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AN INVESTIGATION INTO THE EFFECTS OF THE HANGAR QUEEN PROGRAM

by

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Preface

The focus of this paper concerns the effects of the different command hangar queen (HQ) programs currently in place for the Combat Air Forces. These differences are based on the thresholds established to determine when an aircraft becomes a HQ. The importance of this issue can be seen in the additional workload placed on aircraft maintenance personnel to return aircraft to flight based on an unvalidated requirement. By consolidating the studies performed on cannibalizations (CANNs) and the HQ program, this paper attempts to provide an understanding of the rationale and effects/benefits of the different HQ thresholds. Hopefully, this research combined with new guidance from the Air Staff on CANNs to prevent HQs will prevent unnecessary CANNs.

I had several people who were crucial to completing this research project. First, I would like to acknowledge and thank my faculty advisor Lt Col Teal for his help/guidance. All of the MAJCOMs provided assistance specifically, Maj Hoppner (PACAF), Capt Cartwright/Chief Flemming (ACC), and Chief Hatzinger (USAFE). Finally, several units helped provide current/past data, specifically, Capt Oliver (AFLMA), Capt Flippo/MSgt Hernandez (Spangdahlem AB), and MSgt Sears/SSgt Susenbach (Shaw AFB).

Abstract

Command hangar queen (HQ) programs were established to prevent aircraft from becoming permanent parts donor aircraft. These programs helped eliminate the practice of creating aircraft hulks that would never fly again. HQs are measured by the number of days an aircraft remains on the ground without flying. These thresholds were based on anecdotal beliefs/evidence and were not standardized between the commands, even for like aircraft. The HQ program was/is a driving factor in returning aircraft to flight. This paper focuses on the effects of the different command HQ thresholds on aircraft maintenance for fighter aircraft. It presents the background of the HQ programs and outlines the current guidance along with its effects. The key research area involves the review of previous CANN/HQ program studies and a survey of current logistic group commanders/deputy operations group commanders for maintenance. This research shows that longer HQ thresholds provide benefits and flexibility for aircraft management. The most controversial issue concerning this is the effect of leaving aircraft down for a longer period. While no study has been done to determine the “right” time to keep an aircraft down without a negative effect, the data showed that extending the downtime beyond 30 days provided benefits without negatively impacting return to flight.

The main point of the final recommendation was that the HQ programs should be standardized throughout the combat air forces. There is no rationale behind the current disconnects between the commands. The final recommendation of the research was

impacted by a recent addition of a HQ section to AFI 21-101 stating that CANNs will not be used to return aircraft to flying status for the sole purpose of preventing HQ reporting. With this in mind, current ACC guidelines should be standardized as long as units receive clear instructions that allowing a CANN jet to become a category 1 HQ is actually an indicator of effective fleet management. Units that do not experience any category 1 HQs are, most likely, taking actions solely to prevent aircraft being down beyond 30 days. The new goal should be to have as many CANN jets as possible become category 1 HQs without letting them progress to category 2 unless circumstances dictate it.

Chapter 1

Hangar Queen Program Background

The Hangar Queen (HQ) Program was established to prevent aircraft from becoming a permanent parts donor aircraft. In the past, aircraft had been left down as the designated cannibalization (CANN) aircraft so long that a major effort was required to return them to flight due to the number of parts removed and documentation problems. Any discussions concerning the need for a HQ program are usually met with examples of aircraft hulks being hidden in a hangar never to fly again and statements concerning the negative effects of keeping an aircraft on the ground too long. In an effort to prevent this from happening, several major commands established HQ programs requiring command level oversight for aircraft that were down over an established time. The problem with these programs was that no in-depth study was performed to determine the appropriate HQ threshold. As early as the mid-1980's, the prescribed down times associated with the different command HQ programs were not standardized even though they operated the same types of aircraft. The focus of this research paper is to look at the history of the different command HQ thresholds, review previous HQ/CANN studies, and assess the current field maintenance leaderships' opinions of the HQ thresholds. This study will include the impact of the standards on aircraft CANNs and aircraft availability. While this research will not result in a specific recommendation of the appropriate HQ threshold

for the combat air forces, it hopes to analyze the effects of the different programs using like aircraft to show which of the current command standards is most beneficial. The root of this issue is the unavailability of parts, which leads to the need to cannibalize parts and consolidate the missing components to the least number of aircraft to increase aircraft availability.

Understanding Cannibalization

Our fundamental policy is to cannibalize only when it is absolutely mission-critical.

—Lt Gen Micheal E. Zettler
Deputy Chief of Staff/Installations and Logistics

Cannibalization is the removal of a serviceable component from one aircraft to repair another aircraft. This situation occurs as the result of unavailability of components in the supply system. Because CANNs double the maintenance workload, specific guidance/procedures are in place at the command and unit level to help control/minimize them. Since there is no realistic way to prevent the need for CANNs, it is important to ensure that CANNs resulting from command guidance such as the HQ program are minimized and performed based on a validated requirement.

Cost of Cannibalization

Canibalization is a quality of life issue.

