



THE SECRETARY OF THE NAVY
WASHINGTON, D.C. 20350-1000

SEP 06 2006

Mr. Scott J. Bloch
Special Counsel
U.S. Office of Special Counsel
1730 M Street, N.W., Suite 300
Washington, DC 20036-4505

Dear Mr. Bloch:

Thank you for your letter requesting an investigation of alleged violations at Naval Air Depot (NADEP) North Island, California, (OSC File No. DI-06-0782).

The Naval Inspector General led an inquiry to determine whether artisans (1) failed to properly torque the screws that attach Generator Converter Units (GCUs) to F/A-18 Hornet aircraft prior to July 2005 and (2) failed to use the proper tools to assemble the GCUs. The investigation substantiated both allegations, but concluded a product recall is not required after technical experts determined there was no resulting safety of flight issue. NADEP North Island has taken appropriate action to correct both matters.

I am enclosing two versions of the report of investigation. The first contains names of witnesses and is for your official use. I understand you will provide a copy of this version to the Complainant, the President, and Congress for their review.

The second version has been edited by removing the names of witnesses and is suitable for release to the general public. As has been the case with other reports the Department has provided your office since September 11, 2001, I request you make only this redacted version available to members of the public.

Again, thank you for bringing this matter to our attention. If I may be of further assistance, please let me know at your earliest convenience.

Sincerely,

A handwritten signature in black ink, appearing to read "D. Winter", is written over a horizontal line.

Donald C. Winter

Enclosures:

1. For Official Use Only Copy of Report of Investigation
2. Public Release Copy of Report of Investigation

**Office of the Inspector General
Commander, Naval Air Systems Command**

OSC Case Control Number DI-06-0782
NAVINGEN Case Control Number 20060171
NAVAIR Case Control Number H2006-026

Report of Investigation

5 June 2006

Subj: ALLEGED IMPROPER MAINTENANCE PROCEDURES IN THE F/A-18 HORNET
GENERATOR CONVERTER UNIT (GCU) SHOP AT NAVAL AIR DEPOT NORTH
ISLAND, CA (NADEP, NI)

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Preliminary Statement

1. This report is issued pursuant to a 16 February 2006 Office of Special Counsel (OSC) letter tasking the Secretary of the Navy (SECNAV) to conduct an investigation under 5 USC 1213(a) and (b).
2. OSC is an independent federal agency whose primary mission is to safeguard the merit system by protecting federal employees and applicants from prohibited personnel practices. OSC also serves as a channel for federal workers to make allegations of: violations of law; gross mismanagement or waste of funds; abuse of authority; and a substantial and specific danger to the public health and safety.
3. Reports of investigations conducted pursuant to 5 USC 1213 must include: (1) a summary of the information for which the investigation was initiated; (2) a description of the conduct of the investigation; (3) a summary of any evidence obtained from the investigation; (4) a listing of any violation or apparent violation of law, rule or regulation; and (5) a description of any action taken or planned as a result of the investigation, such as changes in agency rules, regulations or practices, the restoration of employment to an aggrieved employee, disciplinary action, and referrals to the Attorney General of evidence of criminal violations.

Information leading to the OSC Tasking

4. Naval Air Depot North Island (NADEP, NI), San Diego, is a large industrial complex with approximately 3,437 skilled aircraft and marine tradesmen, planners, and engineers experienced in the depot level maintenance, repair and fabrication of naval aircraft. NADEP, NI is responsible for Hornet maintenance, engineering and logistic support. Within NADEP, NI, the F/A-18 Fleet Support Team (F/A-18FST) is responsible for depot and fleet support items for the Hornet. NADEP, NI is a subordinate command of, and reports to, the Commander, Naval Air Systems Command (COMNAVAIRSYSCOM).
5. The OSC tasking stems from a complaint alleging that NADEP, NI artisans in Shop 93305 did not perform mandatory quality assurance inspections on all Generator Converter Units, hereinafter referred to as GCUs and further, that for several years the NADEP, NI artisans in

Suitable for Public Release (names removed)

Shop 93305 did not have the necessary torque tools required to properly torque the screws used to attach the GCUs to the wings of the F/A-18s.¹

6. OSC identified Mr. Richard F. Conrad, a NADEP, NI, WG-2604-10, Electronics Mechanic, as the person who provided OSC information that led it to task this investigation. OSC said Mr. Conrad, hereinafter referred to as Complainant, consents to the release of his name.

7. The OSC tasking letter states that Complainant alleged that the failure to perform mandatory quality assurance inspections on all GCUs stemmed from the lack of necessary torque tools required to properly torque the screws used to attach the GCUs to the wings of the F/A-18s constitutes gross mismanagement and a substantial and specific danger to public safety because of the potential for the loss of aircraft and military personnel.

8. OSC provided the following general summary of Complainant's allegation:

Richard Conrad, electronic mechanic journeyman, Naval Air Depot (NADEP), North Island (NI), California, disclosed to OSC that mechanics in Shop 93305 attached generator conversion units (GCUs) onto F/A-18 fighter jets incorrectly. Specifically, he alleges that, from March 2005 until July 2005, the mechanics did not have the necessary torque tools required to properly torque the screws used to attach the GCUs to the wings of the aircraft. Although Shop 93305 mechanics finally received torque tools in July 2005, Mr. Conrad states that the GCU screws on hundreds of F/A-18s currently deployed by the U.S. military and several foreign militaries still have not been properly torqued. Mr. Conrad also alleges that Shop 93305 does not perform mandatory quality assurance (QA) inspections on all GCU components.

According to Mr. Conrad, now that the mechanics finally have the proper torque tools, they are using the tools to properly attach GCUs to those F/A-18s that come into the shop for routine maintenance and repair. Nevertheless, he alleges that there still remain hundreds of other F/A-18s currently deployed by the U.S. Military that have GCUs that were never properly torqued.² In addition, he advises that several foreign militaries have contracted with NADEP, NI to repair and maintain their F/A-18s; therefore, he maintains that there also are several hundred foreign-owned F/A-18s with this defect.

9. An attachment to the tasking letter provides additional details. In that attachment Mr. Conrad asserts that this situation poses a substantial and specific danger to public safety. He explains that the two GCUs provide all electrical power to the F/A-18 jet, including the aircraft's controls. Therefore, Mr. Conrad maintains that a malfunctioning GCU could cause an F/A-18 to lose electrical power, which could lead to catastrophic failure of the aircraft. In spite of the serious risks posed by faulty GCUs, Mr. Conrad advises that NADEP, NI currently has neither devised nor implemented a plan for inspecting and properly torquing the GCUs on all U.S. and foreign-owned F/A-18s.

10. Complainant also alleges that Shop 93305 employees do not perform adequate quality assurance (QA) inspections on the GCUs. He states that employees currently perform QA inspections on some GCU components, but they do not inspect the torque of the screws on the generator nor do they inspect the screws on the generator housing that secure the GCUs to the

¹ The F/A-18 "Hornet" is a twin-engine, mid-wing, multi-mission tactical aircraft.

² The OSC letter indicated that Complainant said his allegations do not pertain to the F/A-18 E/F "Super Hornet" which has a different type of GCU.

wings of the aircraft. Mr. Conrad advises that Technical Manual A1-211AC-420-000, Work Package 5, requires QA inspections on these components.

Description of Conduct of Investigation

11. On 23 February 2006, NAVINGSGEN e-mailed an advanced copy of the OSC complaint for review to NAVAIR IG. NAVAIR reviewed the documentation and immediately contacted the NAVAIR Program Manager, PMA-265, to ascertain whether there were safety of flight issues as alleged by the Complainant.

12. On February 24, 2006, Subject Matter Expert One (SME-1), PMA-265, provided a briefing to NAVAIR leadership. SME-1 reported that the engineers had determined from the documentation provided that there was no safety of flight issues. As supplementary information, SME-1 added that there are two GCUs, plus a back up battery system on the F/A-18. So if one GCU fails, the second one picks up the load and if the second one fails, the battery automatically assumes the load so the pilot can return to base. Additionally, SME-1 explained that if a GCU is installed incorrectly there would be a serious fluid leak almost immediately, and that if a maintenance person did not detect the leak, the pre-flight check would.

13. On February 24, 2006, NAVAIR IG provided the results of SME-1's brief to NAVINGSGEN, stating that a technical risk assessment regarding any potential Safety of Flight concerns associated with the alleged improper torquing of screws to attach the GCU to F/A-18 aircraft had been conducted by a team consisting of PMA-265 Program Office and NAVAIR HQ Engineering personnel. They concluded that the improper torquing as described in subject complaint is not an immediate safety of flight concern, nor does it require any immediate action on the part of the Navy.

14. NAVINGSGEN signed the investigative tasking letter on 27 February 2006. On 28 February, NAVAIR received the correspondence via e-mail from NAVINGSGEN, which stated, in part:

There are 2 immediate concerns that we request you take for action:

1. What is the effect of not torquing the Generator Conversion Units (GCUs) and does this constitute a danger to F/A-18 airmen and/or to public safety? If so, is a safety alert, grounding or similar action necessary?
2. Has NAVAIR or NADEP North Island received a similar complaint? Have they initiated an investigation?

15. NAVAIR assembled a 4-person team to conduct an on-site investigation, consisting of:

- a. Investigator-1, a NAVAIR IG Command Investigator;
- b. Investigator-2, a NADEP, NI Command Investigator;
- c. Investigator-3, an Electrical Engineer; and
- d. Investigator-4, an Industrial Quality Assurance Specialist.

16. On February 27, 2006, SME-3, PMA-265, provided the following narrative in support of the safety of flight issue:

In support of the investigation into the subject situation, NAVAIR provides the following engineering analysis to determine whether a safety of flight situation exists on the F/A-18 aircraft due to improper torque on the Generator Converter Unit (GCU).

After review of the letter time-stamped 2006 JAN-4 AM 9:40 from Richard F. Conrad, the issue involving potential improper assembly due to lack of torque tools is not in the area of attachment of the GCU to the airframe, but rather in the assembly of the various sub-assemblies within the GCU itself.

Of the sub-assemblies in the GCU, the Silicon-Controlled Rectifier (SCR) modules tend to fail most often. The function of these 12 modules within the GCU is to provide properly conditioned power for the F/A-18 electrical system. Proper assembly of each module to a heat sink is required for proper functioning of the module, and subsequently the GCU. Assembly is performed by carefully laying a cotherm electrical insulating blanket to the heat sink, applying thermal grease to this insulating blanket, and then securing the module to this assembly using four small screws into helicoil-lined holes. Between four and six inch-pounds of torque on each screw is applied to each screw to secure the module properly.

In the event the four screws were to fail, either due to over- or under-torque, the module could lose contact with the heat sink, overheat, and fail. This failure would result in degradation of power quality. Sufficient loss of power quality would result in the GCU going off-line, at which point all electrical supply functions would default to the other GCU in the aircraft. In the unlikely event of a dual-generator failure (approximately 30-35 failures during the six million plus flight hours of the F/A-18 program, mostly attributed to wire chafing), the aircraft would then default to battery-backup for electrical power functions, at which point the pilot would immediately return to base.

During the performance of engineering and repair investigations, GCU modules have been noted as failed from excessive heat buildup resulting from lack of torque in the screws, however, this lack of torque was attributed to failure to tighten the screws at all, vice simply under- or over-torquing these screws.

As part of an overall initiative to improve reliability of the GCU, repair procedures at NADEP North Island were converted to an overhaul process starting in July 2005. However, it will be at least 1-2 years before Fleet data will indicate whether these changes will result in greater GCU reliability.

Bottom Line: Although there is room for improvement in Depot repair processes, it is the position of the F/A-18 Propulsion & Power team that there is no significant safety of flight issue resulting from lack of use of torque tools in assembly of the GCU.

17. The Commanding Officer (CO), NADEP, NI, was contacted regarding the allegations. He said that the Complainant submitted the same complaint to the Federal Aviation Agency and they referred it to NADEP, NI around April 2005. The NADEP CO said they reviewed the complaint and took action to address the allegations.

18. The investigators interviewed 15 people between 6 and 9 March 2006. Persons interviewed included the Complainant; artisans and quality assurance (QA) personnel; supervisors and managers; and NADEP, NI Engineering Department personnel. The investigators reviewed documents pertinent to the allegations. They are listed in Appendix A.

19. The investigators used information in the OSC tasking letter, data provided by NADEP, NI, and the interviews of Complainant and other NADEP, NI personnel to formulate two allegations:

Allegation 1: That unnamed NADEP, NI artisans in Shop No. 93305 did not perform proper, required torquing on all Generator Converter Units (GCUs) for F/A-18 fighter aircraft from 1981 to July 2005, in violation of requirements set forth in Technical Manual A1-211AC-420-000, Work Package 5.

