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Report to the Chairman, Committee on Armed Services, House of Representatives

March 1989

# ICBM MODERNIZATION

# Availability Problems and Flight Test Delays in Peacekeeper Program

GAO/NSIAD-89-105

GAO

**United States**
**General Accounting Office**
**Washington, D.C. 20548**

**National Security and**
**International Affairs Division**

B-223636

March 9, 1989

The Honorable Les Aspin
Chairman, Committee on Armed Services
House of Representatives

Dear Mr. Chairman:

In December 1988 the Air Force declared that full operational capability of the 50 Peacekeeper missile force had been achieved. On December 14, 1988, we briefed your Office on selected events leading to full operational capability. This report summarizes that briefing.

## Results in Brief

The original Peacekeeper missile plan was based on the need to deploy Peacekeepers in silos and the need for an operational test and evaluation flight test program scheduled to start in early 1987. However, the operational test and evaluation program has been changed to make sufficient missiles available to meet the scheduled full operational capability milestone for the Peacekeeper in Minuteman silo program. The Air Force has not yet begun its operational test and evaluation program, which is designed to confirm that the Peacekeeper weapon system will work in its intended environment. Air Force officials believe that developmental flight testing has demonstrated that the system will work as intended.

When full operational capability was declared, the Air Force met its goal of having a sufficient number of missile guidance and control sets (MGCS) to support a 50 Peacekeeper missile force. Maintaining that inventory will be challenging and will depend upon (1) increasing the number of MGCSs available for operational use, (2) increasing the number of serviceable inertial measurement units (IMUs), (3) improving the reliability of the IMU components, and/or (4) sustaining a MGCS repair time that is substantially better than the time that has been generally experienced in the past. Air Force officials agreed with our assessment of the challenges they face but told us that they are confident that their goals will continue to be met.

## Background

The Peacekeeper program, as currently structured, involves the deployment of 50 missiles in Minuteman silos and the development of the Rail

As part of the Peacekeeper program full-scale development effort, the program office planned to conduct 20 missile flight tests before initial operational capability. As of January 1, 1989, the Air Force had conducted 17 Peacekeeper full-scale development flight tests—15 flights before and 2 after initial operational capability. The last flight test occurred in March 1987. The remaining flights are now scheduled to be completed during 1989.

According to the Air Force, reasons for the delay in completing the developmental flight test program included (1) congressional direction to delay the first flight test until agreement on a basing mode was reached, (2) basing mode redirections, which caused the program completion to be delayed about 6 months beyond initial operational capability, (3) an Air Force decision to extend completion until after full operational capability to better bridge the gap between developmental flight testing and operational flight testing, and (4) a decision to use stage 1 rocket motors for operational purposes rather than developmental flight testing because of production delays caused by a fire at the stage 1 manufacturing facility.

Initially, the Peacekeeper operational test and evaluation program was to be conducted in two phases over a 15-year period. Phase I was to begin shortly after initial operational capability (December 1986) and was to consist of 24 missile flight tests over 3 years (8 per year). The phase I program has not yet begun, and the first flight tests are now scheduled to begin in late 1989—about 2-1/2 years later than originally planned. Rather than conducting 8 flight tests per year, SAC now plans to conduct only 3 flight tests per year until Peacekeeper missiles in Rail Garrison basing are fully deployed in fiscal year 1994 (assuming congressional approval) and completing the phase I tests thereafter. As a result, phase I testing will not be completed until about 6 years later than originally planned. Phase II will consist of 84 flight tests over 12 years (about 7 per year), for a total of 108 missile flight tests.

According to the Air Force, the reasons for the change in the original operational and test and evaluation schedule include (1) congressional reductions in the annual missile acquisitions requested by the Air Force and (2) the Air Force's decision to use those missiles to support the deployment of Peacekeeper in Minuteman silos and Rail Garrison programs instead of using them for operational test and evaluation flight tests.

were awaiting IMUs, and no serviceable spares were available. Furthermore, the 30-day repair times in November and December were achieved at the expense of delivering new MGCSs; that is, available IMUs were placed in units awaiting repair rather than used to deliver new MGCSs. The Air Force recognizes that it cannot continue this practice because new MGCSs are needed to support operational sites, test flights, and spares requirements.

