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Desert Storm Reconstruction Report (U)

Volume IX: Logistics (U)

Ronald Nickel et al.

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1. (U) The Center For Naval Analyses (CNA) was tasked to reconstruct naval operations during Operation Desert Storm. Enclosure (1) is Volume IX of the reconstruction report prepared as part of that effort and focuses on Logistics during Desert Storm.

2. (U) Enclosure (1) is forwarded for your information as a reference document on Logistics during Operation Desert Storm.

S. R. ARTHUR

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ABSTRACT

(U) This volume on the logistics support provided to naval forces during Operation Desert Shield/Desert Storm concentrates on the employment of CLF forces; the movement of high-priority cargo, mail, and passengers; ordnance; ship and aircraft readiness; salvage support; and construction battalions.

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SECTION 1

INTRODUCTION AND SUMMARY

[redacted] The logistics support provided to U.S. Navy forces deployed to the NAVCENT area of responsibility (AOR) was outstanding. There is little evidence that these forces were constrained in any way by logistics in their operations. At the war's end, 120 ships were operating in the Red Sea and the Persian Gulf. Six carrier air wings in six weeks of bombing had dropped almost 12,000 tons of ordnance. In support of NAVCENT operations, logistic forces were responsible for delivery of petroleum, oil, and lubricants (POL), high-priority ship and aviation spares, mail, food, and passengers. Combat logistics force (CLF) ships replenished the fleet with freight and ordnance that could not be moved by air. During the months of January and February, the five major forward logistics support sites (FLSSs) processed an average of 183 tons of high-priority cargo and 50 tons of mail each day.

(U) Although the performance of the logistics support system was exemplary, there were problems and lessons to be learned. Much of the logistics success can be attributed to five broad conditions:

- Abundant and ready Navy assets developed in over 40 years of Cold War plans and programs
- Six months to mobilize and build up forces in theater
- A short war that never severely strained Navy support capabilities
- Substantial support from host nations with well-developed and capacious infrastructures
- Over 40 years of Navy operational experience in theater, including the recent reflagging of Kuwaiti tankers during the Iran-Iraq war (Operation Earnest Will).

In view of the above conditions, an overall lesson is in the form of a caveat, namely, that these very favorable conditions are highly unlikely to reoccur in this beneficient combination. Hopefully, this document and other lessons-learned submissions will help the U.S. Navy to further refine its logistics support capabilities.

[redacted]

(U) This document is not a comprehensive view of Navy logistics. It concentrates on the employment of CLF and fleet support ships; the movement of high-priority passengers, mail, and cargo (PMC); ordnance; salvage support; and construction battalions (CBs).

(U) Each of the summary findings listed below is discussed in detail in the sections that follow.

LOGISTICS PLANNING

[redacted] Deliberate logistics planning encompasses the processes used to determine the resources required to support the commander in chief's (CINC's) concept of operations in his regional plans, and to obtain those resources or ensure that they will be available when needed. The Time-Phased Force Deployment Data (TPFDD) on Navy augmenting personnel and non-unit-related material to be sent upon execution of [redacted] were not accurate or complete. This shortcoming of deliberate logistics planning for the Desert Shield/Storm contingency did not seriously affect the sustainability of NAVCENT forces afloat, because of the endurance provided these forces in the form of organic logistics support. The incompleteness of deliberate planning was principally in projecting the categories and quantities of shore-based logistics support that would be needed to accommodate increasing naval force levels in the CENTCOM theater. Fortunately, Saudi Arabia and other regional host nations made available an extensive array of facilities and support capabilities ashore to meet the Navy's emerging requirements. In a less benign or cooperative environment, incomplete logistics planning may result in a reduction in naval combat effectiveness.

ORDNANCE

[redacted]

[redacted]

[redacted] CAIMS provided little information that could be used to manage the flow of ordnance to and within the NAVCENT AOR. Apparently, there is no capability to create a new command, such as NAVCENT, and track the ordnance for the new entity. The CAIMS inability to deal with in-transit quantities was greatly exacerbated during Desert Shield/Storm, making the information it did provide of questionable value.

PASSENGER, MAIL, AND CARGO MOVEMENT

(U) Overall, passengers and cargo moved through the distribution system in an expeditious manner. The movement of high-priority aircraft spare parts to the amphibious task groups, however, was significantly slower than it was to the carriers.

