SUMMARY

SUPPORT OPTIONS FOR A NEW PARADIGM

We have moved away from a containment strategy to one of global engagement with shaping and responding as the key words for the United States Air Force.¹

The increasing number of deployments launched on short notice to unpredictable locations presents new challenges to Air Force personnel and capabilities.²

This paradigm shift presents new challenges to legacy support structures and the evolving Agile Combat Support (ACS) system. Support must spin up to sustain operations almost immediately, minimize airlift demands to increase deployment speed, and have the flexibility to respond to uncertain locations and mission requirements. Concurrently, cost pressures and the personnel considerations of an expeditionary force have led the Air Force to reexamine the complete ACS system to understand how alternative structures, technologies, and methods affect capabilities.


This report examines alternative Low Altitude Navigation Targeting Infrared for Night (LANTIRN) intermediate maintenance operations and explores the implications of support equipment investments in conjunction with various logistics concepts. This study builds on a series of RAND research projects on the evolving ACS system and considers the implications of decisions based on capabilities rather than costs. We address recurring labor and transportation costs; investment costs associated with the options assessed were not available at the time of this study.

The LANTIRN system consists of two pods (navigation and targeting) employed by F-16s and F-15Es. The alternative support structure options range from the current decentralized practice of deploying intermediate maintenance with the fighting units to a network of consolidated support locations (or even a single location). Support equipment upgrades, policies, and capabilities combine with these structure options to form a rich array of possibilities from which the Air Force can choose the best ACS system to meet uncertain scenarios. Our goal is to highlight the key issues affecting these alternatives and to illustrate some of the tradeoffs the Air Force faces in making these decisions.

We consider various investment options and probe assumption sensitivities across several operational scenarios. Scenarios include an extended illustrative Time Phased Force and Deployment Data (TPFDD) deployment program and a halt phase employment scenario. We investigate Line Replaceable Unit (LRU) repair system requirements as well as other systems potentially used for precision attack (LITENING II\(^3\)). Among the assumption sensitivities we probe are those on personnel, productivity, transportation time, and equipment availability. We also examine the finances of each option.

Our research shows that consolidating the LANTIRN intermediate maintenance support system may offer advantages in enhancing operational flexibility, improving support responsiveness, and decreas-

\(^3\) LITENING II is a targeting pod with capabilities similar to the LANTIRN targeting pod, but it relies on a two-level maintenance system whereas LANTIRN’s is a three-level. Existing LANTIRN-capable aircraft would require modification to use LITENING II. The Air National Guard is planning to purchase LITENING II pods to augment its precision attack capabilities.
ing the requirements for highly skilled personnel. A regional support structure, however, would be more sensitive to transportation delays and require greater cross-organizational communication. More important, data collected in the Air War Over Serbia (AWOS) revealed that the USAF may fall short on support equipment by at least 50 percent if it is to meet the requirements of two coincident major theater wars (MTWs).

SCENARIOS, SUPPORT STRUCTURES, AND EQUIPMENT UPGRADES CREATE THE TRADE SPACE

The Air Force currently maintains LANTIRN pods using a decentralized logistics structure, deploying full sets of testers from home operating bases to forward operating locations (FOLs) with the aircraft. Other options rely on varying levels of consolidation, ranging from using a single CONUS support location (CSL) to using a CSL in network with two to four forward support locations (FSLs). This analysis centers on the implications of various levels of consolidation chosen for the LANTIRN intermediate-level support operations relative to operational scenarios ranging from peacetime to two coincident MTWs. We focus on consolidated versus decentralized support and highlight our findings based on data collected in the AWOS. Specifically, we were able to assess illustrative wartime removal rates and transportation times more accurately with the new data.

Structure decisions may concentrate on support locations, but they should not do so exclusively. Adopting new procedures or technologies can affect how various support structures compare with each other in terms of capabilities and costs. Although the Air Force does not plan on upgrading pod performance or purchasing additional LANTIRN pods, we evaluated three investment options to upgrade the current support equipment (LANTIRN Mobility Shelter Set—LMSS) used to repair these pods: “zero” investment, Advanced Deployment Kit (ADK) and Mid-Life Upgrade (MLU). The upgrades offer a reduced footprint (the amount of initial airlift space needed to transport operating materiel and combat equipment) and potentially enhanced support equipment performance and reliability.

