

U.S. DEPARTMENT OF COMMERCE / National Oceanic and Atmospheric Administration



NATIONAL WEATHER SERVICE ENGINEERING HANDBOOK NO. 12

Engineering Quality Control Inspections

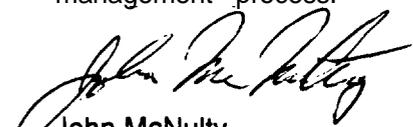
National Weather Service Handbook (EHB-12)

Preface

Prior printings of Engineering Handbook No. 12 (EHB-12) tended to be narrowly interpreted by many users regarding the Engineering Quality Program (EQP) process. EHB-12 has been extensively reworded to accommodate changes in technology and to emphasize the integrated cooperative nature of the process. This document provides more explicit wording encouraging staff to take full opportunity of the process. Important concepts stressed include the *desk analysis*, in preparation for a station review, and provision for an *optional walk-through*. The process also encourages increased use of telephone conferences and reviews. These become even more important in times of limited or restricted resources (e.g., funds, time, staff).

The Electronics Program Review (EPR) is an opportunity for regional and field managers and staff to meet and discuss all aspects of the site electronics maintenance program. Typically, the EPR is conducted by the Regional Maintenance Specialist (RMS) assigned to the site's area. Sometimes the RMS is accompanied by the Electronics Program Manager (EPM); Chief, Systems Integration Branch (SIB); or Chief, Systems Operations Division (SOD). Regional managers other than the RMS may, on occasion, conduct the site EPR.

The EQP begins with those performing the maintenance activities! Electronics staff engaged in maintenance activities are responsible for self-checking the quality of their own work and verifying equipment/systems performance as a part of their normal duties. A fundamental assumption in the EQP process is that the various group leaders/supervisors (e.g., the Electronic Systems Analyst (ESA); station manager; chief, SOD) are reasonably informed regarding their subordinates work activities. In other words, the EQP is an extension of the existing management process.



John McNulty
Chief, Engineering Division

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1. Introduction

This handbook describes the policy and procedures for planning and conducting program reviews for appraising the quality of the National Weather Service's (NWS) field electronics maintenance program. The purpose of this document is to assist the regions in assuring that they have a flexible, workable Engineering Quality Program (EQP) in place to meet national and regional needs.

Periodic station program reviews are an important part of the overall electronics maintenance evaluation process. It is important to the NWS engineering activities that equipment outage time be held to a minimum and high operational availability is attained, but it is equally important that the output of electronic systems meet established specifications. In other words, the quality of the data being furnished from electronic equipment for meteorological and hydrological purposes must be controlled. With this in mind, quality reviews cover many aspects in assuring continuity of the maintenance program, reviewing past operation, observing trends, and ensuring continued system operation within prescribed engineering standards.

2. Process Overview

The EQP begins with those performing maintenance activities! Electronics staff engaged in maintenance activities are responsible for self-checking the quality of their own work and verifying systems and equipment performance as part of their normal duties. The immediate supervisor is the first management official whose responsibilities include reviewing the performance (including quality) of those assigned to perform field maintenance services. Those individuals selected to perform the EQP review functions are at the discretion of the regional headquarters. They should be selected from the more experienced electronics maintenance personnel within the region. Typically, regional specialists may be Regional Maintenance Specialists (RMS) or Area Electronics Supervisors (AES)¹ depending on the regional electronics maintenance program structure; others may be included as part of an extended regional team [e.g., Electronic Systems Analyst (ESA)]. National headquarters [e.g., the National Reconditioning Center (NRC), National Weather Service Training Center (NWSTC), and the National Logistics Supply Center (NLSC)] also support the regions/operational sites. It cannot be overemphasized that the RMSs/AESs are team members and the entire quality process is one of cooperative effort among all involved: station maintenance staff, station managers, and regional and national headquarters managers.

The flowchart on page 2 shows the EQP process. The responsibilities of those involved in this program are discussed in Sections 3 and 4.

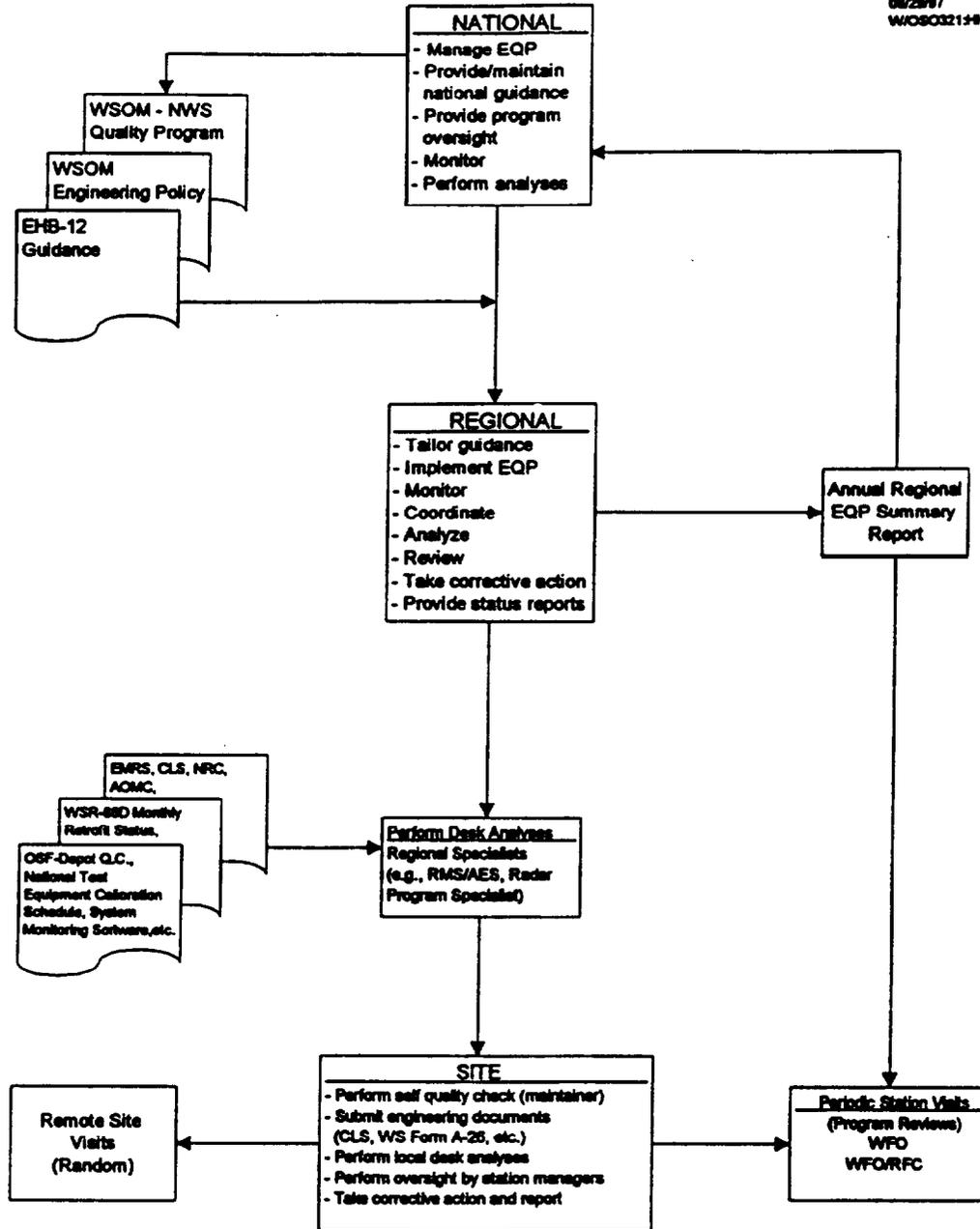
3. Quality Program Responsibilities

3.1 National Weather Service Headquarters (WSH). The WSH provides and maintains national quality guidance and program oversight. This includes random visits to the regional

¹Alaska Region, Pacific Region.