—Lt Gen Micheal E. Zettler
Deputy Chief of Staff/Installations and Logistics

Cannibalization is a major Air Force issue as evidenced by the numerous studies, audits, and congressional testimonies on the subject. While CANNs are a necessity and

have become a way of life in today's Air Force; they bring with them numerous effects ranging from increased workload to a negative impact on the morale of aircraft maintenance technicians. In the Air Force, CANN rates are measured as a metric of cannns per100 sorties. "In FY00, the total USAF maintenance man-hours expended on CANN were over 561,000 maintenance hours—approximately 2 percent of all maintenance man-hours dedicated to all aircraft maintenance that year."¹ As outlined in figure 1, CANNs require at least twice the maintenance time of normal repairs. While

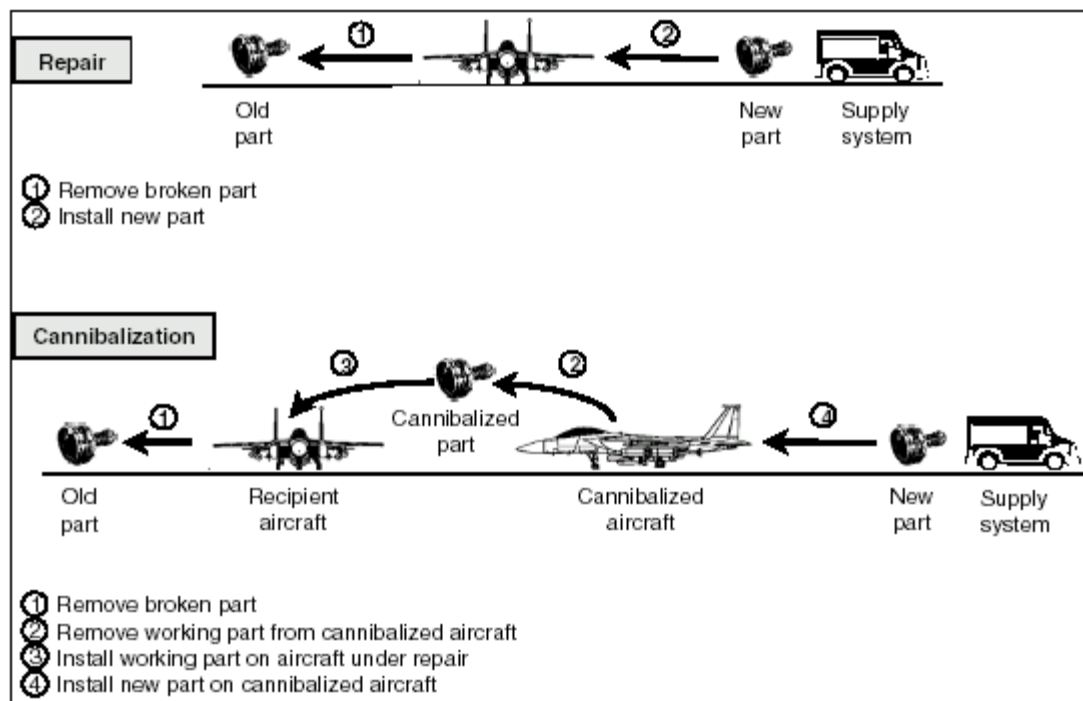


Figure 1. Repairs Require Two Actions, CANNs Require Four;
Source: General Accounting Office Study GAO-01-693T

there is no study to examine the impact of CANNs on the components themselves, it is obvious that this does cause additional wear and tear on the parts to include the ones removed to gain access to the needed component. CANNs have always been a major morale problem for maintenance personnel as evidenced in an April 1984 Air Force Human Resource Laboratory Study.² In recent years, the need to cannibalize has been

defined as a quality of life issue for aircraft maintenance personnel. The additional workload has a negative impact on morale and is even being attributed to low retention rates for maintenance technicians. It is with this thought in mind that this research paper hopes to emphasize the need to ensure CANNs performed to support the HQ program are based on a validated, “real”, need to get the aircraft back into the air. As I conducted my research on this issue, it became apparent that there have been several studies on CANNs and the HQ program. Even though the recommendations of these studies have not been typically received well, they have contributed to the recent shift in extending HQ thresholds and/or loosening requirements for reporting HQ aircraft.

Aircraft Availability

The other key element for consideration in this research paper is aircraft availability. It is a daily struggle for aircraft maintainers to match the number of aircraft available with flying, maintenance training, and scheduled maintenance requirements. In an effort to maximize aircraft availability, units designate aircraft as “cann jets” to consolidate unavailable parts to one aircraft. It is these aircraft that are the main focus of this paper. The impact on availability is seen during CANN jet swapout when two aircraft are unavailable for scheduling purposes. Though the HQ program is not the only reason for CANN jet swapout, it is a driving factor.

Aircraft Availability Impact

Because nearly every fighter squadron will have its own CANN jet, the HQ threshold issue can also have an impact on aircraft availability. This issue comes into play during the period of time when two aircraft are down for CANN. During CANN jet

swapout, one aircraft is in rebuild and one is being taken down as the new CANN jet. If we assume a standard swapout period of three days, we can see the result of a thirty versus fifty-day HQ threshold. Assuming CANN jet turnover is driven solely by the HQ threshold, there would be five less swapouts under the fifty-day threshold. In a wing with three fighter squadrons, this would equate to forty-five days per year of having an additional aircraft for scheduling. This example would also provide the potential to avoid 1,080 hours of non-mission capable time. These savings show the potential for the extending the time an aircraft is a CANN jet. The goal should be to give the units the ability/direction to capitalize on these potential savings by leaving the aircraft down when another maintenance management consideration such as phase flow or another aircraft breaking for an uncannable part does not drive the swap out.