Allegation 2: That unnamed NADEP, NI artisans Shop No. 93305 did not use the proper tools to assemble Generator Converter Units (GCU) for the F/A-18 Hornet in violation of requirements set forth in Technical Manual A1-211AC-420-000, which requires the use of specific torquing tools in the assembly of GCUs.

20. For the reasons set forth in the discussion and analysis of each allegation, the investigators conclude both allegations are substantiated. However, no product recall is required because the improperly performed torquing prior to July 2005 poses no safety of flight issues.³

Summary of Evidence Obtained During Investigation

Allegation One

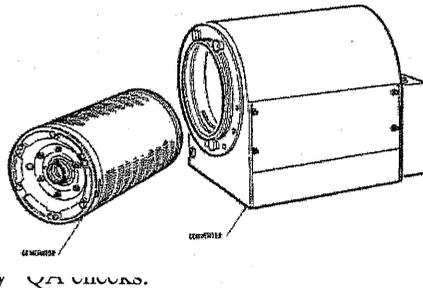
That unnamed NADEP, NI artisans in Shop No. 93305 did not perform proper, required torquing on all Generator Converter Units (GCUs) for F/A-18 fighter aircraft in violation of requirements set forth in Technical Manual A1-211AC-420-000, Work Package 5 (005 00) and Local Engineering Specification (LES) NI 33039-84 Rev A, AMD 2/R, dated 30 November 98.

GCU Description and Principles of Operation

21. The GCU, Part Number 293E775G40 and 971E325G1, is a Weapons Replaceable Assembly (WRA), part of the power generation system for the F/A-18 A-D aircraft. The function of the GCU is to provide 110 volts, three phase, 400HZ power for the F/A-18 A-D aircraft.

22. The GCU, shown in **Figure 1**, consists of two principal assemblies, a generator and a converter, packaged in one unit.

³ Investigators' note: The allegations and after the Complainant had made allegations back to NADEP, NI a by NADEP, NI determined that they relegated to qualified GCU artisan item, prior to it being presented a artisans had not been torquing the have the proper tools, as required the situation. NAVAIRDEPOT 1 artisans performing the "mandatory



was addressed by NADEP, NI prior to, on Agency, who referred the 5. The subsequent inquiry conducted the Complainant were QA checks performed by QA personnel on the end NADEP did determine the CGU manual A1-211AC-420-000 and did not rig and took immediate steps to correct 20-05 dtd 11 Nov 05 talks to the

Figure 1. Generator and Converter Unit

23. The GCU mechanically connects to a driving unit (not part of GCU) through a eutectic/shear drive shaft. The drive shaft protects the GCU by mechanically disconnecting it from the driving unit when the driving torque or GCU temperature becomes excessive.

24. The primary Shop Replaceable Assembly (SRA) in the GCU is the generator. The generator is a slight press-fit into the electrical chassis of the GCU converter, and is secured at its anti-drive end to the chassis tubing assembly **Figure 2**. The converter Shop Replaceable Assemblies (SRAs) are depicted in **Figure 3**.

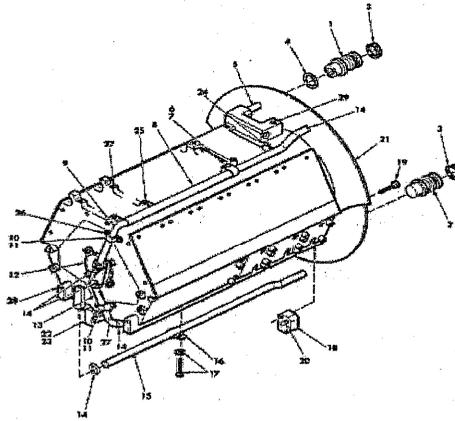


Figure 2. Chassis tubing assembly, exploded view

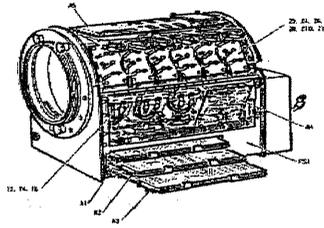


Figure 3. GCU Shop Replaceable Assemblies

25. The generator assembly consists of three separate, brushless ac generators sharing one common hollow shaft and one stator housing. The three generators are the Permanent-Magnet Generator (PMG), the exciter, and the main generator.

26. The PMG has a permanent magnet rotor and two stator windings. One stator winding supplies field current to the exciter. The second stator winding provides power for all the control circuitry and the Main Line Contactor (MLC).

27. The converter portion of the GCU consists of an aluminum alloy chassis with five aluminum alloy covers, and the electronic SRAs. The chassis contains the oil tubes and the electrical harness and connectors and provides mounting surfaces for the SRAs. The SRAs of the converter are shown functionally in Figure 4, and physically in Figure 5. These SRAs contain the electrical circuits with their associated resistors, capacitors, diodes, transistors, transformers, and other components needed to perform specific electrical functions.

28. The converter contains all the necessary electrical circuits to perform the following functions:

- a. Convert the generator assembly 6-phase, variable frequency output to a regulated, 3-phase, constant 400 Hz frequency.
- b. Protect the electrical generating system and aircraft electrical loads against power abnormalities.
- c. Perform the Built-In-Test (BIT) function.

29. Each frequency converter circuit utilizes Silicon Controlled Rectifiers (SCRs) **Figure 4**, in the cyclo-converter portion of the GCU, gated by modulators to form the 400 Hz output wave. The modulators compare a 400 Hz reference wave with a firing wave. The firing wave determines the SCR firing sequence. The transient suppressor (A5) absorbs the electrical energy existing in the main generator stator windings during turn-off of the SCRs. **The SCR connectors require torquing to a specified value.**

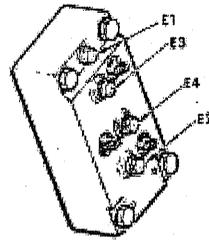


Figure 4. Silicon Controlled Rectifier (Typical)

30. The GCU also contains control and protection circuits. These circuits ensure proper system control and protect the GCU against the following conditions: Overvoltage/Undervoltage, Wrong Frequency, Feeder Fault, Generator Overcurrent, Waveform Distortion, Zero Sequence, Direct Current Content, and Underspeed.

31. System control is maintained by the control logic circuits. These circuits process the signals generated by the protection circuits. Built-In-Test (BIT) circuits interface with the control and protection circuits to indicate a failure or to provide a confidence check of the protective circuits.

32. The Built-In-Test (BIT) circuits interface with the control and protection circuits to perform the following functions:

- a. Indicate a failure of either the GCU or the MLC.
- b. Perform a confidence check of the protection circuits.

33. Two of six inter-phase transformers (IPTs), **Figure 5**, process phases 1 through 6 of the generator's 6-phase output to produce phase A of the GCU output. **The IPT connectors require torquing to a specified value.**

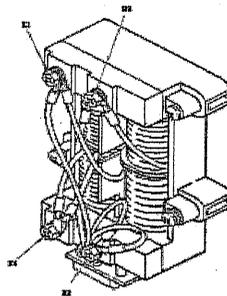


Figure 5. Inter-phase Transformer Assembly (Typical)

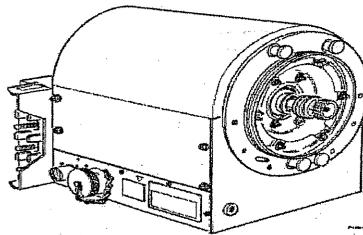
Findings

GCU Torquing Requirements and Applicable Standard

34. F/A-18FST is the F/A-18 aircraft Fleet Support Team. As such, it is responsible for maintenance engineering and logistic support of the aircraft. The two major areas of F/A-18FST responsibility are Fleet support and depot rework support, including the GCU. NADEP, NI receives an average of 25 GCUs per month to overhaul and return to the Fleet.

35. GCU disassembly and reassembly rework processes are governed by a set of NAVAIR maintenance publications that are approved and maintained by the F/A-18 FST, Technical Manual A1-211AC-420-000, the Intermediate Maintenance Manual, hereinafter cited as the Manual,⁴ and NAVAIRINST 4790.30B approved and maintained by AIR-6.1.3, are the standards that govern the procedure for the work performed on the GCU in Shop No. 93305. The work includes disassembly, cleaning, inspection, repair, reassembly and functional testing of the GCU. The Manual also describes the tools required to perform the torquing when reassembling a GCU.

36. Following successful rework, assembly and testing of the GCU, it is installed in the F/A-18 Airframe Mounted Accessory Drive Unit (AMAD). The completed assembly is depicted below at **Figure 6**.



- Either generator is capable of supplying power to the entire system.
- If one of the generators fails, it drops off line and the remaining generator supplies power to the system.
- NATOPS procedures include attempt to reset generator and if still failed, secure the generator and land as soon as practical
- In the event of a dual generator failure, the utility and emergency batteries supply limited dc power for approximately 10-20 min.
- NATOPS procedures include to check that the battery is supplying power and land as soon as possible.
- If improperly connected to the AMAD:
 - Will result in complete loss of AMAD oil due to

⁴ The investigators consulted the current versions of the work packages in the Manual, dated 1 February 2001, with Change 2 dated 1 July 2004 and determined the procedures specified in them also were in effect during April 2005.

GCU not seated properly with AMAD.

- This condition should be recognized (visual oil leakage) during operational leak check after installation.
- If AMAD Fails:
 - Loss of AMAD oil airborne is indicated by an AMAD Pressure Caution.
 - NATOPS procedures include securing generator and securing engine, with possible restart for landing

Figure 6. View of a Generator Converter Unit for an F/A-18 Hornet, Models A through D and GCU Failure Modes

37. The primary work requirements that are pertinent to this investigation are set forth in one chapter, known as a work package (WP), of the Manual. The work package in this matter is identified as WP 005 00, Intermediate Maintenance With Illustrated Parts Breakdown, Generator Converter Unit, Part Numbers 293E775G40 and 971E325G1.

38. To put the sequence in perspective, the GCU is first disassembled in accordance with WP 005 00, then cleaned, inspected, and repaired, if necessary, in accordance with WP 005 00. Finally, it is reassembled using WP 005 00. As part of the reassembly process, WP 005 00 directs Intermediate Maintenance personnel to have Quality Assurance checks at various points in the reassembly, and requires the use of specific type tools to accomplish proper torquing of screws. Those checks are noted in WP 005 00 by a bold (QA) by those tasks, which require a QA check by a qualified QA inspector.⁵

39. **Figure 7** below shows the GCU installed in an AMAD and illustrates the location of the AMAD relative to its installation in an F/A-18. **Figure 8** is an exploded view of the AMAD.

⁵ NAVAIRDEPOT NI Engineering Information Rapid Reply Request (3R Form) dtd 22 Aug 05. The Quality Assurance "call outs" cited in WP 005 00 are directed at those maintainers at the "I" or Intermediate level, not the Depot level maintainers such as NADEP, NI, who have more experience and knowledge and are considered capable of performing QA checks on their own work product once they have been qualified and certified.

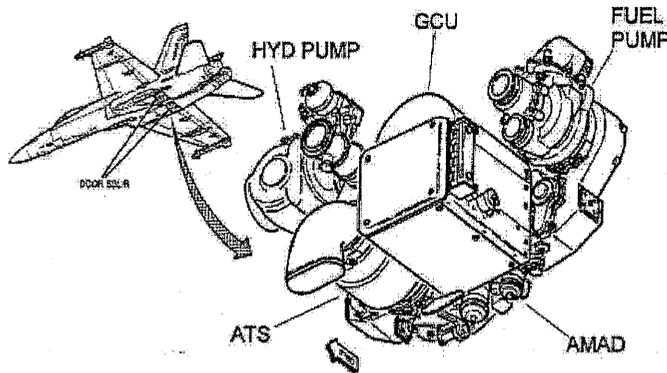


Figure 7. Generator Converter Unit Installed in AMAD

Generator Converter Unit (GCU) Location:

- Inside Doors 53 L/R
- Attached to and is mechanically driven by the Airframe Mounted Accessory Drive Unit (AMAD)

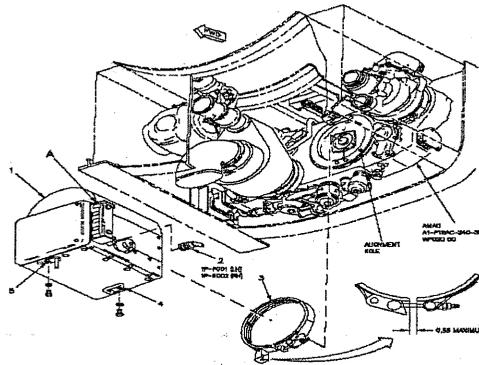


Figure 8. Exploded view of an AMAD.