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headquarters/field offices/sites to review quality programs and practices. The NWS also provides specialized electronic reports as requested by the regions.

3.2 Regional Headquarters/Field. Regional headquarters should tailor this guidance, implement the regional EQP, monitor its progress, coordinate with WSH and those involved in the EQP, analyze and review field reports, identify and determine the cause of quality inconsistencies, recommend required corrective actions, and provide status reports. The Regional Director (RD) is responsible for the establishment, operation, and periodic review of a regional quality program encompassing review of work performed by regional staff (e.g., headquarters, operations, electronics, facilities). This document focuses on the regional electronics maintenance quality program. The RD shall ensure that the regional EQP conforms to this document and that there is adequate regional specific guidance. Routine operation of this program may be delegated. For example, the following individuals may serve as those responsible for routine operation of the EQP.

3.2.1 Chief, Systems Operations Division (SOD). The Chief, SOD or Chief, Technical Services Division (Pacific region) plans, manages, and operates the regional EQP. The Chief may delegate quality program management to other staff ²as appropriate [e.g., Chief, Systems Integration Branch (SIB), Electronics Program Manager (EPM)].

The term EPM is used for the EQP focal point, recognizing that regional programs may require tailoring and other persons may share or serve in this capacity. Refer to regional specific guidance.

3.2.2 Regional Maintenance Specialist/Area Electronics Supervisor. The RMS/AES:

- a. plans, conducts desk analyses, and performs quality reviews ³ ;
- b. coordinates station visits and program reviews with station management [e.g., Meteorologist-In-Charge (MIC), Hydrologist-In-Charge (HIC) as appropriate, ESA, Science and Operations Officer (SOO)];
- c. prepares, maintains, and distributes all required quality program reports;
- d. identifies quality inconsistencies and offers assistance as needed;
- e. provides a short debriefing to the MIC and ESA at the end of the on-site electronics program review (EPR);

²Since EQP includes facilities, shared delegation with the regional facilities liaison engineer is also appropriate. The facilities liaison engineer is primarily responsible for ensuring that realistic regional guidance is provided and that a realistic operational facilities inspection program is conducted.

³Chief, SIB and EPM are encouraged to actively participate in the EQP process, especially the on-site program review.

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- f. provides the MIC a schedule detailing when Action Items (AI) within the RMS's purview will be closed;
- g. coordinates with off-site managers and also provides a schedule to the MIC for AIs beyond the RMS's control; and
- h. prepares a trip report and/or EQP checklist (if used).

The term RMS/AES is used for the regional specialists responsible for routine implementation and operation of the regional EQP, recognizing that regional programs may require tailoring and other persons may share or serve in this capacity (e.g., footnote 1). Refer to regional specific guidance.

3.2.3 Station/Site. Station managers (MIC, HIC as appropriate, ESA) must ensure that every reasonable effort is made to encourage the electronics staff to take timely maintenance actions and efficiently perform all maintenance activities, including reporting.

3.2.3.1 Station Manager. The station manager (MIC, HIC, officials-in-charge) at the Weather Forecast Office (WFO), is responsible for all aspects of the site's electronics maintenance program. He/she:

- a. ensures that national and regional maintenance and quality policies are followed for assigned systems and equipment;
- b. ensures that the normal site management review process includes and encourages close coordination and review of the site's electronics maintenance program;
- c. coordinates review of hydrologic systems and equipment with the HIC at combined [WFO/River Forecast Center (RFC)] offices;
- d. ensures that site staff participate and support the EQP;
- e. ensures that a timetable has been established to correct quality inconsistencies requiring action and that they are corrected in a timely manner (Note: Establish a schedule between the site maintenance program focal point and the regional quality representative for completing and reporting open items);
- f. takes reasonable actions to ensure that the maintenance staff is adequately trained; and
- g. reviews the completed EQP checklist (if used).

3.2.3.2 Electronic Systems Analyst (ESA). Routine operation of the site's electronics maintenance program is delegated to the ESA by the station manager. The ESA:

- a. coordinates the station quality program with the station manager including ensuring that equipment calibrations (operation and test) are performed as required;

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- b. ensures that timely notification is provided to regional managers regarding reviewing work accomplished by assigned staff;
- c. coordinates station quality issues and other engineering matters with the RMS/AES and establishes the timetable to resolve any inconsistencies. **Note:** Quality reviews of subordinates' work are a normal part of the team leader process;
- d. ensures accurate and timely documentation of corrective maintenance, routine maintenance and equipment management activities performed on assigned electronic systems via the Engineering Management Reporting System (EMRS);
- e. provides technical and administrative direction to station electronics staff (e.g., review results of the quality findings with the electronics staff) and pursues resolution of quality issues raised by subordinate station electronics staff;
- f. performs contract specific quality evaluations of contractor support for assigned systems; and
- g. reviews the completed EQP checklist (if used).

3.2.3.3 Station Electronics Technician (ET). Station ETs are the most important element in a successful electronics maintenance program. They perform critical work that ensures continuing and proper operation of NWS systems and equipment. These ETs are responsible for performing quality work and reporting electronics maintenance activities in accordance with established procedures to meet operational requirements. Station ETs shall also report EQP inconsistencies to the ESA related to tools and test equipment, vehicles, engineering handbook (EHB) directives, EMRS reporting, facilities, environment and safety, and training.

4. Regional Headquarters Remote Analyses

The regional specialists (e.g., RMS/AES, radar program specialists, EPM) shall perform desk analyses. These provide critical information needed for selection of random remote site visits and periodic station program reviews.

Prior to site visits/station program reviews, the RMS/AES shall review pertinent electronic management data bases including the:

- a. national test equipment calibration program records-determine if any irregularities are present (e.g., if any instruments are not being calibrated, why?);
- b. Consolidated Logistics System (CLS) records-determine if any irregularities are present [e.g., excessive ordering of a particular Line Replaceable Unit (LRU), use of incorrect EMRS document number on orders];
- c. CLS created site due-in records-determine if any are excessive (e.g., unusual delay in returning LRUs, quantity of LRUs ordered);

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- d. EMRS records to determine if any irregularities are present, the category and relative frequency of corrective maintenance, and equipment management activities accomplished at the site;
- e. maintenance schedules in the technical manuals, and compare with EMRS reports to determine if routine maintenance is being performed;
- f. modification records to verify that all current modifications have been completed and reported; and
- g. Operational Support Facility (OSF) monthly Next Generation Weather Radar (NEXRAD) retrofit and modification status reports-determine any inconsistencies.