Notes

¹ House, *Written Statement for the Record by Lt Gen Micheal E.Zettler before the Subcommittee on National Security, Veterans Affairs, and International Relations, Committee on Government Reform*, 107th Congress, 22 May 2001, 6.

² *Management and Control of Aircraft Cannibalization within Tactical Forces*. Report of Audit (Air Force Audit Agency, June 1986), 5.

Chapter 2

Current Hangar Queen Program Guidance and Its Effects

Until recently, there was no Air Force level guidance on the HQ program. In looking at the command guidance, around 1995 there was a push to establish a Multi-Command Instruction (MCI) 21-101, Maintenance Management of Aircraft, to replace the individual commands' 21-101 instructions. Over the years of independently managing their own supplements to AFI 21-101, the MAJCOMs had developed command unique guidance for the exact same tasks and requirements. The goal of the MCI was to standardize guidance/procedures to the maximum extent possible for the Combat Air Forces. Exceptions to standardization were made on maintenance issues where the commands could not come to an agreement. The intent was to minimize these exceptions by ensuring they were driven by a unique operating environment in a command, not based on tradition or individual preferences. Even though it was not because of a unique command environment, HQ thresholds were one area where the commands could not come to a consensus.

Air Combat Command

As outlined in ACCI 21-101, Maintenance Management of Aircraft, the purpose of the HQ program is to encourage aggressive management of the maintenance actions required to prevent aircraft from becoming HQs. When an aircraft becomes a HQ,

managers at all levels must intensify their effort to alleviate the HQ condition as soon as possible and comply with the responsibilities for each category of HQ. A HQ is defined as an aircraft that has not flown for more than 30 consecutive days. ACC has somewhat relaxed the reporting procedures for HQ aircraft by establishing 3 categories for HQ aircraft. Category 1 includes aircraft that have not flown for more than 30 but less than 60 days. These aircraft require a dedicated recovery team, in-depth Quality Assurance involvement, strict control of CANNs at the Deputy Operations Group Commander for Maintenance (DOGM) level, and reporting the aircraft as a HQ in the monthly MAJCOM metric-reporting program. Category 2 HQs are aircraft that have not flown for more than 60 days but less than 90 days. In addition to the level 1 requirements, units should cease all CANNs, make the aircraft a priority for rebuild, and brief the aircraft's status to the Operations Group Commander. Category 3 HQ aircraft have not flown for more than 90 days. Once an aircraft reaches this level, units must comply with all level 1 & 2 requirements plus brief the Wing Commander on the aircraft's status, cannibalize all parts needed to bring the aircraft to airworthy status, advise the MAJCOM LG of any needed components that are unfeasible to cannibalize, and perform at least an operation check flight to return the aircraft to service. Aircraft that become level 2 or 3 HQs must be reported to the MAJCOM LG via message to include reason for HQ, estimated fly date, and supply information for the parts on order. While these criteria and requirements have been relaxed compared to the 1986 Tactical Air Forces 21-day HQ threshold for fighters, it can still drive units to take actions, CANNs, to return aircraft to flight before the 30 window is passed. The question becomes whether the benefits from keeping a jet

in “cann status” longer outweighs the potential for the additional work to return the aircraft to flight after a longer period of downtime. ¹

Pacific Air Forces (PACAF)

Pacific Air Forces’ (PACAF) current HQ guidance mirrors the ACC guidance with the exception that a Category 1 HQ is an aircraft that has not flown for 51 to 60 days. The PACAF HQ threshold was extended from 30 to 50 days in 1994. The change was initiated by a 1993 Air Force Logistics Management Agency (AFLMA) study on HQ Threshold Methodology. The AFLMA study was followed by a six-month test at two PACAF locations to validate the change in policy, both of these studies will be discussed further in the Review of Previous Studies Section of this paper. The rationale for the change as outlined in an August 1994 position paper cited reduced CANN rate/man-hours, less wear/tear and avoidance of occasional breakage of components, and no negative impact on return to flight or supply support.²

United States Air Forces Europe (USAFE)

USAFE’s current HQ guidance matches PACAF’s. Originally, USAFE maintained the same threshold as ACC, but in September 2000 USAFE adopted the 50-day standard. This change was based on a desire to increase aircraft availability by decreasing the number of times two aircraft would be down for CANN jet swapout. USAFE also wanted to provide the field units more flexibility in making the right management decisions on when to return “cann jets” to flight. Because there had been no in-depth studies performed to determine the right threshold, USAFE chose to extend their standard based on PACAF’s experience with the 50-day standard.³

Air Staff Guidance

The most recent development on this issue is the addition of a HQ section in AFI 21-101, dated 13 February 2002. This addition has two key sentences as part of its general guidance stating, “Cannibalization will not be used to return the aircraft to a flying status for the sole purpose of preventing HQ reporting. Reporting procedures are intended to provide higher level assistance to field units and will not be construed as a “report card”.”⁴ This guidance does not say CANNs should not be used to return the aircraft to flight; rather, that those CANNs should not be driven by the HQ program.

