



UNITED STATES MARINE CORPS  
MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE  
PSC BOX 20005  
CAMP LEJEUNE NC 28542-0005

IN REPLY REFER TO:  
11000  
BI&E  
1 Feb 2017

From: Director of Maintenance Operations Branch, Public Works  
Division

Subj: LIGHTNING PROTECTION SYSTEM TEST PLAN SOP

Ref: (a) NAVSEA OP-5, Vol. I  
(b) MIL-HDBK 419 (NOTAL)  
(c) MIL-HDBK AS 274 (NOTAL)  
(d) NFPA-780 (NOTAL)

Encl: (1) Lightning and grounding system procedures and requirements

1. Purpose. To document PWD responsibilities, requirements, and inspection and test procedures, testing, maintenance, and repairs of the lightning protection and grounding system for the ammunition and explosives areas and static grounds at Marine Corps Base (MCB) Camp Lejeune and Marine Corps Air Station (MCAS) New River, North Carolina. This program is established as required by reference (a) and adheres to the guidelines of references (b) through (d). Enclosure (1) contains the specific procedures and requirements for performing visual inspections and testing of lightning protection and grounding systems.

2. Cancellation. This instruction supersedes any previous Test Plan SOP for testing of lightning protection and grounding systems for ammunition and explosives areas and static grounds at MCB Camp Lejeune and MCAS New River.

3. Scope. This instruction provides procedures for visual inspections and electrical testing of all grounding systems to include primary and secondary ground girdles, ordnance grounds, structural (lightning protection system) grounds, static grounds, stationary ground cables and reels, and flight line grounding requirements. All visual inspections and electrical testing will be per this instruction and references.

4. Responsibilities.

a. Public Works Operations Branch will:

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(1) Set up and maintain a grounding system test plan for the visual and electrical testing of primary and secondary ground system components. The test plan (for magazine storage areas, handling and loading areas, explosives operating buildings and flight lines) shall identify the ground system test locations along with a list of test points and locations to be tested and type of test to be conducted. Maintain lists for magazine storage areas, handling and loading areas, explosives operating buildings, and flight lines with test points identified.

(2) Performance of electrical tests on all primary lightning protection systems and secondary grounding systems, including ordnance ground, static ground, structural ground, metal masses, gates, etc., as required. Clearly mark the ordnance, test reference point (TRP), and static ground when required by the references. Electrical testing of systems is required every 24 months. Lightning protection and grounding systems (new construction) require testing on a monthly basis for the first 12 months and then reverts to the required 24 month interval.

(3) Upon completion of the initial 12 month inspection/testing period, Ops will notify the Facilities Support Contracts (FSC) Branch to have the new facility added to the existing Grounding/Meg Testing Service Contract for future inspection/testing.

(4) Issue to the grounding/meg testing service contractor the system test plan for the visual and electrical testing of primary and secondary ground systems components via service contract.

(5) Be responsible for collecting all inspections and test data for magazine areas at MCB Camp Lejeune and MCAS New River. Responsible for review of test data, issue paper work to correct discrepancies under task order, and maintain test data for six test cycles (12 years). The visual is required every six months; the electrical is required every 24 months. Be responsible to enter all test data into records/files.

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(6) Update written test procedures established in this instruction as per changes in requirements, or major changes in systems. Record and review all test data, analyze for trend development and to determine that all referenced specifications are met. Schedule any necessary corrective action to repair discrepancies found during inspections or reported to you from the Explosives Safety Officer (ESO) or command representatives responsible to perform lightning protection and grounding inspections of ammunition and explosives storage and handling areas.

(7) Provide direction, access, and/or copies of all proper paperwork for visual inspections and electrical testing of lightning protection and ground systems to the MCB Camp Lejeune and MCAS New River ESOs.

(8) Receive and analyze all test data to determine that all referenced specifications are met. Prepare a work authorization test plan as needed to repair or replace grounding systems and monitor test data for trend development.

b. Service Contract Electrical Contractor shall:

(1) Visually inspect all primary lightning protection and grounding systems (ordnance ground, structural ground, metal masses, fences, and gates) every 6 months, with escorts from magazine areas as required by reference (a). Spot check electrical equipment and installation when performing visual inspections. Provide personnel required to perform visual inspections and electrical testing of lightning protection and ground systems with a grounding system inspection report and test point location for each facility. The inspection plan must identify all inspection points and shall identify the person(s) who performed the inspection. Repair immediately any minor discrepancies found during inspections. Prepare and draw sketches per reference (a). Major discrepancies shall be reported to FMD and a request made for corrective action. Record all discrepancies and/or corrective actions taken on the report. Visual inspections are required and shall be recorded every six months. Visual inspections are not required for aircraft static grounds.

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(2) Train all personnel required to perform visual inspections and electrical testing of lightning protection and ground systems. Assign only trained and certified personnel to perform tests and inspections. Train members of the command required to augment the visual inspection team.