(U) Mail movement was a problem in that a significant portion of it was mishandled. Mean and median delivery times were satisfactory, but a fraction of the mail took months to reach its destination. This was most likely a quality-control issue.

(U) Time to fill off-ship requisitions may be significantly reduced for ships with INMARSAT capability because requisitions can be quickly transmitted to CONUS agencies without encountering delays as a result of backlogged military communications channels.

[redacted]

[redacted]

(U) Modern technology can provide systems that would be much more accurate and timely in providing good tracking data on the movement of cargo and passengers. These systems, however, require communications connectivity that did not exist in this war for performing logistics command and control.

COMBAT LOGISTICS FORCE AND FLEET SUPPORT OPERATIONS

(U) A majority of the Navy's CLF ships were deployed to the CENTCOM AOR. The heavy commitment of CLF ships to NAVCENT left a minimal mobile logistics support capability to respond to a contingency in another theater. These logistics support ships, especially the AFSs and TAFSs, replenished major carrier battle force (CVBF) ships much more frequently than they do during peacetime deployments.

(U) The mobility of fleet support ships (tenders and repair ships) with the ability to relocate quickly within the AOR assisted in maintaining the operational effectiveness of supported ships. That mobility also enabled the tenders to service ships deploying through their theater.

(U) Dedicated command-and-control circuits for managing logistics were inadequate. One of the lessons learned from PACEX 89 was that better connectivity of logistics commanders and their assets is required if these assets are to be used in an efficient manner. The whole issue of logistics command-and-control requirements should be reviewed.

SHIP MATERIAL READINESS

[redacted] Ship material readiness during Desert Shield/Storm, as measured by the percentage of time a ship was free of C3 and C4 casualty reports (CASREPs), was near the levels achieved by deployed ships over the past few years. The average time to repair CASREPs (including C2 CASREPs) was one week shorter than the average time over the two years before this operation. Downtime as a result of supply was reduced on average by three days.

[redacted] Rotary-wing detachments aboard NAVCENT ships generally had high mission-capable (MC) and fully-mission-capable (FMC) rates. These rates were comparable to the rates normally achieved by detachments deployed in the Middle East region. Rotary-wing detachments' flight-hour rates, however, were 20 to 40 percent higher than normal.

AIRCRAFT MATERIAL READINESS

(U) MC and FMC rates for aircraft operating on the eight carriers that participated in Desert Shield/Storm were as high as those seen during peacetime for these aircraft. For most aircraft types, actual sortie rates were slightly below while actual flight hours were above planned rates.

(U) Despite the surge in deployments, the type commanders were able to outfit the carriers with adequate supplies of spare parts, support equipment, aircraft engines, and weapons. Some deficiencies in electronic warfare systems can be attributed to procurement levels not meeting the total requirements of six deployed carriers.

SALVAGE SUPPORT

(U) Except for mines, the threat to naval forces in the Persian Gulf was low; nevertheless, major casualties were sustained. The salvage assets put in place during the war would have been only marginally adequate to provide salvage support and assistance for naval forces if the Iraqi threat against these forces had been more aggressive, or if an amphibious operation had been conducted where Iraqi minefields were present in the seaward approaches to the beach. Salvage requirements must be anticipated and included in the planning process.

(U) Services provided by salvage assets included providing support for combat and noncombat casualties, harbor clearance and wreck removal, and search for and recovery of Tomahawk land-attack missiles (TLAMs) and other objects.

(U) Salvage personnel provided expert assistance in assessing the structural damage sustained by both *Tripoli* and *Princeton* from mine explosions. Based upon the analysis, *Princeton* was diverted to Bahrain for temporary repairs before proceeding to Dubai to receive more permanent repairs. The analysis had shown that *Princeton* would be unable to withstand the heavy weather that was developing as she transited toward Dubai.

SEABEES

(U) In February 1991, more than 4,000 CB personnel were deployed to Southwest Asia. The deployed CBs worked on several kinds of projects including construction of infrastructure to support desert "tent cities" to house Marines, airfield improvements to support tactical and logistics aircraft, and road improvements and repair to maintain supply lines and combat unit mobility. CBs assigned to

COMUSNAVLOGSUPFOR worked on the construction of fleet hospitals and public works projects. Other activities included offloading MPS ships and reconfiguring them for Offshore Petroleum Distribution System (OPDS) support, construction of holding facilities for enemy prisoners of war, and construction of runways and helicopter pads at expeditionary airfields.

