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Enhancing Aviation Safety Developing and Implementing NAVAIDs Inspection and Maintenance Programs

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Where Do We Start?

Have a Defined Deliverable

- ➔ Consider: “We need something that we can reference that defines how we do work, and it needs to be useful enough to train others with.”



Know Your Resources

- ➔ Regulatory Documents
- ➔ Technical Documents
- ➔ Industry Resource Centers
- ➔ Industry Best Practices
- ➔ Federal/State Requirements
- ➔ Your Own Team





Sourcing Resources

→ Old Method

- Use a search engine
- Know your keywords
- Learn the regulations that apply
- Find industry sources
- Search for specific documents
- Read all the information
- Source additional resources via document citations
- Phone a friend

→ New Method

- Use an AI
- Ask for keywords
- Ask for regulations
- Ask for industry resources
- Search for specific information
- Ask AI to summarize large documents
- Source additional resources via document citations
- Phone a friend



IDENTIFY YOUR DELIVERABLES





SAFETY FIRST

Every Job Starts with Safety

→ Table of Contents

- What are the hazardous components of this system?
- What are the required safety controls/procedures?
- What safety equipment is needed?
- What steps need to be followed to render the system safe?
- What are the emergency actions to be taken if there is an issue?
- **Don't guess – Use official language provided by the manufacturer**



CAUTION

Electrostatic Sensitive Devices

This equipment may contain electrostatic devices.

- Protect from electrostatic discharge.
- Electronic modules and components should be touched only when this is unavoidable e.g. soldering, replacement.
- Before touching any component of the cabinet, you shall bring your body to the same potential as the cabinet by touching a conductive earthed part of the cabinet.
- Electronic modules or components must not be brought in contact with highly insulating materials such as plastic sheets, synthetic fiber clothing. They must be laid down on conductive surfaces.
- The tip of the soldering iron must be grounded.
- Electronic modules and components must be stored and transported in conductive packing.

Failure to follow this instruction can result in equipment damage.



DANGER

Electric Shock Hazard

This equipment may contain electrostatic devices.

- Do not operate a system that contains malfunctioning components. If a component malfunctions, turn the system OFF immediately.
- Disconnect and lock out electrical power.
- Allow only qualified personnel to make repairs. Repair or replace the malfunctioning component according to instructions provided in its manual.

Failure to follow these instructions can result in death or equipment damage.



DANGER

Series Circuits have Hazardous Voltages

This equipment produces high voltages to maintain the specified current - Do NOT Disconnect while energized.

- Allow only qualified personnel to perform maintenance, troubleshooting, and repair tasks.
- Only persons who are properly trained and familiar with ADB SAFEGATE equipment are permitted to service this equipment.
- An open airfield current circuit can generate >5000 Vac and may appear OFF to a meter.
- Never unplug a device from a constant current circuit while it is operating; Arc flash may result.
- Disconnect and lock out electrical power.
- Always use safety devices when working on this equipment.
- Follow the recommended maintenance procedures in the product manuals.
- Do not service or adjust any equipment unless another person trained in first aid and CPR is present.
- Connect all disconnected equipment ground cables and wires after servicing equipment. Ground all conductive equipment.
- Use only approved ADB SAFEGATE replacement parts. Using unapproved parts or making unapproved modifications to equipment may void agency approvals and create safety hazards.
- Check the interlock systems periodically to ensure their effectiveness.
- Do not attempt to service electrical equipment if standing water is present. Use caution when servicing electrical equipment in a high-humidity environment.
- Use tools with insulated handles when working with airfield electrical equipment.

Failure to follow these instructions can result in death or equipment damage.



NAA NAVAIDs Inspection & Maintenance Program

Imagine You Need to Write a Table of Contents

→ Go Straight to the Source

- 14 CFR Part 139.311 – Marking, Signs, and Lighting
- 139.327 – Self-inspection Program

→ Learn the Specifics

- FAA AC 150/5340-30 (Current Edition) Design and Installation Details for Airport Visual Aids
- FAA AC 150/5340-26 (Current Edition) Maintenance of Airport Visual Aid Facilities

→ Follow the Standards

- NFPA 70 – National Electrical Code (NEC)
- NFPA 70B – Standard for Electrical Equipment Maintenance
- NFPA 70E – Standard for Electrical Safety in the Workplace



Deliverables

Why Has Been Established, Next is the How

→ Develop Your Checklist of Compliance Items (Must Haves)

- FAA AC 150/5340-26 example
 - Inspect PAPI alignment at least monthly
 - Check REIL moisture intrusion every two weeks
 - Document calibration results and corrective actions
- NFPA 70E example
 - Lockout/Tagout required before exposure to live circuits
 - PPE rated for arc flash must be worn
 - Use insulated tools for circuit testing



Now you know what your program **MUST** have, but be sure to reference the equipment's specific technical manuals to avoid generalizations that the AC or electrical codes might make



Deliverables

Compliance Becomes Procedural Action

→ Table of Contents

- What safety information is available?
- What is the equipment?
- What are the specifications?
- What are the settings?
- What are the inspection intervals?
- What do you do at each interval?
- What are the technical and regulatory source documents to reference?
- Are there any tips or tricks for troubleshooting?