(3) Perform electrical tests on all primary lightning protection systems, secondary grounding systems including ordnance grounds, static grounds, structural grounds, metal masses, gates, etc., every 24 months.

(4) Document all test results on ground system test report, inspection check sheet.

(5) Provide copies of all testing documents and discrepancy reports to the FSC Section, Public Works Division.

(6) Record and repair immediately all minor discrepancies found during the inspection. Record all discrepancies which cannot be corrected.

(7) Spot-check electrical equipment and installation when performing visual inspection. Record all discrepancies and submit discrepancy report to FSC for correction via task order on existing FSC contract.

(8) Clearly mark the ordnance, test reference point, and static ground to preclude the misidentification of each.

(9) Ensure Inspection Team membership is provided as directed in reference (a).

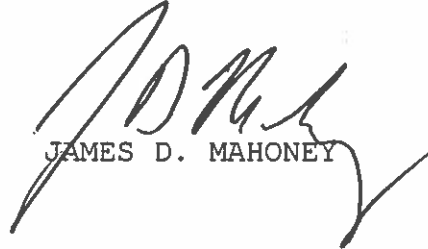
c. Public Works Design Branch will:

(1) Ensure that drawings for all new explosive buildings, magazines, new additions, and replacement of equipment includes all necessary bonding, grounding, and lightning protection requirements per the references.

(2) Report to FMD any lightning protection or grounding deficiencies, testing, or additional system installation or repair requirements.

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(3) Review and oversee the activities lightning protection and grounding system program.



JAMES D. MAHONEY

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## CHAPTER 1

### INTRODUCTION TO LIGHTNING GROUNDING SYSTEM

1. The lightning protection system consists of a primary lightning grounding system and a secondary ground girdle. The primary grounding system is equipped with lightning mast and down conductor. These masts are linked together with underground wire cable. The secondary ground girdle is a continuous wire girdle three feet from the building then buried three feet in the earth; these two wire girdles are separately stretching around the structure. These wire girdles are connected in not less than two places in order to maintain the same potential to each other, and the resistance of the primary grounding system is tested to 25 ohms or less to earth. The girdles serve as grounding for the structure and grounding for the lightning protection systems. They are tested by using the 3 point fall of potential method, using the Test Reference Point (TRP) as primary ground test point. A calibrated digital megger shall be used to make this test.

2. The secondary ground girdle serves as an earth ground for the building and all other grounds used in the structure, bonds to the secondary ground girdle shall be less than 1 ohms resistance. All the buildings structural steel and all the metallic objects within 6 feet of the primary girdle which exceed 400 square inches, both inside and outside, are connected to the ground girdle and shall be at the same potential as the lightning protection system. This prevents side flash and static build-up in and around the facility being protected. Chapter 5 of reference (a) contains a figure that provides an overview of a typical ordnance handling building and depicts the fact that all grounds are bonded together at the lowest point to the secondary ground girdle.

3. Keeping these design facts in mind, the enclosures have been developed to assist in the testing of the systems on an above ground ordnance handling building, earth covered magazines, ready service lockers, handling buildings and pads, aircraft static grounds, flight line grounds, and visual inspection procedures. The results of the 24 month lightning/grounding test must be recorded and maintained for a minimum of six test cycles (12 years). The visual inspections shall follow the check sheet and be performed every six months. The lightning protection/grounding system testing will always be accomplished by trained personnel familiar with the systems.

## CHAPTER 2

### TEST PROCEDURES FOR ABOVE GROUND MAGAZINES AND TRUCK HOLDING YARDS (24 Month)

#### NOTE:

**DISCONNECT ALL ORDNANCE FROM STATIC AND ORDNANCE GROUNDS DURING  
TEST**

#### WARNING

**ALL INSTRUCTIONS FOR USE OF COMMUNICATION EQUIPMENT IN ORDNANCE  
AREAS  
SHALL BE STRICTLY ADHERED TO AT ALL TIMES**

1. GENERAL. Above ground magazine and truck holding yards are typically comprised of a primary lightning protection system and a secondary ground girdle. These grounding/lightning protection systems serve to protect personnel and equipment from the potential of lightning strikes and the build-up and uncontrolled discharge of static electrical charges.

2. TESTING. Test as follows:

STEP 1 - Ensure that the test equipment is calibrated and that all of its equipment is present. Follow floor diagram of all the test points to be tested.

#### NOTE:

**A RECORD SHEET TO RECORD READINGS AND FLOOR/AREA DIAGRAM IS  
PROVIDED WITH THIS SOP.**

STEP 2 - Locate the wire that bonds the lightning masts together around the building to be tested (primary girdle). Test reference point (TRP) connection is located in the test well or next to mast.

STEP 3 - Clean a connection point on the wire cable or grounding rod. This is where the earth tester will be connected for the earth test; 25 ohms or less is required. This cleaned area on the wire cable (or rod) now is called your TRP. Continuity readings will be taken from this point (after the earth ground test). Disconnect all cables from rod.