## Objectives, Scope, and Methodology

Our work focused on the progress in achieving Peacekeeper full operational capability with an emphasis on identifying issues that could affect the Air Force's ability to sustain full operational capability. We interviewed appropriate officials and examined pertinent documents at the Ballistic Missile Office, Norton Air Force Base, California; the Strategic Air Command, Offutt Air Force Base, Nebraska; the Ogden Air Logistics Center, Hill Air Force Base, Utah; the Aerospace Guidance and Metrology Center, Newark Air Force Station, Ohio; the 90th Strategic Missile Wing, F. E. Warren Air Force Base, Wyoming; and Northrop Electronics Division and Rockwell International Autonetics Strategic Systems Division. We discussed the details of this report with officials from the Office of the Secretary of Defense, Air Force Headquarters, and the Ballistic Missile Office, and their comments have been incorporated as appropriate. As agreed with your Office, we did not obtain official Department of Defense comments. We performed our work from September 1988 through January 1989 in accordance with generally accepted government auditing standards.

Unless you announce its contents earlier, we plan no further distribution of this report until 30 days after its issue date. At that time copies will be made available to appropriate congressional committees; the Secretaries of Defense and the Air Force; the Director, Office of Management and Budget; and other interested parties.

- In June 1983 the Peacekeeper research and development flight test program, consisting of 20 launches, was initiated at Vandenberg Air Force Base.
- In January 1984 the Peacekeeper in Minuteman silo program began the transition from full-scale development to production. Through fiscal year 1989, the procurement of 90 production missiles for deployment and testing has been authorized—21 each in 1984 and 1985 and 12 each in 1986 through 1989. The Air Force is requesting 12 missiles in its fiscal year 1990 budget.
- In November 1985 the Congress reduced the number of missiles to be deployed in Minuteman silos from 100 to no more than 50. The Congress also stipulated that no more than 50 Peacekeeper missiles could be deployed unless a more survivable basing mode could be developed. The Department of Defense has proposed developing Rail Garrison basing for the deployment of an additional 50 Peacekeeper missiles. The Congress has provided funding for the development of Rail Garrison basing, but it has not approved the deployment of Peacekeeper missiles in Rail Garrison basing.
- In October 1986 the first Peacekeeper missiles went on alert at F. E. Warren Air Force Base.

## Not All 50 Missiles Are on Alert

On December 31, 1988, as planned, 50 Peacekeeper missiles in Minuteman silos at F. E. Warren Air Force Base had been turned over to the Strategic Air Command (SAC), and full operational capability had been declared. However, some of these missiles were not on alert pending completion of SAC's evaluation of a Peacekeeper weapon system failure that occurred during 1988. The details of the failure and the related number of systems being held off alert are classified. According to SAC, all 50 Peacekeeper missiles could be put on alert if necessary.

Before FOC was declared, the number of missiles deployed and the number of missiles on alert were constrained in 1987 and 1988 by the unavailability of missile guidance and control sets (MGCS), particularly inertial measurement units (IMU)—a major MGCS component—and stage 1 rocket motors.[1] In 1987 we reported that missiles turned over to SAC were not being put on alert due to the shortages of IMUs.[2] In March 1988

[1]The Peacekeeper is a four-stage Intercontinental Ballistic Missile. The first three stages are fueled by solid propellants, and the fourth stage uses liquid propellant.

[2]Procurement: Inertial Measurement Units for Peacekeeper Missiles (GAO/NSIAD-87-194BR, July 31, 1987) and Procurement: Delivery Problems With Inertial Measurement Units (GAO/NSIAD-88-74BR), December 18, 1987).

launched from ground level sites. The last nine were launched from a silo with operational software. According to the Air Force, all of these flight tests were successful and the accuracy demonstrated by the flight test missiles was better than required.

While the Air Force reports show the results of all tests were within the accuracy requirements, the results of the last nine were not as good as achieved on the first eight flight tests. The impact points among the nine flight test missiles launched from a silo and using operational software were more dispersed and the accuracy was not as good. The program office has modified the operational software program to partly correct the problem. According to program officials this modification has been successfully ground tested, and positive results from the change are expected when flight tested on the next development flight. It is also in the process of implementing another change and is continuing to look for other possible explanations for accuracy degradations.

