Scheduled Maintenance Policies for the F-4 Aircraft: Results of the Maintenance Posture Improvement Program

Ralph Elwell and Chris Roach

A report prepared for

UNITED STATES AIR FORCE PROJECT RAND

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This report covers part of the support work done by the Ogden Air Logistics Center and The Rand Corporation for the Maintenance Posture Improvement Program under a Tactical Air Command F-4 Working Group task aimed at reducing the cost of maintenance and at increasing its effectiveness. This work led to a test of scheduled maintenance options at Holloman Air Force Base from 10 March through 10 June 1975. The purpose of the test, which provides a focus for this report, was to define the cost and the benefits of changes in the intervals, content, and packaging of F-4 base level inspections.

Mr. Ralph Elwell, an aerospace engineer, is Aircraft Systems Manager at Ogden Air Logistics Center. Mr. Chris Roach is a member of the Rand research staff. This report was prepared under the Project RAND study project "Operations and Support: Alternative Policies and Structures."
SUMMARY

Part of The Rand Corporation's support of the Maintenance Posture Improvement Program (MPIP) (Program Management Directive L-Y5028 (1) MPIP, 9 September 1974, USAF DCS/S6L) involved active participation with the F-4 Working Group (Chairman: Colonel David Rohr). One of the major topics considered by that group was base level scheduled maintenance of the F-4. The group, led by Ogden Air Logistics Center and Rand, reexamined the content, the interval, and the packaging of base level scheduled maintenance. The result of that effort was an interval extension from a 450 flying hour cycle to a 600 flying hour cycle, a 35 percent reduction in inspection content, a study of the cost at depot level of performing the next due base level inspection in advance, and a proposed repackaging of the phase inspection system into a periodic system.

Under the phase system—both the old and the streamlined versions—inspections were grouped in six approximately equal packages, to be performed at equally spaced intervals during an inspection cycle. The periodic system proposed a redistribution of the work into two major packages to be performed in the inspection docks, with four small additional packages to be performed on the flightline, thus minimizing the number of visits the aircraft had to make to the inspection dock. The repackaging concept was tested at Holloman Air Force Base in 1975, and the Air Force subsequently adopted the periodic system for the F-4.

This report details the history of one part of Rand's and Ogden's scheduled maintenance efforts for the MPIP and provides estimates of expected costs and benefits. The test of performing base level inspections at the depot during major overhaul is discussed in Rand report R-1865-PR.

The basis for comparison of the period and phase systems at Holloman was the manpower required by each and the expected number of aircraft that would be in the inspection dock, and thus unavailable for flying, under each. The Holloman test also provided a basis for determining the effect on manpower and aircraft availability of having
the depot take credit for the base-level inspection that would normally be next due.

To support the entire F-4 force, the periodic system requires only 60 percent of the manpower required by the streamlined phase system (792,800 man-hours per year versus, 1,331,600). It also makes more aircraft available, tying up 57 in the dock at any given time, versus 96 with the phase. The advantage of having the depot absorb the next due base inspections during a depot overhaul is 10 fewer aircraft in the docks for the phase system; with the periodic system, it becomes 16 fewer.

Depot performance of the next due base level inspection saves 137,200 man-hours under the phase system; with periodic inspections it saves 255,000 man-hours. No other major differences between the two inspections systems were found (e.g., neither would cause an increase in the number of aircraft at the depot), and no major problems were encountered.

On the basis of these projected savings, the Air Force has adopted the periodic inspection concept for the F-4 aircraft.
ACKNOWLEDGMENTS

The test discussed in this report could not have been conducted without the interest and professional support of the Holloman Air Force Base maintenance staff. In particular, we wish to thank Col. John T. Anderson, Deputy Chief of Maintenance at Holloman for motivating his organization and for his active interest throughout the test. The test director, Captain Kenneth Ziegler, did an outstanding job of dealing with problems as they arose in the test and otherwise maintaining control and focus in the face of other pressing duties. Lastly, we owe special thanks to SMS James Lilly and Sgt. Blaine Cox of the inspection branch office at Holloman. Their enthusiastic support of the tests and their willingness to track down needed information at no small expense of time played a major role in the tests' satisfactory conclusion.
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I. INTRODUCTION

Part of The Rand Corporation's support of the Air Force Maintenance Posture Improvement Program (MPIP) (Program Management Directive L-Y5028 (1) MPIP, 9 September 1974, USAF DCS/S&L) involved active participation in the Tactical Air Command's F-4 Working Group (Colonel David Rohr, Chairman). One of the topics considered by that group was base level scheduled maintenance of the F-4 aircraft.

Heretofore, the F-4 has been returned to a depot at regular intervals (e.g., 30 months for the F-4C) for major disassembly, inspection, and repair, an event called "Programmed Depot Maintenance," or "PDM." Under a separate, but concurrent system, based on flight time, the aircraft has received also a repeating series of inspections at its base. This second system of scheduled maintenance, based on a cycle of 450 flight hours, cycles about once a year. The necessary inspections for each cycle have been distributed among six roughly equal packages, called "phases," thus providing an even workload over the 450 hours. An alternative inspection system, considered here, we designate the "periodic" system. It calls for two massive inspections in every 600 flying hours, alternating with four minor ones. The more comprehensive of these inspections is called the "600-hour periodic inspection" or "PE;" the other, the "300-hour periodic inspection" or "300-hour HPO." The four minor inspections, which are performed on the flight line, are "100-hour HPOs."

Building on earlier work by Rand and the Ogden Air Logistics Center (ALC), the F-4 Working Group launched an effort, led by Rand and Ogden, to reexamine the content, the interval, and the packaging of base level scheduled maintenance. Among the suggested actions were these.

1. Minimizing Redundancy Between Base and Depot Inspections. Base level and depot level inspections have been considerably redundant, (1) hence the suggestion that the depot finish off the few additional tasks needed for the next due base level inspection, or "take credit for" and obviate the base inspection that would otherwise have been next due. (2)
2. **Pared-Down Inspections.** Base level inspections can be pared down as a result of the accumulation of experience with the current inspection system.

3. **Decreased Frequency of Inspections.** The safe extension of the intervals between inspections is more a matter of judgment and monitoring the effects of the extension than it is a problem of pure technological predictions.

4. **Minimization of Aircraft Dockings.** The downtime due to docking and tearing down aircraft makes many aircraft unavailable at any given time. Further, when an aircraft is in the dock, unscheduled delays almost inevitably occur, due, e.g., to parts unavailable, to the low priority for specialists, to canibalization. But if the docking is a major one, then while some jobs are held up because of such delays, other productive work can be completed. Hence, the downtime for a more comprehensive inspection is shorter, proportionately, than that for a less comprehensive one. This engenders the idea of maximizing the work done during a docking and minimizing the number of dockings per inspection cycle.

Action 1 is the subject of a published report,\(^3\) coauthored by Ogden and Rand, which discussed the man-hour cost and the aircraft availability cost of the depot taking credit for what would normally be the next due inspection at the base. Since part of the initial action on this subject consisted of the planning and testing at Holloman Air Force Base that are discussed in the present report, a brief discussion of that action is included in Sec. II. The expected increase in aircraft availability and the savings in man-hours are noted later in the report.

Actions 2 and 3 are the principal subject of Sec. II, which also discusses the Ogden/Rand approach to reducing the content of scheduled inspections in the field and extending the interval between inspections.

Action 4, together with Action 1, suggested an alternative to the phase system (Fig. 1) namely a periodic system for inspections of the F-4, and a transition from the six-docking to a two-docking system, including, when possible, a shift of the workload of one of these dockings to the depot at the time of the PDM. The test at Holloman
AFB was designed to compare this periodic system with the phase system in its newly extended and streamlined form. This report summarizes the results of that test.
II. BACKGROUND

Ogden ALC and Rand have made a considerable investment in (1) developing preferred maintenance policies and (2) characterizing both failure development and fix policy. In recent years, Ogden and Rand conducted a defect study, in which we tried to distinguish malfunctions that are found and fixed during a depot visit from those that are found and fixed at the base. (1,4) The study included a detailed analysis of all defects discovered on six especially selected aircraft; the two categories are essentially indistinguishable.

The findings on the six aircraft also suggested that since an aircraft is largely disassembled at the depot, it is inevitable that a large share of the base inspection is performed at the depot. This suggested that, at the next due inspection after the PDM, the base should not have to repeat the inspections performed in the PDM. This concept, developed in an earlier Ogden/Rand study, was called Quick Fix. Such a procedure does not restrict the depot from doing base level inspections when it is demonstrably economical to do so. Instead, the depot completes the remaining tasks of the next due base inspections, takes credit for those inspections, and relieves the base of the duplicated work.

One of the purposes of the Holloman test was to quantify the savings, at base level, of such a procedure by estimating the manpower reduction and the increase in aircraft availability resulting from the Quick Fix option if the base were to implement the new phase and the new periodic inspection policies. The hypothesis was that Quick Fix would provide even greater benefits if the aircraft were on a periodic system, since the depot could readily, then, take credit for the work of a much larger (base level) inspection. The policy was tested at Ogden by direction of the MPIP Steering Group. The test took place May 1975 to August 1975 and was reported in Ref. 3.

PARING INSPECTION ITEMS AND EXTENDING INTERVALS

As part of the F-4 Working Group of the MPIP, Ogden ALC and The Rand Corporation embarked upon a quest for methods to review, revise,
and extend the period of base level inspections for the F-4. As antici-
ipated by the MPIP, we felt there had been a constant escalation of inspec-
tion requirements over the past several years with an insuf-
icient emphasis or discipline to pare them down or increase the in-
tervals between inspections. On the basis of prior Ogden/Rand success with subjective data-collection forms, we developed a questionnaire to identify those items that were redundant, that could be inspected less often, or that contributed little or nothing to the reliability of the F-4. The questionnaire is shown in Fig. 2.

This form solicited field opinions on the critical nature of the selected items. Field respondents estimated allowable extensions and were required to justify or explain why an extension could not be con-
sidered. Once developed, the questionnaire was reviewed by the F-4 Working Group and was then distributed to MacDill, Seymour-Johnson, Luke, Holloman, George, and Bergstrom Air Force Bases. Questionnaires were completed by dock maintenance people and returned to Ogden ALC for analysis. While there were minor differences between different series of the F-4 aircraft, the opinions presented represented signif-
nificant agreement in such areas as safety requirements and optimum intervals; they also provided some insights into defect criticality. When views on the same subject were solicited from system management technicians and Ogden ALC engineers, there was, again, significant agreement in most areas, although we observed that the technicians were more reluctant to stretch inspection intervals and eliminate re-
quirements than were the Ogden engineers and base-level maintenance people. The engineering staff found the responses of great value even though the final decision as to classification of failure effects is a technical engineering decision.

With the questionnaire data in hand, a system management mainte-
nance officer, an Ogden ALC system engineer, and a maintenance super-
intendent from the F-4 shop at HQ TAC convened to summarize the results and define the extensions and deletions to be recommended.

This team reviewed each inspection and cancelled those that a majority of users and Ogden ALC agreed were not safety-related or that added little or nothing to the reliability of the F-4 weapon system.
MAINTENANCE POSTURE IMPROVEMENT PROGRAM
ANALYSIS OF PHASED INSPECTIONS
WUC SYSTEM

1. INSPECTION:___ ___ HOUR, PARAGRAPH NR.

2. IN YOUR OPINION IS THIS A SAFETY OF FLIGHT INSPECTION?
   YES □    NO □

3. IF YOUR ANSWER IS YES INDICATE WHY INSPECTION IS SAFETY
   a. ENGINEERING RATIONALE □
   b. ADMINISTRATIVE (RULES, REGS, ETC) □
   c. OTHER SPECIFY ______________________

4. CAN THE CURRENT PHASED INSPECTION INTERVAL BE EXTENDED?
   YES □    NO □
   IF YES, INDICATE MAX TIME YOU WILL ALLOW ___ FLIGHT HOURS
   IF NO, EXPLAIN WHY INTERVAL CANNOT BE CHANGED
   ________________________________

5. ESTIMATE TIME TO GAIN ACCESS TO PERFORM INSPECTION:
   HOURS. ___ ___

6. ESTIMATE AVERAGE REPAIR TIME REQUIRED TO FIX A DEFECT
   FOUND FROM THIS INSPECTION:
   HOURS. ___ ___

7. LIST ACCESS DOORS WHICH MUST BE REMOVED TO PERFORM THIS
   INSPECTION (IF APPLICABLE)
   DOOR NR. ___ ___

8. PLEASE LIST OTHER 6 PHASE INSPECTIONS THAT ARE ACCOMPLISHED
   CONCURRENTLY WITH THIS INSPECTION (I.E., SAME AREA OR SAME
   ACCESS DOOR)
   SYSTEM   HOUR   PARA. NR.
   _____   _____   _____
   _____   _____   _____
   _____   _____   _____

9. ADDITIONAL COMMENTS ________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________

Fig. 2—Questionnaire for extending and deleting inspections
Where the field and Ogden engineering disagreed, the field data were submitted to engineering for reevaluation. No items were canceled without engineering concurrence. The consensus was that many of the general inspections were not finding significant deterioration and were not warranted. Through the years, many inspections have been initiated in reaction to isolated failures and maintenance malpractices. We have observed in the past that some acts of preventive maintenance are counterproductive; they cause more failures and maintenance than they find and correct. The study by Donaldson and Poggio\(^{1}\) showed that 35 to 40 percent of the failures found on aircraft were caused by "maintenance."