Combining scenarios, support structures, and investments, we computed expected warfighter capability levels relative to a range of
deployment and transportation times. Additionally, we assessed relative system cost implications in terms of spares, transportation, and labor expenditures over a 15-year time horizon—the expected life of the program. Our analysis shows that the decision to centralize or decentralize LANTIRN repair operations hinges not on the expected system costs but on the capability and risk levels the Air Force is willing to accommodate in its operational plans. So again, we use these capability metrics in the body of this report and discuss comparative cost implications in the appendices.

ANALYSIS OF THE FUNDAMENTAL FACTOR—TIME

When weighing the implications of decentralized or centralized support, one must consider the deployment and inter/intratheater transportation times associated with each option. Forecasting this time element for MTW scenarios is difficult, so we assessed expected capability levels relative to a range of both deployment and transportation times. Figure S.1 illustrates our results for targeting pods supporting a two-coincident-MTW scenario. We show only the targeting pods because they are mission essential and generate greater demands on the maintenance system.

Given an inherent pod inventory constraint, we begin by setting a pod availability goal for both engaged and non-engaged aircraft. Availability is defined as the number of serviceable pods available for use on aircraft for specific missions. The Air Force currently does not have an availability goal for LANTIRN pods on aircraft, so we chose a value (0.8 pod per aircraft flying surge operations) somewhat higher than that used for the entire aircraft fully mission capable (FMC) rate. Using AWOS wartime removal rates and illustrative wartime flying profiles, we computed pod availability as a function of support structure performance.

Figure S.1(a) shows the expected pod availability for engaged and non-engaged aircraft (trainers) as a function of deployment time for a decentralized support structure during the second war in a two-MTW scenario. Here we define deployment time as the number of days it takes to set up functional repair operations at the FOL once surge missions begin. We indicate two decentralized support sensi-
activities. First, the repair system is sensitive to how quickly support equipment and capability are deployed to the theater. Second, assuming support capability deploys prior to the start of combat operations, if a single tester at an FOL fails, then repair capability at that particular FOL becomes very sensitive to the supply system’s responsiveness in repairing that one tester. Note that if deployment takes longer than four days during the second MTW, there may be no pods available to fly training missions. Furthermore, if deployment times increase beyond this breakpoint, the Air Force risks degrading pod availability to the engaged aircraft. The current LMSS requires approximately 10 days to deploy and set up in theater, whereas the proposed upgrades may enable deployment and setup times under four days. Thus, deployment planners need to prioritize strategic
airlift, which may be severely constrained in a two-MTW scenario, to accommodate this requirement.

The centralization option, shown in Figure S.1(b), introduces a different time factor in our analysis. Now, transportation time (defined as Order and Ship Time—assumes no backorders) becomes the critical system sensitivity. Because equipment and some people are prepositioned near areas of potential conflicts, deployed units must transport unserviceable pods to the regional repair operation. Again, we computed targeting pod availability during the second MTW as a function of the one-way transportation time from an FOL to a regional repair facility. Here, the critical breakpoint is four days, beyond which engaged aircraft capabilities may degrade. Data collected in the AWOS indicate that intratheater transportation between centralized repair operations and FOLs ranged from three to five days (Logistics Response Time [LRT], includes backorders).

**STRUCTURE TRADEOFFS**

*Strategic and operational risks.* Centralized operations may be more susceptible to terrorist attacks or may be located too far from yet unforeseen contingencies, whereas the decentralized support structure is sensitive to the availability of deployment airlift during the early phases of large-scale missions. Both structures may suffer if resupply times do not meet the performance assumptions used to set spare-parts levels. Operationally, a decentralized structure is sensitive to tester downtime. If a single set of testers is deployed, a breakdown will temporarily halt repair. In a consolidated structure, the greatest operational risk is Order and Ship Time, as discussed earlier. The severity of the effects of subpar performance depends upon how actual resupply time differs from the assumptions used to plan Readiness Spares Packages (RSPs) and pod kits for a deployment package.