The developmental flight test program is now scheduled to be completed during 1989. The next flight is scheduled for mid-March 1989, for the purpose of verifying operational procedures and capabilities. The dates for the last two test flights have not yet been established.

According to the Air Force, reasons for the delay in completing the developmental flight test program included (1) congressional direction to delay the first test flight until agreement on a basing mode was reached, (2) basing mode redirections, which caused the program completion to be delayed about 6 months beyond IOC, (3) an Air Force decision to extend completion until after FOC to better bridge the gap between developmental flight testing and operational flight testing, and (4) the decision to use stage 1 rocket motors for operational purposes rather than developmental flight testing because of production delays caused by a fire at the stage 1 manufacturing facility.

## Operational Test and Evaluation Flight Test Program Delayed

Operational test and evaluation (OT&E) is the primary means of assessing weapon system performance. In a May 1987 report on Intercontinental Ballistic Missile modernization to the House and Senate Committees on Armed Services, the Department of Defense stated that

"A credible Peacekeeper OT&E program is indispensable to effective deterrence; it demonstrates how well the system works in an operational environment. It also identifies potential operational problem areas so that they can be fixed. In addition, a credible OT&E program shows the Soviets that the system is militarily capable and

tests, instead of data based on operational flight testing using operational crews and missiles.

Joint Chiefs of Staff guidelines allow developmental test data as an alternative until operational flight test data are available. However, these guidelines point out that developmental data may not be representative of the operational forces and should be replaced as soon as possible with operational flight test data. Yet, as discussed above, operational data are still not available—2 years after the OT&E program was originally scheduled to begin.

According to the Air Force, the start of phase I OT&E flight testing was changed because the Congress reduced the missile buys in 1984, 1985, and 1986, from the 115 requested to 54. Since it takes about 3 years to manufacture and deliver a Peacekeeper missile, only 50 missiles were available by December 1988, and the Air Force allocated all of these missiles to the operational force to meet the FOC milestone rather than allocating some for OT&E flight tests. SAC officials also said that they did not want to start their OT&E program before the development testing program was completed. According to SAC officials, the completion of phase I OT&E is being stretched out because SAC assumes that the Congress will continue to authorize the acquisition of 12 missiles per year and will approve the deployment of 50 Peacekeeper missiles in the Rail Garrison basing mode. If the Congress approves Rail Garrison basing, the Air Force plans to allocate 9 of the 12 missiles acquired annually to Rail Garrison deployment. Therefore, only three missiles per year will be available for future OT&E flight testing until Rail Garrison deployment is completed.

## Guidance System Availability Problems

To sustain required alert rates for a 50 Peacekeeper missile force and minimize off-alert time, the program office's goal was to have 81 MGCSs in inventory at FOC— 61 serviceable units and 20 units in repair. The need for 81 operational MGCSs at FOC was based on maintaining about 61 serviceable units—50 missiles and 11 spares—using an assumed MGCS recycle rate of 17 units per month[7] and a 42-day repair turnaround time. Given the combination of asset availability, recycles, and repair times, the delivery of new and repaired units was expected to balance out the number of recycle units and thereby maintain a level of about 61 serviceable MGCSs. When FOC was declared, the program office goal was met;

[7]The recycle rate equated to a mean time between recycle of 2,100 hours, which was based on total program experience through March 1988.

## Reliability Is Less Than Planned But Is Improving

As of January 3, 1989, the program office reported that the cumulative demonstrated guidance and control system mean time between recycles was 2,444 hours, or 19 percent less than the planned level of 3,000 hours. Since March 1, 1988, MGCS reliability has improved. During the 10-month period from March 1, 1988 to December 31, 1988, the mean time between recycles was 2,839 hours.

One reason why MGCS reliability is less than expected is because of the higher-than-expected failure rate of the Specific Force Integrating Receiver.[9] Reliability of this IMU component has been a continuing problem. In our December 1987 report, we stated that the Specific Force Integrating Receiver reliability was 55 percent below its expected reliability. At that time the program office thought it had identified the causes of the problem, and corrective actions were initiated. However, current data show reliability performance at about 71 percent below planned levels. The program office has taken additional corrective actions and believes the problem has been solved. The corrective actions made by the program office are just beginning to be incorporated into the operational weapon system, and another year of reliability experience is needed to determine whether the problem is solved.