Content of Scheduled Inspections

The number of inspections in the six phases was reduced 43 percent—from 652 to 372. Many of the deleted inspections were minor, as evidenced by a reduction of only 30 percent in look time—from 275 hours to 191; see Fig. 3. (The look times are the expected durations of the inspections with no time allotted for repair, as specified in IF-4(-)-6, Sec. I, part D, of the technical manual "Aircraft Scheduled Inspection and Maintenance Requirements.") A complete list of the inspections eliminated is given in App. A.1.

The brevity of the look hours for these inspections suggests that they concern readily accessible areas that are easily seen during normal maintenance. Results of the Holloman test (to be presented later) indicate further that they generate proportionately smaller repair workloads than the remaining inspections, since the reduction in total hours (including repair) for an inspection is less than the 30 percent reduction for look time.

Extensions of Scheduled Inspections

Possibly because of the way the questionnaire was worded, most individuals framed their decision to extend intervals within the existing system, choosing 75, 150, 225, or 450 hours. Since an extension
Fig. 3 — Comparison of inspection workloads before and after paring down

of the 450-hour cycle to 600 hours seemed feasible to the TAC Working Group, we established a follow-up study to aggressively reevaluate the inspection cycle question. This study was conducted within the Service Engineering Division, Ogden ALC/MME, using the questionnaire approach with one variation.

In the follow-up study, the questionnaire implied that the inspection cycle was going to be changed to 600 hours unless the system engineers could provide solid rationale for vetoing it. General results of this effort were excellent. In fact, only two inspections did not extend to the new interval. However, the engineers did name some sixty items that will require extensive failure data collection from the Maintenance Data Collection System during the period the aircraft are being phased into the longer cycle. Appendix A.2 lists those inspections assigned new intervals, and App. A.3 lists those that will require the special data collection program.
PACKAGING INSPECTION ITEMS: PHASE AND PERIODIC SYSTEMS

The items that survived the pare-down were compiled into two inspection systems: a new pared-down phase system requiring six formal dockings of approximately equal workload at 100-flying-hour intervals and a periodic system requiring two formal dockings 300 flying hours apart. Four other brief inspections, the 100-hour HPOs, occur on the flightline in this periodic system.
III. CONSTRUCTION OF THE HOLLOMAN TEST

In light of the early Ogden/Rand work, it was proposed to the F-4 Working Group that the F-4's inspection system be changed to a periodic system for base level inspections. Consequently, the Working Group directed that a field test of the two systems be made at Holloman Air Force Base with the object of determining whether the reduced phase package or the periodic package provided the greater increase in aircraft availability and reduction in manpower requirements. An additional objective was to develop a model for the transition from the phase to the periodic system to minimize redundant and excessive inspections and workload fluctuations.

The test was designed to be conducted within the existing inspection structure with no special priorities. It was intended to duplicate the real-world environment, with all measurements and data collection held to essential requirements. Before the test, data were collected on flow times and requirements for personnel of the current system. These data provided a standard, against which the two inspection options under test could be evaluated.

At the beginning of the test, two docks were set aside for periodic and 300-hourly post-flight (HPO) inspections, and two docks were used for the reduced equal phase inspections. The number of aircraft to enter the dock each week was determined by Plans and Scheduling at Holloman in conjunction with Ogden and Rand, on the basis of the new 600-hour inspection cycle. Ogden ALC determined which of these to convert to the periodic inspection. The choice of aircraft to convert to the periodic inspection was made to maximize coincidence of the aircraft's next due Programmed Depot Maintenance (PDM) with a future periodic inspection, using Air Force Logistics Command and Holloman data and a scheduling program developed by Ogden ALC. The noncommissioned officer in charge at the inspection dock scheduled the aircraft into the appropriate docks. Appendix C provides a detailed discussion of the scheduling approach used at Holloman for the test. It also provides a guide for the process of converting from a phase to a periodic system.
IV. ANALYSIS OF TEST RESULTS

The data in this report are taken primarily from two sources: from Holloman Maintenance and Operations (MILAP) data, tail number, and work center displays; and from records kept manually by the test director, Captain K. Ziegler, and the dock superintendent, SMS J. Lilly. The MILAP data displays provide manpower estimates, by work center code and work unit code, for each tail number from the time it entered the dock until it first flew after docking. The manual records were used to monitor flow times for each aircraft; the MILAP data on flow times were used only as a back-up data source and reference check. Early MILAP data from January and February 1975 for 23 aircraft were used to provide the standard of comparison for flow times and man-hours for the old phase system. This standard was used to determine manpower savings and increased aircraft availability attributable to each of the two new systems. The raw data used to provide flow times and man-hours for the old phase, the new phase, and the periodic systems are summarized in the tables in App. A.

A comparison of flow times from docking to first successful flight after docking is given in Fig. 4. Note that although the number of inspections in the phase inspection package has been reduced 43 percent (see Fig. 3), this has virtually no effect on flow times; the old and new phase systems both cause the aircraft to be unavailable for 7 days in each of the six phases. This agreement with early predictions indicates little dependence of down time on the content of the inspection package. Similarly, the 300-hourly postflight inspection (HPO) and the periodic inspection, although much larger packages, do not take commensurately longer flow times. The lower part of Fig. 4 summarizes these results over a 600-hour cycle. The reduction in phase content has added only slightly over 1-day availability in the new phase system, while the periodic packaging has added 18 days. (This assumes 1 calendar day for each of the 4 flightline HPOs. These are currently being completed at Holloman in one shift.)

The actual days in the inspection docks are only a part of the
Fig. 4 — Comparison of unavailable time under three inspection schedules
total flow time. (At Holloman, phase inspections are scheduled for 2.5 days, whereas the 300-hour HPO is scheduled for 4 days and the periodic inspections for 7 days.) Table 1 summarizes the delays of a sample of the aircraft inspected during the test. (The sample includes most of the test aircraft; on a few, however, we were unable to get data on post-dock delays.) The table shows the total number of days consumed by each type of inspection. The percentage of total delay days is provided in adjacent columns. Note that the periodic system has a significantly higher percentage of delays due to weekends. This means that if the docks ran on a seven-day schedule, the difference between phase and periodic flow times would be even greater. The two other significant causes for delay are GNORS (grounded, not operationally ready supply) and unscheduled maintenance, indicating recoveries from conditions found during inspection. The longer scheduled dock time of the periodic system allows more of these problems to be dissipated during dock time.

Table 1

REASONS FOR DELAY

<table>
<thead>
<tr>
<th>Item</th>
<th>Periodic Inspection</th>
<th>300 HPO</th>
<th>Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of Days</td>
<td>Percent of all Days</td>
<td>No. of Days</td>
</tr>
<tr>
<td>Weekends</td>
<td>12</td>
<td>55</td>
<td>16</td>
</tr>
<tr>
<td>GNORS</td>
<td>2</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Unscheduled Maintenance</td>
<td>6</td>
<td>27</td>
<td>12</td>
</tr>
<tr>
<td>Scheduled Down day</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sound Suppressor</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Wash rack</td>
<td>1</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

Sample Size: Periodic inspections = 7 aircraft  
300 HPO = 13 aircraft  
Phase = 35 aircraft
In summary, the periodic system shows a convincing advantage over the phase system in terms of the number of days an airplane can be expected to be grounded for the inspection process. Interviews with Holloman personnel indicate that this is in agreement with their experience. They further stated that they have an easier time finishing a periodic inspection in the allotted time than a phase inspection.

**MAN-HOURS AND PERSONNEL**

Figure 5 shows the mean number of man-hours required for the old phase, the new reduced phase, and the two major inspections of the periodic system. Note that the 43-percent reduction in inspection items has reduced the average for one inspection by only 45 hours, a 14-percent reduction in time from the old to the new phase. This indicates a high incidence of noninspection-related work occurring because the aircraft is in the dock. The Holloman dock crews attribute this mostly to housekeeping to satisfy quality control requirements. The lower part of Fig. 5 shows the total number of man-hours required for each of the systems for a full 600-hour inspection cycle. The periodic total includes 10 hours for each of the four flightline HPOs, which have been running 8 to 10 man-hours at Holloman. The new phase requires 85 percent of the man-hours required by the old phase; the periodic requires 51 percent.

The man-hours reflect only part of the manpower picture, since they do not indicate whether some slots become superfluous or whether a few hours extra per week become available for personnel to do other things. Discussions with Holloman personnel indicate that there are indeed slots eliminated by a periodic system. Before the test, Holloman had four inspection docks with nine people assigned to each. The extension to 600 hours reduced that number to three docks, sparing nine people, a saving that is attributable directly to neither the new phase nor the periodic. Outside of the cycle savings, the Holloman staff sees no manpower savings accruing to the new phase system, although they do prefer it to the old system because the six phases are more nearly equal in workload and easier to schedule. They see the periodic as producing manpower savings beyond those caused by the cycle extension. The docks
Fig. 5 — Comparison of work loads for three inspection schedules
at Holloman have been reduced to eight people at each dock and this appears to be sufficient to handle the periodic inspections. Further, only two docks are needed for the periodic system inspections, so the requirement has gone from 27 to 16 people for support in the docks. Holloman is keeping four people in the third dock for dispatch to the flightline to handle the 100-hour HPOs. In addition, the number of people the engine shop had devoted to the inspection docks has dropped from 12 to 9. The net result is that the periodic system requires 10 fewer people at Holloman than does the phase system. If the savings from the interval extension are included, the periodic system requires 19 fewer people than the old phase, while the new phase requires 9 fewer than the old. We might caution that these manpower savings cannot be translated directly to other bases for two reasons. One is that Holloman possesses a very large number of aircraft. Most smaller bases might have difficulty identifying slots that could be eliminated, because the number of people required is smaller to begin with. Secondly, the way man-hour savings translate to personnel slots is very much a function of the organizational structure. It may not be possible to identify saved slots such as those in the engine shop if all specialist support to the docks is dispatched rather than assigned as full-time support.

**DELAYED DISCREPANCIES**

One of the pretest hypotheses was that the longer dock time of the periodic system would lead to more delayed discrepancies (minor maintenance that is routinely deferred) being cleared than in the phase system. During the test, a copy of the 781K file for before and after the inspection was made for each aircraft, and any delayed discrepancy cleared should be reflected in these files. However, an analysis of the files indicated that very few discrepancies were cleared under either the phase or the periodic system. The periodic system did clear slightly more than the phase, but the number cleared under either system was too small for a comparison to be significant.
QUALITY CONTROL

Another hypothesis concerning the longer dock time of the periodic system was that the added time would allow the dock crews to produce a "cleaner" aircraft. During the test we talked to Holloman's Quality Control (QC) staff to get their impressions of the quality of the product from the periodic inspection docks. During the course of the test, they inspected every aircraft which underwent a periodic inspection or a 300 HPO inspection. They agreed that the periodic system produced a better job on the aircraft. Indeed, they felt that the overall condition of the aircraft would improve under the periodic system. After the test we collected data on the QC inspections of the test aircraft, as shown in Table 2.