LOGISTICS PLANNING FACTORS

[redacted] Comparing planning factors to actual data can be misleading in that there is a temptation to conclude that the factors must be wrong if they do not agree with experience. The difficulty with this approach is that it does not consider the uncertainty inherent in predicting the outcome of wars or how they will be fought. A more prudent approach is to use good judgment and observe the data from this operation to determine how the planning factors might be adjusted. For instance, the planning factor for ordnance consumption per carrier per day is [redacted] which is 62 percent higher than the high rate observed during the ground war for the carriers operating in the Persian Gulf. The lack of a credible air threat and the high proportion of precision guided weapons and lighter loads to enhance aircraft survivability may explain the difference.

ORGANIZATION

(U) An overview of the logistics concept of operations is given in the next section. Sections on ordnance; PMC distribution; CLF operations; ship and aircraft readiness; salvage support; the Seabees; and logistics planning factors follow. The first appendix contains a chronology of significant logistics events. The other two appendixes provide supporting data for the ordnance section.

SECTION 2

LOGISTICS PLANNING, CONCEPT, AND ORGANIZATION

DELIBERATE LOGISTICS PLANNING

(U) Deliberate logistics planning encompasses the processes used to determine the resources required to support the CINC's concept of operations to execute a regional plan, and to obtain those resources or ensure that they will be available when needed. In other words, it is concerned with determining the material and personnel required to sustain the forces assigned to a CINC's theater to carry out a particular OPLAN. The material and personnel requirement results of deliberate logistics planning must then be fitted to the strategic lift assets that are available to transport them to the theater. These data are displayed in the OPLAN's TPFDD.

[redacted] The TPFDD on Navy augmenting personnel and non-unit-related materiel to be sent in response to execution [redacted] were not accurate or complete. This shortcoming in deliberate planning was due partly to the fact that the governing CINCENT OPLAN was still in draft form and its TPFDD had not been reviewed and refined to verify its transportation feasibility.

(U) The incompleteness of deliberate logistics planning for Desert Shield/Storm did not seriously affect the sustainability of NAVCENT forces afloat because of the endurance provided these forces in the form of organic logistics support. Navy operating forces carry at least 90 days' endurance in most classes of supply. All Navy units have allowance lists that prescribe the range and depth of items to be carried as accompanying supplies and ordnance. Additionally, CLF ships and fleet support ships, like tenders and repair ships, have separate load lists to support and service the combatant forces. Long experience in supporting forward-deployed and surge-deployed forces has enabled the Navy to develop Logistics Planning Factors (LPFs) that can be used to estimate gross resupply requirements by class of supply for strategic lift purposes.

[redacted] The principal area affected by incomplete deliberate logistics planning appeared to be shore-based support. This support evolved as the need for an expanding shore-based logistics support structure became apparent to accommodate the increasing naval force levels in the theater. Fortunately, a very significant array of facilities and support capabilities were made available to the Navy by Saudi Arabia and other regional host nations during Desert Shield. In a less benign or cooperative

[redacted]

environment, incomplete logistics planning would have resulted in a reduction in naval combat effectiveness.

NAVY LOGISTICS CONCEPT

[redacted] The Navy's logistical concept in Desert Shield/Storm was developed from long-established practices in out-of-area operations. It consisted of adapting familiar deployment routines to the conditions unique to the Arabian Peninsula, and of dividing support responsibilities among the Atlantic/European and Pacific Fleet commands to manage the much larger than usual buildup of forces. A review of Navy messages identified the points covered below as major considerations in managing and shaping the logistics concept. These points are developed further in this paper and are supplemented by a chronology with additional descriptive information and sources. In managing Navy logistics, COMUSNAVCENT and supporting Navy commands:

- Exploited the Navy's comparative advantage in responsiveness that is inherent in routine force deployments and their support.

  — Initially this consisted of repositioning nearby and already loaded forces, the *Independence* and *Eisenhower* carrier battle groups (CVBGs) and the Middle East Forces.