These and other information should be used in the candidate system for the review selection process. In addition, ask station managers to address inconsistencies during station visits.

5. Requirements for Station Program Reviews

Periodic EQP reviews shall be conducted in order to monitor the quality of electronics maintenance work performed. Regional managers shall annually establish station visit schedules, including consideration for the needs of both staffed and remote sites.

Where maintenance is performed by a contractor (or co-operator or grantee), refer to the terms of the contract (or agreement or grant) for provisions regarding quality control of maintenance. See also any relevant instructions in the Weather Service Operations Manual (WSOM). Those documents take precedence over this handbook. However, if there **are** no conflicts, quality reviews should be conducted using the guidance provided herein. Quality inconsistencies should be reported to the Contracting Officer's Technical Representative (COTR). See Section 7.2 for form retention details.

6. Quality Review Process

The ESAs are responsible for checking the work quality of the electronics staff. The purpose of this section is to provide guidance and introduce samples of the EQP process. It includes representative topics that may be used when performing desk analyses and station program reviews.

Electronics staff should refer to relevant EHBs, including maintenance schedules, technical notes, and equipment/systems manuals for detailed technical guidance. The electronics staff is responsible for timely execution of work, timely reporting of their maintenance activities through the EMRS, ensuring that they have only authorized spares on-site, property and promptly returning failed LRUs, and reporting any problems to the ESA. A fundamental assumption in the EQP process is that the various group leaders/supervisors (e.g., the ESA; station manager; chief, SOD) are reasonably informed regarding their subordinates work activities. In other words, the EQP is an extension of the existing management process.

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Circumstances will dictate the type and level of review to be performed. They depend on many variables such as the season (e.g., the beginning of the tornado season will require different emphasis than review during winter in northern latitudes), condition and age of equipment, equipment location (exposure to dust, salt spray), problems brought out by operational personnel, etc. Review decisions are left to the judgement of the reviewer and are based on findings from a desk analyses and station visit.

The EQP process contains: The on-going monitoring and desk analyses, station program review (Appendix A) including an optional walk-through, and follow-up activities (Appendix B).

Appendix B is an *optional EQP checklist*. It is an example of information typically included in the EQP process. Its purpose is to provide the RMS/AES with information concerning the state of the items under review (e.g., desk analysis, station program review, systems, equipment, documentation, training, electronics staff); and if required, the need for corrective action(s). The checklist provides information relative to the condition of equipment/systems and forms a basis for predicting whether subsequent operation will meet NWS requirements.

6.1 Desk (Remote) Analyses. The RMS/AES shall perform periodic desk analyses as indicated in Section 4. They should include checks of available information (e.g., data bases, contractor performance reports, station and regional staff consultations) and analyses. An EQP begins and ends with those on-site. The responsibilities of the on-site staff are included in the line-specific discussions. The RMS/AES may request additional information from site managers regarding site management practices, and systems and equipment performance (e.g., maintenance reporting, spares and training issues, confirm system performance parameters such as receiver sensitivity, servo system dead zone, personal property management procedures). The objective is to ensure that instrumental and electronic systems operate within the degree of accuracy and continuity required for sustained, acceptable meteorological and hydrological operations in the most cost-effective manner possible. The results should be provided in the RMS/AES's trip report (Section 7) memorandum, and/or the EQP checklist. The following desk analysis discussion is based on the optional EQP checklist format.

Line 1. EMRS Maintenance Data. The EMRS documents reported maintenance actions. EMRS data concerning routine maintenance, nonroutine maintenance, and equipment management activities are accessed and used by various functional areas in the NWS. Responsibility falls upon the electronics staff (including the ESA and RMS/AES when they perform maintenance tasks) to ensure that maintenance events are reported accurately and in a timely manner through the EMRS. Periodically review the information in the EMRS, check the NWS site summary reports, take any necessary action to resolve any quality inconsistencies, and identify equipment/system problem areas.

Line 2. CLS. Determine if there are any communication connection problems. Check reasonableness of quantity of items being ordered from NLSC; number of received *defective*; and the number of items returned to the NRC and determined by the NRC to be no *defect found*.

Line 3. NRC. Check to see if there are any outstanding parts due (due-ins) to the NRC.

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Line 4. AOMC. [Automated Surface Observing System (ASOS) Operations and Monitoring Center]. Spot check site maintenance activities.

Line 5. OSF-WSR-88D Monthly Retrofit Status Report. Check the monthly retrofit status reports for modification installation. Determine any inconsistencies or overdo actions.

Line 6. System Monitoring Software. Apply available remote system monitoring software for specific equipment programs (e.g., ASOS, NEXRAD).

Line 7. Test Equipment Calibration. The RMS/AES shall verify that required calibrations have been performed on WFO assigned test equipment, and ensure that test equipment has been calibrated at prescribed intervals according to provisions in the national (and/or regional) test equipment calibration program.

Line 8. Training. Check the state of training, including technical, environmental, and safety, for station technical staff; ensure that personnel dealing with contracts and contractors have received the training required, including refresher, and have signed any documentation required (Section 6). The RMS/AES should also provide guidance and training recommendations regarding site technical personnel.

Lines 9. 10 Additional lines may be added as required.

6.2 Station Program Review. Regions should plan to conduct on-site EPRs as funding and staffing permit. In cases of resource limitations, with regional director concurrence on a site specific basis, remote EPRs may be conducted. EPRs shall be conducted similarly to program reviews held by other NWS regional headquarters divisions. EPRs provide the MIC further opportunity to exchange information, identify and solve problems, and improve the effectiveness and efficiency of their electronics program. EPRs, along with RMS visits, ESA workshops, and periodic ESA/MIC/RMS/regional headquarters conference calls, provide continuing opportunities to ensure successful operation of the regions electronics maintenance program. The responsibilities of those participating in the EPR process are discussed in Section 3.

6.2.1 Sample EPR Process. The following briefly summarizes typical activities encouraged during the EPR process. Regions should tailor them to meet their specific needs. Appendix A contains a *sample electronics program review agenda*.

- a. On a continuing basis, RMSs shall remotely monitor site activities through the use of data base downloads from centralized files, data analyses, and teleconferences.
- b. Resources permitting, the RMS shall conduct site EPRs and provide assistance visits. The RMS shall coordinate EPR scheduling with the MIC and ESA (and HIC and assistant ESA at collocated sites)⁴.

⁴All references to the MIC and ESA, shall be understood to include the HIC and assistant ESA at collocated WFO/RFC sites.