Table 2

QUALITY CONTROL RESULTS FOR TEST AIRCRAFT

<table>
<thead>
<tr>
<th>Inspection</th>
<th>Number Inspected</th>
<th>Satisfactory (Percent)</th>
<th>Major Discrepancies Per Aircraft</th>
<th>Minor Discrepancies Per Aircraft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periodic</td>
<td>8</td>
<td>50</td>
<td>0.75</td>
<td>6.6</td>
</tr>
<tr>
<td>300 HPO</td>
<td>16</td>
<td>50</td>
<td>0.75</td>
<td>5.4</td>
</tr>
<tr>
<td>Phase</td>
<td>10</td>
<td>80</td>
<td>0.40</td>
<td>3.1</td>
</tr>
</tbody>
</table>

During the test, QC continued their normal random sampling of phase aircraft but inspected every periodic inspection or 300 HPO. For this reason, the sample of phases is smaller than might be expected. Nonetheless, the data indicate that the periodic system aircraft are not faring as well under QC inspections as are phase system aircraft. To check this out, we talked to the QC people again to see if their opinion had changed. They again insisted that the periodic produced cleaner aircraft. They felt the data did not indicate this because most of the major discrepancies concerned finding foreign objects in cockpits and work areas. This caused them to define "cleaner" aircraft as having a better quality of maintenance performed, and in this context they felt the periodic system was superior.
POST INSPECTION ABORTS

MILAP data were used to see whether the two systems have significantly different effects on abort rate on the first flight after inspection. Earlier Ogden/Rand research indicated there would be no significant difference between the two systems—they should both experience about the same probability of an abort on the first flight after docking. If this were true, the periodic system would be preferable simply because it required fewer dockings. However, the data indicate that the periodic system causes significantly fewer post-dock aborts than does the phase system. Of 25 aircraft which underwent a periodic inspection or 300-hour HPO, only three had aborts on the first flight after docking, for a 12-percent abort rate. Of 39 aircraft which underwent a phase inspection, nine aborted on the first post-dock flight for a 23-percent abort rate. This could be explained by accepting the quality control inspector's opinion that the periodic system produces a "cleaner" aircraft which would be less likely to abort. However, at least part of the explanation may be the "Hawthorne Effect," a theory that states that people involved in a test act in such a way as to make the test succeed. There is no question that the Holloman people are enthusiastic about the periodic system and thus may have done a better job on periodic aircraft than on phase aircraft. However, the data did make it safe to say that the periodic system is at least no worse than the phase system in post-dock aborts and thus will cause an overall decrease in the number of aborts because it requires fewer dockings.

NOT-OPERATIONALLY-READY-SUPPLY (NORS) RATES

Data for the period of the test indicate that there were no discernible effects on either NORS-grounded or NORS-flyable rates.

THE 100-HOUR HPO INSPECTIONS

The original intent for the periodic system was to have the four 100-hour HPOs in each inspection cycle performed on the flightline by the Organizational Maintenance Squadron at the end of the normal flying day—thus not causing any downtime for the aircraft. Experience
during the test indicates that there are strong reasons for having these inspections performed by experienced personnel dispatched from the inspection docks. The lack of experience of Organizational Maintenance Squadron personnel tended to extend the time required for the inspection as well as making the control problem more difficult. In addition, it created problems with maintaining the necessary paperwork for the inspections. Holloman now has four people in the inspection docks who perform these inspections on a dispatch basis. With this system, the 100-hour HPOs are requiring 8-10 man-hours and generally are less than a one-shift operation. Time change technical orders and time change items can lengthen this flow time, but the Holloman inspection branch's noncommissioned officer in charge feels that it will virtually always take less than a day. Accordingly, we are allowing the conservative figure of one day for all computations concerning the flow time of the 100-hour HPOs.
V. ESTIMATES OF NET SAVINGS

To get a picture of the relative desirability of the phase and the periodic system, it is helpful to extrapolate the net savings to all of the F-4 fleet. This section provides estimates of the savings for TAC, and for the total F-4 fleet, of the new phase and the periodic system, including the added savings available if credit is taken during depot visits for the base level inspection that would have been next due. Estimates of the savings from the extension of an inspection cycle to 600 flying hours are also included in this section.

THE TEST AT OGDEN AIR LOGISTICS CENTER

Concurrently with the Holloman test, a test was conducted at Ogden ALC to determine the incremental cost of performing the next due phase or periodic inspection during PDM at the depot. The details of that test are available in Ref. 3. For this report we are interested only in the total man-hour requirements and flow times. These are summarized in Table 3.

Table 3

REQUIREMENTS FOR NEXT DUE INSPECTION DURING PDM

<table>
<thead>
<tr>
<th>MDS</th>
<th>Additional Man-Hours Required</th>
<th>Flow Time Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Periodic</td>
<td>Phase</td>
</tr>
<tr>
<td>F-4C</td>
<td>169</td>
<td>--</td>
</tr>
<tr>
<td>F-4D</td>
<td>133</td>
<td>--</td>
</tr>
<tr>
<td>F-4E</td>
<td>186</td>
<td>62</td>
</tr>
<tr>
<td>RF-4C</td>
<td>176</td>
<td>--</td>
</tr>
</tbody>
</table>

One significant result is that no flow time is added during a depot visit to complete the base level inspection. Thus each time a base inspection is done at the depot, it provides 7 to 12 days added
availability at the base (depending on whether the inspection is a phase or a periodic). The man-hours required for the phases were not presented in detail; the figure for the F-4E was given as an upper bound on the cost of the phase inspection at the depot. For any inspection the cost in man-hours is less than one-third of the cost at the base because of the amount of the work already done as a normal part of the PDM.

MAN-HOUR SAVINGS

Estimates of man-hour savings for the F-4 force depend on the number of aircraft in the force, their utilization, and the PDM interval. These latter data are summarized in Table 4.

Table 4

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>Monthly Flying Hours per Aircraft</th>
<th>Depot Interval (months)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TAC</td>
<td>World-Wide</td>
</tr>
<tr>
<td>F-4C</td>
<td>142</td>
<td>286</td>
</tr>
<tr>
<td>F-4D</td>
<td>128</td>
<td>496</td>
</tr>
<tr>
<td>F-4E</td>
<td>331</td>
<td>582</td>
</tr>
<tr>
<td>RF-4C</td>
<td>151</td>
<td>362</td>
</tr>
<tr>
<td>Total</td>
<td>752</td>
<td>1726</td>
</tr>
</tbody>
</table>

Table 5 summarizes the man-hour requirements per year for the old phase and the periodic inspection systems. The requirements were computed on the basis of a 600-hour cycle for all three systems to eliminate the effects of interval extension and highlight effects of packaging and deletion of inspection requirements. The "net savings" columns are the differences between man-hour requirements of the new phase or the periodic and those for the old phase. The new phase saves 224,900 productive man-hours per year for the whole F-4 fleet. Using the standard Air Force planning factor of 60-percent productivity this is equivalent to having 200 more people distributed through the
Table 5
YEARLY MAINTENANCE REQUIREMENTS FOR THE F-4 FORCE
(Thousands of man-hours)

<table>
<thead>
<tr>
<th>Model</th>
<th>Old Phase</th>
<th>New Phase</th>
<th>Periodic</th>
<th>Net Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>World-Wide</td>
<td>TAC</td>
<td>World-Wide</td>
<td>TAC</td>
</tr>
<tr>
<td>F-4C</td>
<td>106.0</td>
<td>213.3</td>
<td>54.0</td>
<td>15.4</td>
</tr>
<tr>
<td>F-4D</td>
<td>119.4</td>
<td>462.7</td>
<td>60.8</td>
<td>17.3</td>
</tr>
<tr>
<td>F-4E</td>
<td>308.8</td>
<td>543.0</td>
<td>157.2</td>
<td>44.7</td>
</tr>
<tr>
<td>RF-4C</td>
<td>140.8</td>
<td>337.5</td>
<td>71.7</td>
<td>20.3</td>
</tr>
<tr>
<td>Total</td>
<td>675.0</td>
<td>1,556.5</td>
<td>343.7</td>
<td>97.7</td>
</tr>
</tbody>
</table>

maintenance shops of the TAC fleet. On the same basis, the periodic system savings of 763,700 man-hours equate to over 700 more people available.

The entries in Table 5 were computed in the following manner. With the flying hour program shown in Table 4, the F-4C takes 30 months to complete a 600-flying-hour inspection cycle. Thus during that period each aircraft would require (6 phases) × (311 hours per phase) = 1866 man-hours for the old phase inspections. This would be (1866 man-hours/2.5 years) = 746 man-hours per year for each aircraft or 746 × 142 = 105,932 man-hours per year in TAC. World-wide, the F-4C would require 746 × 286 = 213,356 man-hours per year. The same computation for the new phase system shows a requirement for 90,653 man-hours per year in TAC and 182,582 man-hours per year world-wide. If the F-4C were on the periodic system, during the same 2.5 year interval it would require a PE (at 514 man-hours), a 300-hour HPO (at 396 man-hours), and 4 100-hour HPOs (at 10 man-hours each) for a total of (514 + 396 + 40) ÷ 2.5 = 380 man-hours per year per aircraft. This means the periodic system would require 53,960 man-hours per year in TAC and 108,680 man-hours per year world-wide. Computations for the other F-4s were done in the same manner.

There are, of course, additional savings to be had by letting the
depot perform the next due base level inspection during a depot visit for PDM. Table 6 summarizes the reduction in man-hours at base level alongside the increase in man-hours at the depot for this policy.

Table 6
ADDITIONAL SAVINGS VERSUS COSTS IF DEPOT PERFORMS NEXT DUE INSPECTION
(Thousands of man-hours)

<table>
<thead>
<tr>
<th>Model</th>
<th>Base Savings with New Phase</th>
<th>Additional Depot Cost (Man-hours)</th>
<th>Base Savings with Periodic</th>
<th>Additional Depot Cost (Man-hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>World-Wide</td>
<td>World-Wide</td>
<td>World-Wide</td>
<td>World-Wide</td>
</tr>
<tr>
<td>F-4C</td>
<td>15.1 30.4</td>
<td>3.5 7.1</td>
<td>29.2 58.7</td>
<td>9.6 19.3</td>
</tr>
<tr>
<td>F-4D</td>
<td>11.3 44.0</td>
<td>2.6 10.3</td>
<td>19.4 75.2</td>
<td>5.7 22.0</td>
</tr>
<tr>
<td>F-4E</td>
<td>22.0 38.7</td>
<td>5.1 9.0</td>
<td>42.4 74.7</td>
<td>15.4 27.0</td>
</tr>
<tr>
<td>RF-4C</td>
<td>10.0 24.1</td>
<td>2.3 5.6</td>
<td>19.4 46.4</td>
<td>6.6 15.9</td>
</tr>
<tr>
<td>Total</td>
<td>58.4 137.2</td>
<td>13.5 32.0</td>
<td>110.4 255.0</td>
<td>37.3 84.2</td>
</tr>
</tbody>
</table>

For the entire F-4 force, the additional man-hours required at the depot are less than one-third of those saved at the base. Further, the incremental cost at the depot is small, since adding the base level inspection adds less than 200 hours to a PDM work package in excess of 5000 hours. The incremental difference at the base, on the other hand, is quite large; on the periodic system the depot absorbs over 20 percent of the base level workload.

As an example of how the entries in Table 6 were computed, consider the F-4C aircraft. The F-4C enters PDM every 2.5 years, which is approximately the amount of time needed to cycle through 6 phase inspections. The depot then performs one phase out of six on the F-4C or 1/6 of the phase workload. For the new phase this gives additional savings of 1/6 (90,600) = 15,100 man-hours per year for TAC and 1/6 (182,500) = 30,417 man-hours world-wide. On the periodic system the F-4C enters the depot at the same time it is due the periodic inspection, so the depot takes credit for 514 man-hours of the 950 man-hours
the F-4C needs during each cycle. In other words the depot performs
514/950 = 54 percent of the base level workload on the periodic for
additional savings of 0.54 (54,000) = 29,160 man-hours per year in TAC
and 0.54 (108,700) = 58,700 man-hours world-wide.