Management Effects of the Different Thresholds

The statistical effects of the different HQ thresholds will be covered in the Review of Previous Studies Section done later in this paper; however, the impact on management actions can be initially discussed here. While all of the commands’ goals are to ensure increased supervisory involvement in aircraft that are down for extended periods, the key difference between the 30 and 50-day thresholds is the reporting/tracking of HQs to/by the higher headquarters. The fact that Category 1 HQs are being reported as part of the wing’s monthly metrics to HQ ACC after 30 days will push some units to take the actions necessary, CANNs, to avoid what is perceived as a negative statistic. The new Air Staff guidance needs to be emphasized to ensure units understand its intent. MAJCOM guidance needs re-enforce the new AFI 21-101 guidance on not performing CANNs to solely prevent HQs. All aircraft maintainers will agree that there is a limit to the number of days an aircraft can remain on the ground without causing problems in returning it to flight. The problem is that the HQ thresholds have been arbitrarily determined based on anecdotal evidence/beliefs. While neither of the current thresholds

is the right number, we can examine the effects of the two programs to determine which one has the most benefits and then standardize it across the Combat Air Forces. The HQ program needs to continue to increase management oversight on aircraft down for “extended” periods; however, it should not drive maintenance actions based solely on a calendar. Maintenance actions should be driven by a validated requirement to return the aircraft to service.

Notes

¹ Air Combat Command Instruction (ACCI) 21-101, Maintenance Management of Aircraft, 16 March 2001, 236.

² Pacific Air Forces Instruction (PACAFI) 21-101, Maintenance Management of Aircraft, 16 March 2001, 236.

³ United States Air Forces Europe Instruction (USAFI) 21-101, Maintenance Management of Aircraft, 16 March 2001, 236.

⁴ Air Force Instruction (AFI) 21-101, Aerospace Equipment Maintenance Management, 13 February 2002, 270.

Chapter 3

Review of Previous Studies

In researching this issue, it was interesting to trace the studies that have been performed on the issue of HQ programs and CANNs. The data and recommendations of these studies will be outlined below. The reactions/comments of various commands/agencies to the findings/recommendations of the various studies will also be addressed. These studies cover a period from 1986 to 1994 and include Air Force audits, Air Force Logistics Management Agency Studies, and major command tests.

Management and Control of Aircraft Cannibalizations within Tactical Forces, Air Force Audit Agency Project 5096511, 18 June 1986

This report focused on a 12-month period ending 30 June 1985. During this period, there were 155,700 CANNs consuming 968,000 man-hours and representing the equivalent of 465 maintenance positions.¹ One of the goals of this report was to evaluate the adequacy of controls over CANN. The audit took a hard line concerning CANNs as outlined in Technical Order 00-20-2 which restricted CANNs to priority mission requirements and further limited them to unusual circumstances. This audit had a specific section focused on management of the command HQ programs. At the time of this report, Tactical Air Command guidance specified a 21-day HQ threshold for fighter aircraft and 30 days for non-fighter aircraft. One interesting point is that, even in 1986,

PACAF and USAFE had a different HQ standard for fighter aircraft of 30-days. The report gives credit to the HQ program for reducing the number of aircraft grounded for an extended period. In TAC, the number of reported HQs declined from approximately 160 in 1980 to less than 10 in 1985. However, it states that the emphasis, expressed or implied, to avoid reporting HQs resulted in unnecessary CANNs.²

Audit Findings

Not surprisingly the audit found that, the less time allowed before HQ reporting was required, the higher the number of CANNs because the supply system had not been given the ability to supply the part. Of the 162 CANNs for HQ avoidance reviewed in TAC, 84 were provided by the supply system within the 21-day criteria. If a 30-day standard had been utilized, 101 of the parts would have been issued by supply, a 17 percent decrease in the need for CANNs. For 32 CANNs performed overseas for HQ avoidance, 16 parts were received within the 30-day standard. Under a 40-day standard, supply would have provided 26 of these parts, a 63 percent CANN reduction.³ System deterioration was provided as the rationale to support command HQ thresholds, but there was no analytical data to support the specified standards or explain the differences in the command standards for similar aircraft.

Key Recommendation and Management Comments

The key recommendation for the HQ program was for the Air Staff to perform analysis to determine the amount of time an aircraft can be down without causing damage and use this as the basis for the command HQ standards. In response to this, the Air Staff concurred with the intent, but not with the recommendation. They pointed out that there is no one period of time to keep an aircraft down without damage. Because of the

multiple variables, the Air Staff focused on developing aircraft inspection criteria for aircraft not flown in 30 or 90 days. The Air Staff said the HQ threshold issue would be reviewed as part of the Rivet Repair initiative.⁴ This group made up of representatives from the MAJCOMs would “provide recommendations on HQ program alternatives, including development of an Air Force HQ Program and the standardization of MAJCOM programs. Estimated completion date is 31 July 1986.”⁵ I was unable to locate information on the Rivet Repair initiative; however, it seems they were unable to take the action outlined in the Air Staff’s response to this recommendation.