  — One measure of the Navy's advantage in the responsiveness of its forces was the estimates of sustainability for naval forces in Southwest Asia (SWA) made by the CNO in early September. [redacted]. This level of sustainability exceeded USCINCENT's goals, which had been established in August, and generally matched subsequent revisions in goals as force levels increased.

- Adapted the divisions in the Unified Command Plan (UCP) and the associated formal AORs to fit the situation. Figure 2-1 shows the abutment of three geographic AORs in SWA. Although this division required substantial coordination among all the CINCs, management of Navy logistics in Desert Shield/Storm tended to follow patterns previously established for the region by fleet commands under CINCUSNAVEUR and CINCLANTFLT on the one hand and PACFLT on the other. The most recent arrangements, still in effect at the start of Desert Shield, [redacted]

[redacted]

[redacted]

Earnest Will and Desert Shield informally modified provisions of the UCP in the following ways that were important to Navy logistics.

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Figure 2-1. Southwest Asia: The CENTCOM area of responsibility

[redacted]

[redacted]

— Placed naval forces in the Arabian Sea under USCINCENT's operational control. This revision goes back to the [redacted] creation of a Commander Joint Task Force Middle East (CJTFME). On 17 August, CJTFME was supplanted by the COMUSNAVCENT organization and the former 800 task designators were superseded by 150 designators. Figure 2-2 shows the TF-150 organization on 11 September.

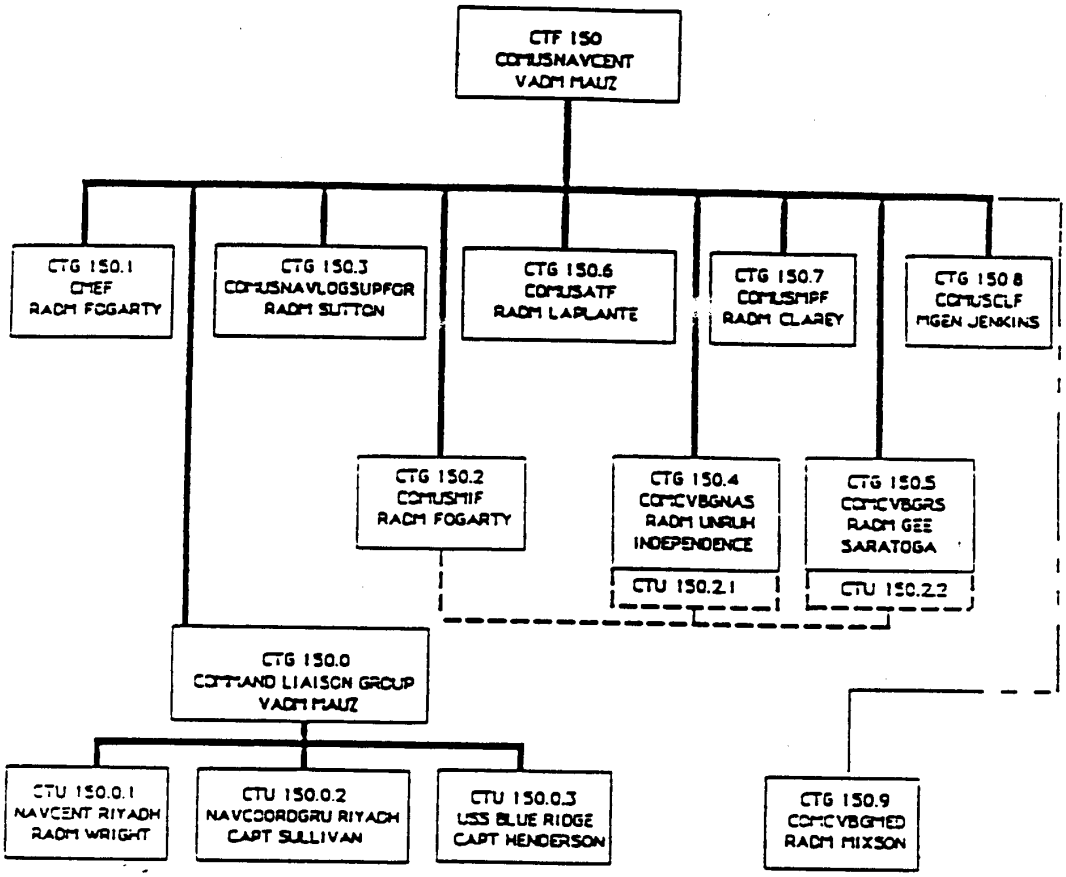

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Figure 2-2. COMUSNAVCENT organization, 11 September 1990