To facilitate comparison of the two options being tested, Table
7 presents total man-hour requirements of the two systems, assuming
that the depot takes credit for the next due inspection. Every year,

<table>
<thead>
<tr>
<th>Table 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL YEARLY MAN-HOUR REQUIREMENTS OF NEW</td>
</tr>
<tr>
<td>PHASED AND PERIODIC INSPECTION SYSTEMS</td>
</tr>
<tr>
<td>(DEPOT DOES NEXT DUE INSPECTION)</td>
</tr>
<tr>
<td>(Thousands of man-hours)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>New Phase</th>
<th>Periodic</th>
<th>Phase - Periodic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>World-Wide</td>
<td>World-Wide</td>
<td>World-Wide</td>
</tr>
<tr>
<td></td>
<td>TAC</td>
<td></td>
<td>TAC</td>
</tr>
<tr>
<td>F-4C</td>
<td>75.5</td>
<td>152.1</td>
<td>24.8</td>
</tr>
<tr>
<td>F-4D</td>
<td>90.8</td>
<td>351.8</td>
<td>41.4</td>
</tr>
<tr>
<td>F-4E</td>
<td>242.1</td>
<td>457.7</td>
<td>114.8</td>
</tr>
<tr>
<td>RF-4C</td>
<td>110.5</td>
<td>264.8</td>
<td>52.3</td>
</tr>
<tr>
<td>Total</td>
<td>518.9</td>
<td>1,226.4</td>
<td>233.3</td>
</tr>
</tbody>
</table>

the new phase system requires over two-thirds of a million man-hours
more than the periodic system to support the whole F-4 force. This
stems from the economies of combining work into fewer packages as well
as the larger workload assumed by the depot in PDM.

Table 8, below, incorporates the effects of the interval extension
from 450 flying hours to 600 flying hours. It shows the yearly man-
hour requirements for the old phase on the 450-hour interval and the
requirements for the new phase and the periodic on the 600-hour inter-
val, assuming the depot does the next due inspection. The final two
columns simply show the difference in man-hour requirements between
the two new systems and the old phase. These are the total man-hour
savings which can be attributed to the efforts of the MPIF F-4 Working
Group in interval extension, paring inspection requirements, and
Table 8

COMPARISON OF THE TOTAL YEARLY MAN-HOUR REQUIREMENTS OF THE NEW PHASE AND PERIODIC SYSTEMS AT 600 FLYING HOURS WITH THE OLD PHASE ON A 450-FLYING HOUR INTERVAL (DEPOT DOES NEXT DUE INSPECTION)

(Thousands of man-hours)

<table>
<thead>
<tr>
<th>Model</th>
<th>Old Phase</th>
<th>New Phase</th>
<th>Periodic</th>
<th>Net Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>World-TAC Wide</td>
<td>World-TAC Wide</td>
<td>World-TAC Wide</td>
<td>World-TAC Wide</td>
</tr>
<tr>
<td></td>
<td>F-4C</td>
<td>141.3</td>
<td>75.5</td>
<td>24.8</td>
</tr>
<tr>
<td></td>
<td>F-4D</td>
<td>159.2</td>
<td>90.8</td>
<td>41.4</td>
</tr>
<tr>
<td></td>
<td>F-4E</td>
<td>411.7</td>
<td>242.1</td>
<td>114.8</td>
</tr>
<tr>
<td></td>
<td>RF-4C</td>
<td>187.7</td>
<td>110.5</td>
<td>52.3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>899.9</td>
<td>518.9</td>
<td>233.3</td>
</tr>
</tbody>
</table>

repackaging inspections. Note that the periodic system requires less than 1/3 of the man-hours that the old system required.

The difference of two-thirds of a million man-hours between the new phase and the periodic can be thought of as equivalent to over 600 additional people available to support the F-4 force. This does not mean that the force could be supported by 600 fewer people, since most of the time is accounted for by dispatch man-hours of people who would have to be available even if there were no inspection workload. In other words, many of the hours are accounted for in specialists' shops where the total workload in dock support is equivalent to less than one person, so eliminating a person would degrade that shop's capability. However, the periodic system will allow that shop more hours for other purposes.

We can make some rough estimate of the number of people who might be eliminated by looking at the inspection dock manning at Holloman. For the phase system, Holloman would need 3 docks at 9 people each plus a 12-person engine team. At this rate, a base with fewer than 32 aircraft needs 1 dock; 33 to 64 aircraft require 2 docks; 65 to 96 aircraft require 3 docks; and 97 to 128 aircraft require 4 docks. Each increment of 32 aircraft also requires 4 engine people. For the
periodic system, Holloman needs 2 docks of 8 people each plus a 4-man 100-hour HPO team and a 9-man engine team. Thus for the periodic, a base needs 1 dock plus a 2-man 100-hour HPO team for each 48 aircraft and 3 engine people for each 32 aircraft. Using current F-4 basing, rough estimates of manpower requirements are summarized for the total F-4 fleet in Table 9.

Table 9
WORLD-WIDE PERSONNEL REQUIREMENTS FOR INSPECTION DOCKS OF PHASE AND PERIODIC SYSTEMS

<table>
<thead>
<tr>
<th>Number of Bases Possessing</th>
<th>0-32 A/C</th>
<th>33-64 A/C</th>
<th>65-96 A/C</th>
<th>97-128 A/C</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7 Bases</td>
<td>10 Bases</td>
<td>9 Bases</td>
<td>2 Bases</td>
<td>28 Bases</td>
</tr>
<tr>
<td>Number of dock people needed for phase</td>
<td>63</td>
<td>180</td>
<td>243</td>
<td>72</td>
<td>558</td>
</tr>
<tr>
<td>Number of engine people for phase</td>
<td>28</td>
<td>80</td>
<td>108</td>
<td>32</td>
<td>248</td>
</tr>
<tr>
<td>Number of engine people for periodic</td>
<td>21</td>
<td>60</td>
<td>81</td>
<td>24</td>
<td>186</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of Bases Possessing</th>
<th>0-48 A/C</th>
<th>49-96 A/C</th>
<th>96-154 A/C</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11 Bases</td>
<td>15 Bases</td>
<td>2 Bases</td>
<td>28 Bases</td>
</tr>
<tr>
<td>Number of dock people needed for periodic</td>
<td>88</td>
<td>240</td>
<td>48</td>
<td>376</td>
</tr>
<tr>
<td>100-hr HPO people</td>
<td>22</td>
<td>60</td>
<td>12</td>
<td>94</td>
</tr>
</tbody>
</table>

Thus to support a phase system for the F-4 force requires 62 docks at 9 people each, plus 248 engine people: $558 + 248 = 806$ people. The periodic system requires 47 docks at 8 people each, plus 47 2-man HPO teams, plus 186 engine people: $376 + 94 + 186 = 656$ people.
people. The periodic system thus could save roughly 150 people world-
wide. Again, these estimates are very rough and depend heavily on
management and organizational policies at the various bases.

A further means of achieving savings would be to centralize the
periodic inspections. This has potential because, as an example, a
54 U.E. base needs 2 PE docks but in actuality would use less than the
full capacity of two docks. The real danger is that the docks would
remain full even though not needed, leading to increased unavailability
of aircraft. If the PEs were done at centralized facilities, TAC
would need 16 docks, PACAF 6 docks, and USAFE 11 docks for a total of
33 docks world-wide. The 100-hour HPO teams would of course stay at
the individual bases. The centralized facilities would need 148 engine
people to support the centralized docks. This would yield an additional
savings of \((47 - 33) = 14\) docks of 8 people each, for 112 fewer dock
people plus \((186 - 148) = 38\) fewer engine people. Thus centralization
of the docks could effectively double the potential personnel savings
to about 300 people world-wide. An added benefit for centralization
would be consolidating the demand for parts; this would increase the
authorized inventory levels and thus lower the probability of an air-
craft being delayed for lack of parts. However, we have no estimates
of the magnitude of this latter effect. Centralized docks would need
support from other specialist shops, although the Holloman data are
not sufficient to estimate the actual number of people involved in this
support. The people added at the centralized docks would be minimal,
however, if the docks were collocated with a centralized intermediate
repair facility. There are, of course, many other factors beyond
economy to be considered in the centralization of maintenance.

AIRCRAFT SAVINGS

The test results showed no significant difference between the flow
times of the old phase system and the new phase system. Thus we would
not expect to see any changes in aircraft availability if the new phase
were adopted. However, there are significant differences in flow time
between the phase system and the periodic system, which have substantial
effects on aircraft availability.
In Table 10 we have summarized the effects of the new phase and the periodic in terms of unavailable aircraft. The entries in the table are the number of aircraft which could be expected to be in the inspection process at any time and thus unavailable for use. The last column shows the difference in the two systems (number unavailable in the new phase system minus those in the periodic system) and thus is the number of additional aircraft available under the periodic system. With the periodic system there will be 16 to 17 more aircraft available in TAC and 39 more aircraft available world-wide.

Table 10

UNAVAILABLE AIRCRAFT: COMPARISON OF PHASE
AND PERIODIC SYSTEMS

<table>
<thead>
<tr>
<th>Model</th>
<th>Number of Aircraft</th>
<th>Difference (Phase - Periodic)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>New Phase</td>
<td>Periodic</td>
</tr>
<tr>
<td></td>
<td>World-Wide</td>
<td>World-Wide</td>
</tr>
<tr>
<td>F-4C</td>
<td>6.5</td>
<td>13</td>
</tr>
<tr>
<td>F-4D</td>
<td>7.5</td>
<td>29</td>
</tr>
<tr>
<td>F-4E</td>
<td>19</td>
<td>33.5</td>
</tr>
<tr>
<td>RF-4C</td>
<td>8.5</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td>41.5</td>
<td>96.5</td>
</tr>
</tbody>
</table>

For an example of how the entries in Table 10 were computed, consider the F-4D. Referring back to Fig. 4, the new phase causes an aircraft to be unavailable 42 days out of each 600-flying-hour cycle, while the periodic causes 25 days unavailability during the same interval. For the F-4D, 600 flying hours will take about 2 years, so the phase causes $42 \div 2 = 21$ days per year unavailability per aircraft, whereas the periodic causes 12.5 days per year unavailability. For TAC, with 128 F-4Ds, this gives about (128) (21) \div 365 = 7 to 8 F-4Ds unavailable at any point in time under the phase system. For the periodic system, there are (128)(12.5) \div 365 = 4 to 5 unavailable at any time. With 496 F-4Ds world-wide, this means that 29 are unavailable
at any point in time on the phase system and 17 are unavailable with the periodic system.

If the next due inspection is done at the depot, the difference becomes even more striking. Using the F-4C for an example, the depot would perform every 6th phase, lowering unavailability due to base level inspections by the 7 days occupied by that phase. Since the depot flow time is not affected, the net difference is 7 days added availability for each 2.5-year inspection cycle. On the periodic system the depot interval for the F-4C is such that the depot would perform every periodic inspection. The base would then perform only a 300-hour HPO (at 9.2 days flow time) and four 100-hour HPOs (1 day flow each) for a total of 13.2 days unavailable time during each 2.5 year cycle. This provides an added 11.9 days availability because the depot is doing the next due (periodic) inspection. Using these availability numbers for the F-4C and similar computations for the other F-4s, we can extrapolate again to the F-4 force. These results are presented in Table 11.

The first column in Table 11 shows the expected number of aircraft unavailable if the F-4 continued under the old phase system on a cycle of 450 flying hours. The last columns show the decrease in unavailable aircraft for each of the new systems compared to the old system.

<table>
<thead>
<tr>
<th>Model</th>
<th>Old Phase (450 hr. cycle)</th>
<th>New Phase</th>
<th>Periodic</th>
<th>Net Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TAC</td>
<td>World-Wide</td>
<td>TAC</td>
<td>World-Wide</td>
</tr>
<tr>
<td>F-4C</td>
<td>8.7</td>
<td>17.3</td>
<td>5.5</td>
<td>11</td>
</tr>
<tr>
<td>F-4D</td>
<td>10.0</td>
<td>38.7</td>
<td>6.5</td>
<td>25.5</td>
</tr>
<tr>
<td>F-4E</td>
<td>25.3</td>
<td>44.7</td>
<td>17.5</td>
<td>30.5</td>
</tr>
<tr>
<td>RF-4C</td>
<td>11.3</td>
<td>28.0</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>55.3</td>
<td>128.7</td>
<td>37.5</td>
<td>86</td>
</tr>
</tbody>
</table>

Table 11
UNAVAILABLE AIRCRAFT UNDER THREE INSPECTION SYSTEMS
(DEPOT DOES NEXT DUE INSPECTION)
phase, assuming the depot does the next due inspection. The savings for the new phase (17.8 aircraft in TAC, 42.7 aircraft world-wide) are caused by the interval extension and the depot inspection since the flow times for the new and old phase are essentially the same.