- c. A month before the EPR, the RMS shall develop an EPR agenda, integrating topics⁵ proposed by the site, by the RMS, and regional managers (e.g., Chief, SIB/SOD). The RMS shall then gather data and information to review during the EPR and forward an advance copy to the site for their review prior to the EPR.
- d. The RMS shall meet with the MIC and ESA at the beginning of the EPR to discuss the site's overall electronics maintenance program. Following this meeting, the RMS shall meet with the ESA and the electronics staff, with the MIC and other staff attending any sessions when there is some mutual benefit. The MIC is encouraged to participate in as much of the EPR as possible.
- e. On a sampling basis, the RMS shall confirm, or conduct a review of the site's systems administration policies and procedures, systems and equipment, documentation and records, maintenance operations procedures, safety and environmental procedures implementation and compliance. Care shall be taken to ensure that remote sites are periodically visited.
- f. The RMS shall document AIs.
- g. The MIC shall priority rank AIs and schedule when they will be closed and who is responsible for the action(s).
- h. Following the EPR, the RMS shall prepare a trip report, including findings, actions, and open AI assignments with schedule and forward the report to the MIC and ESA and to the appropriate regional headquarters managers (e.g., Chiefs SIB/SOD, EPM). Assigned AIs shall be followed up and completed. The MIC/HIC is responsible for ensuring that assigned site related AIs are completed; the RMS is responsible for ensuring that Regional Headquarters (RHQ) assigned AIs are completed, and that cleared site AIs are closed.
- i. The EPM (or manager performing the function) shall develop and submit a summary of the EPRs to WSH annually following the guidance in Section 7.

6.2.2 Walk-through (Optional). An important part of the EQP sampling process is a walk-through of the station to obtain explicit first-hand knowledge of conditions and practices regarding ongoing engineering activities. **Normally, not every piece of equipment and/or document at a facility or every parameter of a selected system needs to be checked.** Verification of proper

⁵ The RMS should include all topics of import to the operation of a successful maintenance program. Along with topics normally associated with maintenance operations, consideration should be given to safety and environmental concerns, including initial training for new staff and periodic refresher training for all staff.

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equipment adjustment, examination of physical condition, and investigation of operational performance should be carried out to the degree required to provide the reviewer confidence that equipment is being operated within its design capabilities and maintained in accordance with established technical standards. In many instances, equipment parameters can be evaluated without a detailed check of engineering and descriptive technical documentation. In other instances, when deviations are suspected, a more detailed check may be required, or it may even be necessary to perform a calibration to determine whether or not the system is operating as specified. An additional reference aid in the process is included as Appendix C, Equipment Quality Check Guide, which may be used as a reference in determining the adequacy of the maintenance performed. The RMS/AES and ESA should check on the causes of delayed maintenance (e.g., deferred corrective/routine, deferred calibration of test equipment). They should provide assistance or explain any equipment based technical problems encountered by site personnel.

7. Reporting

Reports concerning quality inconsistencies are an important aspect in maintaining program control. The EQP checklist may be used by the RMS/AES, or other designated official, to document their results. A program review report or trip report will also satisfy formal documentation requirements.

The EPM shall generate an annual summary report of all regional quality visits for the fiscal year. This summary shall be submitted to the Chief, Engineering Division, WSH, during the first quarter of the following fiscal year and should summarize the number of quality visits, the percentage of equipment/systems inventory reviewed, and all substantive items from their quality program. Use Appendix D, *Recommended Schedule of Engineering Quality Program Visits*, for guidance.

7.1 Distribution. Copies of each completed EQP report should be distributed promptly by the RMS/AES to the station manager (with a copy to the HIC at co-located river forecast centers as appropriate), ESA, and the EPM. Follow regional guidance.

7.2 Retention. EQP related reports and/or checklists shall be retained for 3 years. Any reports and/or checklists of significant historical interest or involved in litigation should be retained for 5 years after the equipment involved is deactivated.

8. Quality Control of Contractor Activities

The objective of quality control of contractor activities is to assess contractor performance. Contract monitoring provides important information to Government officials including the Contracting Officer (CO) and the COTR. The CO delegates to the COTR authority to administer specific technical aspects of the contract, The CO relies on the advice and expertise of the electronics staff including regional and site technical personnel (e.g., EPM, RMS/AES) for monitoring and evaluating the contractor's technical performance. The EPM, RMS/AES typically serve as a COTR or a Technical Monitor (TM). The COTR/assistant COTR (ACOTR) has delegated responsibility. For example, he/she can approve invoices and make acceptance of deliverables. The TM has specific duties in contract performance and provides

input to the COTR. These assignments are management decisions and are assigned based upon contractual needs. Before serving in the capacity of COTR/ACOTR/TM, personnel must have received the minimum training required by statute. The COTR/TM may be required to sign procurement specific documents (e.g., non-disclosure, conflict of interest forms). The following guidance, though not complete, is typical. Specific guidance from the CO supersedes guidance provided herein.

- a. Review the requirements in the contract. Determine contract type. The contract, including the Statement of Work (SOW), contains the details of requirements and obligations for both parties.
- b. Coordinate with the CO to ensure that the requirements of the parties to the contract are clearly defined and understood.
- c. Review the contractor's in-process work. Review the contractor's quality control records, if required. Coordinate with the CO. The COTR/TM must provide periodic written reports to the CO, as required.
- d. For any contractor deficiencies, follow the specific guidance of the CO.
- e. The CO is the only individual who may obligate the Government. The COTR/TM does not have that level of authority.

Examine the contractor's portion of the contract if the contractor disputes the existence of a discrepancy. If the contractor's position is incorrect, inform the CO first by telephone, then in writing, stating the facts and background to the issue. Many times an issue can be promptly resolved through a timely telephone call to the CO/COTR. The CO, with the advice of counsel, is the final arbitrator in contract issue resolution.

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Appendix A - Sample Electronics Program Review Agenda

A. Initial Briefing with MIC/HIC/ESA [SOO, Warning Coordination Meteorologist (WCM), Data Acquisition Program Manager (DAPM) as needed]

1. Program Review Issues
 - a. Review purpose of the program review
 - b. Discuss electronics program responsibilities/delegation
 - c. Discuss agenda and availability of key staff for review topics
 - d. Identify specific areas the site wants emphasized; identify specific areas the RHQ wants emphasized (assuming prior coordination occurred, there should be no surprises)
Discuss status of significant action items that need to be completed
 - f. Site should provide a pre-prepared briefing package of projects/accomplishments (Note: Site personnel are encouraged to provide the package to the RMS prior to the visit as part of the desk analysis and site visit preparation process)
2. Awards
 - a. Number of "spot" awards given within last year
 - b. Nominations for medals?
3. Equal Employment Opportunity (EEO) Programs
 - a. Diversity training
 - b. Sexual harassment video
4. Labor Management Relation
 - a. Duty schedules posted following WSH and NWSEO contract [Alternative Work Schedule (AWS) only] guidance?
 - b. Does ESA have a copy of the union contract?