Monthly

- Check for any apparent damage to any Light Unit. Repair or replace any damaged components.
- Check for water damage or insect infestation. Remove insect infestation (if present). Repair or replace any damaged components.
- Check for presence of rodents. Remove rodents (if present). Repair or replace any damaged components.
- Check all control equipment for proper operation, including photocell for voltage powered systems. Repair or replace any damaged components.
- Clean the outer surface of the front glass. Use a soft cotton cloth moistened with alcohol.
- Check the glide slope and alignment angle of each Light Unit. Use the onboard Light Unit digital readout. Readjust if necessary.
- Check level and operation of tilt switch. Repair or replace any damaged components.
- Inspect housing, LEDs, electrical connections, filters, and front glass for damage, breakage, or a warped shape. Repair or replace any damaged components.
- Clean the interior of the housing. Remove any foreign matter. Also check for water damage, insect infestation, and presence of rodents.
- Make sure mounting is rigid and sturdy. Tighten any loose hardware—nuts, screws, etc. Realign the Light Unit if hardware has loosened.
- Make sure no vegetation obscures the light beams. Remove vegetation. Use weed killer to prevent any regrowth.
- Check whether the lightning arresters and/or surge suppressors are scorched or show other signs of failure. Also check after electrical storms. Replace as necessary.
- Record output current and input voltage of adapter (if used). Repair or replace equipment if input is abnormal.
- Check Humidity Indicating Plug. A lavender (pink/purple) color indicates a presence of humidity in the optical chamber. If humidity plug indicates 20% or more, a seal may be compromised. Inspect the front glass seal and the rear LED heat-sink assembly seal for damage. Replace components as necessary.

Quarterly

- Check the obstacle-free approach plane for clearance from tree growth, new towers, pole lines, or other obstacles. The obstacle-free plane is four miles long and extends 10 degrees on either side of the runway centerline. Remove obstacles as necessary.

Semiannually

- Check the insulation resistance of underground cables and record the results. Remove obstacles as necessary.
- Check the resistance of the grounding system and record the results. Remove obstacles as necessary.



Deliverables

If There's No Record, It Never Happened...

✈ Record Your Inspections and Work

An example log entry for a PAPI system might look like this:

- **Date:** January 2, 2014
- **Time:** 1800
- **Name:** John Smith
- **Type:** Unscheduled Maintenance
- **Remarks:** Arrived at site for unscheduled outage. Found PAPI lights out on the second inboard box. Notified OCC. Issued APF NOTAM # 14/01. Began maintenance. Completed repair of PAPI system at 2240. Completed Quarterly Maintenance per AC 150/5340-26 and manufacturer's handbook at 2350.





The Tough Part **IMPLEMENTATION**





Implementation

If It's Not Documented, It Never Happened...

➤ The Easy Part

- Equipment – You are familiar
- Checklists – You have them
- Process – You know it
- Parts – You got'em

➤ Possibly More Difficult

- Qualified staff
 - Ensure your staff meet the requirements set forth in the regulation for the specific job
- Adequately equipped
 - Ensure your staff have the proper equipment to do their jobs safely
 - Make sure that equipment, PPE, or tool meets all specifications
 - **BEWARE** the requirements for some items that require regular inspection, refurbishment, or replacement to meet regulatory requirements



Implementation

→ Doing The Work

- Tight schedule
- Work **MUST** be completed
- Techs **MUST** follow the requirements
- Equipment downtime may seriously affect aircraft arrivals in some weather conditions
- Training & Accountability are key
- Program/work organization set the standard – staff must execute

→ Recordkeeping

- **DOCUMENT EVERYTHING** – No work should occur where a record is not created
 - Keep it basic: When? Who? What?
- Establish an audit and oversight process
 - If you miss a single required inspection or maintenance interval, the FAA Airport Safety Inspector may determine this to be a discrepancy
- Be ready to demonstrate compliance at all times



Secure buy-in early and don't overcomplicate the process.

This program depends on clear expectations, shared responsibility, and repeatable actions. Success requires support across departments — because your compliance is only as strong as the weakest link.



LAST BUT NOT LEAST... **TIPS & TRICKS FOR SUCCESS**





Tips & Tricks For Success

→ Improvement is ALWAYS Possible!

- Look for paper processes and ELIMINATE it
 - Paper gets damaged, destroyed, lost, and is difficult and time consuming to audit
 - It is extremely difficult to recognize trends on paper
 - Integrate the process with a work order system to ensure PMs are automatically scheduled and assigned and trends are automatically recognized and staff are alerted
- Keep an inventory of parts on-hand (Especially for long lead time or critical items)
- Spread responsibility – Share the workload of ensuring your program is executed
- Assign champions to take responsibility over key aspects of the program, such as safety, recordkeeping, auditing, inventory, or training
- Be sure to establish visibility to regulatory and equipment updates
 - FAA ACs, NFPA 70, 70B, 70E, Manufacturers, and best practices
- Engage your staff and let them have some ownership over the plan development
- Engage industry partners, such as AAAE, ACI, FAC, and other airports, to learn about what others are doing
- Be open to new technologies – automation, remote monitoring and diagnostics, reporting, trend recognition
- Promote the program, celebrate your wins, and **JUST TAKE THAT FIRST STEP**





Tips & Tricks For Success

➤ Steal EVERYTHING (but give credit)!

- There are lots of resources out there and lots of people, airports, and industry groups whose mission it is to make your life easier – LET THEM

➤ Ask AI or Google, but go looking for resources

➤ Airport Cooperative Research Program (ACRP) – [EXAMPLE RESOURCE](#)

- Funded by the FAA, this organization seeks to answer all the questions any airport could ask about any applicable topic

➤ American Association of Airport Executives (AAAE) Hub - [LINK](#)

- Industry information and collaboration hub to engage with others and search a library of files, including checklists, program documents, technical specifications, evaluations, tools, procedures, etc.

➤ Florida Airports Council (FAC) – [ONE OF US!](#)

- In-State organization with a comprehensive list of contacts, projects, and information related to everything airports





QUESTIONS?

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