A comparison of Tables 10 and 11 shows that having the depot perform the next due inspection world-wide provides 10 additional aircraft on the phase system (96.5 - 86) and 16 aircraft (57.5 - 41.0) on the periodic system. Again, the depot has a greater effect when the aircraft is on a periodic system because it can undertake a much larger part of the workload than if the aircraft is on the phase system. Table 11 shows that the periodic/depot inspection combination causes less than half the aircraft unavailability of the phase inspection system. In fact, there is almost a two-squadron difference between the availability of aircraft under the phase and periodic systems for the total F-4 force. Compared to the old phase on the 450-hour cycle the results are even more striking, showing an increase of over 3-1/2 squadrons world-wide.
VI. CONCLUSIONS

The purpose of the Holloman test was to compare the periodic and new phase inspection systems on the bases of manpower requirements and aircraft unavailability. On these bases the periodic system is superior. It requires significantly fewer man-hours on the average (792,800 man-hours per year as opposed to 1,331,600 man-hours per year for the phase) to support the total F-4 force. It also causes fewer aircraft to be unavailable because of base level inspections than does the phase (57 world-wide as opposed to 96 world-wide for the phase system).

The periodic also allows the depot to assume more base level workload during PDM. For the periodic, the depot inspection saves 255,000 hours of base level work as opposed to 137,200 hours for the phase. Similarly, the depot has a greater affect on availability with the periodic, where it increases the mean number of available aircraft by 16, as opposed to an increase of 10 for the phase system. Independent of the inspection system, the MPIP efforts which led to the Holloman Test have produced substantial savings over the old phase on a 450-flying-hour inspection interval. If we assume that the depot will take credit for the inspection that would have been next due, the new phase requires 849,000 fewer man-hours than the old; the periodic requires 1,538,000 fewer. The new phase provides 43 more available aircraft than the old; the periodic provides 88, equivalent to over 3 1/2 squadrons of F-4s world-wide.

The Holloman test tends to confirm most of the pre-test hypotheses derived from early Ogden/Rand work in scheduled maintenance. The flow times for the phase system were disproportionately large compared to the size of the inspection package, supporting the hypothesis that duration of an inspection is more a function of delays and other uncontrollable factors than of the work required during the inspection. Similarly, post dock aborts were at least as bad for the phase as for the periodic system, supporting the hypothesis that maintenance causes maintenance and that the number of dockings should be minimized.
Also, the man-hour savings from the pared inspection requirements of the new phase were not as large as might be predicted from the number of inspections deleted, supporting the hypothesis that the work done in phase docks is more a function of Quality Control's general requirements than of specific work-card requirements. The only pre-test hypothesis that was not confirmed in the test was the assumption that more delayed discrepancies would be cleared under the periodic system. However, it is still possible that this is feasible with the longer periodic dock time, if it is made a point of strong management interest. In the Holloman test, such focus was discouraged to demonstrate whether increased discrepancy clearance would fall out as a by-product of the periodic system.

The foregoing discussion has centered on peacetime operations and economy. The change in inspection systems also has implications for war time. The reduction in docks and people required for inspections decreases the tonnage required for deployment thus enhancing mobility. For short-duration contingencies inspection docks may not need to be sent at all. Since aircraft under the periodic fly considerably longer between major dockings there will be a larger proportion of the force which can fly without needing an inspection than under the phase system. This is where the real advantage of the added availability of aircraft occurs.

For some contingencies the aircraft may have depot visits postponed for the duration, thus delaying the periodic done at the depot. However, inspections are frequently delayed under such high-stress situations and the periodic would require fewer such delays than the phase system. For long-duration wars, aircraft must return to the depot, inspections must be performed at a base, and the system would return to what would be equivalent to a peacetime procedural mode with higher sortie rates.

On the basis of the test results, Rand and Ogden recommended in their final report that the Air Force adopt the periodic inspection system for the F-4 aircraft. The Air Force has since accepted the recommendation and is in the process of converting the F-4 to the periodic system.
Appendix A.1*
DELETED F-4 (-6) PHASE INSPECTIONS

This section lists by the old inspection interval those inspections deleted from the new inspection deck.

75 HOUR INSPECTIONS

(-6) Para. -

WUC System 11000 Airframe

3. Aft and inboard faces of the outboard legs of F.S. 303 bulkhead for cracks.

WUC System 13000 Landing Gear

1. Main landing gear scissors switch actuating cam for cleanliness, chipped paint and rough surface.

WUC System 23000 Power Plant

4. Low pressure fuel filter element, main fuel filter element and AB fuel filter element for contamination.

150 HOUR INSPECTIONS

WUC System 11000 Airframe

4. Vacuum forward and aft cockpit floors prior to seat installation.
6. Clean forward and aft cockpit left and right consoles.
7. Clean forward and aft cockpit instrument panels.

WUC System 13000 Landing Gear

1. Arresting gear up latch mechanism for cracks and distortion; latch roller and mechanism for cleanliness and binding; up latch cable for broken and frayed strands.

WUC System 74000 Line Control

1. Electronic components for security; wiring for chafing.
2. Electrical connector plugs at all components and bulkheads for security, cracks, corroded outer shell, and frayed wires and potting compound reversion.
3. Hydraulic and air pressure lines for dents, chafing, and leakage.
4. Wiring harness to modulator and radar package main wiring harness for chafing.

*Sections in gothic type are reproduced photographically from Ref. 5.
225 HOUR INSPECTIONS

(-6) Para. - WUC System 11000 Airframe

5. Cockpit canopy sills and longerons for corrosion.
6. Vacuum radome and radar bay area.

WUC System 13000 Landing Gear

3. NDI connecting bolt for upper and lower torque arm assembly.

WUC System 14000 Flight Controls

11. Inboard and outboard spoilers for proper alignment with wing contour.
12. Perform speed brake to wing clearance check.
13. Feed system venturi for heat damage and loose or frayed wires.
   a. Feel system venturi heaters for correct resistance.
20. Outboard slats for cracks, corrosion, distortion, and security;
    attaching fittings and linkage for cracks, security and corrosion.
    (E A/C only)
21. Pneumatic lines, PNS3-07458-186, -187, -248, -249, -266 in main landing gear wheel well, aft outboard area for leakage, chafing,
    condition and proper clearance (E A/C only).

WUC System 23000 Power Plants

1. L/R engine forward, upper and side mounts for distortion, corrosion
   and security.

WUC System 45000 Hydraulic & Pneumatic

1. Hydraulic and pneumatic lines for dents, chafing and leakage.
4. Utility hydraulic reservoir for evidence of leakage, dents, chafing
   and security.
5. Utility hydraulic pressure transmitter for evidence of leakage, loose
   electrical connector and corrosion; harness for deterioration and
   security.
6. Manifold mounted solenoid operated hydraulic selector valves for evi-
   dence of leakage, broken or loose safety wire and security.
7. Visible hydraulic and pneumatic valves and lines for evidence of
   leakage, corrosion and security.
10. Visible hydraulic and pneumatic lines for chafing, nicks, dents and
    scratches, broken anchor clips, loose or leaking fittings; flexible
    lines for kings, twisting and frayed outer braid. Lines and clamps
    for proper installation.
(-6) Para. - WUC System 46000 Fuel

8. All fuel tanks and manifold drain line shutoff valves safetied.

WUC System 51000 - Instruments - General

3. Standby compass for security and cracked glass.

WUC System 55000 Malf. Analysis & Recording Equip.

1. Perform operational check of VGH Recorder system.

WUC System 73000 Radar Mapping

1. SLR magazine for bent pins and connector frame.

WUC System 76000 Electronic Countermeasures

1. RHAW forward blade antenna for chafing, wiring for broken and frayed wires.

450 INSPECTIONS

WUC System 11000 Airframe

1. Nose section and forward fuselage for corrosion.
2. Radome hinge assembly for cracks. Lubricate hinge bolts.
3. Windshield seals for cuts, tears, and deterioration.
4. Center fuselage skin panels for cracks, dents, buckles, corrosion, and loose or missing fasteners.
5. Center fuselage access door seals for deterioration and security.
6. Left and right forward missile cavities, missile fin and wing doors and attachment link fittings for cracks and alignment.
7. Auxiliary air door actuators for leakage, scoring, corrosion and security.
8. Engine auxiliary air doors for dents, cracks, heat damage, corrosion and loose or missing rivets; loose, deteriorated or missing seals; hinges for cracks and corrosion; bumper pads for security.
9. Engine compartment and keel web for heat damage, cracks, buckles, corrosion and loose or missing rivets.
10. Auxiliary air door position switch for position and security.
11. Hydraulic selector valves, swivels and lines for leakage and security.
12. Selector valves electrical connectors for security and heat damage.
13. Aft fuselage for cracks, dents, loose or missing fasteners; loose, deteriorated or missing seals; access door hinges for cracks and corrosion.
14. Aft fuselage cooling air inlet duct for corrosion and obstructions.
(-6) Para. - WUC System 11000 Airframe (cont'd)

15. L/R wing skin panels, access panels and doors for corrosion and loose or missing rivets and screws.
16. L/R wing spoiler and speed brake well structure for corrosion.
17. L/R wheel well structure for corrosion and cracks.
20. Ramp hinges and hinge pins for wear and corrosion.
23. Side radomes for scratches, cracks and gouges; radome sills for loose or missing plate nuts and gouged or torn seals.
24. Camera and equipment access doors for dents, scratches, damaged or missing fasteners and receptacles, loose or missing screws and plate nuts or gang channels, worn heads on airloc fasteners, gouged or torn seals and torn or missing insulation.
25. Camera window frame in door 502 for corrosion.
26. Left and right photoflash doors for torn or missing seals, cracks and security; door mechanism for binding, bent or broken linkage.
27. Left and right photoflash compartment drains for obstructions.
29. Inboard longeron frame for doors 30L/R for cracks.

WUC System 12000 Cockpit & Fuselage

4. Map and data case for damage and security
5. Aft consoles, pedestal, control and vertical panels for cracks, secure knobs and switches, and loose or missing switch guards.
6. Forward consoles, pedestal, control and vertical panels for cracks, secure knobs and switches, and loose or missing switch guards.

WUC System 13000 Landing Gear

2. Outboard MLG door for security, cracks, corrosion, and loose or missing rivets. Link rods for distortion and loose rod ends.
3. Inboard MLG door for security, cracks, corrosion, distortion, loose or missing rivets and security of door actuating attachment fitting.
4. Strut door for security, cracks, corrosion and loose or missing rivets. Strut guides for wear, binding, and distortion.
5. Side brace actuator:
   a. Assembly for leakage, end fitting (down lock) for security, lower and upper attach points for distortion, cracks or bearing seizure, shuttle valve for leakage.
   b. Limit switch and cam mechanism for corrosion and security.
   c. Connecting hydraulic and pneumatic lines for leakage and security. Electrical connector for security and harness for deterioration.

WUC System 13000 Landing Gear

6. Up-latch mechanism:
   a. Up-latch cylinder and shuttle valve for leakage and security. Mechanism for cracks, corrosion, distortion and security. Sequence valve and cam for leakage and security.
(6) Para. - WUC System 13000 Landing Gear (cont'd)


7. MLG shock strut for corrosion, nicked or scored piston, cracks, leaks and evidence of piston bottoming. Piston fork for distortion.

8. Inboard door actuator for leakage and security. Door linkage for cracks, distortion and security.

9. MLG strut upper attachment trunnions and drag brace for distortion; drag beam bearing pad for cracks and security.

10. Torque links and pins for distortion, leakage, cracks, and security.

11. Safety switch for security and electrical harness for deterioration.


14. Nose gear uplash cylinder and shuttle valve for leakage and security. Mechanism linkage for corrosion, cracks, distortion and security; attachment point holes for elongation.


WUC System 14000 Flight Controls

2. Rudder pedal adjustment for binding (aft cockpit).

7. Leading edge flap interior and exterior for dents, cracks, and boundary layer control heat damage; hinges and attach fittings for cracks and corrosion; bonding jumpers for wear and security.

18. Left and right speed brake for dents, cracks and wear; attach fittings for cracks and corrosion; honeycomb panel for cracks, dents and delaminations; bonding jumpers for wear and security.

19. Speed brake cylinder and lines for security, corrosion and leakage.

20. Left and right trailing edge flap hinges and attach fittings for cracks and corrosion; bonding jumpers for wear and security.

21. Perform the following operational check:
   a. Normal flap control system operational checkout.
   b. Normal flap/ slat control system operational checkout.