What Complainant Told OSC and SECNAV

40. Complainant, a NADEP, NI WG-2604-10, Electronics Mechanic, started working for NADEP, NI in February 1981. During March 2005 Complainant was assigned to the GCU Shop, Code 93305, to support the shop artisans, who had a large back up of work due to flooding that had occurred in their workspaces in Building 66.⁶

41. Complainant has worked at NADEP, NI as an electronic mechanic journeyman since 1982. He worked in Shop 93305 of the Components Department from March 2005 until November 2005. Prior to working at NADEP, NI, Complainant served on active duty in the Navy for 20 years.

42. Complainant alleges that from March 2005 until July 2005 NADEP, NI did not provide the mechanics in Shop 93305 with necessary torque tools. He explains that torque tools are required to properly attach GCUs to F/A-18 fighter jets. According to Complainant, each F/A-18 is

⁶ The Complainant, although a qualified electronics technician, had no previous experience with the GCU and was working as an on-the-job trainee.

equipped with two GCUs, one on each wing.⁷ The GCUs supply all of the aircraft's electrical power. Military specifications set forth in Technical Manual A1-211AC-420-000, Work Package 005, require mechanics to use torque tools to attach GCUs to the wings of the aircraft. The torque tools enable the mechanics to tighten the screws on the GCUs to the exact torque settings specified in the manual. Complainant alleges that the mechanics repeatedly requested torque tools; however, management did not provide the torque tools until July 2005. Complainant states that, prior to July 2005, the shop supervisors merely instructed the mechanics to use wrenches to tighten the screws to the point of being "snug, but not too tight."⁸

43. According to Complainant, now that the mechanics finally have the proper torque tools, they are using the tools to properly attach GCUs to those F/A-18s⁹ that come into the shop for routine maintenance and repair. Nevertheless, he alleges that there still remain hundreds of other F/A-18s currently deployed by the U.S. military that have GCUs that were never properly torqued. In addition, he advises that several foreign militaries have contracted with NADEP, NI to repair and maintain their F/A-18s; therefore, he maintains that there also are several hundred foreign-owned F/A-18s with this defect.

44. Complainant asserts that this situation poses a substantial and specific danger to public safety. He explains that the two GCUs provide all electrical power to the F/A-18 jet, including the aircraft's controls.¹⁰ Therefore, Complainant maintains that a malfunctioning GCU could cause an F/A-18 to lose electrical power, which could lead to catastrophic failure of the aircraft.¹¹ In spite of the serious risks posed by faulty GCUs, Complainant advises that NADEP, NI currently has neither devised nor implemented a plan for inspecting and properly torquing the GCUs on all U.S. and foreign-owned F/A-18s.¹²

45. Complainant also alleges that Shop 93305 employees do not perform adequate quality assurance (QA) inspections on the GCUs. He states that employees currently perform QA inspections on some GCU components, but they do not inspect the torque of the screws on the generator nor do they inspect the screws on the generator housing that secure the GCUs to the wings of the aircraft. Complainant advises that Technical Manual A1-211AC-420-000, Work Package 005, requires QA inspections on these components.

What Complainant Told the Investigators

46. The Complainant was interviewed on 6 March 2006. The Complainant stated that the screws in the entire inventory of Navy GCUs delivered from NADEP, NI prior to July 2005 were

⁷ The statement is factually incorrect. As noted in figure 7 supra, the GCUs are mounted in an Airframe Mounted Accessory Drive Unit, which itself is mounted internally inside the fuselage at the rear of the wing root.

⁸ The Complainant's 17 April 2006 e-mail response clarified this portion of his original response in that the shop supervisor did not say "snug or not too tight," it was the way the new people were instructed by other artisans as there was no way to check with the proper tools.

⁹ The GCU Shop personnel do not mount the GCUs in the AMAD or the aircraft.

¹⁰ In addition to the two GCUs, the F/A-18 has a battery backup, and can be flown manually if that system fails.

¹¹ SME-2, Naval Safety Center, provided statistics for FY'05 through FY'06 to 31 March 2006. Those statistics show that there were nine F/A-18 A-D airframes and three aircrew lost, none of them attributable to GCU or AMAD failures. The results of one investigation for FY'06 are unreported to date.

¹² This statement is not correct. The response is addressed at ¶s 146 through 149.

not torqued.¹³ He expressed concern that Foreign Military Sale (FMS) GCUs that were processed by NADEP, NI also had screws that were not torqued. He specifically mentioned Kuwait, Malaysia, and Spain. His estimate was that about 30 FMS units per year were worked on at NADEP, NI. The Complainant wanted to know if either NAVAIR or the effected FMS countries had been notified of this issue. The Complainant was also concerned about two aircraft crashes that occurred recently, one that occurred on 14 October 2005 and a second crash that occurred at El Centro and he wanted to know if they were the result of electrical failures. The Complainant stated that he had seen broken screws and some screws falling out in returned GCUs. The Complainant stated that he knew of catastrophic GCU failures at both North Island and Lemoore. He stated that two planes went down, one on October 14, 2005 and the other on January 15, 2006. The Complainant said the mishaps could have been electrically related, but he did not know if they were the result of improper torquing.

47. On 4 April 2006, the investigators sent the Complainant an e-mail requesting clarification on the underlined portion of the preceding statement. On 6 April 2006, he provided the following response:

“Catastrophic GCU failures: the first unit was from Lemoore, if memory serves, the unit was in bldg 378 in June 2005 when we moved the assembly/disassembly there. I do not know what the disposition was, the unit was tagged EI (Engineering Inquiry) and in a box. Visually it looked to be both heat and physically damaged. The second unit failed here at North Island, I did not see the unit but would refer you to Mechanic-4, as he would probably have the particulars.

48. On 14 April 2006, the investigators sent Mechanic-4, a senior GCU artisan, an e-mail requesting a response to the Complainant’s e-mail. His 14 April 2006 e-mail response stated:

Regarding the two crashes, I have NO knowledge of the causes, and I have no knowledge of any of the details that may have been discovered during the official investigations.

In my opinion, the Complainant was "brainstorming" worst possible case scenarios, as a way to bolster his positions, not from ANY knowledge of the situations. He regularly engaged in the same sort of worst case scenario discussions, in the shop, about literally every topic under the sun, whether aircraft related, politics, weather, price of gasoline at the pump, et cetera, ad absurdum, ad nauseum.

Rarely, loose hardware is observed in GCUs returning to NADEP for repair. These GCUs are also repaired at AIMDs afloat and ashore, and IMAs in the field. When these are found, a strong effort is made to search the unit to figure out where the screw came from. Most of the time, it cannot be matched to a hole in unit, and is ascribed to poor housekeeping at whichever activity last worked on it. New screws are not 100% perfect, and we (the Government) buy from the "lowest bidder". I have many times broke the head from a screw when installing it with a calibrated torque driver, at less than the prescribed torque value. This is normal variation in manufacturing. Yes, over torquing can also cause a premature fastener failure. So can prolonged operation in a high temperature, high vibration environment.

The GCU that failed at NAS Lemoore, if my memory serves, was the newer type that runs only in the F/A-18E/F Super Hornet, which we have only just in the last two weeks started working on here at the NADEP. Lemoore's AIMD has worked them for more than two years. I have no knowledge of Lemoore's maintenance practices. Engineer-1 should be able to give you particulars about this incident.

¹³ The statement is technically incorrect. While the GCU Shop personnel were not using tools that could measure the torque they were applying, the act of tightening the screws did apply some amount of torque to them.

The GCU that failed here happened during the First Shift (day crew). It was long over when I came in to work. [A named artisan], and possibly, [another artisan], were working that day. I recall that the drive shaft separated, but it is designed to do that under certain circumstances, such as a bearing failure or overheating. I do not know what was finally decided about that unit. I would not describe that failure as "catastrophic", if I am thinking of the same event. Bearings fail during ordinary operation. Drives shafts sometimes part during normal operations. Neither would have anything to do with torquing, properly done or not. Engineer-1 might know more about this one also.

I do not know if the official investigations on the two crashes have been concluded or not, but to my knowledge, no investigator has contacted the NADEP regarding the GCU or electrical system in any way. I am not saying that it is impossible for a GCU to be part of an incident, but the Complainant is trying to make GCUs the culprit in EVERY incident, with no knowledge of the particulars in any case that occurs. Yes, they COULD have been electrically related, they could also have been hydraulically, pneumatically, structurally related, there could have been bad fuel, engine failure, FOD, bird ingestion, weather, pilot error, training error, or any of several hundred other direct or contributing causes, and those are just the ones I can come up with off the top of my head. Any, or all, or none. I myself just do not know, and I am not an expert of aviation crash investigation or analysis"

Nor is the Complainant.

Please recognize the fact that I have always, in this episode, tried to make clear the difference between my opinions, and my facts. The Complainant has a few facts, and a lot of opinions and suppositions.

He was trying hard to get out of the generator shop from the first day he was assigned to it, when he had no knowledge or experience with the equipment. Nearly everything he has done and said since that time has been calculated to force management to move him to a job he liked better. I believe the term for this situation is "disgruntled employee".

49. The Complainant stated that QA procedures were not being followed. He said that steps in the Manual, Work Package 005, requiring specific torque values and marked (QA) were not actually being inspected by QA personnel as the item was being processed in the Shop. He stated; however, that QA verification was being done in the test cell during the final test. The Complainant also stated that the Quality Check List (QCL)¹⁴, which has been implemented by QA to verify torque values on the SCR modules, was not being done on all units and was now only being partially performed on the units that were being checked.

50. The Complainant stated that Mechanic-4 initiated an order for the proper torque tools in April 2005, and that Mechanic-2, who was tasked with setting up the bench toolboxes when the GCU shop was reorganized and moved, also raised the issue. The Complainant said that after his complaint to the FAA, Mechanic-3, another senior artisan, posted the torque values in the shop, after torque tools borrowed from other activities at Naval Air Station North Island became available in July 2005. The Complainant stated that he felt that work should have come to a halt when it became known that the artisans did not have the proper torquing tools to work on the GCUs. The Complainant stated that the lack of torque tools affected everyone in the shop, not

¹⁴ The QCL cited was initiated after the Complainant, around August 2005, made this same complaint to the FAA.

just him. He added that torque tools were not available to anyone in the shop, when he was first assigned there.¹⁵

51. The Complainant stated the tools that were ordered for the bench toolboxes had not been received as of December 05 when he left the shop.¹⁶ He said GCU shop personnel starting marking screws that had been torqued after the proper torque tools were received, but the practice of marking the screws was not in the Manual and may not be done by everyone.

52. The Complainant stated that five additional people, including him, were assigned to the GCU line when NADEP, NI started doing a complete teardown and rebuild of the GCU. He said that was the work he performed while he was assigned to the GCU shop. He stated that he had no documentation, e.g., manuals, publications, related to the work he was to perform¹⁷ and only received on-the-job training, assisting other artisans when he arrived in the GCU shop in March 2005. The Complainant stated he first read the publications in July 2005, when he was told he would have to be certified. He said the Manual called for all screws to be QA inspected.¹⁸

53. The Complainant stated that he requested a manual on torque values when he became aware of the issue, but Supervisor-5 denied that request. However, he noted that there were at least two Manuals in the shop for use by the artisans. The Complainant said that there was no indication of torque requirements on work orders until the QCL was started. He also stated that the QCL was incomplete in that it did not cover anything other than the SCR modules and inter-phase transformers.¹⁹ The Complainant said he was not a certified artisan for the GCU shop and was not authorized to sign off (or stamp) any work.

54. The Complainant stated that there was pressure from management for the artisans to go back to work when the issue of torque tools was brought up and that they did not stand up and say they could not do the work because they did not have the tools.

55. The Complainant stated he was "pulled off" of the GCU line in December 2005 and re-assigned to another shop.

56. In a follow-up e-mail interview the investigators asked Supervisor-5 why the Complainant had been moved from the GCU shop to the 2M shop. His response states:

On Jan. 1st, 2006 the GCU workload that Mr. Conrad and about 10 others had been assigned to was transferred to another Branch (Instruments) as part of a LEAN²⁰ Manufacturing move/process. During

¹⁵ Statements from senior artisans in Shop 93305 indicate there were some torque tools available, albeit they were not the proper tools and were not calibrated as required.

¹⁶ A 6 April 2006 e-mail from Mechanic-4 indicates the tools were received sometime prior to mid-November 2005, as they were marked as calibrated during that timeframe.

¹⁷ Two copies of the Manual and a copy of NAVAIR 4790.30B were available in the shop.

¹⁸ Investigators reviewed the Manual and found there are twenty-nine (29) specific (QA) call-outs related to assembly of the GCU. Not all of the call-outs are related to fasteners and while those that are deal with multiple fasteners for each call-out, the Manual does not require (QA) checks for all fasteners, in or on the GCU.

¹⁹ Investigators found that the inter-phase transformers were not included on the QCL.