B. Program Management

1. Electronics Program Reviews
 - a. Explain origin and objectives of EPRs
 - b. Discuss electronics program responsibilities/delegation
2. Staffing
 - a. Enough resources to meet responsibilities?
 - b. Work schedules provide adequate maintenance coverage? Back-up?
 - c. Contingency plans when staffing is low (MIC involved)?
 - d. Conferences to resolve problems?
Familiarity with adjacent office technical staff
 - f. Plan for soliciting help from surrounding offices (use SIB as needed)?
 - g. Track routine/non-routine/overtime
3. Budget
 - a. Percent of travel allotment used and future requirements

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- b. CLS Charges
 - c. Monthly/year-to-date totals
 - d. Travel/CLS charges tracked on site?
 - e. Phase coding and accuracy
 - f. Access to CLS (dial, Internet)
 - g. Immediate Port Address Card (IMPAC) used correctly
 - h. Phase codes used correctly
4. Electronics Program Management
- a. Current work assignment plan (WSOM Chapter H-50)
 - b. Matrix of systems responsibilities
 - c. Electronics and systems manuals/documentation
 - d. WSOMs/Operation Manual Letters (OMLs)/Regional Operations Manual Letter (ROMLs)
 - e. Routine maintenance performed following EHBs and contract maintenance schedules?
 - f. Site quality assurance assessments and tracking
 - g. Corrective maintenance performed following engineering procedures?
 - h. EHB series updates
 - i. NRC: Due-in report status; No Defect Found (NDF) report status
 - j. CLS status (e.g., number of LRUs ordered; repeat orders)
 - k. On-site spares maintenance management: Type and quantity on-hand as authorized by Initial Spares Support Lists (ISSLs), or other program guidance (e.g., WSR-88D, ASOS, NWR, upper air)
 - l. Management of expendables and other consumables: Procedures, Point of Contact (POC)
 - m. Contract maintenance (e.g., NWR maintenance: Contractor promptly returns defective LRUs for repair, maintains authorized spares quantities only?)
 - n. Technical documentation: Current? POC?
 - o. Site Configuration Management (CM): Current? POC?
 - p. Form A-26 (EMRS Maintenance Record) submitted by operators examined by ESA and staff?
5. Maintenance Reporting (EMRS)
- a. How EMRS is used in management decision process; EMRS is your maintenance reporting system
 - b. What EMRS says about the site [e.g., Routine Time (RT), Non-routine Time (NT), SYSAD, modifications, travel, Operational Test (OT)]
 - c. Status of EMRS submissions: Routine, corrective, modification/Technical Information Package (TIP), deactivation/activation?
 - d. Areas under/over reported
 - e. Access to EMRS (dial, Internet)
6. Operations
- a. Frequency of meetings with management team/operations staff
 - b. Procedures documented in Station Duty Manual (process)?
 - c. Station call-back procedures

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7. Training: NWSTC, other in-house, on-site, and local training
 - a. Planning for NWSTC courses - site training plan (site POC)
 - b. Use of NWSTC and SIB lending libraries
 - c. Use of NWSTC correspondence/remote training courses
 - d. Local training courses (funding available on site for training?)
 - e. Station seminars
 - f. ET staff encouraged to attend job related college/professional seminars?
 - g. Non-technical duties assigned to ET staff rotated to gain experience?
 - h. ET staff provided reasonable accommodation for accomplishing on-site remote training?
 - i. Site safety training program: Initial, recurring?
 - j. Site environmental training program: Initial, recurring?
8. Office Administration
 - a. Action item tracking system
 - b. Suspense system in place
 - c. Read/respond to e-mail
 - d. Forward e-mail/hard copy to staff
 - e. Provide input to MIC's monthly activity report

C. Electronic Systems Maintenance

1. WSR-88D
 - a. Technical manuals complete?
 - b. Maintenance/modification notes up-to-date [overdue list from Operation Support Facility (OSF)]?
 - c. Log book in the Radar Data Acquisition (RDA)
 - d. Delta SYSCAL checks (>1.5, why? >2.0 correct as soon as possible)
 - e. Does ESA or designated ET attend Unit Radar Committee (URC) meetings?
 - f. Are URC minutes provided to ESA and ET staff?
2. Surface Observing Sites
 - a. ASOS
 - o Site techs who can dial into ASOSs and check syslog/diags/clear flags
 - o List of priority response times for ASOS outages
 - o List of phone numbers/passwords for each assigned site
 - o List of backup sites ASOS tech is responsible for
 - o List of phone numbers/passwords for each site backed up
 - o List of host sites for obs transmitted by ASOS sites that the site maintains
 - o Coordinate first-look maintenance with ETs at offices near ASOSs
 - o Ensure forecasters are aware of who to notify when ASOS Operations and Monitoring Center (AOMC) calls
 - o ASOS ET complete ASOS maintenance and responsibilities before other duties
 - o Spares kits complete? Defective LRUs promptly returned?

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- b. Cooperative Observer Program (COOP - regional POC)
 - o Review last month's Centralized Automated Data Acquisition System (CADAS) report
 - o Any failures? Corrective action coordinated with DAPM/ESA? Resolved?
 - o Changes to CADAS sites (phone numbers, etc.) reported on Form B-44 (Worksheets for Coop Station Documentation) and/or requested on Form B-43 (Request for Establishment or Change in Status of Cooperative Station)?
 - o Instructions on how to call CADAS? Who monitors?
 - c. Second Order [Paid A, Coop A, Microcomputer Assisted Rating System (MARS)]
 - o Logistics to support equipment at sites
 - o Established as data sites through RHQ?
 - o Impact on workload
 - d. Hydrologic (regional POC)
 - o List of priority response times, as appropriate
 - o List of phone numbers/passwords for each assigned site
 - o Interagency POC [e.g., United States Geological Survey (USGS)] phone numbers
 - o Maintenance/modification notes up-to-date?
 - o Site location list current? Provided to WSH?
 - e. Marine (regional POC)
 - o List of priority response times, as appropriate
 - o List of phone numbers/passwords for each assigned site
 - o Maintenance/modification notes up-to-date?
 - o Site location list current? Provided to WSH?
 - f. Tsunami (regional POC)
 - o List of priority response times, as appropriate
 - o List of phone numbers/passwords for each assigned site
 - o Maintenance/modification notes up-to-date?
 - o Site location list current? Provided to WSH?
3. NWR
- a. Site program to assess quality of broadcasts [Instrument Flight Rule (IFR) monitor signal/deviation]
 - b. Number of radios/transmitters/links
 - c. Expansion efforts?
 - d. Problems?
 - e. Local maintenance or contract? Experiences
 - f. Are defective LRUs promptly returned for repair?
 - g. Are spares maintained at authorized quantity levels?
 - h. Contract repair sites [e.g., National Oceanic Atmospheric Administration Weather Radio (NWR) transmitters]

D. Computer Systems Administration and Maintenance

1. Automation of Field Operations and Services (AFOS)
 - a. Site management procedures
 - b. Focal points
 - c. Backups - current

2. Office Local Area Network (LAN)/Wide Area Network (WAN)
 - a. SiteLAN/WAN management procedures
 - b. Focal points
 - c. Backup/maintenance procedures
 - d. Site systems layout (diagram - all systems, interconnects, workstation configurations)
 - e. Patch panel layout - neat - documented
 - f. Property database [computers, serial numbers, Compact Disk (CD) numbers]
 - g. Software licensing/location of software
 - h. Routers and modems labelled
 - i. Tape Backup: number of tapes in rotation, checking/noting error log entries? Tape drive cleaning log
 - j. CC:Mail: cc:Mail database maintenance/logs, check status, reclaim
 - k. WAN and Transmission Control Protocol (TCP)/Internet Protocol (IP) (e.g., ping) troubleshooting skills. Training? Computer-Based Training (CBT)? Video?