STEP 4 - Test the TRP (25 ohms or less is required), record the reading and date on the six test record sheets provided, and reconnect all cables. Secure the earth tester in its case.

STEP 5 - Using a zeroed digital resistance meter with long leads, check for continuity from the TRP to the first lightning mast, from the second mast to the third and so on. A high reading will indicate a break in the wire cable you are reading back through the system. No reading will indicate there is more than one break in the cable linking the mast together.

STEP 6 - If the continuity readings from mast to mast are good (less than 1 ohm), record and go to the next step. If breaks were detected, disconnect the wire cable from the mast and run a new continuous cable from mast to mast.

STEP 7 - MAST INSPECTION. The lightning mast shall not be closer than 6 feet to the structure and no further away than 25 feet. EXAMPLE: Mast 40 feet high 20 feet from the structure 1/2 the height of the mast. EXAMPLE: Mast 60 feet high 25 feet from the structure, wooden masts shall be capped at the top and have two down conductors. The mast shall be high enough to protect the entire structure from a lightning strike.

STEP 8 - Inspection of metallic objects passing through the zone of lightning protection to the building being protected. These objects are usually steam pipes, railroad tracks, etc. These objects shall be bonded prior to entering the lightning protection zone. Bond them to the primary lightning protection wire girdle and make these areas a test point.

**NOTE:**

**ELECTRICAL TRANSMISSION LINES AND COMMUNICATIONS LINES SHALL BE BURIED FOR THE LAST 50 FEET PRIOR TO ENTERING THE STRUCTURE.**

STEP 9 - You have completed the test and inspection on the primary lightning protection system by verifying there is continuity from lightning mast to lightning mast and back to your test reference point. All metallic objects passing through the zone of protection must be connected to the primary lightning protection system. Record all readings as required on the six cycle test record sheet.

STEP 10 - Locate the ground girdle. According to design it is three feet from the structure and buried three feet in the ground.

**NOTE:**

**MOST OF THE TIME THE GROUND CABLE (GIRDLE) CAN BE LOCATED BY SEEING A CABLE RUNNING OUT OF THE GROUND CLOSE TO THE FOOTER AND THEN RUNNING TO THE STRUCTURE, OR IT MAY BE LOCATED ON THE FLOOR INSIDE THE STRUCTURE.**

STEP 11 - Identify all cables around the structure. Run a continuity check from these cables to the primary lightning protection test reference point (1 ohm or less is required). If no reading can be established, the secondary and primary girdles are not connected together. First check for grandfather clauses (for older systems). Notify the ESO and FMD. Effect repairs or initiate corrective actions, whichever is required.

STEP 12 - Zero the digital resistance tester if the leads have been changed. Test continuity from the ground girdle to all metallic objects within the primary girdle inside and outside the structure, including windows, doors, conduit, structural overhangs, ladders, etc. Connection shall be 1 ohm or less. Record the readings on the six cycle test record sheet.

**3. SUMMARY.**

a. Ensure that all readings are recorded on the five cycle test record sheet. Check with previous readings for any variations. This will let you know if there are any possible system integrity problems.

b. File the record for use during the next 24 month test. The record can be used for six 24 month tests. Report any discrepancies of the test to the ESO, FMD, and command representatives for corrective action.

**NOTE:**

**ALL METALLIC OBJECTS (400 square inches or more) WITHIN THE PRIMARY GIRDLE OF A PROTECTED ORDNANCE STRUCTURE SHALL BE AT THE SAME POTENTIAL AS THE LIGHTNING PROTECTION SYSTEM.**

**NOTE: GROUNDS ARE TO BE CONNECTED TO THE GIRDLE AT THE LOWEST POINT OF THE SYSTEM.**

## CHAPTER 3

### Test Procedures for Earth Covered Magazines (24 Month)

1. GENERAL. The concrete construction of an earth covered magazine is reinforced with steel bars. Some earth covered magazines have steel casings inside. These reinforcement bars or cases are connected to or are considered the primary lightning protection and grounding system. This forms an umbrella of protection (FARADAY CAGE) for the ordnance stored inside the structure. This system is tested to 25 ohms or less to a TRP (earth ground).

2. TESTING. Test as follows:

STEP 1 - Ensure that the test equipment is calibrated and that all of its equipment and cables are present. Follow floor diagram of all the test points to be tested.

#### NOTE:

**A RECORD SHEET TO RECORD READINGS AND FLOOR/AREA DIAGRAM IS PROVIDED WITH THIS SOP.**

STEP 2 - Locate the ground girdle (if applicable) for the structure. According to design, it is three feet from the structure and buried three feet in the ground (located in test well or under white PVC cap by bulkhead wall).