²⁰ "Lean production," a process that results in better, more cost-efficient products, greater productivity, and greater customer loyalty. The hallmarks of lean production are teamwork, communication, and efficient use of resources, e.g., less or zero defects, less space, less man-hours.

the last days of Dec., I was asked by my counterpart in that Branch to submit a roster of the GCU artisans and what they did in that program. I gave him the list with names, their job on the GCU program and their shift. My counterpart selected those that he felt at the time could adequately cover the program on 2 shifts and the remainder, 4 individuals, were brought back to the main Avionics area in Bldg. 463²¹ and are employed where the workload dictated at the time. All, including Mr. Conrad, are either running diagnostic tests on F/18 component circuit cards and/or repairing them. Mr. Conrad is in the repair side of that. 2M repair is an extremely vital function performed in lab conditions and has EVERYTHING to do with the reliability of the product we send back to the Fleet to perform their missions. The job that he performs each day is critical and, I am told, he has performed that function adequately now for the past 3 months.

What GCU Shop 93305 Artisans Said

57. Mechanic-3 was interviewed in Building 206 at 1400 on 7 March 2006. Mechanic-3 stated that he has worked in the GCU shop for about 6 years and is a certified artisan working on the GCU for all operations, except final "sell off".²²

58. Mechanic-3 stated that the GCU shop did not use proper torque tools going all the way back to the early 1980s, when [another artisan] set up the GCU shop at NADEP, NI. He said [that artisan] established all the procedures used up until April 2005. According to Mechanic-3, the GCU shop has used various types of cordless electric screwdrivers²³ to install screws, some with an adjustable slip torque setting. He said a DeWalt model was favored and was the most durable. Mechanic-3 stated that the screwdriver was set at "0" for SCR modules mounting screws and at "3 or 4" for an estimated 12 in-lbs torque. He said the electric screwdrivers were not calibrated and were never compared to a calibrated torque wrench. Mechanic-3 stated that everyone in the GCU shop used the cordless screwdrivers. He also stated that the SCR module screws requiring low torque were also manually torqued with a screwdriver. Mechanic-3 stated that the electric screwdrivers were in use in the GCU shop up until 1 September 2005 and that no one ever approved the use of electric screwdrivers to torque screws in the GCU.

59. Mechanic-3 stated that it was not until the Complainant filed his grievance that torque tools were brought up as an issue. He stated that Supervisor-5 obtained some torque tools from an unknown source in about July 2005. Those interim tools were used for several months and were returned around January 2006, upon receipt of the tools ordered by Mechanic-4. Mechanic-3 said that at that time the GCU shop was fully stocked with the proper tools.

60. Mechanic-3 stated that QA personnel never verified torque settings at the workbench or questioned the use of electric screwdrivers to install screws. He added that the artisans worked mostly from memory when they torqued the screws on the GCUs and when in doubt they checked the Manual. Mechanic-3 said that since they have received the proper tools, he has posted the torque values at the workbenches. He said that QA only checks the final paperwork and final test or "sale" of the GCU.

²¹ The Complainant was one of the four artisans moved to Building 463.

²² The "sell off" is the final step to place the item as ready for issue (RFI).

²³ In a 8 May 2006 e-mail, the witness reaffirmed his initial statement regarding the use of electric screwdrivers during the assembly of the GCUs.

61. Mechanic-3 stated that since the issue of proper tools and torquing was brought to light, the GCU shop has been following the Manual to the letter and is using proper torque tools for all required operations.²⁴ He said the shop toolbox is under a tool control program and is inventoried and signed for each day.

62. Mechanic-3 stated that two different groups of people were moved into the GCU shop, the first in 2004 and the second in 2005. He said that some of these people were unhappy with the move, to include the Complainant, who made it clear that he did not want to be assigned to the GCU shop. Problems with over-torquing started with the arrival of new personnel. He also stated that there are still people in the test cell, in Building 66, who do not want to be there and this requires additional supervision, about 2 hours per day.

63. Mechanic-3 stated that the Complainant was transferred to the micro-miniature repair shop. He also stated that the Complainant is unable to do the work because he has problems with his hands resulting from scraping barnacles from boats in his younger years.

64. Mechanic-4 was interviewed in Building 206 at 1400 on 8 March 2006. Mechanic-4 is an artisan in the Test Cell in Building 66 and is certified for all GCU operations. He said that he worked one year in the GCU shop around 2000 and has been assigned to the GCU shop since late 2002. He also occasionally works in the assembly area in Building 378 when there is no work in the Test Cell.

65. Mechanic-4 stated that there was only one torque tool available in Building 66 prior to July 2005, and that tool was only used to torque the bolt on the quick-attach-detach (QAD) clamp when mounting the GCU in the Test Cell. He said that prior to the move of part of the GCU shop to Building 378, the entire shop was housed in Building 66 and that there was single toolbox for the entire shop and that did not contain the proper torque tools for work on the GCUs as cited in the Manual. Mechanic-4 stated that he was uncomfortable with not having proper torque tools and he brought up the issue with various supervisors, [names omitted], as long as two years ago. Mechanic-4 also stated that the lack of torque tools was mentioned to QA personnel²⁵ several times, but they took no action when told that it had also been taken up with supervisory personnel.

66. Mechanic-4 stated the he attempted to secure tools from the tool crib in the March/April 2005 timeframe, but the required tools were not available from any tool crib site at North Island. He said the tool room typically only stocks tools needed for use on aircraft unless specifically requested. Mechanic-4 said that he initiated procurement of the tools in April 2005. He stated that he had to resubmit the order at least six times and that the original quantity requested was eventually reduced. Mechanic-4 said the torque tools he ordered were finally received sometime in the October/November 2005 timeframe.

67. Mechanic-4 corroborated Mechanic-3's testimony and stated that prior to receiving proper torque tools a Black & Decker electric screwdriver was used to apply most fasteners because it

²⁴ During a visit to the GCU shop in building 378, Mechanic-3 showed the investigators the set of four torque tools now available in the shop toolbox that he normally uses.

²⁵ Mechanic-4 could not recall the names of the QA personnel.

had a low torque range. He said that a DeWalt electric screwdriver was used later, because it had a wider adjustable torque range. Mechanic-4 confirmed that the electric screwdrivers were not calibrated. Mechanic-4 added that everyone in the GCU shop was not properly torquing screws until the proper torque tools were received.

68. Mechanic-4 stated that when the shop was moved to building 378 in July 2005, there were no torque tools available, until two tools were borrowed from other work centers, not the tool crib. The two borrowed torque tools covered most, but not all ranges required by the Manual. The borrowed tools were not adjustable and could only be calibrated at a single setting. One was set for 8 inch-lbs and one was set for 12 inch-lbs. The borrowed tools were returned upon receipt of the GCU shop's new tools.

69. Mechanic-4 stated that, to his knowledge, the lack of proper torque tools had never been raised prior to his requests. He said again, that to his knowledge, no torque tools were issued to GCU artisans back in the 1980s. He added that no one followed the Manual requirements until the proper tools were available. Mechanic-4 stated that as of late 2005, there are three sets of proper torque tools in the GCU shop in Building 378 and one set in the GCU Test Cell in Building 66.

What NADEP, NI Supervisors Told the Investigators

70. Supervisor-5 was interviewed in Building 206 at 0700 on 8 March 2006. He stated that he had been a supervisor for the GCU shop for about 2 years, but that the GCU shop is no longer under his supervision. He said also had eight other shops under his supervision, as well as the GCU shop.

71. Supervisor-5 stated that the GCU shop artisans always torqued screws to the requirement of the Manual and that torque tools were always available in the shop. He stated that he had seen artisans using torque tools during the years he was a supervisor over the GCU shop. Supervisor-5 stated that torque tools were available at all times in Building 66, prior to moving the GCU shop to Building 378. Supervisor-5 said he requested the additional tools required to support the move from Building 66 to 378. He stated that the move required tools to support three bench toolboxes in 378 and one in Building 66. Supervisor-5 stated there was always a set of torque wrenches in the shop and the master toolbox had a full range of torque wrenches.

72. When asked why the Complainant would say that torque tools were not available, Supervisor-5 stated that the Complainant was on a "vendetta" and there was no basis for the claim.

73. Supervisor-5 stated that he knew nothing about the use of electric screwdrivers used in place of the proper torque tools in direct contradiction to the testimony, other than the Complainant, of artisans, who have been working in the GCU shop for at least five years.

74. Supervisor-5 stated that the LES²⁶ and technical manuals existed in the shop. He said the work packages (referred to as Routers) have been cleaned up and the LES has been updated.²⁷

75. Supervisor-5 stated that torque tools could be exchanged if broken at the main tool crib and could be checked out when tools were out for calibration. They could be checked out from the tool crib on a 30-day chit. He said there were screwdriver type torque wrenches. He stated that torque wrenches were available in some form that may not be pretty, but were serviceable.

76. Supervisor-5 stated that he visited the shops five to six times per day and that he briefed people to use torque wrenches. He stated that the artisans were always following torque procedures when he went through the shop and that the shop tools preceded his tenure.

77. Supervisor-5 stated that QA personnel, QA-4 and another person, looked at the torque tools procured and required that each artisan demonstrate the use of the torque tools in August 2005.

78. Supervisor-5 said that he had no knowledge of the QA checks on torque. He stated that they could have verified torque in the GCU shop but normally only did checks in the test cell. He said there was no change to the test cell QA sampling plan since January 05, which was only done at final test. He stated that the QCL on the 12 SCR modules was done to coincide with the acquisition of the new torque wrenches. QA-3 provided the QA sampling plan now in use.

79. Supervisor-5 stated that there was a training video, which included torquing techniques made before the Complainant was assigned. A copy of the video was provided to investigators.²⁸

80. Supervisor-5 stated that the Complainant wore wrist braces on occasion and had some difficulty using tools. He said he discussed medical issues with the Complainant and that the Complainant could probably get work restrictions due to medical conditions. The Complainant is now working in the 2M shop (micro-miniature), but he cannot handle small tools.

81. Supervisor-4, an Electronic Integrated Systems supervisor, stated he was the GCU shop foreman from 2001 to until July 2005. He said he was the first shift supervisor and was not responsible for the second or third shifts. He is located in building 463.

82. Supervisor-4 stated that the facilities in building 66 went down for several months around February 2005 and that the shop shifted to a new Aircraft Engine Component Test

²⁶ The Local Engineering Specification (LES) does not call out torque values, but does refer the artisan to the Manual.

²⁷ LES NI 33039-84 Rev A was not revised until torque was raised as an issue. North Island updated and published LES NI F18-010-05, which was followed not too long after by Rev A, which was still in work when we visited.

²⁸ The investigators reviewed the video and determined that there is no mention of torque values or proper tools. Of note however, it appears as though non-conforming tools, e.g., manual and electric screwdrivers, such as those described by the artisans, were used to demonstrate the "how to" in the video.

Stand²⁹ (AECTS) in the cell. He said that about six new people were brought into the shop to assist with the backlog created by the flooding of building 66. Supervisor-4 said there was only one toolbox for all three shifts and added that there was one full set of torque wrenches in the shop toolbox in building 66. He said the GCU shop was subsequently moved to building 378 around July 2005, where there were four benches and more space.

83. Supervisor-4 reiterated Supervisor-5's information related to the training video related to GCU assembly that was produced for the I-level maintainers about 3 years ago.

77. Supervisor-4 stated that there was a central tool room available to check out torque wrenches. He stated that electric screwdrivers were not used to torque screws.

84. Supervisor-4 stated that both the LES and Technical Manual should have been available in the shop and that both supervisors and artisans are responsible for the LES and Technical Manual being present in the shop. He stated that there was some use of the manual and that the LES being outdated was the only problem.

85. Supervisor-4 stated that there was no formal training for artisans and that artisans received on-the-job training (OJT) supervised by senior artisans.

86. Supervisor-4 stated that he had no knowledge of the allegation that artisans were failing to properly torque screws in the GCUs prior to July 2005, when he left his position as the first shift supervisor.

87. Supervisor-4 stated that a tool control person or artisan could check out tools and that a memo would be required for a long-term checkout. He stated that they could leave the work area or they might need approval from a supervisor. Supervisor-4 restated that torque tools were located in the toolbox in building 66 and the artisan did not have to leave the work area to get tools. Supervisor-4 stated that there were no torque issues that he was aware of.

88. Supervisor-4 stated that QA did random sampling only in the test cell. He indicated however, that if a "V" for verify was pulled from the dispenser³⁰ then QA may monitor an end-to-end run³¹ or just sign off on the paperwork. In his 8 May 2006 e-mail response, Supervisor-4 stated that the dispenser contains approximately one hundred pills, dispensed one at a time; that there are ninety of "B" (Bypass) and ten "V" pills (Require verification), placed in random order. He said that if a "B" is pulled the certifier, or artisan, annotates the call sheet and the Work Order as such, and places all required documentation with the unit and places the unit on the "Sell Bench."³² Supervisor-4 added that in the case of a "B" a Quality Assurance Specialist (QAS) is

²⁹ The AECTS is a computer controlled test stand used to conduct I-level troubleshooting on the F/A-18 GCUs as well as about 25 other aircraft generating systems (P-3, E-2, AV-8B, etc). It consists of a 150 Hp motor, gearbox, oil system, load bank, controls, and software.