## Sustaining MGCS Repair Times Are Dependent on Available IMUs

In March 1988 the Air Force forecasted that it would need to achieve an MGCS repair time of 42 days by December 31, 1988, to achieve its goal of 61 serviceable MGCSs. Though the average repair time for all MGCSs has been 91 days, in November and December 1988 the average MGCS repair time dropped to 30 days.

Considering the availability of only 71 fully operational MGCS at FOC, maintaining an inventory of 61 MGCSs would require the 30-day repair time achieved in November and December to be sustained. Even if all of the 81 MGCSs that have been accepted were available for operational use, repair times would still have to be about 60 days based on the current recycle rate.

Program office and contractor officials stated that the primary reason for the 91-day MGCS repair time has been the unavailability of spare IMUs—some repair time was simply time awaiting an IMU before the MGCS repair could be completed. They stated that if spare IMU's were on hand

[9]The IMU contains two important components, the Specific Force Integrating Receiver and the Third Generation Gyro. These two components are supplied to Northrop Electronics Division as government-furnished equipment for integration into the IMU.

# Deployment Schedule for Peacekeeper Missiles in Minuteman Silos

| Month | Number of missiles | |
|---|---|---|
| | Deployed | On alert |
| March 1988 | 36 | 22 |
| April 1988 | 38 | 23 |
| May 1988 | 38 | 24 |
| June 1988 | 40 | 25 |
| July 1988 | 41 | 25 |
| August 1988 | 43 | 30 |
| September 1988 | 44 | 38 |
| October 1988 | 46 | 38 |
| November 1988 | 48 | 44 |
| December 1988 | 50 | [a] |

[a]The actual number is classified.

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# Major Contributors to This Report

## National Security and International Affairs Division, Washington, D.C.

Paul Jones, Associate Director, Air Force Issues, (202) 275-4265
Steven Kuhta, Assistant Director
John Klotz, Evaluator

## Los Angeles Regional Office

James Dinwiddie, Evaluator-in-Charge
David Hubbell, Evaluator
Michael deCastro, Evaluator

to replace failed units, an MGCS could be repaired in less than 30 days, about the same repair time demonstrated in November and December 1988. Factors contributing to the achievement of the 30-day repair time in November and December 1988 included the following.

- The program office closely managed the availability of MGCSs and IMUs. Daily decisions were made as to which units would begin repair with emphasis on repairing those units that could be repaired quickly.
- The Air Force placed priority on installing new and repaired IMUs in failed MGCSs rather than installing them in new MGCSs because it takes approximately three times longer to test a new set than it does to test a repaired set.
- While the Air Force was constraining the number of missiles being put on alert, the inventory of IMUs was being greatly increased as Northrop Electronics Division's IMU deliveries returned to contract schedule. Between March and September 1988, 23 new IMUs were delivered, increasing the IMU inventory from 82 to 105 units. Also, during this time frame, there were fewer MGCS recycles than expected, which greatly reduced the demand for IMUs.

Whether reduced repair times necessary to support 61 serviceable MGCSs can be sustained remains to be determined, since a shortage of serviceable IMUs still exists. For example, at the end of December 1988, 12 MGCSs were awaiting IMUs, and no serviceable spares were available. Furthermore, the 30-day repair times in November and December were achieved at the expense of delivering new MGCSs; that is, available IMUs were placed in units awaiting repair rather than used to deliver new MGCSs. The Air Force recognizes that it cannot continue this practice because new MGCSs are needed to support operational sites, test flights, and spares requirements.

that is, 63 serviceable MGCSs were available—two more than planned. Maintaining the planned inventory of 61 serviceable MGCSs will be challenging and will depend upon (1) increasing the number of MGCSs available for operational use, (2) increasing the number of serviceable IMUs, (3) improving the reliability of the IMU components and/or (4) sustaining a repair time that is substantially better than the time that has generally been experienced in the past. Air Force officials agreed with our assessment of the challenges they face but told us that they are confident that their goals will continue to be met.