#### NOTE:

**USUALLY, IF THERE IS A GROUND GIRDLE CABLE IT WILL EXTEND OUT OF THE GROUND CLOSE TO THE HEADWALL AND CONTINUE INTO THE STRUCTURE. SOMETIMES THE GROUND CABLE WILL EXTEND OUT OF THE FLOOR INSIDE THE BUILDING.**

STEP 3 - Clean a connection point on the ground girdle, wire, cable, rod or some point on structural steel. This is where the earth tester will be connected for the earth test (25 ohms or less is required). This cleaned area is called your test reference point (TRP). Continuity readings will be taken from this point after the earth ground test. Disconnect all cables from ground rod (when used).

STEP 4 - Test the ground girdle, record the reading and date on the five cycle record sheet provided, and reconnect all cables. Secure the earth tester in its case.

STEP 5 - Zero a digital resistance tester if the leads have been changed. Test continuity from the TRP to all metallic objects of or around the structure, including doors, conduit, structural overhangs over doors, metal ventilators, security grates under the ventilator inside, railroad tracks, etc. Connections to the ground girdle shall be 1 ohm or less. Record the continuity readings on the six cycle test record sheet.

STEP 6 - Check inside the earth covered magazine for a ground system. Test to 1 ohm or less continuity to the ground girdle. Record readings on the six year test record sheet.

STEP 7 - Inspect to ensure that the ventilator and security grate is NOT bonded from the ventilator down to a ground inside the magazine. It shall be bonded from the top and outside to the ground girdle.

### 3. SUMMARY

a. Ensure that all readings are recorded on the six cycle test record sheet. Check with previous readings for any variations. This will let you know if there are any possible system integrity problems.

b. File the record for use during the next 24 month test, the record can be used for six 24 month tests. Report any discrepancies of the test to the ESO, FMD, and command representatives for corrective action.

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## CHAPTER 4

### Test Procedures for Ready Service Lockers (24 Month)

1. GENERAL. The above ground ammunition storage lockers are metal safe-like containers used to temporarily store munitions prior to use. They are portable; mounted on metal skids.

2. TESTING. Test as follows:

STEP 1 - Ensure that the test equipment is calibrated and that all of its equipment is present. Follow area diagram of all the points to be tested.

#### NOTE:

**A RECORD SHEET TO RECORD READINGS AND FLOOR/AREA DIAGRAM IS PROVIDED WITH THIS SOP.**

STEP 2 - Locate the ground rods for the container. According to design, it is no more than three feet from the container on opposite corners.

STEP 3 - Clean a connection point on the ground rod and connect to the down strap. This is where the earth tester will be connected for the earth test (25 ohms or less is required). This cleaned area on the rod is called your test reference point (TRP). Continuity readings will be taken from this point after the earth ground test. Disconnect all cables.

STEP 4 - Test the ground rod, record the reading and date on the six cycle test record sheet, and reconnect all cables. Secure the earth tester in its case.

STEP 5 - Zero the digital resistor tester. Test all the test points as identified on the diagram for that container (less than 1 ohm resistance to the TRP is required). Record the readings on the six cycle test record sheet.

3. SUMMARY

a. Ensure that all readings are recorded on the six cycle test record sheet. Check with previous readings for any variations, this will let you know if there are any possible system integrity problems.

b. File the record for use during the next 24 month test, the record can be used for six 24 month tests. Report any discrepancies of the test to the ESO, FMD, and command representatives for corrective action.

## CHAPTER 5

### Test Procedures for Ordnance Handling Buildings and Pads

1. GENERAL. An operating building grounding system is typically comprised of a primary lightning protection system and a secondary ground girdle. These buildings typically have ordnance grounds installed inside, which is an isolated grounding system design for assembly/disassembly of ordnance.

2. TESTING. Test as follows:

STEP 1 - Ensure that the test equipment is calibrated and that all of its equipment is present. Follow floor plan grounding diagram for all points to be tested.

#### NOTE:

**A RECORD SHEET TO RECORD READINGS AND FLOOR/AREA DIAGRAM IS PROVIDED WITH THIS SOP.**

STEP 2 - Locate the wire that bonds the lightning masts together around the building to be tested (primary girdle). The reference TRP connection is located in the test well or next to mast.

STEP 3 - Clean a connection point on the wire cable or grounding rod. This is where the earth tester will be connected for the earth test, 25 ohms or less is required. This cleaned area on the wire cable (or rod) is your TRP. Continuity readings will be taken from this point (after the earth ground test). Disconnect all cables from rod.

STEP 4 - Test the primary system. Also test any ordnance grounding system, as both have the same result requirements (25 ohms or less). Record the test readings and date on the six cycle test record sheets provided. Reconnect all cables. Secure the earth tester in its case.

STEP 5 - Using a zeroed digital resistance meter with long leads, check for continuity from the TRP to the first lightning mast, from the second mast to the third and so on. A high reading will indicate a break in the wire cable you are reading back through the system. No reading will indicate there is more than one break in the cable linking the mast together.



STEP 6 - If the continuity readings from mast to mast are good (less than 1 ohm), record and go to the next step. If breaks were detected, disconnect the wire cable from the mast and run a new cable continuously from mast to mast. Turn in a discrepancy report and corrective actions.