³⁰ The certifier, or artisan, puts the product or item needing verification on a Quality Verification (QV) Request form "Call Sheet," provided for documentation by QV personnel. The certifier, or artisan, then pulls a "pill" from a dispenser located next to the call sheet.

³¹ A unit that runs End-To-End can be defined as Ready For Issue (RFI). At that point the unit is ready for the "Quality Verification Final Accept" (Type III sampling verification).

³² During a 11 May, 2006 telephone conversation, Supervisor-4 explained the pill verification process occurs in the Test Cell after a GCU has been completely assembled, tested and identified as RFI. At that time the artisan pulls a

accountable only for the completeness of the paperwork and the certifier, or artisan, is responsible for the rest.

89. Supervisor-3, an Electronics Integrated Systems Mechanical supervisor, stated that he was the supervisor of the GCU shop from about mid-September 2005 to January 2006. He is located in building 463.

90. Supervisor-3 stated that he knew about the torque issues and had heard about the complaint; that he had not seen electric screwdrivers used to torque screws, but he had seen them used to remove screws. He stated that he went through the shop one to two times a day.

91. Supervisor-3 stated that the proper calibrated torque tools were on order in the September/October 2005 timeframe to support the stocking of three shop toolboxes in building 378 and one shop toolbox in building 66. He said that building 66 is being condemned as part of the LEAN process. The tools in building 66 have been moved to building 378. Supervisor-3 also stated that under the LEAN process, the repair concept was changed and it is now required that all circuit cards be removed from every GCU for test and check.

92. Supervisor-3 stated that a line was added to the work package (or Router) to spot check torque. He said that artisans were required to demonstrate torque capability using sheets prepared by QA-4 from Quality Assurance.

93. Supervisor-3 stated that on-the-job training was the only training for artisans, but that everyone was already trained during his period of supervision of the GCU shop. He said all the artisans were trained in assembly/disassembly and four or five of them were trained for the test cell.

94. Supervisor-3 stated that they now have only two shifts working in the GCU shop and that the third shift was shutdown in November/December 2005. Supervisor-3 said he was responsible for the first shift only. He added that [two other people] were interim supervisors between Supervisor-4 and himself.

95. Supervisor-3 stated that artisans get tool control training and new toolboxes have been established in building 378. They were reworking the toolbox in building 66.³³ Torque sheets

pill. If a "V" is pulled, QA is notified and the verification process is initiated. Final acceptance with a "V" is performed with a visual examination/witnessing of the product during testing, measuring or final configuration validation, with a complete review of accompanying work documents to ensure all directed work has been accomplished, certified and verified during the in-process phase.

³³ In his 8 May 2006 e-mail, Supervisor-3 clarified his statement, stating that prior to the move to Building 378 the specialized tools were kept in the master toolbox in Building 66. When the move was made to Building 378 those specialized tools were removed from the master toolbox in Building 66 and moved to the toolboxes in Building 378. He added that all of this took place prior to his becoming a supervisor in the GCU shop.

and check-off sheets have already been established. Supervisor-3 stated that three adjustable torque tools were turned in³⁴ as part of establishing the new toolboxes in buildings 378 and 66.

96. Supervisor-3 stated that he did not remember if he had ever seen the audit performed at NADEP, NI by the QA department.

97. Supervisor-1 stated that he was the second shift supervisor for the GCU shop from July 2004 to December 2005 and he also oversaw four additional shops. He is located in building 378.

98. Supervisor-1 stated that first shift supervisors are the lead for what gets done and they are responsible for work assignments and procurements. The second shift is more of an administrative job. There were three shifts in the GCU shop, but they no longer have a third shift. [Another person] is now the second shift supervisor. Supervisor-1 stated that there is no work lead in building 66 or 378, but Mechanic-4 is the "go-to guy" in building 66 and Mechanic-3 is the "go-to guy" in building 378.

99. Supervisor-1 stated that there was a request for torque tools in April 2005, which was forwarded to first shift and then the LEAN team got involved. He stated that normally everything of this nature is forwarded to the first shift. He stated that Mechanic-4 brought up the issue of torque tools for the test cell in April 2005. It was the June to July 2005 timeframe that torque tools were first brought up as an issue for the buildup going on to establish the new GCU shop building 378. Supervisor-1 stated that the procurement of torque tools was eventually approved 29 July 2005 and at least one set had been received during his tour, which ended in December 2005.

100. Supervisor-1 stated that he was aware of the use of electric screwdrivers being used to torque screws from the beginning and added that he thought torque tools were available. Supervisor-1 stated that the shop was doing business the same way it had for years under previous supervisors, Supervisor-4 and [three others]. He added that the general philosophy was to do the best job you can with what you have.

101. Supervisor-1 stated artisans are authorized to leave their work area to go to the tool room.

102. Supervisor-1 said that he knew that there was a QA callout issue raised with the Manual in July 2005, and that he contacted QA-5. He stated that he did not work with the Manual and had not read it. He opined that supervisory personnel should be more aware of QA requirements.

What the QA Specialists Said

103. QA-3 stated that prior to July 2005, QA sampling on the GCU production line was only done in the test cell to verify the final test.

³⁴ In his 8 May 2006 e-mail, Supervisor-3 also said that he did not know if the tools he turned in were the tools Supervisor-5 had obtained from other activities on base after the lack of proper tools was raised as an issue, prior to the Complainant making his complaints to the FAA and OSC.

104. QA-3 stated that artisans must undergo a certification program before they are able to sign off on work. He said supervisory personnel decide who is to be qualified as a certifier and monitor the certification process.³⁵ He added that QA personnel may watch and sign-off on the certification process.³⁶ QA-3 stated that it is up to the trainer to make sure that the artisan being trained follows the standards called for in the Manual.

105. QA-3 stated that QA does perform shop audits on toolboxes, documentation, calibration, etc. Shop audits are set for a calendar year and are generally done at a rate of two per month. They check toolboxes and inventory lists to make sure everything is there, but would not detect if a required tool had never been included in the toolbox.³⁷ QA-3 stated that QA did not know about any issues with torque tools until September 2005, as it had not been brought to their attention until then. He stated that QA would have followed up if they had known about the problem. He said that after the issues were brought up by the Complainant QA was told to check into the matter. QA-3 said that in response, a QCL was established by QA with partial coverage of the GCU SCR modules, and the artisans were re-qualified on the use of torque tools. He stated that after the complaint came to light, QA initiated a QCL that required the conduct of Mandatory, or Type I, Verification of the artisans satisfactorily torquing of SCR modules on GCUs, but has moved on to random, or Type III sampling on the QCL rather than Mandatory Verification. QA-3 indicated that QCLs are generally frowned upon as being a crutch. He said the QCL for the SCR modules was released after discussions with engineering because it is more critical if the SCR modules are over-torqued, due to possible damage to the Cho-Therm electrical insulator. He added that this action was initiated even though there were no data to demonstrate that there was a problem.

106. QA-5 stated that he was only involved with the GCU shop after it was moved to building 378. He stated that the transfer of the program to his office occurred in January 2006.

107. QA-5 stated that Supervisor-1 called him in 2005 and said the Complainant needed help in the shop. He said he was not responsible for the GCU shop, but he was the only QA available at the time. He stated that the Complainant showed him the Manual and pointed out the "(QA)" callouts. QA-5 stated that there is no specific method that shows whether the QA callout in the technical manual is mandatory. He said that QA should watch torquing, not be requesting tools for the artisans. QA-5 stated that he talked to Supervisor-1 as to why the Complainant was asking questions. He said he was suspicious of his contact with the Complainant, as the Complainant told him that he was a Journeyman and that was not the first time he had seen a (QA) in a technical manual. QA-5 made the statement that "the Complainant was a journeyman and should know the procedures, so why was he asking." QA-5 said that Supervisor-1 said that

³⁵ In his response to a 27 April 2006 e-mail query, QA-3 stated that an artisan must be trained and qualified before he or she can certify any work.

³⁶ In his response to a 27 April 2006 e-mail query, QA-3 said that QA grants certification authority to all personnel required to perform certification actions after verifying their qualifications cited in their Individual Qualification Record (IQR).

³⁷ In his response to a 27 April 2006 e-mail query, QA-3 indicated that specialty tools are not necessarily listed as an inventory item; that such tools are usually issued to a particular shop for common usage and would not show up on an inventory list.

they would look into the issue. QA-5 stated that he or Supervisor-1 contacted the QA handling shop.³⁸

108. QA-1, now retired, stated that he first became aware of quality issues related to overhaul and repair of F/A-18 GCUs in late October 2005 via phone call from [a NADEP NI manager]. He stated that [the plant manager] informed him that he had received a phone call from the San Diego FAA regional office relaying an anonymous call they received from an individual claiming to work on GCUs at NADEP, NI. The anonymous individual reported his grave concern that an F/A-18 would crash into the crowd at the air show because of maintenance malpractice on the GCUs. No other details were provided.

109. QA-1 stated that he commissioned an investigation after an anonymous report was made to the FAA concerning issues with the GCU and the Blue Angels. He said the FAA referred the matter back to NADEP, NI and the anonymous report was tracked back to the Complainant.³⁹ QA-1 said the issues of torque tools and torque settings were discussed with the Complainant. He said the Complainant had been transferred to the GCU shop in March 2005 and that it was discovered as part of the LEAN process in April 2005 that there were no torque tools in the area, after the team found that the GCU shop should have been using specific torque tools to assemble the GCU. He said that orders were placed for the missing tools at that time.⁴⁰

110. QA-1 said his interview with the Complainant focused on two primary concerns in order of priority; 1) Obviously, investigating the serious allegations and 2) [in his position], he viewed it as part of his responsibility to foster a robust, non-punitive and open system of communication to report quality issues. He stated that he felt it was important to determine why the problems were reported the way they were versus through the chain of command.

111. QA-1 stated that the Complainant told him he was concerned because two months earlier an F/A-18 GCU broke and injured someone while being tested at Lemoore. He said the Complainant believed it was because of improper tightening of bolts on the GCU; that our repair instructions called for several bolts to be secured to specific torque settings and that the artisans did not have the proper torque wrenches for those bolts. QA-1 stated that the Complainant further said that there was conflicting documentation and instructions, and that QA personnel did not check those torque bolts. He said that the Complainant seemed genuinely concerned about the safety of the GCUs. Additionally, QA-1 said that he judged the Complainant's comments as credible and worthy of further detailed investigation by engineering and QA.

112. QA-1 stated that he asked the Complainant to define his chain of command and was told by the Complainant as follows: his supervisor, Supervisor-4; his shift supervisor Supervisor-1; Supervisor05; and finally the Program Manager. QA-1 said he asked the Complainant if any of

³⁸ During QA-5's 2 May 2006 re-interview, he said that he contacted the QA personnel responsible for the GCUs in October 2005.

³⁹ The witness' statement indicates he was trying to identify the Complainant. However, the investigators do not feel there was any malicious intent, as everyone we talked to, made it patently obvious that all were well aware of who had initiated the initial complaint; the complaint to the FAA that caused the inquiry cited by QA-1 and the subsequent complaint to OSC.

⁴⁰ There was a time lag between the time the original request was placed and when they were finally acquired. This resulted from questions raised as to the number of tools requested and the actual need.

those people were aware of the issues, and if they had done anything about it. He stated that the Complainant said that everyone up to and including Super-5 was aware, but he did not know if the Program Manager knew. He added that the Complainant said the Shop had ordered the torque wrenches but they had not as yet arrived. QA-1 said he asked the Complainant why he had reported these issues in the manner he had and the Complainant said he was very concerned about the safety of those people at the air show and did not know what else to do. QA-1 stated that he thanked the Complainant for discussing the issues with him and assured the Complainant that the issues would be thoroughly investigated. He said he also advised the Complainant that if he felt he was the victim of any reprisals as a result of his complaint that the Complainant should contact him immediately. QA-1 said the Complainant told him that he had already received a letter of reprimand and he wanted it expunged and his good name restored. QA-1 said he told the Complainant he would look at that as well.

113. QA-1 said that before concluding the meeting, he reviewed the complete chain of command with the Complainant and advised him that if he had anything further to add, to contact himself, and that if the Complainant was not satisfied with the results of the investigation he was welcome and encouraged to see the Production Officer, or take it to the next level and see the Executive Officer (XO), then the Commanding Officer (CO).⁴¹

114. QA-1 stated that the Complainant made a phone call in October 2005 and reported on the torque tools after the fact. QA-1 stated that as of October 2005 the GCU shop was still not setting all torque values and that they were only setting torque values for the specific tools they had in hand. He added that no mention was made of the use of electric screwdrivers to set torque. QA-1 stated that he felt the evidence was credible enough to warrant an investigation and he contacted QA and engineering regarding the complaint. He stated that production discovered the discrepancy in August 2005 and a plan of action was put in place to correct the problem. He added that there was confusion with the engineering instructions and immediate steps were taken to correct those instructions.