## Availability of Guidance and Control System Hardware Is Less Than Planned

One objective of the program office's March 1988 Peacekeeper deployment plan was to have 81 operational MGCSs and 103 IMUs (78 serviceable units and 25 units in repair) delivered to the Air Force at FOC. As of December 31, 1988, the availability of MGCSs for operational use was less than planned, as was the number of serviceable IMUs.

At the end of December 1988, the Air Force had accepted 81 MGCSs from Rockwell International, Autonetics Strategic Systems Division. Only 71 of the 81 MGCSs were fully operational—63 were serviceable and 8 were returns from the field needing repairs. Ten units were not fully operational because of the following reasons.

- Nine had been accepted on an interim basis without IMUs. These were placed in storage awaiting production IMUs. According to program officials, to ensure serviceable MGCS needs were met, they decided to emphasize repairs over the delivery of new units. The principal reason for this was the fact that a new MGCS requires 100 hours of acceptance testing compared to 36 hours acceptance testing for a repaired unit.
- One is being used to provide training at Vandenberg Air Force Base in support of the next Peacekeeper developmental flight test. It is equipped with a development IMU.

At the end of December 1988, the Air Force had accepted 110 production IMUs from Northrop Electronics Division—7 more than the 103 planned.[8] Of the 110 IMUs delivered at FOC, 65 were serviceable—13 less than the Air Force planned at FOC. Of the remaining 45 IMUs, 38 were in repair, and 7 were being used to support production, repair, and test activities.

[8]In December 1987 we reported that delivery of MGCSs was behind schedule due to problems with IMUs. The IMU delivery problem has improved, but, as discussed in this report, reliability of the units remains a problem.

thoroughly tested. Operational testing provides the only end-to-end test of the entire weapon system for system availability and alert through RV [re-entry vehicle] impact. OT&E includes testing, $C^3$, logistics, connectivity, and hands-on operational experience for flight test crews and technicians."

The Joint Chiefs of Staff has established guidelines that specify minimum statistical confidence levels required for weapon system reliability.[6] The Peacekeeper OT&E flight test results provide the accuracy and reliability data that the Joint Chiefs of Staff use to develop the SIOP. SAC is responsible for the actual design and conduct of the Peacekeeper OT&E flight test program and determining the number of OT&E assets needed to comply with Joint Chiefs of Staff guidance. According to the Air Force, the OT&E program for Peacekeepers deployed in Minuteman silos requires 108 flight tests, using operational crews and missiles, to meet Joint Chiefs of Staff and SAC reliability guidelines.

Initially, the Peacekeeper OT&E program was to be conducted through a two-phased program over a 15-year period. Phase I OT&E was to begin shortly after IOC with 24 missile flights conducted over a 3-year period (8 per year). Phase I was to establish the baseline Peacekeeper accuracy and reliability performance parameters of the deployed weapon for SIOP planning and ascertain whether the system in its operational configuration works as it should. Phase II was to begin after phase I with 84 missile flights conducted over a 12-year period (approximately 7 per year). Phase II was to verify the continued performance and reliability of the weapon system.

However, the phase I OT&E program has not been implemented as originally planned. As of January 1, 1989, there had not been any phase I OT&E flight tests. The first flight test is now scheduled for the third quarter of calendar year 1989—about 2-1/2 years later than originally scheduled. Rather than conducting 8 OT&E flights per year, the Air Force now plans to conduct 3 per year, until fiscal year 1994—the scheduled completion of deployment of 50 Peacekeeper missiles in Rail Garrison basing (assuming congressional approval). This schedule will delay completion of phase I testing until about mid-1995—about 6 years later than planned. Thus, the Air Force will not have complete operational data necessary to establish the minimum statistical confidence levels for weapon system reliability as required by the Joint Chiefs of Staff until about 7 years after FOC. The Peacekeeper has been incorporated into the SIOP based on data developed during the first seven developmental flight

[6]Weapon system reliability refers to the proportion of missiles that would be successfully launched, complete all phases of flight, and deliver their payload.

a plan was developed by the program office, and agreed to by SAC, to constrain the number of missiles on alert to reduce MGCS failures and repairs until the supply pipeline was more mature. (See app. II for the deployment schedule).