WUC System 23000 Power Plant

8. Perform complete EGT indicating system functional check.

WUC System 41000 Air Conditioning

2. Pressure suit airflow valve for security and loose or missing knob.

3. Foot heat ducts and diffusers for security, cracks, obstructions and loose hose connections.

6. Foot heat and defog ducts and nozzles for security, cracks, obstructions and loose hose connections; wiring for heat damage.
(-6) Para.- WUC System 41000 Air Conditioning (cont'd)

7. Foot heat and defog valve for security, cracks, corrosion and loose or broken linkage.
11. Refrigeration ram air inlet and outlet ducts for dents, cracks and corrosion.
16. Pressure suit temperature sensor for security, corrosion and loose electrical connections.

WUC System 42000 Electrical Power Supply

1. AC power system test receptacles for security and loose or missing jumper caps.

WUC System 45000 Hydraulic & Pneumatic Power

1. Visible hydraulic and pneumatic lines for chafing, cracks, nicks or scratches, and leaking connections; clamps for torn or missing cushion material and security; B nuts for cracks and corrosion.
2. PC II accumulator assembly for loose or cracked attachment bands, cracks, leakage, nicks and scratches.
3. PC II hydraulic reservoir for leakage, nicks, dents, chafing, evidence of overpressurization and loose mounting bolts; associated lines, fittings and valves in area for leakage and security.
4. PC I system accumulator for loose or cracked attachment bands, cracks, nicks and leakage.
5. PC I hydraulic reservoir for leakage, nicks, dents, chafing, evidence of over pressurization and loose mount bolts; associated lines, fittings and valves in area for leaks and security.
6. Hydraulic flex lines for security, fraying, chafing and leakage.
7. Hydraulic and pneumatic valves, restrictors and swivels for security, cracks, nicks or scratches and leaking connections.
8. Hydraulic lines for evidence of leakage and security.
9. Left and right photoflash door actuators and selector valve for leakage and security.

WUC System 46000 Fuel

1. Fuel vent mast for security, cracks, loose or missing screws and obstructions.
2. Fuselage fuel tank compartment static drains for leakage and obstructions.
6. Fuel components, couplings and lines for evidence of leakage; structure for corrosion and cracks.
(-6) Para.  -  WUC System  49000 Miscellaneous Utilities

1. Aft fuselage overheated detector loop (2 elements) for chafing, loose or broken anchor clips and properly secured connectors.

WUC Systems  51000 Instruments - General

1. Static pressure ports for proper installation, security and obstructions.
2. Pitot and static moisture drains for cleanliness, protruding drains for security, grommets for proper alignment.
3. Air data computer set air test fitting for security and loose or missing dust caps.
4. Standby compass correction cards for presence and legibility.

WUC System  71000 Radio Navigation

1. UHF/ADF antenna cover for cracks, cleanliness and security.
2. TACAN antenna for cracks, cleanliness and security; coax cable for chafed or frayed shielding.
3. Lower UHF communication blade antenna for cracks, dents and security.
4. External intercommunication headset adapter assembly for security, cleanliness and deterioration.
5. IFF antenna cover for cracks, cleanliness, and security.

WUC System  73000 Radar Mapping

1. Visible wire bundles on the FLR antenna and radar package for chafing, loose or broken ties and anchor clips and loose or corroded terminals.
2. Electrical connector plugs at all components and bulkheads for security, cracks, corroded outer shell, frayed wires and potting compound reversion.

WUC System  76000 Electronic Countermeasures

1. ECM missile well adapter for serviceability, security, damage and missing hardware.
Appendix A.2

TRANSFERRED F-4 (-6) PHASE INSPECTIONS TO EXTENDED INTERVALS

This section lists by the old inspection interval those inspections which have been extended, together with their new interval.

75 HOUR INSPECTIONS

(-6) Para. - WUC System 11000 Airframe New Interval
1. Outer wing upper aft locking lug for cracks. 450
2. Outer wing lower aft locking lug for cracks 150
4. Bulkhead FS 303.62 for cracks (Visual) in area around the first 5/32 fastener hole above wing moldline and wing to fuselage attach bolts. 450
5. NDI number 3 fuel cell web PN 32-32139, forward to fuel cell hatchway, along left, right, forward and aft edge. 450

WUC 14000 Flight Controls
1. Stabilator cover plate and retainer assemblies for wear and loose or missing rivet. 450
2. Stabilator for cracks, corrosion and loose or missing fasteners; direct special attention to upper aluminum torque box skins at S.S. 51.85 rib area. 450

WUC System 23000 Power Plant
1. Starter for evidence of hot gas leakage, oil leakage, low oil level and security. 225
2. Starter fan for broken or cracked blades. 225
3. Area for foreign objects 225

WUC System 46000 Fuel
1. Perform pressurization and vent system checkout. 225
2. Perform air refueling receptacle operating check. 450

150 HOUR INSPECTION

WUC System 11000 Airframe
1. Ram air turbine cavity for moisture. 450
2. RAT door stops for security, cracks and distortion. 450
3. Bypass bellmouth pneumatic filters for corrosion; ultrasonic clean and reinstall element. 450
5. Clean forward and aft canopy actuator wells. 450
### 150 Hour Inspection (Cont'd)

(-6)  Para. -  WUC System 12000 Cockpit and Fuselage  

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>New Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Remove forward and aft ejection seats for shop inspection and lubrication.</td>
<td>225</td>
</tr>
<tr>
<td>2.</td>
<td>Remove time release mechanism, drogue gun and inertia reel. Wipe clean with solvent.</td>
<td>225</td>
</tr>
<tr>
<td></td>
<td>a. Remove drogue chute.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Time release mechanism check.</td>
<td>225</td>
</tr>
<tr>
<td></td>
<td>a. Time delay of 2.25 ± 0.10 seconds.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Barostat for actuation between 11,500 and 14,500 feet.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. Insure that plungers overrun approximately 1/4 inch and return to normal position each time mechanism is cocked.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Drogue gun check:</td>
<td>225</td>
</tr>
<tr>
<td></td>
<td>a. Time delay</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Firing pin protrusion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. Spring compression</td>
<td></td>
</tr>
<tr>
<td></td>
<td>d. No firing pin protrusion when drogue is cocked.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e. Cartridge, internal portion of barrel, barrel and housing threaded areas for cleanliness and corrosion.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Check inertia reel for oil leakage.</td>
<td>225</td>
</tr>
<tr>
<td>6.</td>
<td>Perform inertia reel quick disconnect pull check.</td>
<td>225</td>
</tr>
<tr>
<td>7.</td>
<td>Clean ejection seats with solvent.</td>
<td>225</td>
</tr>
<tr>
<td>8.</td>
<td>Forward and aft ejection seats for damage, corrosion, frayed and deteriorated harness lines, oxygen hoses and cables; elongated holes, galled and worn bushings and loose or missing screws and rivets.</td>
<td>225</td>
</tr>
<tr>
<td>9.</td>
<td>Lower ejection handle check:</td>
<td>225</td>
</tr>
<tr>
<td></td>
<td>a. Handle locked with guard up.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Guard down, handle for freedom of operation and catapult gun firing pin for actuation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. Lower ejection handle pull test.</td>
<td></td>
</tr>
</tbody>
</table>
150 HOUR INSPECTION (Cont'd)

(-6) Para. - New Interval

10. Install time release mechanism, drogue gun, inertia reel and drogue chute. 225

11. Forward and aft ejection seat equipment:
   a. Rocket motor firing mechanism lanyard connected to seat. Protective boot installed. 225
   b. Lockwire and lead seals installed on rocket motor firing mechanism, guillotine firing mechanism, and time release mechanism. 225
   c. Leg guards properly installed. 225

12. Install forward and aft ejection seats. 225
13. Remove control stick well cover and clean stick wells. 225
14. Install forward and aft control stick well covers 225
15. Cockpit area for foreign objects, cleanliness, cracks and corrosion. 225

WUC System 13000 Landing Gear

2. Service main landing gear shock struts. 225

WUC System 14000 Flight Controls

1. Rudder rotary damper for proper service and security. 225

2. Inspect stabilator hinge bolts, nuts, lockpins for security; visually check washers for cracks. 450

3. Forward and aft control sticks for looseness at sockets. 225

WUC System 42000 Electrical Power Supply

1. All visible wire bundles for chafing, loose or broken ties and anchor clips and loose or corroded terminals. 225

2. Electrical connector plugs at all components and bulkheads for security, cracks, corroded outer shell and frayed wires and potting compound reversion. 225
150 HOUR INSPECTION (Cont'd)

(-6) Para.- WUC System 45000 Hydraulic and Pneumatic Power

1. Remove ram air turbine nose dome and inspect for corrosion and moisture. 225

2. Perform ram air turbine blade check. 225

3. Service air compressor:
   a. Drain oil from air compressor. 225
   b. Remove oil strainer and clean with solvent. 225
   c. Install oil strainer. 225
   d. Fill compressor oil tank with oil. 225
   e. Oil drain plug safetied with 0.032 wire. 225

WUC System 71000 Radio Navigation

1. Perform Emergency IFF system operational check. 225

225 HOUR INSPECTION

WUC System 14000 Flight Controls

5. Rudder feel cylinder and selector valve for leakage and security. 450

7. Stabilator feel trim actuator for security, cracks and binding; trim actuator electrical connector for security. 450

8. Emergency flap pneumatic bottle for nicks and loose or cracked attachment bands and properly positioned anti-chafe strips; moisture drained. 450

14. Rudder feel trim actuator for security; motor/brake for evidence of heat damage and security. 450

16. Inboard slat retract limit switch for security; attaching brackets and roller arm for cracks and security; mechanism for distortion and security; rod end bearings for binding and evidence of wear. (E A/C only) 450

17. Inboard slats for cracks, distortion and security; attach fittings and linkage for cracks, security and corrosion. (E A/C only) 450
## 225 HOUR INSPECTION (Cont'd)

<table>
<thead>
<tr>
<th>Para.</th>
<th>New Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>19. Outboard leading edge slat actuator for leakage and security; overcenter spring cartridge for security and binding; retract limit switch for security; attaching brackets and roller arm for cracks and security; mechanism for distortion and security; rod end bearings for binding and evidence of wear. (E A/C only)</td>
<td>450</td>
</tr>
</tbody>
</table>

WUC Systems 45000 Hydraulic and Pneumatic Power

<table>
<thead>
<tr>
<th>Para.</th>
<th>New Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Pneumatic pressure transmitter for deteriorated shock mounts.</td>
<td>450</td>
</tr>
<tr>
<td>9. Stabilator APU reservoir and power package for evidence of leakage.</td>
<td>450</td>
</tr>
</tbody>
</table>

WUC Systems 46000 Fuel

<table>
<thead>
<tr>
<th>Para.</th>
<th>New Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Motor operated fuel shutoff valves for evidence of leakage; electrical connectors for security.</td>
<td>450</td>
</tr>
<tr>
<td>2. Fuel manifold and coupling clamps for cracks, leakage, broken or missing safety wire.</td>
<td>450</td>
</tr>
<tr>
<td>3. Fuel lines and elbows for leakage, frayed bonding jumpers or broken safety wire.</td>
<td>450</td>
</tr>
<tr>
<td>4. No. 1 fuel tank lower access panel, tank mounted accessories and fuel line adapters for cracks, corrosion, leakage and broken safety wire.</td>
<td>450</td>
</tr>
<tr>
<td>5. External centerline fuel flow transmitter for cracks, corrosion and security.</td>
<td>450</td>
</tr>
<tr>
<td>6. External centerline tank fuel disconnect valve poppet for evidence of leakage.</td>
<td>450</td>
</tr>
<tr>
<td>7. Wing and centerline pressure regulators (3) for cracks, corrosion and security.</td>
<td>450</td>
</tr>
<tr>
<td>10. Wing external tank fuel flow transmitter for security and leakage.</td>
<td>450</td>
</tr>
<tr>
<td>11. Inboard wing fuel transfer and low level shutoff valve flanges for corrosion, cracks, leakage, broken safety wire, loose connecting lines and electrical leads. Lines and leads for proper installation.</td>
<td>450</td>
</tr>
</tbody>
</table>
### 225 HOUR INSPECTIONS (Cont'd)

<table>
<thead>
<tr>
<th>Para.</th>
<th>WUC System 47000 Oxygen</th>
<th>New Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Oxygen hose, for cuts, crushing and deterioration.</td>
<td>450</td>
</tr>
</tbody>
</table>

**WUC System 51000 Instruments - General**

1. Pitot and static moisture drain lines for dents, chafing and secure connections. 450

2. Static system moisture drain valve for freedom of movement or binding and clearance to nearby components. Check for minimum clearance of 1/8" to Radome; alignment of valve skirt to drain hole and foreign objects in radome. 450

4. Perform pitot static instrument minimum performance checkout. 450

**WUC System 52000 Autopilot**

1. Perform visual check of G Limiting Accelerometer for leakage. 450

2. Remove Motional Pickup Transducer. 450

3. Perform Motional Pickup Transducer checkout. 450

4. Install Motional Pickup Transducer. 450

5. Perform functional checkout of Automatic Flight Control System. 450

**WUC System 72000 Radar Navigation**

1. AN/APN-159 antennas and antenna connectors for security, cracks and cleanliness. 450

### 450 HOUR INSPECTION

<table>
<thead>
<tr>
<th>Para.</th>
<th>WUC System 23000 Power Plant</th>
<th>New Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Remove starter.</td>
<td>225</td>
</tr>
</tbody>
</table>

2. Inspect and lubricate AiResearch starter output shaft. 225

3. Starter inlet duct bellows sections for cracks and holes. 225
450 HOUR INSPECTIONS (Cont'd)

(-6) Para. -

4. Starter and ducts for security and evidence of hot gas or oil leakage; lubricating oil drained and refilled; magnetic sump plug for metal particles.
   a. Remove starter pad drain plug from transfer gearbox.
   b. Drain oil into adequate container.
   c. Replace drain plug and safety.