115. QA-1 stated that his investigation determined that the GCU assembly, with respect to torque tools, had probably been done the wrong way since 1981.

116. QA-1 stated that although the complaint regarding torquing and lack of proper tools in the GCU shop had merit, he felt the Complainant had a personal agenda; that previous to his assignment to the CGU shop he had had an autonomous position and was able to work unsupervised for years. QA-1 added that after the process change the Complainant was under direct supervision, had lost his autonomy and had made it clear that he did not want to be in the GCU shop. QA-1 said that the Complainant had been written up for leaving his work area without permission and for locking Router documents required to work on GCUs that were in the process of being worked on in the shop, in his toolbox.⁴²

⁴¹ This iteration of the ongoing complaint was initiated after the issues were initially raised in the April 2005 time frame and prior to them being raised to the OSC, and corrective actions had already taken, or were in progress.

⁴² These documents are required to remain with an item as it progresses through the repair process.

117. QA-1 stated although a follow-on audit was indicated in the basic document, it was not conducted, and the original audit⁴³ apparently had not been distributed.

118. QA-1 said that he contacted the QA branch head for the F/A-18 GCU and instructed him to conduct a complete investigation of the Complainant's allegations and in addition to audit the entire rework and overhaul program for the F/A-18 GCU top to bottom.

119. QA-1 stated that he contacted the head of the engineering department, informed him as to what was happening with regards to the GCUs and received permission to task his engineers to assist in the investigation. QA-1 said the subsequently he contacted the FST engineer responsible for the F/A-18 GCU engineering issues and described the Complainant's concerns. He said that the FST engineer did not seem too concerned about the issue and was initially reluctant to become engaged with the issues. QA-1 added however, that after further information was provided the FST engineer was persuaded that engineering should be involved in the resolution of the allegations.

120. QA-1 said that he informed the CO/XO as to what was taking place and promised a situation report within a couple days.

121. QA-1 stated that the following day he had a meeting with production, engineering and QA to further clarify the issue and assess the risk. He said that meeting lasted approximately two hours during which time he questioned engineering on every conceivable failure mode and effect that could possibly occur from any maintenance NADEP, NI might possibly perform on these units. He added that a question of recall was considered due to the failure to torque the screws properly in the GCU shop, however Engineering assured him that there was no need to recall or red stripe the GCUs as 1) there were no catastrophic, or significant failure modes that could occur related to this torque issue that would adversely effect either safety of flight or mission accomplishment; 2) despite the long history of repairing these items there was no record of related problems reported by the fleet either through engineering investigation (EI) history, or Quality Deficiency Report (QDR)/Aviation Discrepancy Report (ADR) history; and 3) NADEP, NI had conducted an Airspeed (LEAN) event on this product line a couple of months earlier. He stated that while over-torque might cause a crack in a thermal barrier it is not considered a flight safety problem, and under-torque could have a life cycle, but not catastrophic, effect. QA-1 stated that there had been no QDRs on the GCU for five years. He added, however, that there was an EI conducted where some screws were found to be under-torqued.

122. QA-1 stated that as a result of the Airspeed (LEAN) process review engineering, production and QA were already aware of the issues the Complainant brought forward and had implemented a corrective action plan that was being managed. He said that although all the corrective actions had not yet been completed, there were no mission degradation or safety issues of concern to engineering.

123. QA-1 said the command has gone to extraordinary lengths over the past two years to ensure everyone understands the importance of reporting issues of concern, especially those regarding

⁴³ Quality Audit Report NO. 54510-0001-05 noted that outdated and canceled references were used in the processing of GCUs

safety and quality. He said the CO has personally invited and strongly encouraged everyone to utilize the chain of command and come forward with these issues. QA-1 said the CO's message and intent is included as the CO's published quality policy statement, was the keynote topic of a recent tailgate address, and is defined in the CO's letter in the Depot Talk magazine. QA-1 said his interview of the Complainant demonstrated that he knew what his chain-of-command was, up to his program manager, but for whatever reason chose not to exercise the established process. QA-1 stated that he found the Complainant's statements with respect to the chain of command to be less than credible, raising questions as to his motivation for reporting these issues, especially in the manner he did.

124. QA-1 stated that NADEP, NI thoroughly investigates quality or safety issues regardless of how these issues are brought to light. He added that, in his opinion, whenever someone goes completely outside the established chain of command it complicates the investigation because the investigator must be able to separate valid grievances and legitimate issues of concern from self-serving alternative agendas. He said that when the Complainant failed to utilize the chain of command to report the issues, he demonstrated a disregard for known, established process and willingness to violate procedures raising questions as to his reliability and therefore questions as to the legitimacy of his claims. QA-1 said these questions could potentially hamper the ability to resolve valid issues. He added that because the Complainant had circumvented the Command, he was concerned that the Complainant may not be believed, jeopardizing proper resolution of the issues.

125. QA-1 said that based on the actions he had taken relative to the allegations he was comfortable the issues brought forward by the Complainant did not pose a threat to safety or mission accomplishment and reported his findings to the Executive Steering Council (ESC). He added that regardless of his belief as to the lack of safety of flight or mission degradation threat, he ordered the institution of a temporary mandatory QA check on the torques and a detailed QA audit to determine the veracity of the Complainant's allegations.

126. QA-1 said that he reviewed the QA audit⁴⁴ conducted in November 2005. He said the audit indicated the corrective action plan from the Airspeed (LEAN) event had been substantially implemented; however, some issues still needed to be cleaned up and therefore QA issued a 3R⁴⁵ and Quality Correction Notice (QCN) to specifically address them. He indicated that he reported his findings back to the ESC and felt the matter had been addressed and the proper corrective actions were taken to resolve the issues.⁴⁶

⁴⁴ The audit report stated that a follow-up audit was to be done. The investigators found no evidence that any such audit was conducted.

⁴⁵ An engineering information rapid reply request, 3R form NAVAIR Depot NORIS 5600/4b (7-01).

⁴⁶ Investigators determined that an engineering information rapid reply request [3R form NAVAIR Depot NORIS 5600/4b (7-01) electronically generated] was submitted by shop 93305 to code 4.0 requesting authorization to assemble units without having to perform Quality verification of QA designated checkpoints noted in NA A1-211AC-420-000, WP 005 00. Code 4.0's response was that QA check points called out in NA A1-211AC-420-000, WP 005 00 did not require mandatory verification however, may be required as determined by the Quality Organization. This request followed the allegation (1) made by the unnamed NADEP artisan. Therefore, findings indicate that the QA Organization did not identify QA checkpoints prior to the above (3R) request. This would include Quality verification requirements associated with torque specifications as outlined in NA A1-211AC-420-000, WP 005 00. On 12 October 2005, [a person] requested an engineering response from Engineer-1 concerning failure modes and effects of under/over torquing of fasteners used to assemble the F/A-18 GCU. On 13 October

127. QA-4 is both a Product Line Specialist and a Senior Quality Assurance Specialist. He is located in building [number].

128. QA-4 stated that he had no knowledge that the GCU shop was not using torque tools and that he had no knowledge that electric screwdrivers were being used in place of proper torque tools during GCU assembly.

129. QA-4 stated that "(QA)" in the Technical Manual is geared for I-level maintenance and the call outs are considered to be guidelines for QA to use or not.

130. QA-4 met with QA-1 and Engineer-1 to discuss torque on SCR modules. QA came up with a QCL for the SCRs based on the recommendation of Engineer-1. QA-4 stated that the SCR modules were recommended for QA verification as a concern, but that there have been no catastrophic failures related to SCR modules. He stated that originally the QCL required verification of all SCR modules, but this was changed to random sampling after the artisans were certified. QA-4 stated that the QCL is presently verified by random sampling (5 of 50 units). QA-4 stated that there may be old work packages in the system that do not call out the QCL requirements and for these old documents, it is necessary for the artisan to write the QCL requirement on the work package. Newly printed work packages will have the QCL requirement already on the document.

131. QA-4 stated that QA would implement sampling of SCR module torque in the test cell in building 66. For the time being, the QCL, with random sampling (5 of 50), will continue to be required for the GCU shop.

132. The following received from the QA Shop and reviewed by the Investigators is provided for information relative to the QA audit cited supra. The NADEP, NI Quality Organization conducted an audit of GCU shops 93305 and 93503 on 24-28 October 2005 after being notified of the allegations. Quality Audit Report NO. 54510-0001-05 noted that outdated and canceled references were used in the processing of GCUs. Quality Correction Notice 54510-020-05 dated 2 November 2005 documented that GCUs processed at NADEP, NI revealed that several technical references listed, e.g., LES, drawings (Drwg), and technical manuals on the parent Work Order (WO) and the sub route WOs had passed their rescission dates or had been canceled. Industrial Engineering Technicians reviewed and updated GCU Routers to incorporate updated references while eliminating those that were rescinded or cancelled. The Investigators' review of GCU Routers dating from July 2005 to February 2006 indicated that no quality verifications were required with the exception of final acceptance operation line number 0110. Furthermore, audit findings and interviews with artisans from GCU shops 93305, 93503 and QA, indicated that a type II temporary mandatory verification of SCR module torque values were put into effect in November 2005. Following completion of Type II Temporary Mandatory Verification

2005, Engineer-1 replied via E-mail that all torque values contained in NA A1-211AC-420-000, WP 005 00 should be adhered to. He also said improper torque settings of screws and wire leads on the twelve silicon controlled rectifiers (SCRs) could lead to shorting the SCRs and eventually GCUs shop replaceable assemblies cascading failure. However, Engineer-1 further concluded that these potential failures were not considered Flight Critical due to redundant systems, which include a second GCU, a battery backup, and manual controls. Furthermore, since Engineer-1 did not consider these failures to be Flight Critical, Mandatory Type I Verifications by the Quality Organization are not required.

requirements, Type III Verification Sampling was initiated. Quality Characteristics List (QCL) 01-05 was prepared by QA-4 in November 2005 identifying quality verification requirements for GCUs processed by shop 93305 and 93503. Although the use of QCLs to identify quality characteristics of production items is not considered standard practice, when used it should be referenced in the Router. Investigators' review of current GCU Routers prepared February 2006 did not reflect QCL number 01-05. Since QCL 01-05 was not referenced in GCU Routers, artisans assigned to shops 93305 and 93503 stated during interviews that they only learned of the existence of this QCL from other artisans.

What the Engineers Said

133. Engineer-1 is a Fleet Support Team (FST) Engineer who supports the GCU work at the Depot. He is located in building [number].

134. Engineer-1 stated that the original I-level Technical Manual was written by General Electric was the company that originally developed the GCU for the F/A-18A/D in the late-1970s.

135. Engineer-1 stated that he knew that the GCU shop had at least one torque tool, but he did not know if it was the proper tool and had not seen the tools used by the GCU shop. Engineer-1 stated that he did know that [a mechanic], who retired three to five years ago, used electric screwdrivers to torque screws in the GCU and he had witnessed electric screwdrivers being used during a GCU EI. He stated that there were no discussions about calibrating the electric screwdrivers.

136. Engineer-1 stated QA decided, in October 2005, that torque was critical and there would be no waivers to the requirement. There was a meeting with QA-1 in October 2005 to discuss the torque issue. Engineer-1 stated that there was no resolution from this meeting and that the GCU shop had to comply with the torque requirements of the Manual. A QCL was written by QA, which only included the SCR modules. Engineer-1 stated that there was no data on SCR failures, but it was the best engineering judgment to include only the SCRs in the QCL. Engineer-1 stated that the QCL had been in place about two months and that there was no other QA required during assembly of the GCU. Engineer-1 stated that one of the outcomes of his meeting with QA-1 was that he was tasked to re-write the LES for the GCU.

137. . Engineer-1 reiterated previous information provided by Supervisor-4 and Supervisor-5 regarding I-level training video made at NADEP, NI about three to four years ago.

138. The results of the NAVAIRHQ query regarding a possible safety of flight issue upon receipt of this tasking is cited supra at ¶16 and ¶126.

Discussion and Analysis

139. The weight of the credible evidence developed during this investigation leads us to conclude that electronics mechanics in the GCU Shop had not been torquing GCU screws properly for at five years prior to April 2005. Additionally, the mechanics who did the work in

that timeframe believe this condition had existed since the F/A-18 was introduced into the inventory in 1981.

140. We find that electronics mechanics in the GCU Shop did not have the necessary, required specialty tools to perform proper torquing on the item they reworked until this issue was raised and prior to that time they had been using electric and manual screwdrivers to torque screws on the GCUs. The electric screwdrivers were not calibrated. This discrepancy existed for at least five years prior to the complaints raised around April of 2005, based on statements from mechanics who performed GCU rework during that period of time. Additionally, those mechanics believe that this condition had existed since the F/A-18 was introduced into the inventory in 1981.