[redacted]

- Divided responsibility for supporting naval forces between PACFLT's CTF-73 for afloat forces in the Persian Gulf and North Arabian Sea (NAS), and Sixth Fleet's CTF-63 for afloat forces in the Red Sea. COMUSNAVLOGSUPFOR (CTG-150.3), ashore in Bahrain, served as COMUSNAVCENT's principal agent for shore-based logistics support and was responsible for the shore facilities.

- Continued an earlier agreement between CINCUSNAVEUR and COMUSNAVCENT that assigned ship maintenance and repair responsibilities in USCINCENT's AOR to CTF-63.

- Expanded on the transportation patterns and logistics hubs developed during four decades of Navy operations in SWA.

  - At the start of Desert Shield, U.S. naval forces had access to a number of facilities in SWA, some of which had established Military Airlift Command (MAC) channel flights. The Administrative Support Unit (ASU) at Bahrain (established in 1948) and the FLSS at Diego Garcia (established in 1962) were used routinely. Al Fujayrah and Al Masirah were additional support sites used intermittently since the 1987 reflagging operations in Operation Earnest Will. [redacted]

- Decentralized management of the CLF ships, leaving operational control to the battle force commanders and their respective logistics coordinators. In addition, the concept emphasized a demand-pull form of resupply and the replenishment of combatants at sea to minimize exposure of high-value ships [redacted].

  - COMUSNAVCENT noted that the adequacy of CLF ships in both the Persian Gulf/NAS and the Red Sea argued for decentralized management by the respective battle force commanders of these assets rather than have them centrally controlled. CTG-150.3 was assigned operational control of all Navy facilities ashore, including the FLSSs [redacted]

[redacted]

[redacted]

- Exploited host-nation support (HNS) strengths, in particular the capacious infrastructure with regional fuel sources, developed ports, and airheads. Although the planning by USCINCENT before Desert Shield anticipated most of the categories of HNS that would likely be available, it almost certainly underestimated the quantities and qualities of the supplies and facilities provided in each of those categories. Of particular benefit to Navy logistics management were fuel, developed ports, and airfields, along with the equipment for loading and unloading cargoes, shipyards, warehouses, and stevedores.

SECTION 3

ORDNANCE

[redacted] This section examines several ordnance issues related to availability, requirements, expenditures, and management. It begins with an examination of NAVCENT's and MARCENT's shares of the Navy's worldwide inventory during Desert Storm. Next, it discusses ordnance production and transfers of ordnance between the Navy and other services. Then, NAVCENT's ordnance requirements are compared to its expenditures. This is followed by a discussion of NAVCENT's concerns about the availability of LGBs. Differences between the daily ordnance expenditures of Red Sea and Persian Gulf carriers are then examined, and the sustainability that NAVCENT's ordnance inventory would have provided if Desert Storm had continued is discussed. Finally, the section closes with a discussion of the usefulness of CAIMS as an ordnance management tool during Desert Shield/Storm.

FINDINGS

[redacted] The primary findings were as follows:

- The Navy needs a standard methodology for determining strike ordnance requirements that indicates the level of risk inherent in the requirements.

1. An LGB kit consists of a computer control group (CCG) and an AFG. Any CCG can be used with any Mk 80 series bomb to make an LGB. On the other hand, there is a specific type of AFG for each of the three types of Mk 80 series bomb.

- Because of inaccuracies in its data and restrictions on the way its output can be organized, the usefulness of CAIMS as an ordnance management tool was limited.

ORDNANCE INVENTORIES

(U) Tables 3-1 and 3-2 show NAVCENT's, MARCENT's, and the Navy's inventories of serviceable, ready-for-issue weapons at the beginning and end of the war, respectively. The NAVCENT and MARCENT data are from the MUREPs for the components. The Navy data were extracted from CAIMS by the OP-04 Logistics Planning and Execution Center (LPEC). As explained later in this section, the quality of CAIMS data is substandard. Nevertheless, because these data are the only worldwide inventory data available, they must be used in any attempt to develop at least an approximation of inventory distribution during Desert Shield/Storm.