5. Install starter.

9. Rear gear box hinge bracket for maximum allowable gap between bracket slot and hinge bolt per T.O. 25-579-46/56 (or applicable)
Appendix A.3

F-4 (6) INSPECTIONS REQUIRING THE CONTROLLED INTERVAL EXTENSION

PROGRAM TO REACH THE 600 HOUR SYSTEM

Special track must be kept of certain inspections to ensure the adequacy of the new interval. Those inspections are listed below by new inspection interval.

100 HOUR INSPECTION

WUC System 23000 - Power Plant

NOTE

Main fuel controls with the controlled root thread cap screws (orange Dykem painted head) will also be identified by 1/2 to 1 inch yellow circle applied with epoxy paint or a decal located just below the inlet guide vane rig port, and do not require inspection.

1. Cap screws on the main fuel control for broken (780) heads (none allowed) at the following locations:
   a. Main fuel control base plate to case (12 cap screws).
   b. Main fuel control cover to case (15 cap screws).
   c. CIT sensor on main fuel control cover (4 cap screws).

WUC System 41000 - Air Conditioning, Pressurization and Surface Ice Control

1. CADC air inline filter cleaned by ultrasonic method or replaced. (Door 16)

2. Replace electronic equipment pressurization system chemical dryer cartridge. (Door 22)

WUC System 45000 - Hydraulic and Pneumatic Power Supply

1. Replace pneumatic system chemical dryer cartridge (Door 22).

200 HOUR INSPECTION

WUC System 41000 - Air Conditioning

1. Left and right leading and trailing edge boundary layer control valves for freedom of movement, check per Section III, T.O. 1F-4 ( )-2-7; bent (780) or distorted (780) control rods; rod end bearings for freedom of movement; limit switches for security (730); trailing edge boundary layer control duct flange area for cracks (190). (Door 8NL/R)
300 HOUR INSPECTION

WUC System 12000 - Cockpit and Fuselage

1. Perform inertial reel quick disconnect pull check per Section II, T.O. 1F-4( )-2-3.

WUC System 14000 - Flight Controls

1. Rudder Power control cylinder for leakage (381); rod ends and attach fittings for cracks (190) and security (730). (Door 66L)

2. Rudder damper for leakage (381); rod ends for security (730). (Door 66L)

3. Rudder rotary damper for proper service and security (730). (Door 70) (Except aircraft with Boron rudder installation.)

4. Stabilator power control cylinder for leakage (381) and security (780); rod end and attach fittings for cracks (190) and distortion (780). (Door 65)

WUC System 23000 - Power Plant

Left/Right Engine:

NOTE

Special emphasis will be placed on inspection of all visible plumbing and wiring for chafing, clamping, routine and security.

1. Visible portions of engine (Doors 73, 74, 78, 81, 82, 83, 92, 96, 138, 514).
   a. Wire bundles and fluid lines for chafing (020) and proper installation per T.O. 1F-4C-10 and T.O. 20-379-46.
   b. Accessories and Marmon clamps for security (730).
   c. Visible bleed air ducts for cracks (190), dents (780), evidence of leakage (381), and security (730). Trailing edge bleed air ducts for chafing (020) between duct bellows and oil scavenge line (left engine).
   d. Afterburner and nozzle for distortion (780) and evidence of binding (135); actuators for leakage (381); actuator rods for distortion (780) and security (730); liners for cracks (190) and missing pieces (750).
   e. Combustion outer casing for hot spots within 4 inches of forward flange.
300 HOUR INSPECTION (Cont'd)

f. Remove clamp and inspect flange weld area of bleed air cap, PN 2502553 for cracks (190), using NDI method per Section VIII, T.O. 1F-4C-36.

g. Bleed air check valve flappers for wear (020) and free movement; hinge pin for wear (020), pin mounting hole for elongation, hinges for cracks (190) and broken springs; and strut mounting screws for proper safety.

h. Bleed air duct mounting bracket for securing (730), worn (020) bolts and slots. Visible area of the large flange using NDI (fluorescent) method per T.O. 33B-1-1 (duct installed).

i. Engine bay for foreign objects.

2. Rear gear box hinge bracket for max allowable gap between bracket slot and hinge bolt per T.O. 2J-J79-46.

3. Throttle control box for shaft deflection less than 2° in accordance with engine control box wear check per T.O. 1F-4(R)C-2-8.


5. Variable nozzle feedback cables.
   a. Perform nozzle feedback cable binding check per T.O. 1F-4( )-2-8. (F-4C/D)

WUC System 45000 - Hydraulic and Pneumatic Power

1. Air compressor for evidence of oil leakage (381), overheating (900), cracked (190) or loose (730) interstage lines; oil pump for leakage (381); fan for nicks (425), dents (780), distortion (780) and broken (070) spring; hydraulic motor for leaks (381), security (730) and proper oil level. (Door 22)

2. Moisture separator for security (730) and loose (730) pneumatic lines; electrical switch for security (730); harness for deterioration (117) and security (730). (Door 22)

WUC System 51000 - Instrument - General

1. Drain and purge pitot system per Section IV, T.O. 1F-4C-2-12 (F-4C)
600 HOUR INSPECTION

WUC System 12000 - Cockpit and Fuselage

1. Clean or replace canopy seal auxiliary air supply in-line filter element; clean filter body with solvent, (P-O-680); replace gasket and connect lines (aft outboard left console - under anti-G panel).

2. Fwd and aft catapult gun:
   a. Remove secondary cartridges (2 each).
   b. Firing mechanism for cleanliness, corrosion, freedom of operation, lubricate very lightly with oil (MIL-L-7870).

   CAUTION
   Install new seals during catapult gun assembly.

3. Assemble catapult gun.
   a. Catapult gun firing pin spring for 8 +4 -0 pounds compression; pin for 0.109 +0.031 -0.015 inch protrusion, sear for cracks.
   b. Cock catapult firing mechanism.

4. Scissors mechanism check:
   a. Gap between jaws of scissors 0.010 to 0.050 inch. (Time release mechanism cocked.)
   b. Force required to move scissors forward from a vertical position 5-15 pounds.

5. Rocket motor check:
   a. Firing pin protrusion 0.109 +0.031 - 0.015 inch.
   b. Spring compression 8.0 to 12.0 pounds.
   c. Sear for cracks.


7. Emergency harness release check:
   a. Actuate emergency release handle.
   b. Shoulder harness loop strap, lap belt harness and leg restraint lines for complete release.
   c. Sticker slips for 50-70 pounds break-out force.
600 HOUR INSPECTION (Cont'd)

WUC System 14000 - Flight Controls

CAUTION

Ensure outboard wing panels are extended prior
to operation of wing leading edge slats.
Structural damage could result.

1. Perform the following operational check: (Leave flaps/slats
extended at end of check.)

   a. Emergency flap control system check per Section VI, T.O. 1F-4( )
      -2-4. (F-4C/D; Also F-4E 66-284 thru 71-236 before T.O. 1F-4E-566).

2. Perform stabilator looseness check per Section III, T.O. 1F-4(R)C-2-4.

3. Lateral feel system flex shaft for security (730), spring cartridge
   and screw jack actuator for corrosion (170) and binding. (Door 86R)

4. Lateral control servo valve actuator for leakage (381) and security
   (730). (Door 86R)

5. Spoiler dual servo valve for leakage (381) and security (730).
   (Door 88R)

6. Trailing edge flap cylinder for leakage (381); limit switches for
   security (730); rod ends for cracks (190). (Door 88R)

7. Inboard leading edge flap actuating cylinder, accessible lines and
   attaching hydraulic fittings for leakage (381) and security (730);
   bellcrank and spring cartridge for cracks (190) and security (730).
   (Internal access door).

8. Center leading edge flap actuating cylinder, accessible lines for
   leakage (381); flap mechanism for cracks (190) and security (730).
   (Doors 72R and 112R)

9. Outboard leading edge flap actuating cylinder and accessible lines for
   leakage (381); flap drive link and bellcracks for cracks (190) and
   security (730). (Door 109R)

10. Stabilator feel trim actuator for security (730), cracks (190) and
    binding (135); trim actuator electrical connector for security (730).
    (Door 64)

11. Perform lateral, stabilator and rudder control system operational and
    rigging checkout per T.O. 1F-4 ( ) C-2-4. (Doors 21L/R, 61, 63, 64,
    and 65)

12. Perform stabilator system APU operational check per Section III, T.O.
    1F-4 ( ) C-2-4 (Door 61) (RF-4C-43 and up and after T.O. 1F-4-903).
600 HOUR INSPECTION (Cont'd)

13. Inboard spoiler actuating cylinder for leakage (381), end cap bland nut and rod end for cracks (190) and security (730). (Door 101R)

14. Aileron power control cylinder for leakage (381) rod end gland nut and hinge for cracks (190) and security (730). (Door 102R)

15. Outboard spoiler actuating cylinder for leakage (381); end cap gland nut and rod end for cracks (190) and security (730). (Door 101R)

16. Inboard spoiler actuating cylinder for leakage (381); end cap gland nut and rod end for cracks (190) and security (730). (Door 102L)

17. Aileron power control cylinder for leakage (381); rod end gland nut and hinge for cracks (190) and security (730). (Door 102L)

18. Outboard spoiler actuating cylinder for leakage (381); end cap gland nut and rod end for cracks (190) and security (730). (Door 101L)

19. Inboard leading edge flap actuating cylinder and accessible lines and attached hydraulic fittings for leakage (381) and security (730); bellcrank and spring cartridge for cracks (190).

20. Center leading edge flap actuating cylinder and accessible lines for leakage (381); flap mechanism for cracks (190) and security (730). (Doors 72L and 112L)

21. Outboard leading edge flap actuating cylinder and accessible lines for leakage (381); flap drive link and bellcrank for cracks (190) and security (730). (Door 109L)

22. Lateral control servo valve actuator for leakage (381); and security (730). (Door 86L)

23. Spoiler dual servo valve for leakage (381) and security (730). (Door 88L)

24. Trailing edge flap cylinder for leakage (381); limit switches for security (730); rod ends for cracks (190). (Door 88L)

WUC System 23000 - Power Plant

NOTE

The plan in the rotary actuator shaft at the null position may give a false indication of lever arm looseness.

1. Rotary actuator arm bolt for security; if bolt is loose enough to allow lever arm movement on shaft, actuator should be removed for overhaul.
600 HOUR INSPECTION (Cont'd)

2. CSD oil filter for leakage (381) and security (730); element for tears (947), buckling (780) or contamination (230). Clean or replace filter element. Replace retaining ring and O-ring. Torque bowl 100-200 inch pounds and lockwire.

NOTE

If element is replaced because of a discrepancy, then send it in a clean plastic bag to Ogden ALC for analysis.

WUC System 41000 - Air Conditioning

1. Water separator coalescer removed, cleaned and reinstalled. (Door 6R) (F-4E 69-7589 and up and after T.O. 1F-4-908).

2. Visible bleed air ducts in door 30L/R for security (730), broken (070) clamps secure (730) insulation and evidence of leakage (381).