In addition to the shortages of IMUs, in December 1987 a fire occurred during the manufacturing of a stage 1 rocket motor, which delayed motor deliveries to F. E. Warren Air Force Base for operational deployment. To have enough motors to support FOC, the Air Force had to use three stage 1 rocket motors for operational deployment that were initially intended to be used on developmental flight test missiles. The Air Force also had to use a motor for operational deployment that was to be used for production quality assurance testing. Use of these assets made 50 stage 1 motors available for operational deployment of 50 Peacekeeper missiles by December 1988.

## Flight Testing Delayed

The purposes of the Peacekeeper weapon system flight testing programs are to verify operational capabilities and establish a performance baseline for mission planning purposes. These programs are more than 2 years behind their original schedules—the program office's developmental flight test program has not been completed, and SAC's operational flight test program, which will use operational crews and missiles, has not begun. As a result, the Air Force has not yet begun its operational test and evaluation program, which is designed to confirm that the deployed Peacekeeper weapon system will work in its intended environment. Until operational testing begins, Peacekeeper accuracy and reliability data, which is currently being used in the Single Integrated Operational Plan (SIOP), are based on the results of the first seven developmental flight tests. However, Air Force officials believe that development testing has demonstrated that the system will work as intended.

### Full-Scale Developmental Flight Test Program Not Completed

In 1979, as part of the Peacekeeper program full-scale development effort, the program office planned to conduct 20 missile flight tests before IOC to validate system performance and obtain a reasonable statistical sample to demonstrate that the system meets its design specifications and operational requirements.

The developmental flight test program was not completed before IOC as planned. As of January 1, 1989, the Air Force had conducted 17 Peacekeeper developmental flight tests—15 before and 2 after IOC. The last flight test occurred in March 1987. The first eight flight tests were

# Status of the Peacekeeper Weapon System

The Peacekeeper weapon system acquisition experience has been one of continued missile development, procurement, and deployment, with several redirections in how the missile should be based. When full-scale development of the Peacekeeper weapon system began in 1979, the Department of Defense planned to deploy 200 missiles in a multiple protective structure basing mode. The Peacekeeper program, as currently structured, involves (1) deployment of 50 missiles in Minuteman silos and (2) development of the Rail Garrison basing mode as a means of achieving long-term Intercontinental Ballistic Missile survivability. The Congress stated in the National Defense Authorization Act for fiscal year 1989 that its authorization of research and development funds does not constitute a commitment or express an intent by the Congress to provide funds to procure and deploy Peacekeeper missiles in a Rail Garrison basing mode.

## Background

In December 1986 initial operational capability (IOC) of 10 Peacekeeper missiles in Minuteman silos at F. E. Warren Air Force Base, Wyoming, was achieved. Full operational capability (FOC) was declared by the Air Force in December 1988. Brief descriptions of selected events leading to these milestones follow.

- In September 1979 full-scale development of the Peacekeeper missile and multiple protective structure basing to enhance survivability was approved. The Department of Defense planned that 200 missiles would be deployed.
- In October 1981 the President announced his strategic modernization plan, which provided for the continuation of Peacekeeper missile development and the deployment of at least 100 missiles. The President canceled the multiple protective structure basing development and proposed (1) near-term deployment in existing Titan and Minuteman silos modified to increase silo hardness and (2) development of three alternative long-term basing options. The President's near-term basing proposals were subsequently rejected by the Congress.
- In November 1982 the President proposed deploying 100 Peacekeeper missiles in closely spaced super-hardened silos. This basing mode was subsequently rejected by the Congress.
- In April 1983 the President's Commission on Strategic Forces recommended a revised Intercontinental Ballistic Missile modernization program, which included deployment of 100 Peacekeeper missiles in Minuteman silos. This recommendation was endorsed by the President and approved by the Congress.

# Contents



**Abbreviations**

| | |
|---|---|
| FOC | full operational capability |
| GAO | General Accounting Office |
| IMU | inertial measurement unit |
| IOC | initial operational capability |
| MGCS | missile guidance and control set |
| OT&E | operational test and evaluation |
| SAC | Strategic Air Command |
| SIOP | Single Integrated Operational Plan |

More detailed information on the results of our review is included in appendixes I and II. This report was prepared under the direction of Harry R. Finley, Director, Air Force Issues. Other major contributors are listed in appendix III.