Table 3-1. Serviceable, ready-for-issue ordnance inventories at the beginning of the war

a SOURCE. MUREPs.
b SOURCE. Office of the Secretary of Defense (OSD) *Desert Storm Munition Expenditure Report*.
c NAVCENT reported a combined HARM/Shrike inventory early in the war.
d SOURCE. LPEC. The OSD report did not include APAM.

Table 3-2. Serviceable, ready-for-issue ordnance inventories at the end of the war

a. SOURCE: MUREPs.
b. SOURCE: LPEC data and 3 March 1991 CAIMS Asset Visibility Report.

[redacted] Figures 3-1 and 3-2 show NAVCENT's inventories as percentages of the Navy's inventories at the beginning and end of the war, respectively. To the degree the limitations of the CAIMS data permit, the tables and graphs indicate not only how much ordnance was in the theater of operations, but also how much remained out of the theater (either in transit or in storage) potentially available for other contingencies or for future transfers to NAVCENT and MARCENT. By the end of the war, NAVCENT and MARCENT had in their inventories all of the Navy's Mavericks

PRODUCTION AND INTERSERVICE TRANSFERS OF ORDNANCE

[redacted] Five strike weapons were being manufactured at the rates shown in table 3-3 when Desert Shield/Storm began. Although 23,200 inert Mk 83 practice bombs were converted to general-purpose bombs during the buildup and the war and although the production of a few weapons was accelerated, no increases in the types or quantities of weapons produced occurred. In fact, production surge capability over the short run was practically nonexistant. Not only were most weapons out of production, but others that were in production, such as HARM, were made in shared facilities, so the [redacted] [3-1].

[redacted] resupply of [redacted] would have been needed in 7 days, and resupply of [redacted] would have been needed in 14 days.

Figure 3-6. NAVCENT ordnance sustainability at end of war

CAIMS AND ORDNANCE MANAGEMENT

(U) During Desert Storm, CAIMS's usefulness as an ordnance management tool was limited for several reasons. First, its data are of substandard quality. As reported in [3-10], in peacetime, month-to-month variations of 10 percent or more in the total number of weapons of a given type reported in CAIMS are not unusual. These variations cannot be accounted for by new production or changes in the material condition of the inventory. The variations are due primarily to mismatches in the reporting of issues and receipts that have not been corrected. This problem was exacerbated during the buildup and war, when mismatches increased dramatically

Table 3-9. Average daily expenditures, 17 through 27 February

[redacted]

Weapon	Expenditures	
	17 to 23 February	24 to 27 February
HARM	4	1
Rockeye/APAM	213	464
Mk 84	20	20
Mk 83	385	545
Mk 82	368	599
Mk 84 LGB	2	2
Mk 83 LGB	10	4
Mk 82 LGB	8	3
Gator	0	12
Walleye	3	1

Table 3-10. NAVCENT inventory on 3 March

[redacted]

Weapon	Inventory
HARM	
Rockeye/APAM	
Gator	
Mk 84	
Mk 83	
Mk 82	
Mk 84 LGB	
Mk 83 LGB	
Mk 82 LGB	
Walleye	

[redacted] Figure 3-6 indicates that, at preparation-phase expenditure rates, the only weapons for which NAVCENT had less than a 30-day supply were [redacted] Discounting substitution of other weapons, resupply of both weapons would have been needed within about 18 days to sustain expenditures. At the ground-war rate, the only weapons available at less than a 30-day supply were

[redacted]

Table 3-8. Comparison of ordnance expenditures by carriers in the Red Sea and Persian Gulf

[redacted]

	Red Sea	Persian Gulf
During entire war		
Tons/day/carrier	43	49
Carrier on-station days	10F	143
Tons/flying day/carrier	58	58
Carrier aircraft flying days	78	123
During ground war		
Tons/high-intensity day/carrier	59	116
Carrier on-station days	8	16
Tons/high-intensity flying day/carrier	78	124
Carrier aircraft flying days	6	15

ORDNANCE SUSTAINABILITY AT THE END OF THE WAR

(U) Table 3-9 shows NAVCENT's average daily strike ordnance expenditure rates during the last seven days of preparation for the ground war and during the four days of the ground war itself. The data reflect differences in ordnance use during the two periods. For example, Mk 82 and Mk 83 LGBs were expended at much higher rates during the preparation phase than during the ground war; Mk 82 bombs, Mk 83 bombs, and Rockeyes, on the other hand, were expended at higher rates during the ground war than during the preparation phase.