3. Trailing edge bleed air duct, PN 2502118 and PN2501669-7, for cracks (190) using UDI method per Section VIII, T.O. 1F-4C-36. (F-4C/D; Also F-4E 66-284 through 71-236 before T.O. 1F-4E-566.)

4. Trailing edge bleed air duct, PN 2502117 and PN 2501668-7, for cracks (190), using NDI method per Section VIII, T.O. 1F-4C-36. (F-4C/D; Also F-4E 66-284 through 71-236 before T.O. 1F-4E-566.

5. Replace or clean electronic equipment air in line filter element and clean filter body with solvent (P-D 650). Replace gasket and connect lines. (Door 23)

NOTE

If element is replaced because of a discrepancy, then send it in a clean plastic bag to Ogden ALC for analysis.

6. Cabin pressure regulator for security (730) and cleanliness (230); selector safetied to FLIGHT position (0.020 lockwire).

7. Cabin pressure safety valve for security (730) and cleanliness (230).

WUC System 51000 - Instruments - General

1. Perform altitude encoder operational check per T.O. 1F-4(R)C-2-12.

WUC System 93000 - Drag Chute

1. Perform drag chute mechanism maintenance and operational check per Section V, T.O. 1F-4( )-2-5.
Appendix B

FLOW TIMES AND MAN-HOURS

Table B-1

PRETEST PHASE INSPECTION DATA (SAMPLE SIZE = 23)

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<th>Aircraft Serial Number</th>
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Table B-2

NEW PHASE INSPECTION DATA (SAMPLE SIZE = 40)

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**300-HOUR HPO INSPECTION DATA (SAMPLE SIZE = 18)**

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### Table B-4

**600-HOUR P.E. INSPECTION DATA (SAMPLE SIZE = 7)**

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Appendix C
TRANSITION PROCEDURE FOR MOVING FROM A PHASE 
TO A PERIODIC INSPECTION SYSTEM

TRANSITION TO "NEW PHASE"

The flying-hour schedule at Holloman Air Force Base prior to the test was such that the aircraft were scheduled into the phase dock at the rate of eight aircraft per week on the 450-hour cycle. At the start of the test of the proposed periodic system, several factors were used to estimate the proper rate to schedule aircraft for inspection under the new scheme. First was extension of the 75-hour inspection interval (450-hour cycle) to the 100-hour interval (600-hour cycle) now in effect for the new phase system, which would decrease the rate at which the aircraft enter the dock.

The future flying-hour schedule for the aircraft also influences the required inspection rate, but preparations for deployment left the program somewhat undefined for the near future.

A third factor was the question of whether the aircraft coming to the depot would receive (in addition to the PDM) the next due phase or periodic or if they would be returned to the field for this action. The cost for the depot to do the next due inspection was being determined at that time.

Because of the unknowns, an exact schedule could not be defined, but some initial estimates were made to start the test with the stipulation that the rate would be altered as required to maintain a reasonable interval for the aircraft.

The method used in transition to the 300-hour interval was to continue docking aircraft but at the reduced rate required by the new interval. For example, aircraft flying 25 hours per month were inspected every three months with a 75-hour interval. With a force size of 120 aircraft, 40 aircraft were processed each month, or about 9 aircraft per week. On a 100-hour interval, aircraft are processed every four months or about 7 aircraft per week. The method of transition was simply to adjust the input schedule, causing an increasing
interval for each successive aircraft until all have been established on the 100-hour schedule.

The required input rate can be computed as follows:

\[
N = \frac{12 \times F \times T}{52 \times I},
\]

where \( N \) = Number of aircraft to enter the dock each week
\( F \) = Number of flying hours per month per aircraft
\( I \) = Interval in flying hours between inspections
\( T \) = Total number of aircraft available;
\[
\frac{12}{52}
\]
converts flying hours per month to flying hours per week.

For the Holloman test, the following numbers and calculations were used to determine the required input rate:

\[
F = 26 \text{ flying hours per month}
I = 100 \text{ flying hours between inspections}
T = 88 \text{ aircraft}
\]

\[
N = \frac{12 \times 26 \times 88}{52 \times 100} = 5.28 \text{ aircraft per week.}
\]

Six aircraft were scheduled per week, which gave roughly a six-week cushion for those weeks when no maintenance is accomplished (eight aircraft were scheduled under the old system). Therefore, changing from an input rate of eight to six aircraft per week would gradually change the interval from 75 to 100 hours. The decks of inspection cards for new phase were structured for this transition to avoid extending individual inspections beyond their respective intervals.

**TRANSITION TO PERIODIC SYSTEM**

Since a periodic system was to be tested also, the strategy used was a gradual transition from the phase to the periodic system while collecting sufficient data about both, and providing a model for the transition process. With the phase system, the aircraft now receive
an inspection every 100 flying hours or roughly 16 weeks at 26 flying hours per month. Under the periodic system, the aircraft were alternately to receive a 600-hour periodic inspection and a 300-hour inspection in the docks. Having once received a periodic inspection, an aircraft would not require another docking for 300 flying hours or approximately 50 weeks. Thus at the end of 16 weeks, the workload in the docks would be decreased by the number receiving a periodic inspection during each week the first 16 weeks.

After the sixteenth week different aircraft will be undergoing the transition, so the number requiring inspections from week 33 will be additionally decreased by the number receiving periodic inspections from week 17 to week 32. Aircraft receiving periodic inspections in the first week will require their second periodic inspection in week 51. Thus 51 weeks are required in the transition from phase to periodic.

The method used to change to the periodic system was to find how many inspections per week the base fleet would need if it were on a periodic system and then make that number of periodic inspections out of the six scheduled for inspection each week. We will discuss the procedure after determining the required inspection rate for the periodic system.

It was decided to schedule aircraft for inspections, assuming the depot would make a 600-hour periodic inspection during the PDM visit. Therefore an aircraft would be due a 300-hour HPO inspection 300 flying hours after leaving the depot, a 600-hour periodic inspection 600 flying hours after leaving the depot, and a second 300-hour 900 flying hours after leaving the depot, if it flew that many before returning to the depot (see Fig. C-1).

Therefore during a complete PDM cycle of each aircraft (a cycle is the PDM interval plus the flow time in the depot), each aircraft will receive one 600-periodic inspection and two 300-hour HPO inspections if the aircraft flies 900 or more hours during the interval. A cycle for the F-4D is roughly 172 weeks. The rate for 600-hour periodic (PE) inspections is then:

\[
R_{600, PE} = \frac{1 \text{ PE per aircraft}}{172 \text{ weeks}} (97 \text{ aircraft}) = 0.564 \text{ periodic inspections per week.}
\]
To add the six-week cushion to this rate requires inflating 0.564 to 0.638 periodic inspections per week. Two 600-hour periodic inspections in three weeks (0.667) is easy to schedule and roughly equal to 0.638.

If two 300-hour and one 600-hour periodic inspections are made in each cycle, then four 300-hour inspections in three weeks would maintain the proper ratio. The dock schedule for these numbers is shown in Fig. C-2. Therefore, of the six aircraft requiring inspection each week, two went to the periodic system. For each of the first 16 weeks, four aircraft received a phase inspection and two a periodic system inspection. The two receiving a periodic inspection would not be due their second inspection until week 51 rather than week 17, as under the phase system, so only the four aircraft per week that had phase inspections during the first 16 weeks would require inspection from week 17 to week 32. Two of those four receive a periodic inspection, leaving only two to receive a phase inspection. From week 33 only those receiving phase inspections during the prior 16 weeks will be due inspections, and they will now receive a periodic inspection only--no phase inspection. From week 51, the aircraft receiving PE or 300-hour HPO inspections from week 1 will come due their second PE or HPO, and the fleet will then be completely on the periodic system. Note that this approach assumes that the depot will perform a PE on all aircraft undergoing PDM. If this is not done, then the periodic inspections and 300-hour HPOs are performed at the same rate of approximately 1 per week.

The system developed for Holloman appears satisfactory for transition of the F-4 fleet. To reiterate, the approach is to determine the number of aircraft that would be inspected on the periodic system each week and choose that number from the aircraft normally entering the docks for phase inspections that week. The aircraft should be chosen so that their next PE will be due at the same time as their next visit to the depot to maximize the contribution of the depot. In other words, the transition is made by initiating a full periodic system for the selected aircraft while maintaining a phase system for the remaining aircraft. This of course involves a heavier workload during the early stages of the transition than either system alone. At Holloman this
FIELD DEPOT INTERFACE: F4-E, RF-4C

48 MONTHS

FIELD DEPOT INTERFACE FOR THE F-4D
BASED ON A UTILIZATION RATE OF 26 FLYING HOURS/MONTH

SECOND 300-HOUR HPO AND PE WILL BE ACCOMPLISHED AT DEPOT IF FLYING HOURS ARE LESS THAN 900

Fig. C-1 — Proposed periodic system

WORKLOAD RATIO 2 TO 1:
2 MIDCYCLE 300 HPO INSPECTIONS FOR EACH 600-HOUR PERIODIC INSPECTION
WORKLOAD CYCLE: EVERY 3 WEEKS

<table>
<thead>
<tr>
<th>WK 1</th>
<th>WK 2</th>
<th>WK 3</th>
<th>WK 4</th>
<th>WK 5</th>
<th>WK 6</th>
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<tbody>
<tr>
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<td>PE</td>
<td>300 HPO</td>
<td>300 HPO</td>
<td>PE</td>
<td>300 HPO</td>
</tr>
<tr>
<td>DOCK B</td>
<td>300 HPO</td>
<td>PE</td>
<td>300 HPO</td>
<td>300 HPO</td>
<td>PE</td>
</tr>
</tbody>
</table>

TYPICAL DOCK SCHEDULE (PE: 9 CALENDAR DAYS - 7 WORK DAYS)
(300: 4 WORK DAYS)

Fig. C-2 — Example of typical schedule for two docks, periodic system
workload was approximately equivalent to the phase workload before the extension from a 450 flying-hour to a 600 flying-hour interval. Since Holloman made the interval extension at the same time as the test started, it needed no additional personnel for the transition period.

The specific steps for the transition process are

1. Determine the number of aircraft to induct into the periodic system each week.
2. Determine the number to be given PEs.
3. Choose the appropriate number of aircraft from the aircraft normally entering the phase docks that week.

Once an aircraft has been given an inspection in the periodic system subsequent inspections are scheduled in the normal manner according to elapsed flying hours.

Step 1 requires determining the weekly rate at which aircraft would be given a periodic system inspection. This is done by dividing the average flying hours per month per aircraft into 600 to determine the expected length of interval an inspection cycle requires. During this interval all aircraft at the base must receive a 300 HPO and a periodic; thus each aircraft must enter the dock twice during this interval. Dividing the interval (expressed in weeks) by 2 times the number of aircraft on the base gives the number of periodic dockings required each week. However, if the depot does base level inspections, the average number done by the depot per week (= number of aircraft going to the depot each year divided by 52) should be subtracted from the weekly rate. This net weekly rate is then the number to be given a periodic system inspection each week. (Depending on the size of the base, a planning horizon of 3 or 4 weeks may be preferable to the 1-week horizon.)

Step 2 requires that the proportion of PEs and 300 HPOs performed each week to be the same as the proportion of each the base expects to perform over the long run. For example, on the F-4E and RF-4C, the depot performs every other periodic at current flying rates. Thus the base would perform 2 300-hour HPOs and 1 PE between depot visits. The
ratio of 300 HPOs to PEs is 2 to 1 so that, of every 3 aircraft selected to enter the periodic system, 2 are given 300-hour HPOs and 1 is given a periodic. For the F-4C, on the other hand, the depot would perform every periodic, so the base would perform only 300-hour HPOs on the aircraft inducted into the periodic system.

Step 3 chooses, from among those aircraft entering for inspection, the aircraft which are closest to 300 or 600 hours away from PDM (depending on whether the inducted aircraft is to receive a 300 HPO or a PE) in order to minimize the number of intervening inspections.

In order to simplify the conversion, we ignore what phase would normally be due the aircraft to be converted. Ogden ALC will provide a special conversion deck of work cards for the PE and the 300 HPO to guarantee that critical items are not underinspected from ignoring the next due phase.

This conversion procedure was designed to smooth the workload at the docks: i.e., it attempts to ensure that a time does not occur downstream when ten aircraft are due PEs in one week or all aircraft coming in to the docks are due PEs rather than the expected mix of PEs and some 300 HPOs.
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