Sincerely yours,

Frank C. Conahan
Assistant Comptroller General

## Guidance System Availability Problems

To sustain required alert rates for a force of 50 Peacekeeper missiles, the program office's goal was to have 81 MGCSs in inventory at full operational capability—61 serviceable units and 20 units in repair. When full operational capability was declared, that goal was met. Having a sufficient number of guidance and control sets to continue to support a 50-missile force will be challenging.

At the end of December 1988, the Air Force had accepted 81 MGCSs, but only 71 were available for operational use. Of the 10 units not available for operational use, 1 is being used with a development IMU for training to support the next Peacekeeper developmental flight test and 9 were accepted on an interim basis without IMUs.

Additionally, guidance control system reliability has not been as good as planned. One measure of reliability is mean time between recycles.[3] As of January 3, 1989, the program office reported that the MGCS cumulative mean time between recycles was 2,444 hours, or about 19 percent less than the planned level of 3,000 hours. The mean time between recycle rate has improved, however, with a recycle rate of 2,839 hours achieved during the 10-month period of March through December 1988.

In November and December 1988, the average MGCS repair turnaround time has been about 30 days—better than the goal of 42 days. Only 71 fully operational MGCSs were available at the end of December 1988. To maintain an inventory of 61 serviceable MGCSs, as planned by the program office, a 30-day repair time will have to be sustained. A 30-day MGCS repair time is a substantial reduction from the overall average time for all MGCS repairs of 91 days.

Program office and contractor officials stated that the primary reason for the 91-day average MGCS repair time has been the unavailability of spare serviceable IMUs—some repair time was simply time awaiting an IMU before the MGCS repair could be completed. They stated that when spare IMUs are on hand to replace failed units, an MGCS could be repaired in less than 30 days, about the repair time experienced in November and December 1988.

Whether reduced repair times necessary to support 61 serviceable MGCSs can be sustained remains to be determined, since a shortage of serviceable IMUs still exists. For example, at the end of December 1988, 12 MGCSs

[3]A recycle occurs each time a component is removed from an operational missile because of a fault indication.

Garrison[1] basing mode as a means of achieving long-term Intercontinental Ballistic Missile survivability. However, in the National Defense Authorization Act for fiscal year 1989, the Congress stated that its authorization of research and development funds does not constitute a commitment or express an intent by the Congress to provide funds to procure and deploy Peacekeeper missiles in a Rail Garrison basing mode.

In December 1986 initial operational capability of 10 Peacekeeper missiles on alert in Minuteman silos at F. E. Warren Air Force Base, Wyoming, was achieved. While full operational capability was declared by the Air Force in December 1988, not all 50 missiles are on alert. Some missiles are not being put on alert pending the completion of an evaluation of a Peacekeeper failure that occurred in 1988. The details of the failure and the number of missiles being held off alert are classified but have been provided to you by the Air Force in a separate letter. According to the Strategic Air Command (SAC), all 50 missiles could be put on alert if necessary.

## Flight Testing Delayed

Peacekeeper weapon system flight testing is intended to verify operational capabilities and establish the operational reliability and accuracy of the deployed system to provide baseline data for the Single Integrated Operational Plan (SIOP).[2] Peacekeeper flight testing is more than 2 years behind its original schedule—the program office's developmental flight test program has not been completed, and SAC's operational flight test program has not begun. The purpose of the operational test and evaluation program, using operational crews and missiles, is to ensure that the deployed Peacekeeper weapon system will work in its intended environment. The Peacekeeper has been incorporated into the SIOP based on data developed during the first seven developmental flight tests.

Joint Chiefs of Staff guidelines allow developmental test data as an alternative until operational flight test data are available. However, these guidelines point out that developmental data may not be representative of the operational forces and should be replaced as soon as possible with operational flight test data.

[1]The Rail Garrison concept consists of 25 trains, each carrying two Peacekeeper missiles, parked on existing military installations. In the event of national need, the trains will move onto the nation's railroad network. For further information, see ICBM Modernization: Status of the Peacekeeper Rail Garrison Missile System (GAO/NSIAD-89-64, January 12, 1989).

[2]The SIOP allocates all strategic assets—land- and sea-based ballistic missiles, bombers, tankers, and cruise missiles—to specific targets.