Management of Aircraft Cannibalization Air Force Audit Agency Project 91062014, 1 October 1992

This audit is very similar to the one performed in 1986. It focused on two key aspects of cannibalization. First, whether the CANNs were appropriate. Second, how well CANN data was captured in the maintenance data collection system. This study reviewed 8,893 CANN actions between 1 April and 30 June 1991 at 18 Air Force bases. Though the first aspect is the main concern for this paper, the second indicates that CANN data may be understated by approximately ten percent in the maintenance data collection system and visibility of serially controlled assets may be impacted.⁶

Audit Findings

From the population of 8,893 CANNs studied, 1,998 were isolated as actions taken to prevent aircraft from becoming HQs. Of these, 882 actions had known dates for the receipt of the needed component. By comparing the receipt date of the part with the date of the associated CANN, the auditors were able to determine the impact of extending the HQ threshold by 7 days. The results showed that, at 16 of the 18 locations, 596 CANNs

could have been avoided by allowing the aircraft to remain down an additional 7 days (see table 1 below for day by day breakout).⁷ Similar to the 1986 audit, this report cited that the commands did not have completed studies or other documentation that showed the HQ thresholds were based on expected supply response times and the periods of inoperability that can occur without damage to aircraft systems. This issue was further highlighted by pointing out the different HQ standards between commands operating the same aircraft. The auditors felt that the Air Force could save maintenance costs and maintain the same level of mission capability by extending the HQ threshold.

Table 1. Potential Reductions of CANN Actions

Days Between CANN and Parts Receipt	Number of CANN Actions	Number of Maintenance Hours
0	147	640.50
1	124	633.85
2	72	419.10
3	72	284.90
4	54	342.90
5	53	202.60
6	41	306.30
7	33	187.2
Total	596	3,017.35

Source: Air Force Audit Agency, Management of Aircraft CANN Report of Audit, Project #91062014, 1 October 1992

Key Recommendation and Management Comments

As a result of this audit, “the AF/LG should require the operating commands to reassesses and, as appropriate, revise the HQ threshold considering (a) expected supply response times and (b) the periods of inoperability that can occur without damage to the aircraft systems.”⁸ In response, the HQ USAF/LG stated: “Concur with intent. An increasingly business-oriented Air Force suggests the need for a consistent yet flexible

HQ threshold methodology based on objective and subjective factors. MAJCOM and wing organizational changes, DMRDs, and stock funding issues—elements not part of this audit—should also be considered in developing such a methodology. AF/LG has tasked the Air Force Logistics Management Agency (AFLMA) to (a) study the Air Force Audit Agency recommendations and the other elements just cited, and (b) develop a HQ threshold methodology based on that study's findings. This methodology will be adaptable to MAJCOMs with differing missions, locations, and possessed aircraft—and implementable at MAJCOM or wing levels. Estimated completion date is 1 February 1993.”⁹

ACC /USAFE/PACAF Responses to Audit #91062014

In July 1992, HQ USAF/LGMM sent a message (151711Z JUL 92) to all of the MAJCOM/LGMs requesting their views/alternative recommendations on the subject audit. The wording of the message was somewhat inflammatory and incorrectly stated that the audit requested individual HQ programs for each mission design series (MDS). After reviewing the MAJCOM responses, I believe that this became an emotional issue where the MAJCOMs did not honestly evaluate the findings. Instead the typical “knee-jerk” maintenance response based on “opinions and anecdotal data” was provided. The MAJCOMs sought to defend what they perceived as an attack on their HQ programs rather than looking to review/make adjustments to the thresholds. Given these reactions it is easy to see the resistance to extend the threshold or even contemplate the need for the program in today's Air Force.

In their response (HQ ACC/LGQ message # 031002Z AUG 92), ACC was quick to point out that they “do not have an arbitrarily established HQ policy.”¹⁰ Next, the issue

of skeletal remains of what was once a fighter aircraft, documentation problems, and potential aircraft accidents is brought up. Finally, the basis for ACC's HQ threshold is stated: "based on the flightline experience of command officers and senior enlisted maintenance personnel who were concerned for the safety, reliability, and airworthiness of valuable resources."¹¹

The USAFE response (HQ USAFE/LGM message # 061549Z AUG 92) defended their HQ program. Their main point was, "Given the current spare parts situation, ...regardless of what the HQ threshold is, CANNs are going to be required to avoid HQs."¹² The basis for the USAFE threshold was stated as: "Experience shows that CANN aircraft down time should not exceed 30 days to ensure that aircraft can be safely returned to operational service. Our experience also shows us that aircraft down for extended periods of time had other aircraft systems fail that were not related to the CANN actions. An example is aircraft seals drying out due to lack of use."¹³

PACAF also disagreed with establishing longer, MDS standardized HQ thresholds in their reply (HQ PACAF/LGM message # 230100Z JUL 92). The message starts out by citing the same type of emotional issues: "every base had at least one and sometimes several aircraft which had been so long and so extensively cannibalized that recovery was virtually impossible", "Bitter experience taught us that the longer an aircraft was unutilized, the more difficult it was to recover as a sortie producing asset, not only because seals had deteriorated and other mechanical degradation had taken place...."¹⁴

PACAF also disagreed with the audit's finding that avoidable CANNs occurred because operating commands established arbitrary HQ policies and stated that the HQ threshold does not force CANNs, per se. It goes on to say that since the HQ threshold does not

directly drive CANNs, extending the time would not automatically decrease them and firmly opposed extending the threshold. Finally, PACAF did agree on establishing a standardized HQ threshold for the combat air forces, but would oppose anything over 30 days.¹⁵

Developing an Objective Hangar Queen Threshold Methodology, AFLMA Project LM922168

As tasked by the AF/LG, AFLMA took on the controversial task of developing an objective HQ threshold. The project plan called for comparing data on the same MDS from units operating under a HQ program and units without a HQ program. Interviews were conducted at the field and depot levels to address traditional maintenance issues concerning the HQ program. The report did not find evidence that a HQ threshold was either beneficial or harmful to an F-16 aircraft. It was also unable to find any quantitative evidence of excessive maintenance resulting from the HQ threshold policy, but interviews indicated that almost everyone believed this to be true.¹⁶ In response to the HQ program preventing units turning their aircraft into shells, the study showed that this does not happen at units without a HQ program. Based on these facts, the report recommended the commands consider eliminating the HQ program. Of course, this recommendation brought on another emotional based response from the MAJCOMs. The study failed to produce hard data to determine the “right” number of days for an aircraft to be on the ground. The study needed to focus on the costs/benefits of swapping out CANN jets less frequently. I was only able to locate two responses to this study.