STEP 7 - MAST INSPECTION. The lightning mast shall not be closer than 6 feet to the structure and no further away than 25 feet. EXAMPLE: Mast 40 feet high 20 feet from the structure 1/2 the height of the mast. EXAMPLE: Mast 60 feet high 25 feet from the structure, wooden masts shall be capped at the top and have two down conductors. The mast shall be high enough to protect the structure from a lightning strike.

STEP 8 - Inspect all metallic objects passing through the zone of lightning protection to the building being protected. These objects are usually steam pipes, railroad tracks, etc. These objects shall be bonded prior to entering the lightning protection zone. Bond them to the primary lightning protection girdle, and make these areas a test point.

**NOTE:**

**ELECTRICAL TRANSMISSION LINES AND COMMUNICATIONS LINES SHALL BE BURIED FOR THE LAST 50 FEET PRIOR TO ENTERING THE STRUCTURE.**

STEP 9 - You have completed the test and inspection on the primary lightning protection system. By verifying there is continuity from lightning mast to lightning mast and back to your test reference point. All metallic objects (400 square inches or more) within or passing through the zone of protection must be connected to the primary lightning protection system. Record all readings as required on the six cycle test record sheet.

STEP 10 - Locate the ground girdle. According to design, it is three feet from the structure and buried three feet in the ground.

**NOTE:**

**MOST OF THE TIME THE GROUND GIRDLE CABLE CAN BE LOCATED BY SEEING A CABLE RUNNING OUT OF THE GROUND CLOSE TO THE FOOTER AND THEN RUNNING TO STRUCTURAL STEEL. THE GROUND CABLE MAY BE LOCATED ON THE FLOOR INSIDE THE BUILDING.**

STEP 11 - Identify all of the cables around the structure. Then run a continuity check from these cables to the primary lightning protection TRP (1 ohm or less is required). Label these cables as; ground girdle, power ground, static, or ordnance grounds, as required. If no reading can be established, the secondary and primary girdle is not connected together. Check for grandfather clauses (for older systems). Notify the ESO and FMD and make repairs or turn in a request for corrective action, as required.

STEP 12 - Zero the digital resistance tester if the leads have been changed. Test continuity from the ground girdle to all metallic objects within the primary grid (i.e., anything inside or outside the structure 400 square inches or more), including windows, doors, conduit, structural overhangs, ladders, etc. Connection shall be 1 ohm or less. Record the readings on the six cycle test record sheet.

### 3. SUMMARY

a. Ensure that all readings are recorded on the six cycle test record sheet. Check with previous readings for any variations. This will let you know if there are any possible system integrity problems.

b. File the record for use during the next 24 month test, the record can be used for six 24 month tests. Report any discrepancies of test to the ESO, FMD, and command representatives for corrective action.

#### NOTE:

**ALL METALLIC OBJECTS (400 square inches or more) WITHIN THE PRIMARY GIRDLE OF AN ORDNANCE OPERATING BUILDING SHALL BE AT THE SAME POTENTIAL AS THE LIGHTNING PROTECTION SYSTEM.**

#### NOTE:

**GROUND S ARE CONNECTED TO THE LOWEST POINT NEAR THE GROUND GIRDLE. HIGHER CONNECTIONS ARE CONSIDERED TO BE CONNECTED TO THE DOWN TRAP OF THE SYSTEM.**

## CHAPTER 6

### Test Procedures for Aircraft Static Grounds (24 Month)

1. GENERAL. The flight line grounding points are under the control of various different TENANT commands. All these tests are to prove static grounding points (10,000 ohms or less).

2. TESTING. Test as follows:

STEP 1 - Ensure that the test equipment is calibrated and that all of its equipment is present. Follow area diagrams of all the test points to be tested.

#### NOTE:

**A RECORD SHEET TO RECORD READINGS AND FLOOR/AREA DIAGRAM IS PROVIDED WITH THIS TEST PLAN.**

STEP 2 - Locate the ground connections (DESIGNATED TIE- DOWNS) on the flight line.

STEP 3 - Locate and clean a power ground point on the flight line or in the nearest hanger. This is where the earth tester will be connected for the earth test (25 ohms or less is required for Power Grounds). This cleaned point is called your test reference point (TRP). Ensure that NOTHING but the meter is connected to any point under test.

STEP 4 - Test the other ground points, record the test reading and date on the six cycle test record sheet provided, and reconnect all cables. Secure the earth tester in its case.

3. SUMMARY

a. Ensure that all readings are recorded on the six cycle test record sheet. Check with previous readings for any variations. This will let you know if there are any possible system integrity problems.

b. File the record for use during the next 24 month test, the record can be used for six 24 month tests. Report any discrepancies of the test to the ESO, FMD, and command representatives for corrective action.

