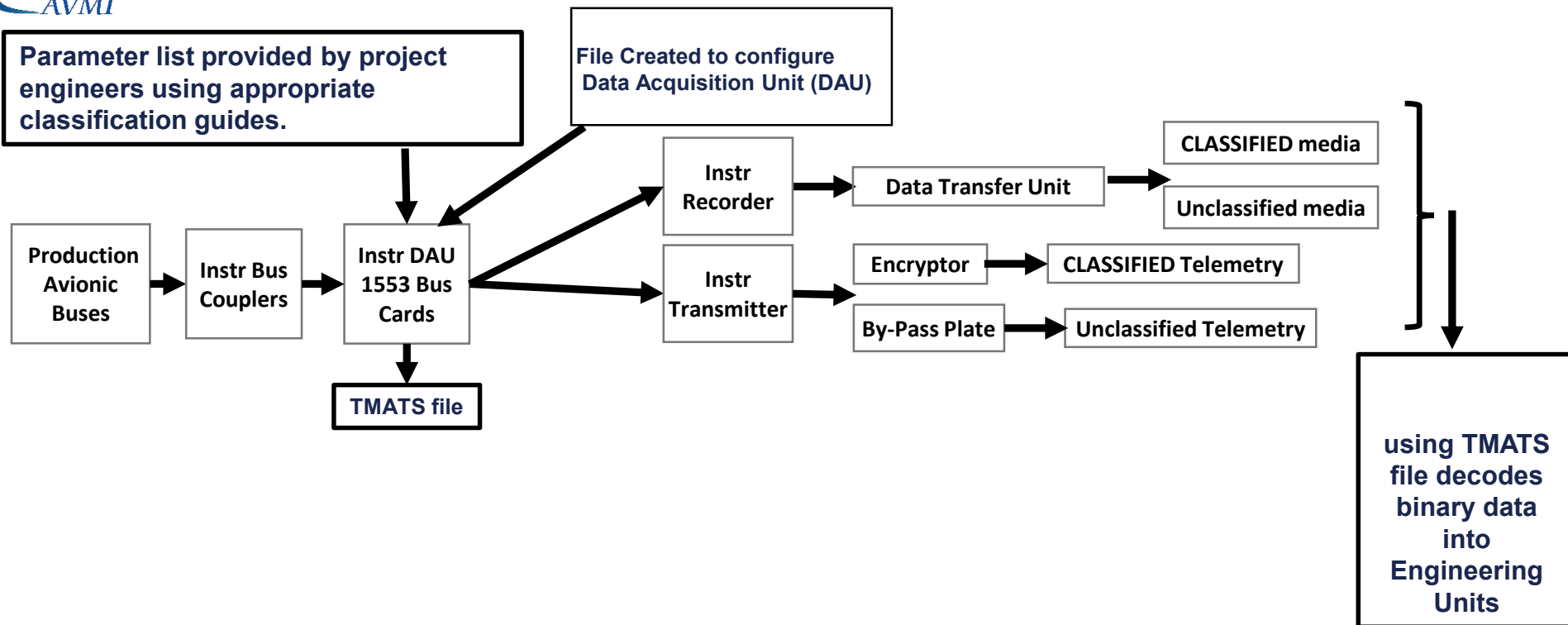
- Data at Rest (DAR) Requirement
  - Currently the airborne data recorders fielded do not support DAR
  - Is DAR a hard requirement? Can a waiver be obtained?
- Security classification of equipment
  - Need to better understand exactly what equipment needs to be treated as secret
    - Differing opinions
- Validation process for Data Acquisition System configuration files
  - Prove that the data being selected handled at the appropriate classification level
- Unclear encryption policy
  - Is encryption mandatory for all telemetry data regardless of classification level?
- Based on experience with the ATO for data validation lab
  - Time consuming, renewal process took over a year
  - Strain on personnel resources for research and data collection
- Handling of classified data has many impacts on an organization
  - Facilities
  - Equipment
  - Personnel

# Example Aircraft System with Ground Station Boundaries





# Generic Instrumentation System Example



Project parameter lists generated by the project engineers using appropriate classification guides. Parameter lists are published within the test plans with associated classification levels.

Instrumentation system is programmed and configured (with vendor configuration file) to capture the requested parameters:

- A Telemetry Attributes Transfer Standard (TMATS) file is generated and used for processing recorded and telemetry data. This file is required to translate the recorded binary data into engineering units.

# Path Forward

- Scope requirements with stakeholders
- Develop a realistic POA&M
- Assign personnel to research and gather information needed
  - Expect the need to provide the following:
    - High level boundary scenario for each aircraft configuration
    - Written Con-ops description of high level boundaries
    - Detailed Block diagram of Instrumentation
    - Detailed description of each component on the block diagram down to the card level, Data sheets on all components
    - Letters of Volatility (LOV) for selected components from each vendor
- Provide example ATO inputs document to for discussion (Based on example)
- Develop a roles and responsibility document with all stakeholders for the platform ATO
  - Memorandum of Understanding

# Path Forward (Cont.)

- Determine who would be the authority deciding security requirements for aircraft?
  - Program office
  - Cyber evaluators
  - Other
- Evaluate impacts of agreed upon requirements
  - Staffing
  - Facilities
  - Equipment development/procurement
- Develop Technical Standard Operating Procedures (TSOP's)

# Conclusion

- Plan ATO efforts into all project schedules & estimates
- Establish realistic expectations with customer
- Document any received guidance received from multiple parties
- Establish regular communications with evaluators
  - Eliminates misunderstanding of who has action
- Be patient, the evaluators are NOT the enemy
- Educate workforce with examples, and standard operating procedures

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