3. Advanced Weather Interactive Processing System (AWIPS)/HPs/SOO/Science Applications Computer (SAC)
 - a. Site system administration responsibilities
 - b. Availability
 - c. Focal points
 - d. Backup/maintenance procedures
 - e. Software files backup physical storage

4. Internet (RHQ POC)
 - a. Degree of access within the office
 - b. NWS internet policy posted?
 - c. Used for EMRS? CLS? ESA home page?
 - d. Recent guidance (NWS policy mm/dd/yy; RHQ staff notes mm/dd/yy)
 - e. Monitor World Wide Web (WWW) browser use? SIB instructions available

5. Phone System
 - a. Who has primary responsibility? Backup?
 - b. Who determines programming and configuration?
 - c. Who is involved in phone system management in the office?
 - d. Service demarc: Services properly cross-connected?
 - e. Wiring centers: Circuits labelled at service demarc and wiring centers?
 - f. Backboards: Clearly labeled. Properly cross-connected
 - g. Emergency phone lines: Lines ahead of phone system, wired to the operations area under the floor without anything else attached. Backup procedures in place and tested periodically?

- h. Communications PC: In low traffic area, preferably with LAN server, and clearly labeled [include both local telco and Intra Exchange Circuit (IXC) carrier circuit numbers]
 - i. Communications room: Not being used for a storage area; leave approximately 1.5 inches of slack on each side of cross connects - with no loops or loose wires - leave clean and neat
 - j. Communications inventory: Service type [e.g., T-1, Federal Telecommunications System (FTS), company]. Trouble number for service problems
 - k. Documentation maintenance for site phone system: Current? POC?
6. Contract Maintenance (RHQ POC, site POC) Contractor meeting contract requirements?
- a. Any corrective action required?
 - b. Contractor work inspected? How often?
 - c. COTR training (initial, recurring) for staff

E. Facilities Program Management

1. Office Furniture
- a. Office furniture rearrangements can impact electrical power loading within the office; contact RHQ facilities before rearranging
 - b. Panels/Uninterruptible Power System (UPS)/Heating, Ventilation and Air Conditioning (HVAC) system
 - c. Coordinate with RHQ facilities to purchase items to be permanently installed in the building
 - d. Electric heaters/coffee pots should not be plugged into modular furniture outlets (remove immediately!)
2. Emergency Generators
- a. Review generator run times (RDA and WFO)
 - b. Generator start/stop times logged in station duty log
 - c. Site usage compared to region-wide usage
 - d. Policy on when to go to backup
 - e. Procedures in place and followed for periodic testing of generator
 - f. Documentation: Current?

F. Site Practices and Support

1. Safety
- a. ESA describe site safety program/management
 - b. ET tracking by lead forecaster
 - c. Chemical/hazardous material storage cabinet
 - d. Hazardous spill plans in place
 - e. Material Safety Data Sheets (MSDS) readily available/posted, as required
 - f. Equipment room used as storage
 - g. Exits clearly marked
 - h. Exits free from obstructions

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- i. Fire extinguishers/inspections current
 - j. Two-person travel (remote observation sites/RDA)
 - k. Under floor dust/water/cables/drains clear?
2. Storage Areas
- a. Storage area clean, organized
 - b. Sufficient storage space
 - c. Need for off-site storage
3. Test Equipment
- a. On-site tracking of test equipment calibration
 - b. Calibration schedule
 - c. Documentation
 - d. Date of last calibration
 - e. Proper disposal of obsolete/unneeded test equipment
4. Environmental (RHQ POC, site POC)
- a. Describe site environmental compliance program/management policies and practices.
Are staff familiar with requirements, policies, and procedures?
 - b. Site environmental training program
 - c. Documentation maintenance
 - d. Chemical/hazardous material storage cabinet, solvents, fuel storage, vapors

G. Personal Property Management

- a. Site departmental bar code files current?
- b. Site property custodial files current?
- c. Bar codes properly attached to required personality? (e.g., bar codes on required laptop computers, test equipment, etc.)
- d. Property pass list current? Date valid?

H. Optional Site Walkthrough - See Appendix B for Guidance

I. Deficiencies and/or Corrective Actions - See Appendix B for Guidance

- a. Required follow-up (POC)
- b. Schedule (POC)
- c. Problem areas?

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Appendix B

OPTIONAL ENGINEERING QUALITY PROGRAM CHECKLIST	
<i>RMS/AES's name:</i> _____ <i>Station identifier code:</i> _____ <i>Region/Area:</i> _____ <i>Date:</i> _____	
CANDIDATE ITEMS	REMARKS
<i>Desk (Remote) Analyses:</i> 1) EMRS Maintenance Data 2) CLS (connection problems) 3) Outstanding Defective Parts Due to NRC 4) AOMC (check site maint. activities) 5) OSF WSR-88D Monthly Retrofit Status Report 6) System Monitoring Software 7) Test Equipment Calibration 8) Training (technical and safety) 9) 10)	
<i>Station Program Review:</i> A) Initial Briefing With MIC/HIC/ESA B) Program Management C) Electronic Systems Maintenance D) Computer Systems Adm. & Maint. E) Facilities Program Management F) Site Practices and Support G) Site Walk-through (optional) H) Deficiencies/Corrective Actions	
<i>Station/Site Walk-through Exception Reporting (Fill in line numbers used):</i>) _____) _____) _____) _____) _____) _____	
RMS/AES (Signature):	
Station Manager (Signature):	
ESA (Signature):	

Appendix B (Continued)
Optional EQP Checklist Walk-through Description

The following list is a sample of items often considered for inclusion when performing a site walk-through. For items (lines) selected, include the number in the optional EQP checklist form. For example, if line three is selected, fill in) _____ as 3) Issuances, followed by your remark(s) in the *REMARKS* column. **Note:** The Engineering Inspection Report, WS Form H-2, may still be used, as appropriate. However, users are encouraged to use the current version; that is, the optional EQP checklist which may be tailored to meet specific needs.

Line 1. General Equipment Check. Those performing EQP checks of selected equipment, shall perform a visual examination; ensure that the equipment is ready for operation; and no defects exist.

Line 2. Tools and Test Equipment. The condition, storage, availability, and stock of tools (including electrostatic discharge devices, proper chip removal and insertion tools) and test equipment assigned to the electronics staff should be periodically reviewed by those performing EQP checks. Detailed test equipment lists are contained in EHB-5 (Test Equipment and Techniques). The ESA should ensure that the electronics staff obtain replacements for defective, missing, or obsolete items. Those performing EQP checks should verify that the electronics staff knows the proper use and maintenance of tools and test equipment assigned. The ESA should provide instructions on items any individual is not completely familiar with and inform the electronics staff of the availability of special test equipment.