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## CHAPTER 7

### Lightning Protection and Grounding Inspection/Test for Hangars (24 Month)

1. GENERAL. The hangars are spread out over various parts of the flight line and are under the control of various commands. Not all have lightning protection systems installed.

2. TESTING. Test as follows:

STEP 1 - Ensure that the test equipment is calibrated and that all of its equipment is present. Follow area diagrams of all the test points to be tested.

#### NOTE:

**A RECORD SHEET TO RECORD READINGS AND FLOOR/AREA DIAGRAM IS PROVIDED WITH THIS SOP.**

STEP 2 - Locate the ground connections in the hangar floor.

STEP 3 - Clean a connection point on the ground. This is where the earth tester will be connected for the earth test (25ohms or less is required for Power Grounds). This cleaned area on the rod is called your test reference point (TRP). Ensure that NOTHING but the meter is connected to the point under test.

STEP 4 - Test the ground points. Use this connection point as reference for testing the rest of the grounds, (all must be 25 ohms or less). Record the readings and date on the six cycle test record sheet provided. Reconnect all cables.

STEP 5 - Test to any point on the lightning protection system (25 ohms or less). This point is your TRP for the lightning protection system tests. From this TRP, do continuity tests for the rest of lightning protection system (shall be less than 1 ohm). Record the readings and date on the six cycle test record sheet provided. Secure the test equipment in its case.

#### 3. SUMMARY

a. Ensure that all readings are recorded on the six cycle test record sheet. Check with previous readings for any variations. This will let you know if there are any possible system integrity problems.

b. File the record for use during the next 24 month test, the record can be used for six 24 month tests. Report any discrepancies of the test to the ESO, FMD, and command representatives for corrective action.

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## CHAPTER 8

### Visual Inspection Procedures (6 Month)

1. GENERAL. The visual inspection shall be conducted every six months. The following procedures will be followed.

#### 2. INSPECTION

STEP 1 - Ensure that any large metal objects within the primary grid, or inside of the lightning masts, are connected to the primary ground/girdle or bonded to structural steel.

STEP 2 - Inspect cables connected to lightning masts to ensure that they are in good condition and are at least AWG #1/0 or larger, made of bare copper wire, are attached to the mast, have no sharp bends in wire, and have no more than 1/3 of the strands are broken. Repair, replace, or install new cables as needed.

STEP 3 - On lightning-protected buildings, inspect to see that there are no trees in the protected area.

STEP 4 - Randomly inspect all grounding systems connections to see that they are secure and free from paint, corrosion, or foreign materials which may impair ground system efficiency. Make repairs as necessary. Inspect both inside and outside of building.

STEP 5 - Check to see that all metal masses (400 square inches or larger) are connected to the secondary ground girdle. Examples of masses are metal siding doors, shutters, and trusses. Repair or add bonding as needed.

STEP 6 - Check ordnance ground buses, static ground buses, and instrumentation ground buses for clear identification of each, and make sure connections are secure (via pull test) and connection points are free from paint, corrosion, or foreign material that may impair the efficiency of the system. Repair if needed.

STEP 7 - Check to see that all utilities coming into the buildings are buried the last 50 feet.

STEP 8 - Ensure all metallic conductors, including intrusion detection lines, water, electrical, steam, air conditioning



lines, etc., are run underground the last 50 feet to the building.

STEP 9 - Ensure fences are bonded to the lightning protection system if they come within 50 feet or as determined by reference (d). Ensure all fences are grounded within (or every) 50 feet if high tension lines cross fencing, are directly overhead or run parallel to fences. Ensure that fences are grounded at places where personnel may routinely touch the fence and areas where structure and materials are located within 6 feet of the fence.

STEP 10 - Review previous test records to ensure fences are bonded from gate post to gate post, gate post to gate, and gate post to secondary ground girdle, if within zone of protection. If outside zone of protection, ensure ground rods are driven on each side of gate post in place of connecting to secondary girdle.

3. SUMMARY. File the records for use during the next six month inspection. Report all discrepancies of test to the ESO, FMD, and command representatives for corrective action.

