



Hardware Maintenance of Doppler Weather Radars

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1. INTRODUCTION

1.1. General Overview

- **Need for maintenance & calibn**
- **Maintenance Planning**
- **Various options**
 - 1) In house**
 - 2) Maintenance contract**



In house maintenance

- **Budget and planning**
- **HR recruitment and training**
- **Full internal control**
- **Inherent flexibility**
- **Central inventory reduces cost**



Maintenance contract

- **Mostly OEM based**
- **Highly expensive**
- **Less flexible**
- **User can concentrate on applications**
- **QOS unpredictable**



1.2. Maintenance Procedures

- Requirements & procedures vary
- Can be generalised to > extend
- Safety first
- Documentation and logging
- Inventory maintenance
- Monitoring, recording, analysis



Types of maintenance

Can be classified in two groups:

(1) Preventive maintenance

- Prevention is better than cure**
- Needed for system reliability**
- Help to correct grey faults**
- Build familiarity & confidence**



1.2.1.1.General Cleaning and Checks

Keep equipments clean at all times.

Disconnect Power supply before cleaning operations.

Accumulation of dust over time lead to short circuit, reduced efficiency choked thermal dissipation etc.



1.2.1.2. Cabinet Cleaning

- Even if the cabinets are fitted with air filter, regular cleaning of the internal parts is required to stop dust accumulation.
- Use a vacuum cleaner, a clean dry cloth or a small brush.
- Every trace of dust must be carefully removed both inside and on the external parts of the cabinet.
- Do thorough cleaning operation at least once a year.



1.2.1.3. Air Filters

- The air filters be disassembled and cleaned to remove layer of dust formed on it.
- The cleaning schedule depend on quantity of dust removed.
- This depends on environmental dust levels.
- Unhardened dust can be removed using a high pressure water pump.
- Use detergents to remove hardened dust
- Once cleaned, the filters be dried well before use.



1.2.1.4. Indicator lights and lamps

- Ensure firm fitting of the lamps and LEDs
- Remove traces of oxidation, corrosion or dirt -
- Replace lamps when blackened.

1.2.1.5. Fuses

- Fuse terminals are liable to oxidation.
- Oxidation and dust increase circuit resistance.
- Take out of housings to check for oxidation.
- Clean ends of fuses with a cloth moistened with CCl₄ or IPA -type solvent.
- Take out fuses one at a time to avoid swapping



1.2.1.6. Linking Cables

- Inspect cables regularly to ensure no breakage
- Any cable showing signs of aging be replaced
- Inspect coaxial cables with special care as they are vulnerable to dents or sharp bends.
- Inspect connectors and make sure that they are correctly fixed.
- Metallic contacts showing signs of corrosion must be protected or replaced.



1.2.1.7.Transformers & Inductors

- Inspect transformers and inductor terminals and remove all traces of dirt or moisture.
- Components in oil baths be inspected at least once in a year.
- Casings, terminals and ceramic insulators be kept scrupulously clean.
- Use clean cloths or cloth moistened with IPA for cleaning terminals and ceramic parts.
- Ensure right tightening of mounting screws.
- Ensure proper contact pressure for all electrical contacts.



1.2.2. Corrective Maintenance

- Action to mend and revive a defective radar.
- Break-down arising out of gradual degradation.
Eg. A mechanical trouble in Antenna may sent a sign in the form of unusual sound.
- But most faults happen suddenly.



A fault condition can be ascertained in three ways:

1) During preventive maintenance

1) From the BITE mechanisms

1) As an abnormal operating state.



Control And Monitoring System

- Continuous monitoring of important parameters
- Abnormalities are highlighted as warnings
- Takes immediate safety measures in case
 Serious faults are diagnosed by software.
- CAMS is not fool proof
- Reliability & dependability of CAMS vary much
- Manual troubleshooting, fault localisation and remedial action continues to be the last stay.



Manual fault finding Prerequisites

- Observe record and familiarise with various health parameters and status displays
- Acquire working knowledge on system functionalities, inter dependability between subunits etc.
- Learn to use T & M tools and interpret results
- Learn to locate read and interpret manuals, flow charts, schematics& block diagrams and other forms of documentation.
- Maintain detailed maintenance register.



Fault finding procedures

- Interpret BiTE messages and CAMS status
- Make visual examination of suspected parts
- Make fresh measurements
- Check interconnections and interlocks
- Cross check and connect symptoms and status
- Check fault register for similar past cases
- Ensure internal errors of CAMS and BiTE are not the culprits



Remedial action

- Once faulty unit or components are identified, repair or replace them with good spares.
- Never forget to tune or recalibrate the radar system when incorporated changes demands so.
- Normalise any by-pass or jumper setting changes to enable troubleshooting
- Recoup used spare components or units early