The first response to the AFLMA report was from the ATC/LG. He stated that the researchers missed the point of the HQ program and strongly disagreed with the

recommendations. The real intent of the HQ program was to force units to work the hard-broke aircraft and get them flying instead of only using the “good flyers.” Comments from depot personnel concerning about the benefits of leaving a CANN jet down longer were a “smoke screen” because it is easier for them to manage parts based on a supply rate instead of preventing HQ aircraft.¹⁷

ACC/LG concurred with the ATC/LG and stated that the report measured the cost of the HQ program, but was unable to measure the benefit. He used a metaphor to help point out the unseen benefits: “Just because children no longer contract once fatal diseases is no reason to eliminate an immunization program.”¹⁸ The fact that there are no “dust covered” aircraft in a hangar that has not flown for a year causes people to see the HQ program as a nuisance.¹⁹

PACAF Test of a 50-Day Hangar Queen Threshold

Following the AFLMA study, HQ USAF/LGM sent a memorandum to the commands to summarize the recent efforts concerning the HQ program. He felt that, “Although the issues raised in this AFAA audit and AFLMA report generate diverse views, we believe that such dialogue is constructive and results from the fact that this audit concerns issues important to our convictions on how best to maintain readiness and defend budgets.”²⁰ It was left up to the MAJCOMs to determine whether or not to establish a HQ threshold. If established, HQ thresholds “should be based on a defensible and published methodology that is based on objective and subjective factors.”²¹ This guidance generated a test of a 50-day HQ threshold in PACAF. While it appears there was no real scientific method to select 50 days as the potential standard, it was an attempt to validate the effects of extending the HQ threshold.

To perform this 6-month test, PACAF selected both F-15 (Kadena) and F-16 (Misawa) test bases for the 50-day threshold. Two like MDS bases were selected within PACAF to maintain the 30-day standard for comparison F-15 (Elmendorf) and F-16 (Kunsan). This would help ensure a fair comparison of the 30/50-day standards under similar conditions. The test focused on CANN rates, neutralized parts availability by dividing CANN rates by the total non-mission capable supply (TNMCS) rates, and compared actual number of/man-hours for CANNs. The results of the test showed no negative impact on supply support, maintenance documentation, or flight discrepancies as a result of the extended downtime. Though unable to be confirmed by this test, it was felt that fewer CANNs would also reduce wear/tear and occasional breakage of components. As shown in the tables below (tables 2,3,4), the test units were able to significantly reduce CANN rates and the numbers of/man-hours for CANNs than both their previous year's and the control base's statistics. Based on the test data, PACAF extended their HQ threshold to 50 days for the entire command in September 1994. In September 2000, the results of this test were used to increase the USAFE HQ threshold from 30 to 50 days.²²

Table 2 Cannibalization Rates

Location	Prior Year's Rates	Test Period Rates	Percentage Change
Kadena (F-15 Test Base)	11.1	9.9	-11%
Elmendorf (F-15 Control Base)	16.5	15.6	-5.5%
Misawa (F-16 Test Base)	8.6	6.7	-22%
Kunsan (F-16 Control Base)	10.6	9.1	14%

Source: 1994 PACAF 50-Day HQ Threshold Test

Table 3 CANN Rate/TNMCS Rate

Location	Prior Year	Test Period	Percentage Change
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Kadena (F-15 Test Base)	1.87	1.04	-44%
Elmendorf (F-15 Control Base)	1.62	1.34	-17%
Misawa (F-16 Test Base)	1.40	0.87	-38%
Kunsan (F-16 Control Base)	1.83	1.47	-19%

Source: 1994 PACAF 50-Day HQ Threshold Test

Table 4 CANN and Man-hour Reductions

Location	Prior 6-Months	6-Month Test Period	Percentage Change
Kadena - # CANNs	705	642	-%
- # Man-hours	5844	4188	-%
Misawa - # CANNs	460	360	-%
- # Man-hours	4172	3646	-%

Source: 1994 PACAF 50-Day HQ Threshold Test

Notes

¹ *Management and Control of Aircraft Cannibalization within Tactical Forces.* Report of Audit (Air Force Audit Agency, June 1986), 1.

² Ibid, 21-25.

³ Ibid, 21-23.

⁴ Ibid, 24-25.

⁵ Ibid, 24.

⁶ *Management of Aircraft Cannibalization.* Report of Audit (Air Force Audit Agency, October 1992), 1.

⁷ Ibid, 6.

⁸ Ibid, 5.

⁹ Ibid, 5.

¹⁰ Message, 031002Z AUG 92, HQ ACC/LGQ to HQ USAF/LGMM, 3 August 1992.

¹¹ Ibid.