LIST OF MCB CAMP LEJEUNE & MCAS NEW RIVER TEST & AND INSPECTION  
POINTS

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APPENDIX A

LIST OF MCB CAMP LEJEUNE & MCAS NEW RIVER TEST AND INSPECTION  
POINTS

Attachment J-1502000-31			
AREA	TEST POINTS	SECURITY GATE	FENCED
ARM / DE--ARM	10	YES	YES
AS 222	1	YES	YES
AS 255	3	YES	YES
AS 265	16	YES	YES
AS 3000	3	YES	YES
AS 3900	14	YES	YES
AS 3905 FRONT	2	YES	YES
AS 4100 FRONT	6	YES	YES
AS 4108	56	YES	YES
AS 427	2	YES	YES
AS 429	5	YES	YES
AS 480	15	YES	YES
AS 5012	2	YES	YES
AS 5012 GATE	3	YES	YES
AS 5013	3	YES	YES
RLS-SAS 5029 A&B	4	YES	YES
AS 5014	6	YES	YES
AS 5015	6	YES	YES
AS 5016	4	YES	YES
AS 5017	5	YES	YES
AS 5027	4	YES	YES
AS 510	4	YES	YES
AS 515	39	YES	YES
AS 515 FRONT	33	YES	YES
AS 518	21	YES	YES
AS 805	5	YES	YES
AS 840	16	YES	YES
AS3905	25	YES	YES
AS4100	14	YES	YES
AS4106	11	YES	YES
AS-508 Hanger	20	YES	YES
AS903	15	YES	YES
CALA	5	YES	YES
CALA Gate	2	YES	YES
FUEL PITS	16	YES	YES
MAIN STORAGE AREA	18	YES	YES
MATS 2-7	178	YES	YES
MF-Van Pad	5	YES	YES
RLS SAS 518	1	YES	YES
RSL 529 A	1	YES	YES

RSL 529 B	1	YES	YES
RSL 529 C	1	YES	YES
RSL 529 D	1	YES	YES
RSL AS890 A/B/C	3	YES	YES
RSL SAS 4100 A	1	YES	YES
RSL SAS 4106	1	YES	YES
RSL SAS 4108 A & B	2	YES	YES
RSL SAS 4148 A&B	2	YES	YES
RSL SAS 504 A&B	2	YES	YES
RSL AS508 A&B	2	YES	YES
RSL SAS4109R		YES	YES
S- 609 SUSPECT CARGO	14	YES	YES
SAS 3460	11	YES	YES
SAS 3601	3	YES	YES
SAS 4089	33	YES	YES
SAS 5022	6	YES	YES
SAS 5023	6	YES	YES
SAS 5028	4	YES	YES
SAS 5029	18	YES	YES
SAS 839	6	YES	YES
SAS 882	7	YES	YES
SAS 888	8	YES	YES
SAS 535	16	YES	YES
SAS 592	16	YES	YES
SBB 154	14	YES	YES
SBB 155	6	YES	YES
SBB 157	12	YES	YES
SBB 158	8	YES	YES
SBB 159	8	YES	YES
SBB 327	12	YES	YES
SBB 342	8	YES	YES
SFA 1	6	YES	YES
SFA 10	12	YES	YES
SFA 11	10	YES	YES
SFA 12	12	YES	YES
SFA 2	6	YES	YES
SFA 3	6	YES	YES
SFA 4	6	YES	YES
SFA 5	5	YES	YES
SFA 8	6	YES	YES
SFA 9	10	YES	YES
SFD 1	3	YES	YES
SFD 10	3	YES	YES
SFD 11	3	YES	YES
SFD 12	3	YES	YES
SFD 13	3	YES	YES
SFD 14	3	YES	YES
SFD 15	3	YES	YES

SFD 16	3	YES	YES
SFD 17	3	YES	YES
SFD 2	3	YES	YES
SFD 3	3	YES	YES
SFD 4	3	YES	YES
SFD 5	3	YES	YES
SFD 6	3	YES	YES
SFD 7	3	YES	YES
SFD 8	3	YES	YES
SFD 9	3	YES	YES
SH 49	16	YES	YES
SHE 1	17	YES	YES
SHE 10	19	YES	YES
SHE 11	13	YES	YES
SHE 12	6	YES	YES
SHE 13	7	YES	YES
SHE 14	4	YES	YES
SHE 14 CATENARY	13	YES	YES
SHE 15	9	YES	YES
SHE 16 RAMP	9	YES	YES
SHE 17	9	YES	YES
SHE 18	9	YES	YES
SHE 19	9	YES	YES
SHE 2	17	YES	YES
SHE 20	9	YES	YES
SHE 21	8	YES	YES
SHE 3	19	YES	YES
SHE 4	19	YES	YES
SHE 5	14	YES	YES
SHE 6	19	YES	YES
SHE 7	12	YES	YES
SHE 8	19	YES	YES
SHE 9	19	YES	YES
SRR 18	8	YES	YES
SRR 21	8	YES	YES
SRR 23	13	YES	YES
SRR 25	8	YES	YES
SRR 600	12	YES	YES
SRR 601	12	YES	YES
SRR 602	12	YES	YES
SRR 603	8	YES	YES
SRR 604	8	YES	YES
SRR 605	8	YES	YES
SSA 1	11	YES	YES
SSA 10	5	YES	YES
SSA 11	5	YES	YES
SSA 2	11	YES	YES
SSA 3	11	YES	YES

[illegible]