Line 3. Issuances. The ESA shall verify that all current maintenance, modification, and software notes have been completed, and reported on. The RMS/AES should spot check that parts on hand are authorized; that maintenance activities, including completed modifications have been reported via the EMRS; the EMRS (Section 6.1, line 1) to ensure that the list of completed modifications for the subject site is accurate; and spot check the quality of workmanship as evidenced by recent work activity. If the work is not acceptable, the RMS/AES should recommend to the station manager and ESA ways to correct inconsistencies. If the work is not acceptable, the RMS/AES should offer to assist the station manager and ESA in exploring ways to correct the inconsistencies. It is the responsibility of the station manager and ESA to ensure that inconsistencies identified by the RMS/AES are scheduled for resolution, resolved on schedule, and reported to the regional EQP focal point. The RMS/AES should watch for unauthorized modifications, and if detected, should inform station management that they must be removed. Notations concerning modifications may be made on the EQP checklist.

Line 4. Vehicles. The ESA/MIC shall check the condition of any Government-owned or leased vehicle assigned to, or used by, the electronics staff; review with the responsible individual(s) any vehicle maintenance required; **and** determine the adequacy of any special equipment installed (e.g., ground control radio, flashing light, cargo carriers) or the need for such equipment. The RMS/AES may spot check vehicle maintenance logs and vehicles' condition.

Line 5. Manuals and Handbooks. The ESA shall check the completeness, availability, and condition of station systems documentation (e.g., WSOM chapters, technical manuals, EHBs including maintenance notes, modification notes) against current publication requirements;

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determine if all materials have been received, filed, and are readily accessible for system administration and maintenance; and check that maintenance forms, records, and schedules are available, maintained, and properly executed and filed. The ESA/RMS/AES shall assist the electronics staff in obtaining any missing documentation and inform them on the proper maintenance of documentation including reporting maintenance and systems administration activities.

Line 6. Facilities. Check general site condition, such as appearance of the station, offices and operations areas, storage, and the electronics staffs work area. A review of selected facilities at the WFO (local) and remote sites (e.g., RDA, ASOS, hydrologic, NWR) should be conducted periodically. Both safety and environmental concerns should be addressed. Facilities reviews will be performed by the regionally designated facilities inspector(s). The RMS/AES provides backup services only. The primary responsibility for conducting and reporting facilities inspections does not reside with the RMS/AES. The electronics staff should be familiar with EHB-3 (Facilities), which provides guidance and technical criteria for the performing of facilities reviews. Facilities inconsistencies shall be reported to the SOD chief (or designated facilities representative).

Line 7. Spare and Replacement Parts. Review the status of available spares (e.g., LRUs, parts) at the station for authorization, reasonableness, condition, and storage. Ensure that program specific identified spare sub-assemblies have been installed and tested [e.g., Automatic Radiotheodolite (ART) pylon assembly]. If not, recommend prompt action be initiated to remedy any problem. Urge that required items, known to be available, be requisitioned. It is important that repairable defective units be returned *promptly* and that any equipment that has been replaced or is excess to station requirements be reported. Note: The RMS/AES can check NRC due-in reports for overdue items during the desk analysis (line 3). The ESA should routinely monitor site performance in this area. It is also important to survey non-repairable defective units. Check that personnel are familiar with the required maintenance records (WS Form A-26), equipment return tags (WS Form H-14), repair policy, and disposition of repairable items. Disposition of equipment and parts is identified in EHB-1 (Instrumental Equipment Catalog). Any hazardous materials should be handled/disposed of using guidance provided in Hazard Communication Program guidance which may be found on the WWW home page (<http://www.oso3.nws.noaa.gov/safety>) and in state or local regulations. Note: This draft guidance is in the process of being reviewed and will be updated.

Line 8. Safety and Environment. Verify that inspection safety tag's last inspection date is within requirements. Follow national and regional guidance. As necessary, discuss environmental conditions (e.g., temperature and humidity extremes, lighting, noise, dirt and debris, and vibration/shock requirements) in which the office, technical staff, and systems are expected to operate with the station manager and ESA, including condition of stairs, walkways, storage of fuel, chemicals, use of MSDS, etc.

Line 9. Shop. Check its general condition (consider safety issues), such as appearance of the work space, lighting, freedom from clutter, storage areas, and test equipment within the electronics staffs shop area.

Line 10. Contractors Performance. Refer to Section 8 for more information

Line 11. Operational Check. This initial check includes verifying equipment/system operation and the physical appearance of the equipment/system. The ESAs should perform hands-on checks which may include both mechanical and electronic (electrical) checks of critical attributes of equipment/systems selected. Most new equipment/systems have built-in diagnostics that can be used as an aid in obtaining a sense of operational performance.

Line 12. Specification Check. If it is suspected that problems exist, additional checks for standards and tolerances should be the next step in the quality validation process. Here again, certain parameter checks are more important than others. "Core" parameters are noted in the respective EHBs.

System standards and tolerances are applicable to the system taken as a whole. Unit standards, in general, may be found in individual EHB's and/or equipment manuals. Where the standards and tolerances in equipment instruction books and other material are in conflict with those contained in the EHB directives, the criteria contained in the applicable EHB shall apply.

Line 13. Calibration Check. To ensure that the equipment meets all parameters as discussed above, a more detailed level of review may be necessary. This may take the form of an actual calibration, in whole or in part, of the system (or subsystem) or a comparison against a standard.

Line 14. Other. After the above reviews have been performed, the RMS/AES may decide that an even more detailed check is required to assure proper operation; or, that corrective maintenance is warranted. The specifics cannot be determined prior to the review. It requires judgment, and depends on the circumstances encountered during the site walk-through.

Appendix C - Equipment Quality Check Guide

A check of equipment and facilities is a procedure to determine the quality of the ongoing maintenance programs (electronics and facilities). The purpose is to ensure that equipment/systems are meeting operational requirements and to minimize unscheduled interruptions of operating equipment and abnormal deterioration of facilities. For modernization systems, the following is an **example procedure** (not all inclusive) which indicates what is to be checked, how it is to be checked, and what documentation is to be used to perform the quality check. In some cases it may be advisable to assemble a team of highly skilled staff to perform the optional equipment/system check (e.g., WSR-88D; upper air).