141. We find that QA personnel were not aware that artisans in Shop 93305 were not torquing GCUs to the values called for in NAVAIR Technical Manual A1-211AC-420-000 until the Complainant raised the issue.

142. We find that the testimony of supervisors who asserted the GCU artisans had the proper tools and were complying with torque values in the Manual is not credible.

143. We find that artisans in shop 93305 knew the torque specification requirements listed in NA A1-211AC-420-000, WP 005 00 and LES NI 33039-84 Rev A, AMD 2/R, dated 30 November 98. However, the artisans were unable to comply with these requirements for the reasons set forth in allegation number two below.

Conclusion

144. The allegation is **substantiated**. However, in January 2006, when the Complainant made his allegations to OSC, corrective action had already been completed (in November 2005).

Listing of Actual/Apparent Violations

145. Failure to comply with requirements in NAVAIR Technical Manual A1-211AC-420-000, Work Package 005 and Local Engineering Specification (LES) NI 33039-84 Rev A, AMD 2/R, dated 30 November 98.

Actions Planned or Taken

146. When the Complainant raised the issues to the FAA, NADEP, NI Management initiated NI Quality Report Audit 54510-0001-05 that determined the GCU shop artisans had not been torquing the items in accordance with NAVAIR Technical Manual A1-211AC-420-000, Work Package 005; that the Routers being used by the artisans were citing references that had been canceled, expired or no longer existed; that LES NI 33039-84 Rev A, AMD 2/R needed to be reviewed for validity; that the Industrial Engineering Technician branch review technical references to ensure they are current. Immediate actions were taken to correct the deficiencies cited in the Audit.

147. Industrial Engineering Technicians reviewed GCU Routers and made the necessary corrections to ensure the documentation is valid and current.

148. QA initiated Quality Characteristics List (QCL) re: 293E775G40 & 971E325G1 dtd 1 November 05. This document required the mandatory verification of Silicon-Controlled Rectifier (SCR)⁴⁷ modules when the artisans received the proper torque tools to ensure they were in fact complying with the torque values called for in the Manual. Once they were satisfied the artisans were in compliance they issued QCL re: 293E775G40 & 971E325G1 Rev dtd 16 Mar 06, which requires random checks of GCUs to ensure proper torque values are being met.

149. QA also oversaw the re-qualification of GCU artisans and verified that their Individual Qualification Records (IQR) properly documented their qualification to certify their own work as being in compliance with the Manual.

Allegation Two

That unnamed NADEP, NI artisans in Shop No. 93305 did not use the proper tools to assemble Generator Converter Units (GCU) for the F/A-18 Hornet in violation of requirements set forth in Technical Manual A1-211AC-420-000, which requires the use of specific torquing tools in the assembly of GCUs.

Findings

Introduction

150. The findings for Allegation 1 are incorporated here by reference. Those facts demonstrate the artisans had not been torquing GCU screws to the proper values called for in the Manual. Those facts also demonstrate the artisans' failure to comply with those requirements arose from a lack of the proper tools as called for in the Manual, rather than *any deliberate attempt to circumvent proper procedures*. The facts also show that the failure to properly torque GCU screws and lack of proper torque tools was more likely than not, a condition that had existed since the introduction of the F/A-18 into the inventory in 1981.

151. Under the QA system in place at NADEP, NI, there was no verification that the appropriate tools or torque values were used during the GCU assembly process. It was, and still is, the responsibility of the artisan performing the GCU assembly to ensure that the appropriate tool and torque value is used and that each QA callout in the Manual is complied with. However, it appears that the issue of lack of tools did not come to light until two artisans attended training at the manufacturer's facility for the F/A-18 E-F models. Upon his return from that training, Mechanic-4 brought the issue to his supervisors and initiated a NAVAIRDEPOT NI Material & Work Request, Tool Request dated 25 Apr 05.

152. To reiterate information provided in Allegation 1, the artisans in Shop 93305 used manual tools, e.g., nutdrivers and screwdrivers that were tightened by feel and electric screwdrivers with adjustable breakaway torque settings that were not calibrated in an effort to comply with the torque requirements of the Manual until the later part of 2005. This process is believed to have

⁴⁷ QA initially witnessed the installation of all 12 SCR modules (8 screws per module). However, this approach was changed after a few weeks to witnessing random samples of GCUs (5 of 50 units) and the number of SCR modules witnessed per GCU was also reduced.

extended all the way back to 1981, but none of the artisans interviewed have worked on the GCUs for more than five years.

153. Around July 2005, after the issue of a lack of proper tools came to light, two non-adjustable torque tools were secured that could be calibrated for a single torque value. One was calibrated for 8 in-lbs and one for 12 in-lbs to meet torque values for GCU assembly. These tools did not cover all required torque values called out in the Manual. These tools were used until the full sets of torque tools were in place in November 2005.

154. Manual tools and electric screwdrivers are not acceptable substitutes for calibrated torque tools with the proper adjustment range. The artisans were aware of this and they stated that the subject of not having proper torque tools was brought up with supervisors and QA personnel on several occasions. It is unknown why supervisory or QA personnel did not take immediate action to rectify the situation prior to the Complainant raising the issue.

155. As cited during the discussion of Allegation 1, several supervisory personnel made statements that torque tools were available, and had always been available in building 66 before the GCU shop was moved to building 378, and at both locations after the GCU shop was moved. They also asserted that the torque tools were properly used by the artisans. The supervisory personnel made reference to an I-level training video made several years ago at North Island which showed torque tools being used to assemble a GCU.⁴⁸ As noted supra, this is in direct conflict with statements made by senior artisans and one supervisor, that the required torque tools had never been available prior to November 2005 and only a limited use set was available between July 2005 and November 2005.

156. It was not until April 2005 that torque tools with the proper adjustment range were requisitioned and these did not enter the inventory until November 2005. Four sets of torque tools were available at the time of the investigation, with one set located at the test cell in building 66 and three sets located in the GCU shop in building 378. Further, Shop 93305 artisans had been requalified in the use of the new torque tools and certified to sign off, or "stamp", their work as meeting the standards for assembly of GCUs as called for by the Manual. Further, it was not until the issues surfaced in the April 2005 timeframe that the lack of torque tools became known within NADEP, NI and corrective action was initiated. However, even with some urgency and visibility, it still took about seven months to obtain the tools, get them calibrated, deliver them to buildings 66 and 378, and get the artisans requalified to certify their work.

157. It is not clear why the lack of torque tools was not flagged as a major issue many years ago. The artisans may simply have been following long established procedures and working with the philosophy of "do the best you can with what you have".

⁴⁸ See footnote 28.

Torque Tools and Applicable Standards

158. The requirements for torque tools are found in NAVAIR Technical Manual A1-211AC-0420-000.⁴⁹

What GCU Shop 93305 Artisans Said

159. The lack of appropriate tools to properly torque GCUs has been discussed by Mechanic-3 and Mechanic-4 supra at ¶s 57 through 69. Their statements confirm the fact that GCU artisans did not have the tools necessary to comply with the requirements of the Manual until November 2005. Their statements further confirm that artisans in the GCU shop used manual and non-calibrated electric screwdrivers to assemble GCUs, prior to receipt of loaner tools in July 2005 and the requisitioned tools in November 2005. They further confirm that the loaner tools did not cover the entire range of torque values called for in the Manual.

What the QA Specialists Said

160. QA-3 at ¶ 105 discussed QA's knowledge of the lack of required torque tools in the GCU shop and why they had not been aware of this deficiency.

What the Engineers Said

161. Engineer-1 at ¶ 135 stated that he knew that the GCU shop artisans had used electric screwdrivers to torque screws and that he knew [a mechanic], who retired three to five years ago, used electric screwdrivers to torque screws. He said he did not know about calibrating the electric screwdrivers.

What the Engineers Said About A Product Recall⁵⁰

162. There is no safety-of-flight issue with any GCU provided to the fleet prior to the receipt of the proper torque tools in late 2005. At worst, mis-torqued screw could result in premature failure of the GCU through overheating due to poor contact across heat transfer surfaces; damage to the electrical insulator under the 12 SCR modules and failure of a module; a failed electrical connection; a damaged helicoil; damage to the tube flange through electrical arcing; or Foreign Object Damage internal to the GCU potentially resulting in an electrical fault. A catastrophic failure of the GCU, where the GCU loses containment, is an unlikely event. The aircraft is configured with two GCUs, each of which is capable of powering the aircraft. In the event that one GCU fails for any reason, the aircraft electrical power distribution system is configured to immediately transfer that GCUs bus to the opposite GCU at which point the pilot would return to base as soon as practical. There is also a battery backup system that can be used in emergencies to allow safe recovery of the aircraft after a dual GCU failure.

What NADEP, NI Support Personnel Told the Investigators

163. QA-2 is [a] Production Control for Components. QA-2 is located in building [number].

⁴⁹ Torque tool requirements are found at page 35 ¶ 16 of the Manual.

⁵⁰ Also addressed supra at ¶ 16.

164. QA-2 stated that she had been in her present job for about three years. She said her office provides materials and consumables needed for production of the GCU; that items such as torque tools would be ordered through NADEP, NI Code 6.2 and the tool crib would actually procure the tools.

165. QA-2 stated that QA-2 served on the AIRSPEED team to improve the GCU production line including flow and turn-around time.

166. QA-2 stated that Production Control does work packages (Routers) that call out the LES, instructions, and technical data. QA-2 said that Foreign Military Sales (FMS) Routers are essentially prepared the same as United States Routers, except that special instructions are put on the FMS router that say parts cannot be swapped. QA-2 said that an Industrial Engineering Technician (IET) does technical updates to the Routers. QA-2 stated all changes must be routed through an IET and QA-2 would not be aware of any changes. QA-2 said the IETs make changes at the direction of engineering. QA-2 added that the office does not provide technical documents; that technical data is part of the technical library that will send out notices when documents expire and it is up to the engineers to correct/update these documents.

167. QA-2 stated that the artisan must stamp the router to say that they did the work. QA-2 stated that QA also stamps the router and that there is a log book in the test cell showing QA actions. QA-2 said the logbook entry is part of inventory control.

168. QA-6 is a Production Control Supervisor for GCU shop. QA-6 is located in building [number].

169. QA-6 stated that the GCU production requirement for the present quarter is 143 units due to a large number of backorders. QA-6 said there are 54 backorders for the GCU as well as back orders for the generator assembly. QA-6 added that a typical quarter would have a production requirement of approximately 90 units. QA-6 said her office monitors time, labor, and material. She stated that 68 hours is the standard repair time for a GCU.

170. QA-6 stated that there is no serial number placed on the work package (router) and that only a generic order is received for Navy units. QA-6 said however, the FMS Routers do have a GCU serial number included. QA-6 said it is up to the artisan to put a serial number on the router for a Navy GCU. QA-6 stated that the serial number can also be voided and the paperwork assigned to another unit if the original unit is determined to be beyond economical repair (BER). QA-6 said that for accounting purposes the work hours are assigned to the next unit, noting that NADEP, NI does not get paid for units that are not delivered. QA-6 stated that it is up to the artisans to recommend a course of action for each GCU, e.g., to keep working on a unit or scrap it. QA-6 said the paperwork for each GCU is not final until the GCU is sold at final test.

171. QA-6 also stated that SRAs sent to the Consolidated Automated Support System (CASS) without serial numbers have serial numbers added to make sure that CASS personnel do not swap the SRAs with other units they are working on.

172. Supervisor-2, an Industrial Support Supervisor, is [description omitted] and is located in building [number].

173. Supervisor-2 was asked if he recalled a request for torque tools from Mechanic-4 in early 2005. He said he did not remember the request or if the tools were available, but said that he normally referred people to the Snap-on tool catalog when tools were not available in the tool crib. He added that he vaguely remembered the procurement for a list of torque tools, primarily because the order included a specific type of Snap-on screwdriver bits.

174. Supervisor-2 stated that tools could be checked out daily by artisans from any of the local tools cribs or for short periods if a memo was provided. He also stated that if a tool was procured, then it could be assigned permanently.

175. Supervisor-2 stated that he would routinely review all requests for tool purchases to see if the specific tools or something similar were already available in the tool crib.

Discussion and Analysis

176. The investigators find that NADEP NI knew of the lack of required torque tools before the Complainant made his disclosure. The issue was brought to the attention of Mechanic-4's supervisors upon his return from the manufacturer's facility, where he was trained on the F/A-18 E-F model GCUs.⁵¹ After a number of conversations with his supervisors, Mechanic-4 initiated a requisition for the necessary tools. This took place in April, 2005 and corrective action was initiated. However, even with some urgency and visibility, it still took about seven months to procure the tools, get them calibrated, deliver them to buildings 66 and 378, and get the artisans qualified and certified on the use of the tools.