## VISUAL INSPECTION CHECKLIST

## VISUAL INSPECTION CHECKLIST

### APPENDIX B

# VISUAL INSPECTION CHECKLIST

DATE OF INSPECTION: \_\_\_\_\_

MAGAZINE NUMBER OR I.D. \_\_\_\_\_

AREA: \_\_\_\_\_

CHECKLIST	COLUMNS	A	B
STRUCTURE:		GOOD	BAD
(A) STRUCTURE INTERIOR-EXTERIOR		_____	_____
(B) EARTH BUILT UP AREAS		_____	_____
(C) DOORS, HINGES, CLOSURES		_____	_____
(D) PAINTING (ALL AREAS)		_____	_____
(E) GROUNDS (PAVEMENT, EROSION, GRASS)		_____	_____
(F) DRAINAGE		_____	_____
(G) VENTILATIONS (ROOF, WALL)		_____	_____
(H) FENCES, GATES		_____	_____
(I) LOADING RAMPS, DOCKS, ETC.		_____	_____

## ELECTICAL GROUNDING AND BONDING:

(A) PRIMARY GROUNDING POINTS (CONNECTIONS)	_____	_____
(B) SECONDARY GROUNDING POINTS (CONNECTIONS)	_____	_____
(C) DOOR AND HINGE STRAPS (BONDING)	_____	_____
(D) AIR TERMINALS (LIGHTING MAST)	_____	_____
(E) OVERHEAD ELECTRICAL LINES, POLES, ETC.	_____	_____
(F) UNDERGROUND ELECTRICAL SYSTEMS	_____	_____
(G) INTERIOR GROUNDING POINTS (SECONDARY GRID)	_____	_____
(H) EXTERIOR GROUNDING POINTS (SECONDARY GRID)	_____	_____
(I) GATE-FENCE BONDING, GROUNDING	_____	_____
(J) ROOF, WALL VENTILATORS (GROUNDING TERM)	_____	_____
(K) CONDUCT SYSTEMS (PHYSICAL CONDITION, STRAPS, ETC)	_____	_____

\*\*ALL COLUMN B REFERENCES, DISCREPANCIES REQUIRE CORRECTIVE ACTION. REFER TO STANDARD OPERATING PROCEDURES.

COMMENTS:

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VISUAL INSPECTION CHECKLIST

24 MONTH MAGAZINE TEST      AMMO SUPPLY POINT      DATE: \_\_\_\_\_

VISUAL INSPECTION

MAGAZINE #: \_\_\_\_\_

STRUCTURAL DISCREPANCIES:

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GROUND DISCREPANCIES:

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GROUND DISCREPANCIES:

ELECTRICAL DISCREPANCIES:

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COMMENTS:

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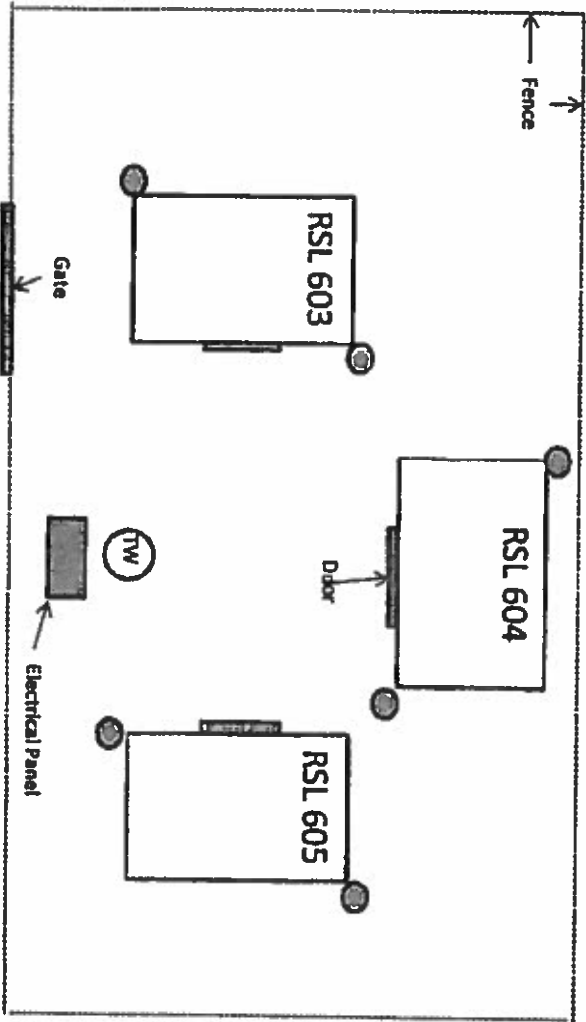
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MAGAZINE SKETCH  
APPENDIX C

EXAMPLE

## SRR-603, 604, 605



Name:

Date:

Temp:

Earth:

Type:

Megger: Serial Number

TW to Earth: 15

TW to 603 Door: 12.1 R 2.12

TW to 603 Ground Rod:  
Front 1.41 Back 1.44

TW to 604 Door: 11.48 R 1.48

TW to 604 Ground Rod:  
Front 1.41 Back 1.44

TW to 605 Door: 11.48 R 1.44

TW to 605 Ground Rod:  
Front 1.41 Back 1.41

TW to Gate: 11.43 R 1.44

TW to Fence: 2.71

Electrical Panel 3.35