*Deployment footprint.* Among the goals of the Expeditionary Aerospace Force (EAF) are deployment predictability to improve stability in the personal lives of Air Force personnel and quick-hitting expeditionary operations. These goals require rapid deployment of strong combat forces, with a premium on reducing footprint. While consolidation options may reduce personnel deployments by over...
100 people, the greatest footprint reduction is realized through the elimination of equipment movement.

Organizational issues. Although the thrust of this analysis is on the quantitative issues associated with various logistics structures, we cannot overlook the less-tangible cross-organizational implications of our dipole options space. Decentralized support requires that individual squadron or wing commanders compete for valuable airlift early in the campaign. Competing not only with other LANTIRN units but also with other commodities, mobilization plans may need to be modified to prioritize deployment timelines. Although centralized support requires minimal tactical airlift (pods are relatively small), commanders would have to share a global asset pool that includes not only personnel and repair equipment but also tactical transport and the pods themselves.

SUPPORT OPTION ADVANTAGES AND DISADVANTAGES

Although the centralized option requires fewer test sets and fewer highly skilled personnel, the annual transportation costs may be higher. Our analysis shows that these annual costs, coupled with labor expenses, could be virtually the same across the options analyzed. The recurring peacetime costs may thus essentially be equal.

The regional support structure drastically reduces the deployment footprint, and because FSLs are removed from combat operations, both support equipment and people face lower risks. Although regional operations may become more vulnerable to attack (both conventional and cyber), proper preparations and communications design can alleviate these threats.

Collocation of test equipment not only reduces the effects of single-string failures but also eliminates the need to transport repair equipment to support various contingencies. Support equipment spares can be cannibalized from collocated sets, minimizing the effects of supply system delays. Because test set transport and setup times can be lengthy and equipment readiness is unpredictable in the theater, the regional structure offers a much more stable support system. However, daily pod transportation risks increase with the consolidated options. Pods will pass through additional transportation channels, with more people involved in the loading and unload-
ing process. We have no data indicating pod sensitivity to transport, but rough handling in the new channels may become a problem in the proposed regional structure. Standardized training procedures and tools can mitigate this potentiality.

Finally, the consolidated intermediate repair structure will require new organizational processes. Unit commanders will have to relinquish some of their control over LANTIRN pods. They will also have to communicate closely with the support centers and other bases serviced by the same regional facility. Performance metrics and incentive systems may also need to change to support a system focused on customer (warfighter) satisfaction, on-time delivery, and quality workmanship.

CONCLUSIONS

Our analyses show that given representative planning scenarios and deployment and transportation processes, the Air Force must invest in support equipment upgrades regardless of the support structure, and it must evaluate the resource constraints it could face in a two-MTW scenario. Furthermore, the extended pipelines necessary in centralized support exclusively from continental United States (CONUS) facilities may reduce warfighter capabilities. Thus, in assessing centralized repair alternatives, the Air Force should consider networked FSL and CSL structures.

The FSL structure introduces new risks to the Air Force, but it also offers some distinct advantages over the current system. The most viable structure our analyses identified would use two FSLs and one CONUS facility. Figure S.2 shows a notional implementation of such a structure with prepositioned sets in each region (gray bubbles) and peacetime manning (white bubbles). This regional system requires that pods be shipped from FOLs to the centralized repair facilities. Again, using AWOS removal rates and an illustrative two-MTW scenario, the map indicates that the Air Force needs more test sets than it possesses. Thus, if the Air Force is to meet multiple major contingency requirements, support equipment capability should be reevaluated.

Clearly, the Air Force may want to consider alternatives not discussed in this report. Our intent is to provide an operational capa-
Figure S.2—Alternative Positioning of LANTIRN Testers and Personnel

We recommend that the Air Force invest in the support equipment upgrades and leverage lessons learned from the AWOS, where consolidated repair operations at RAF Lakenheath, Aviano Air Base, and Spangdahlem Air Base supported deployed units, minimizing the need to transport pod intermediate-level maintenance equipment. Recall that a centralized system will be sensitive to transportation times and may suffer from poor cross-organizational cooperation and communication. Regional structures may relax some of the constraints put on the repair system, but the Air Force should be mindful of the limitations it may face in support of two MTWs.