¹² Message, 061549Z AUG 92, HQ USAF/LGM to HQ USAF/LGMM, 6 August 1992.

¹³ Ibid.

¹⁴ Message, 230100Z JUL 92, HQ PACAF/LGM to HQ USAF/LGMM, 23 July 1992.

¹⁵ Ibid.

Notes

¹⁶ Air Force Logistics Management Agency, *Letter of Report Developing an Objective Hangar Queen Threshold Methodology* (Project # LM922168), 5.

¹⁷ Brigadier General William L. Worthington, JR., Director of Logistics, HQ ATC, letter to Colonel Stafford, AFLMA/CC, subject: AFLMA Project # LM922168.

¹⁸ Major General Ronald C. Spivey, Director of Logistics, HQ ACC, letter to Colonel Stafford, AFLMA/CC, subject: AFLMA Project # LM922168.

¹⁹ Ibid.

²⁰ Brigadier General William M. Douglas, Director of Maintenance, HQ USAF, memorandum to all HQ/LGM, subject: Aircraft Cannibalization Management.

²¹ Ibid.

²² HQ PACAF/LGMM, 50-Day Hangar Queen Threshold Test, staff study, 31 August 1994.

Chapter 4

Results of Field Level LG/DOGM Hangar Queen Threshold Questionnaire

In an attempt to assess the field level maintenance leadership's perspective of the HQ program thresholds, a 4-question survey was sent to the logistics group commanders and deputy operations group commanders for maintenance at combat air force bases. Out of the 48 questionnaires sent out, 20 replies were received. Two of the questions were the most successful in eliciting responses concerning their opinion of the HQ program/thresholds. The responses could be easily divided between supporters of the shorter ACC HQ threshold and those that favored a longer standard. Several of the respondents were able to supply a personal perspective of both programs because of assignments/experience under both of the guidelines. Another theme consistent in all of the questionnaires was the need for more parts in supply to prevent cannibalization from being a "normal" cost of meeting the mission. Every survey received felt that a command HQ program was needed; however, the opinions of the appropriate threshold varied between the ACC 30-day standard and a longer standard of around 50-days.

Supporters of the ACC 30-day Threshold

I think the ACC approach is best. 30 days is local management attention. 60 days draws HQ attention. Aircraft go over 30 days for a lot of good reasons, rarely mismanagement but it happens and is best controlled (and decided) at the wing level. After that, aircraft are held down over 60 days

for higher level support issues, such as CLSS time/priorities, parts availability, et al areas that higher headquarters could help with.

—LG/DOGM Survey Respondent

Of the 7 responses that supported the ACC 30-day standard, it was clear that 2 people felt the 30-day threshold was only a local management issue. While they would try to return the aircraft to flight within 30 days, the graduated ACC program still provided the flexibility to keep the aircraft down longer if the situation required. The more traditional “hardcore maintenance” approach was taken by 4 of the respondents. These maintainers were against any extension of the threshold and one even preferred to swap out “cann jets” every two weeks. The rationale for less time on the ground was based on a belief that the benefits of increased downtime did not outweigh the costs. Specifically, the increased difficulty in rebuilding a CANN jet and the problems of getting the aircraft back to flying good were cited as the reason to minimize downtime. The last of the 7 responses did not supply enough information to determine the basis for preference of the ACC threshold.

Supporters of a Longer Threshold

I would agree with extending the length to 50 days. Being in ACC, my wing started rebuilding Cann jets after 21 days of Cann status to avoid our Cann bird from going into HQ status. We have since decided to extend the days an aircraft is in Cann status to 42 days. At the 30-day point, we comply with ACC requirements for Category 1 and then start rebuilding the Cann jet at the 42-day point. This decision helped to cut down the number of Canns we do saving man-hours and wear on equipment. I personally do not see the need for the requirements ACC puts on us at the 30-day point.

—LG/DOGM Survey Respondent

Of the 13 surveys that supported a longer threshold for HQ status, I was able to determine that at least 5 survey opinions were based on experience with both the 30 and 50-day standard. These individuals indicated that they see the benefits of keeping an aircraft as a CANN jet longer without negative impacts on returning the aircraft to flight. Two of these maintainers have seen these benefits at their current ACC base after deciding locally to accept Category 1 HQs. One person pointed out the additional savings created by utilizing components that are awaiting installation in the CANN jet, instead of having to expended the man-hours for the removal. This almost provides a forward supply point for high usage items with intermittent availability in the supply system. Most of the individuals favoring the longer threshold believed that the extended downtime gave the supply system more time to provide the part as high priority, mission capable (MICAP), requisition. This decreased the occurrence of multiple CANNs of the same part from CANN jet to CANN jet

Chapter 5

Conclusions

We cannibalize only as a last resort.