177. The investigators find that QA oversight of the GCU assembly process was minimal until late 2005. Their review indicated QA activities were limited to final sign-off of paperwork in the test cell in building 66 with the occasional witnessing of final GCU tests. QA implemented a QCL in late 2005 calling for mandatory verification of torque values on the SCR modules during the assembly process. At the time of the investigation, the QCL requirement was passed on by word of mouth rather than written instruction. The requirement is now cited on the GCU Work Package (Router). The use of the QCL is somewhat questionable since it only addresses the torque values on the mounting screws of the SCR modules. During the on-site interviews, investigators were told the QCL would convert to a random sampling schedule at a later date; the conversion occurred while the investigators were still at NADEP NI.

Conclusion

⁵¹ On 18 May 2006 a telephone conversation with Mechanic-4 determined that he and [another person] learned of the requirement for specialty tools when they attended training for F/A-18 E through F model GCUs at the facilities of TESTEK in Livonia, Michigan and Smith's Aerospace in Dayton, Ohio during the Spring, of 2004.

178. The allegation is **substantiated**. However, at the time the Complainant made the allegations to OSC in January 2006 corrective steps had been taken, commencing in April 2005 and the final action completed in November of 2005.

Listing of Actual/Apparent Violations

179. Failure to comply with requirements in NAVAIR Technical Manual A1-211AC-420-000, Work Package 005 and Local Engineering Specification (LES) NI 33039-84 Rev A, AMD 2/R, dated 30 November 98.

Actions Planned or Taken

180. Tools required for the proper torquing of GCUs per the Manual were initially ordered in April 2005, were received, calibrated and issued to the artisans' toolboxes in mid-November, 2005. In the interim, between the time the tools were ordered and placed in the artisans' toolboxes, calibrated tools were borrowed from other entities on the base, allowing artisans to comply with the torque requirements of the Manual.

181. All 93305 artisans were trained, qualified on the use of the specialty tools to properly set the torque values for the GCUs, and recertified to perform the QA checks called for in the Manual. QA personnel provided oversight of the actions taken, reviewing the artisans' IQRs to ensure their qualifications were documented and physically observing their assembly of GCUs.

Personnel Actions Taken

182. NADEP, NI has addressed the matters raised in this investigation through individual and shop training and has determined that no disciplinary action against anyone associated with this incident would be appropriate. This decision is consistent with the table of penalties for first offenses and the fact that none of the personnel involved have a record of prior misconduct, poor performance, or performance based actions. Disciplinary action at this time would not serve any purpose or promote the efficiency of the service, but would be punitive in nature.

183. When the investigation commenced, corrective action had already been taken to address the issues of the failure to torque GCUs to the proper values and use of specialty tools to properly perform torquing called for in the Manual. The lengthy passage of time makes it difficult to gather definitive evidence to support any conclusion other than the fact that the GCU artisans confirmed that unauthorized tools were used, and the proper torque values had not been set as a result of the lack of proper tools. Further, although it is apparent that these deficiencies had probably been in existence since the F/A-18 was introduced into the system in 1981, there is no evidence to support that fact prior to the year 2001. The investigators found no evidence to support a finding of malice on the part of any individuals involved and, after proper procedures were reinforced with the artisans, there were no further infractions.

184. To reinforce this decision, NADEP, NI found it significant that no loss of F/A-18 A-D airframes or crews have been attributed to a GCU failure. Finally, there have been no reports of problems in that vein from the Fleet and independent technical experts, including members of the F/A-18 Desk at NAVAIRHQ, PEO(T), PMA-265, have confirmed there is no need for a product recall because the unauthorized maintenance procedure used does not pose a risk to the Fleet.

Observations and Recommendations

185. The investigators note that a minimum allocation of the required tools were procured. They also note that although a tool may be borrowed from another workbench's toolbox in the event a like tool is broken or sent to be calibrated, it would not be deemed a good practice.

186. The investigators recommend that at least two spare sets of required torque tools be procured and stocked in the central tool crib at NADEP, NI to allow rapid replacement in the event a tool is broken or has to be sent out for calibration.

187. The investigators also recommend that NADEP, NI review the requirement for torque tools and specialty tips for the F/A-18 E through F models and procure and stock those items in the GCU artisans' workbench toolboxes and central toolroom.

188. The investigators note that the supervisors responsible for the GCU shop were not aware that the Manual required special torque tools; that the artisans were using unauthorized tools; and that the artisans had not been applying proper torque values when assembling the GCUs until the issues were brought to their attention beginning in early to mid-2004. They also note that the supervisors took no action until the matters came to a head in April 2005. The investigators surmise that this ennui resulted from longtime practices in the GCU shop, from its inception in 1981, and the lack of Quality Deficiency Reports; other documentation of problems with the way the GCUs were being maintained at NADEP, NI; and the fact that artisans had not brought the issues to their attention until Mechanic-4 and [another person] returned from training on the F/A-18 E through F model GCUs about May 2004.

189. The investigators recommend that new supervisors be required, at a minimum, to acquaint themselves with specialty requirements to accomplish tasks in a particular shop. It goes without saying that the same holds true for artisans newly assigned to a particular shop, although, by necessity, their knowledge needs to be more in depth.

190. The investigators note that although the QA personnel performed periodic audits of the GCU shop toolboxes they were not aware that special torque tools were required, as they were not listed on the inventory list, and therefore never noted that as a deficiency.

191. The investigators recommend that the artisan workbench toolbox inventory list and/or the Individual Materiel Requirement List (IMRL) be updated to reflect the need for the special torque tools required by the Manual to assemble GCUs for the F/A-18 A through D models and to meet the requirements, where different for the E through F models.

192. The investigators recommend Engineer-1's decision that artisans may self-certify the QA call-outs, as discussed in footnote 46, be incorporated into the manual for future reference.

193. The investigators believe, but are unable to determine, that failure to adhere to standards over time in this case may be attributed to the initial start up of the GCU maintenance program in 1981 that apparently did not meet the requirements called for in the Manual. The investigators believe the original artisan(s) passed their methodology to subsequent mechanics, perpetuating improper performance of maintaining the GCUs. As discussed above at paragraph 156, the

issues brought forth by the Complainant stemmed from the lack of the proper tools called for in the Manual, rather than *any deliberate attempt to circumvent proper procedures*.

194. The investigators note that conversations with senior management of the Depot indicate that they actively encourage personnel, through various media, to report problems and discrepancies, either through their chain-of-command or directly to the top.

195. Finally, the investigators believe it important that NADEP, NI make the supervisors, artisans and QA Specialists aware of the findings of this report that relate to their well intentioned, but improper, torquing of GCUs, with unauthorized and un-calibrated tools. Further, this investigation should serve as a teaching point for the meaning of strict adherence to specified procedures. It illustrates that a lack of knowledge and lack of proper tools may be just as inappropriate as omitting or changing a step in the procedure. Fortunately, in this case the failure to apply the proper torque values as the result of not having the required tools did not result in any catastrophic mishaps.

Appendix A - Reference Documents

1. Disclosure from Mr. Conrad's to OSC dated 4 Jan 06
2. NAVAIR Technical Manual A1-211AC-0420-000 dtd 1 Feb 01 w/chng 2 dtd 1 Jul 04
3. NAVAIRDEPOT NI Commanding Officer ltr 6.0:WTT:mab/06-098 of 21 Mar 06
4. NAVAIRDEPOT NI Commanding Officer ltr 6.4:DAL:mab/06-179 of 16 May 06
5. NAVAIRDEPOT NI Engineering Information Rapid Reply Request (3R Form) dtd 22 Aug 05
6. NAVAIRDEPOT NI Local Engineering Specification NI 33039-84 Rev A, AMD 2/R, dtd 30 Nov 98
7. NAVAIRDEPOT NI Local Engineering Specification (LES) NI F18-010-05 dtd 10 Aug 05
8. NAVAIRDEPOT NI Local Engineering Specification (LES) NI F18-010-05 Rev A DRAFT dtd 15 Mar 06
9. NAVAIRDEPOT NI Material & Work Request, Tool Request dtd 25 Apr 05
10. NAVAIRDEPOT NI Quality Report Audit 54510-0001-05 dtd 28 Oct 05
11. NAVAIRDEPOT NI Quality Characteristics List (QCL) re: 293E775G40 & 971E325G1 dtd 1 Nov 05
12. NAVAIRDEPOT NI Quality Characteristics List (QCL) re: 293E775G40 & 971E325G1 Rev dtd 16 Mar 06
13. NAVAIRDEPOT NI Quality Correction Notice (QCN) 54510-020-05 dtd 11 Nov 05
14. NAVAIRDEPOT NI Report of Investigation HL-05-NI-03 (F2005-128) of 29 Sep 05
15. NAVAIRDEPOT NI Router Information Report – Part 293E775G40 dtd 7 Mar 06
16. NAVAIRDEPOT NI Router Information Report – Part 971E325G1 dtd 7 Mar 06
17. NAVINSGEN ltr 5041/20060171 Ser N65/0298 of 27 Feb 06
18. NAVAIRINST 4790.30B, Depot Level Customer Service Processing of Aeronautical and Support Equipment Repairables/Consumables of dtd 8 Nov 01
19. OPNAVINST 4790.2J, Naval Aviation Maintenance Program (NAMP) of dtd Feb 05
20. OSC ltr re: DI-06-0782 of 16 Feb 06

21. OSC Report of Disclosure DI-06-0782
22. Statement - QA-1 of 24 Apr 06
23. Statement - Mechanic-2 of 1 May 06
24. Sworn Statement - Supervisor-1 of 8 Mar 06
25. Sworn Statement - Conrad, Richard, WG-2604-10, Electronics Mechanic of 6 Mar 06
26. Sworn Statement - QA-2 of 7 Mar 06
27. Sworn Statement - Mechanic-3 of 7 Mar 06
28. Sworn Statement - Supervisor-2 of 9 Mar 06
29. Sworn Statement - Mechanic-4 of 8 Mar 06
30. Sworn Statement - Supervisor-3 of 8 Mar 06
31. Sworn Statement - Engineer-1 of 8 Mar 06
32. Sworn Statement - QA-3 of 7 Mar 06
33. Sworn Statement - Supervisor-4 of 8 Mar 06
34. Sworn Statement - QA-4 of 9 Mar 06
35. Sworn Statement - Supervisor-5 of 8 Mar 06
36. Sworn Statement - QA-5 of 2 May 06
37. Sworn Statement - QA-6 of 7 Mar 06
38. Report of Interview - QA-6 of 24 Apr 06
39. Report of Interview - E-mail - Supervisor-1 of 21 Apr 06
40. Report of Interview - E-mail - Complainant of 14 Apr 06
41. Report of Interview - E-mail - Mechanic-2 of 1 May 06
42. Report of Interview - E-mail - Mechanic-3 of 8 May 06
43. Report of Interview - E-mail - Subject Matter Expert Two (SME-2) of 18 Apr 06
44. Report of Interview - E-mail - Mechanic-4 of 6 Apr 06
45. Report of Interview - E-mail - Mechanic-4 of 14 Apr 06

46. Report of Interview - E-mail - Mechanic-4 of 19 Apr 06
47. Report of Interview - E-mail - Mechanic-4 of 3 May 06
48. Report of Interview - E-mail - Supervisor-3 of 8 May 06
49. Report of Interview - E-mail - Engineer-1 of 8 May 06
50. Report of Interview - E-mail - QA-3 of 8 May 06
51. Report of Interview - E-mail - Supervisor-4 of 8 May 06
52. Report of Interview - E-mail - Supervisor-5 of 6 Apr 06
53. Report of Interview - E-mail - Supervisor-5 of 29 Apr 06

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Appendix B - Witness List

Fact Witnesses

1. QA-1, former Quality Assurance
2. Supervisor-1, Electronic Integrated System Mechanic Supervisor
3. Conrad, Richard, WG-2604-10, Electronics Mechanic (Complainant)
4. Mechanic-2, Electronics Mechanic Apprentice.
5. QA-2, Production Controller
6. Mechanic-3, Electronics Mechanic
7. Supervisor-2, Industrial Support Supervisor
8. SME-2, Navy Safety Center, Norfolk, VA
9. Mechanic-4, Electronics Mechanic
10. Supervisor-3, Electronic Integrated System Mechanic Supervisor
11. Engineer-1
12. QA-3, Quality Assurance Specialist
13. S-4, Electronic Integrated System Mechanic Supervisor
14. QA-4, Quality Assurance Specialist
15. Supervisor-5, Avionics
16. QA-5, Quality Assurance Specialist
17. QA-6, Production Controller

Subject Matter Experts

1. SME-1, PMA-265, NAS Patuxent River, MD
2. SME-2, Navy Safety Center, Norfolk, VA
3. SME-3, PMA-265, NAS Patuxent River, MD