SYSTEM	WHAT TO CHECK	HOW TO CHECK
ASOS (EHB-11, Automated Observing Equipment)	Check acquisition control unit, data collection package, pressure sensor, temperature dewpoint sensor, visibility sensor, present weather sensor, wind sensor, freezing rain sensor, thunderstorm sensor, tipping bucket, ceilometer, peripherals, and GTA radio.	Use ASOS Site Technical Manual S100: Table 1.5.4, page 1-82; Table 1.5.5, page 1-84; Table 1.5.6, page 1-85; Table 1.5.7, page 1-85; Table 1.5.8, page 1-86.
AWIPS (EHB-13-11)	Contractor maintained system.	Coordinate with ESA
NEXRAD (EHB-6, Radar Systems)	Check to ensure equipment is clean, operable, and lubricated. Check RDA, radar products generator, principal user processor, color video monitor, unit control position(s), workstation assembly, applications terminal, statistical multiplexer, dedicated port modem, printer, radar transmitter, waveguide pressurization unit, antenna/pedestal, microwave radio, AC units, tower, uninterruptible power supply, generators, software loads, and backups.	Use NWS EHB 6-503: Inspection, Lubrication, and Maintenance Requirements Manual; Workcard Sets; and Specified Technical Manuals.
Hydrologic Equipment (EHB-10)	Check overall appearance, weather stripping around base plate and door, collection bucket. Ensure equipment is clean, operable, and lubricated. Check battery voltage, punched tape supply roll, zero adjust, force post, funnel, recording tape, electronic limer, dashpot oil, wiring, connectors, switches, and hardware.	Use NWS EHB-10 Instruction Manual: 10-101, 10-103, 10-104, 10-105, 10-112, 10-204, 10-206, 10-207, 10-208, 10-304, 10-307, 10-500, 10-600. Sections: 4.1, 4.2, 4.5.

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<p>NWR B220/ B222/ B230 FAMILY</p>	<p>Check the transmitter, air filter, indicator lamps, line voltage, etc. Verify power output level, correct RF frequency (use comms. monitor or maintenance panel), voltage standing wave ratio (VSWR), and the program audio. Verify installation of all mods. Check ancillary equipment and antenna system. Verify that routine maintenance has been annotated in the transmitter log.</p>	<p>Use NWSTC NWR B220/B222. Instruction Manual: Tables 1.1, 3.1, 3.2, 4.2, 4.3, 4.4. Sections 3.3, 4.11, 4.12.1, 4.12.2, and 4.13.1.</p>
<p>Surface Equipment (EHB-8)</p>	<p>Check overall appearance, cables, rack and/or cabinet, meters, ink, transmitters, power supply, electrical alignment, lubrication, cleanliness, connections for tightness, cable for signs of insulation deterioration or wear. Check hardware for rust, flaking and cracks.</p> <p>*Sent only with original equipment. Not available otherwise. **Supplied only to those using this type of equipment.</p>	<p>Use NWS EHB-8 Instruction Manual: 8-111*, 8-112*, 8-113*, 8-114*, 8-116*, 8-119**, 8-300, 8-304, 8-305, 8-309**, 8-310**, 8-311**, 8-312**, and 8-406** Sections: 4.1 thr. 4.5</p>
<p>Upper Air ART-1, 1R ART-2, 2R (EHB-9, Aerological Sounding Equipment)</p>	<p>Paragraph 5.2.2.1 Service Meter Quick-Check Paragraph 5.2.2.2 Azimuth Drive Current Idle Balance Steps a,b,c Paragraph 5.2.2.3 Elevation Drive Current Idle Balance Steps a,b,c Paragraph 5.2.4.1 Receiver Quick-Check Paragraph 5.2.2.4.2 Reset Check Paragraph 5.2.3.1 Battery Test Paragraph 5.2.3.2 System Checkout Paragraph 5.2.4.1 Power Supply Alignment</p>	<p>Use Automatic Radiotheodolite Instruction Manual Volume 1</p>

During the quality check, the following points should be considered to determine the aging and condition of the equipment and to assist in gaging the caliber of maintenance performed. Where problems are discovered, corrective action should be taken or recommended and a notation made on the EQP checklist.

1. Printed circuit boards shall be clean and free from excessive dust, cracks, moisture contamination, and shall have clean solder joints.
2. Connectors must mate solidly. They should be free from corroded solder joints, frayed insulation, short circuits, and signs of moisture seepage. Connections should not be dirty, loose, or corroded. Check for signs of moisture leakage.
3. Fuseholders shall be free of corrosion and loose connections, and provide firm mechanical connection with the fuse.

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4. Terminal boards and mounted parts should be firmly in place, free of loose connections, and free of dirty, corroded, or broken contacts.

5. Cables, wires, cords, test leads, shields, and tubing should be free from cracks, cuts, binds, frayed or cracked insulation, kinks, corrosion, poor connections, and short or open circuits. Interconnecting cables within cabinets should be neatly dressed. Test leads should be checked for deteriorated insulation resistance. Cable ties should be free from cracks and other signs of deterioration. They should not be overly tight so as not to damage the insulation on wires and cables. Cable service loops should be of appropriate length and properly secured.

6. Gears should be free from excessive backlash and have no broken, bent, or missing parts or sections. No gears should show signs of excessive wear.

7. Mechanical components requiring lubrication (e.g., gear trains, bearings) must be clean, properly aligned and periodically lubricated in accordance with the maintenance schedule; lubricants must show no evidence of metal particles, be clean, and show no signs of moisture and dirt contamination. Check to ensure that equipment is not over lubricated (e.g., seals not bulging, burst).

8. Access doors and dust covers should fit properly; seals should be in good condition. Hinges should be free of binding and be appropriately lubricated; and weather seals should be functional (e.g., around panels, doors, switch covers).

9. Locks installed on field equipment must be used and must be free of binding, dirt, dust, and corrosion.

10. Instrument cabinets, racks, and air filters are to be free from dirt, dust, and debris (including metal filings, nuts, screws, washers, wire clippings) especially in the bottoms of racks. No notes or extraneous materials are to be taped on cabinets or chassis. Observe general condition, need for paint, etc.

11. Ground conductors should be as short and direct as possible and should be electrically and mechanically sound.

12. Check for unauthorized modifications and installations.

13. Individual system parameters should meet specified tolerances [e.g., Minimum Discernable Signal (MDS), VSWR].

14. Check software revision levels.

15. Towers: check for corrosion, cable clamp integrity, equipment and tower mounting integrity, ladder integrity, and general safety.

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Appendix D - Recommended Schedule of Engineering Quality Program Visits

Engineering quality visits should be scheduled as listed below. The equipment listed below should be considered as complete systems. *Quality reviews should, when possible, be made in conjunction with other visits* (e.g., maintenance trip, installation survey).

Frequency	System	Note
Periodic (during scheduled station program reviews)	WFO/RFC Equipment such as: - AFOS/Local LAN - Local ASOS - Local Surface Equipment - AWIPS - WSR-88D (RPG,PUP,local RDA) - NWR - Upper Air	Include RTA Terminal Forecasts issued (WSOM D-21) Include HVAC, UPS Include UHFRL Include HGE
As Appropriate (based on EQP analysis results & coordination with station managers)	Remotely Located WFO/RFC Equipment such as: - ASOS (Remote) - ARC/LARC - WSR-88D (Remote RDA) - EPG - Fire Weather Equipment - Remote Surface Equipment - General Communications Equipment - Individual Hydro Equipment - Tide gages	Include sensors, communications Non-airport, several pieces One or two pieces at a site

Systems not listed shall be checked as determined by regional directives or dictated by local needs.