—Gen Michael Ryan

House Armed Services Committee Testimony, 27 Sep 00

While it is hard to dispute that command HQ programs were originally needed to offset a lack of maintenance discipline in the field, we need to be able to take an honest look at the program's purpose in today's maintenance environment. If we can agree that is still a good idea to have command directed, structured management oversight of aircraft that have been down for extended periods of time, we still must examine the program guidelines to make sure they were based on validated requirements. Once we agree that the program is needed and establish criteria for fighter aircraft based on data, these requirements should be standardized throughout the combat air forces. The controversy over the basis for establishing HQ thresholds is as valid today as it was when the programs were originally established. Except for the 6-month PACAF test, no head to head studies have been done to measure the effects of the 30/50-day HQ thresholds. While neither of these standards may be the "right" number, there should be little doubt that the 50-day threshold is more beneficial. As with any issue, this can be disputed, but all of the studies indicate it is true. The longer threshold provides the field with more flexibility and removes the perceived negative aspect of leaving aircraft in "cann status"

longer. Though some units under the ACC 30-day threshold have made a conscious decision to accept category 1 HQs, others will still expend maintenance resources to prevent even a category 1 HQ. CANNs to rebuild a CANN jet will never be completely prevented by a longer threshold; however, a shorter threshold can and does drive more CANNs. CANN jet swap out is based on numerous factors: phase time issues, hard breaks on other aircraft, or unavailability of parts that can not be cannibalized. Swap outs performed solely to beat the 30-day HQ clock are not based on a validated requirement and should not be driven directly or indirectly from the MAJCOM. My intent is not merely to avoid CANNs, just to ensure CANN man-hours are expended for the right reasons. CANNs should always be performed to ensure the maximum numbers of aircraft are available not only for the day's schedule, but to be ready to go to war.

When I started formalizing my recommendation on the HQ threshold based on my research, my first belief is that, whatever the threshold, it should be standardized across the combat air forces. Initially, I was swayed to make a recommendation to standardize the 50-day threshold based on PACAF's experience. But as I thought about the recent inclusion of a HQ section in AFI 21-101 discouraging CANNs solely to avoid HQs, I realized a different way to use the ACC requirement to report a 30-day category 1 HQ in the monthly metrics to the MAJCOM. While my research did not enable me to determine the "right" downtime for fighter aircraft, it did demonstrate the benefits of keeping an aircraft in "cann status" beyond the 30-day threshold when other aircraft management considerations allow. If the intent of Technical Order 00-20-2 and AFI 21-101 is to discourage unnecessary CANNs and all the data indicates extending CANN jet downtime beyond 30 days is beneficial, units which never let their CANN jets become category 1

HQs are not managing their fleet as effectively as units that allow category 1 HQ to occur. This new interpretation turns the category 1 HQ metric on its head. It changes the negative perception of having CANN jet become a category 1 HQs into a positive indication of effective fleet management. With this in mind, I have the following recommendation.

The ACC guidelines should be standardized, but only if clear guidance is provided to field units to ensure that CANNs for the sole purpose of avoiding a category 1 HQ will not be performed as outlined in AFI 21-101. Just because the command does not feel the 30-day threshold is driving CANN jet swap outs does not mean that the units are not cannibalizing to prevent reporting what is currently perceived as a negative metric. As part of this, units should be informed that extending CANN jet downtime beyond the 30-day threshold, when other maintenance considerations allow, is a positive metric showing effective fleet management. The new goal should be to have as many CANN jets as possible become category 1 HQs without letting them progress to category 2 unless circumstances dictate it. The category 1 HQ metric could then provide the MAJCOM and Air Staff with an indication whether units are complying with the new AFI 21-101 HQ CANN guidance and the intent of the Air Force senior leadership to reduce CANNs. With this in mind, I do not know how many CANN jets should become category 1 HQs in a squadron for a given year, but I do believe that a squadron that does not have any is swapping out CANN jets based on the traditional, unvalidated belief about aircraft downtime. To do this, they are performing CANNs for the sake of returning the aircraft to flight before the 30-day threshold is reached which goes against T.O. 00-20-2, AFI 21-101, and the senior Air Force leadership's intent to reduce CANNs.

Bibliography

ACCI 21-101, Maintenance Management of Aircraft, 16 March 2001.

Air Force Logistics Management Agency, *Developing an Objective HQ Methodology*, Project number LM922168 (Maxwell AFB, Gunter Annex, 1992).

AFI 21-101, Maintenance Management of Aircraft, 13 February 2002.

Douglas, Brigadier General William M., Director of Maintenance, HQ USAF, memorandum to all HQ/LGM, subject: Aircraft Cannibalization Management, 14 June 1993.

House Subcommittee on National Security, Veterans Affairs, and International Relations, Committee on Government Reform, *Military Aircraft, CANNs Adversely Affect Personnel and Maintenance*, prepared by United States General Accounting Office, 107th Congress, 22 May 2001.

House Subcommittee on National Security, Veterans Affairs, and International Relations, Committee on Government Reform, *Written Statement for the Record*, by Lt Gen Micheal E. Zettler, 107th Congress, 22 May 2001.

HQ PACAF/LGM, Hickam AFB, HI. 50-Day HQ Threshold Test. Staff study, 30 August 1994.

Management and Control of Aircraft Cannibalization within Tactical Forces. Report of Audit. Air Force Audit Agency, June 1986.

Management of Aircraft Cannibalization. Report of Audit. Air Force Audit Agency, October 1992.

PACAFI 21-101, Maintenance Management of Aircraft, 27 September 1999.

Spivey, Major General Ronald C., Director of Logistics, HQ ACC, letter to Colonel Stafford, AFLMA/CC, subject: AFLMA Project # LM922168, 1 April 1993.

USAFEI 21-101, Maintenance Management of Aircraft, 1 January 1999.

Worthington, Brigadier General William L., JR., Director of Logistics, HQ ATC, letter to Colonel Stafford, AFLMA/CC, subject: AFLMA Project # LM922168, 5 May 1993.