(U) Table 3-10 shows NAVCENT's on-hand inventory at the end of the war, per [3-4]. Figure 3-6 shows the number of days that the inventory of each weapon[1] would have lasted if the war had gone on and expenditures had continued at the rates in table 3-9. In each pair of bars, the left bar depicts sustainability assuming the ground war had not started and the preparation phase had continued; the right bar depicts sustainability assuming the ground war had continued.

1. HARM and Walleye are not included in the figure because their sustainability is off the chart as a result of their low expenditure rates.

[redacted]

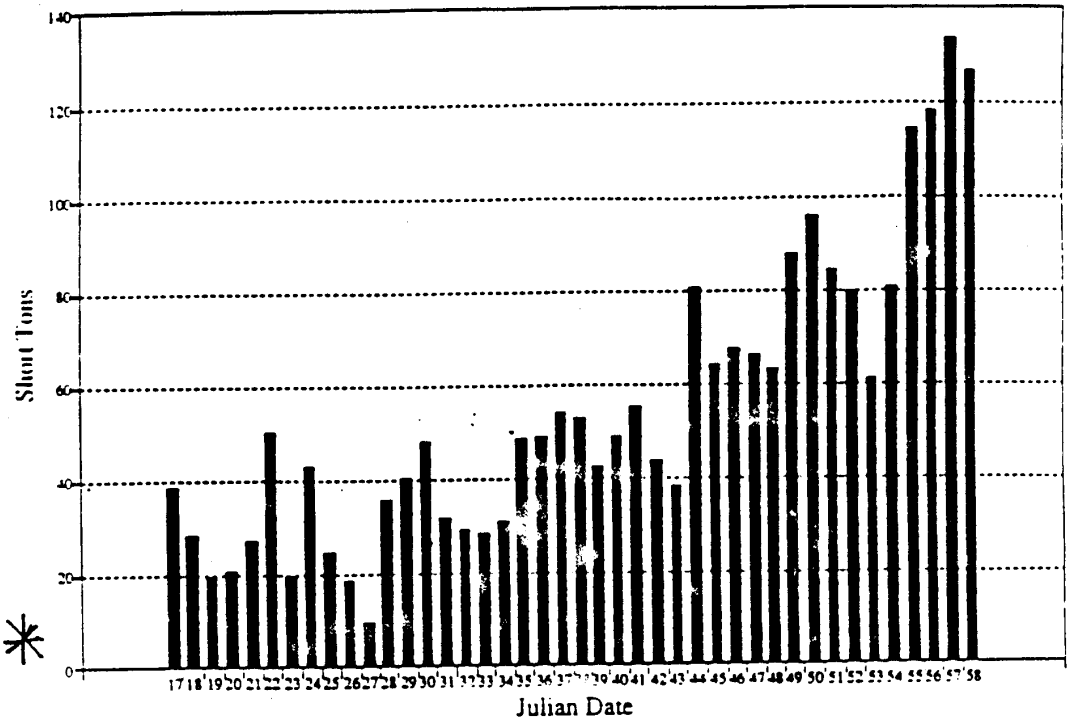

Figure 3-5. Persian Gulf ordnance expenditures per carrier

(U) Table 3-8 compares the average daily expenditures for Red Sea and Persian Gulf carriers during the entire war and during the ground war only. The first and fifth rows show the tons of ordnance expended per carrier per day that the carriers were on station, whether or not strikes were flown. The third and seventh rows show the tons of ordnance expended per carrier per day that strikes were flown.

The table and figures show that the onset of the ground war brought a noticeably greater increase in the expenditures by Persian Gulf carriers than it did in the expenditures by Red Sea carriers.

were immediately available, the LPEC suggested that NAVCENT obtain some kits from MARCENT.

DAILY EXPENDITURES PER CARRIER

(U) Figures 3-4 and 3-5 show the pattern of strike operations in the Red Sea and Persian Gulf, respectively, through depictions of daily expenditures per online carrier. The figures are based on data from appendix C.

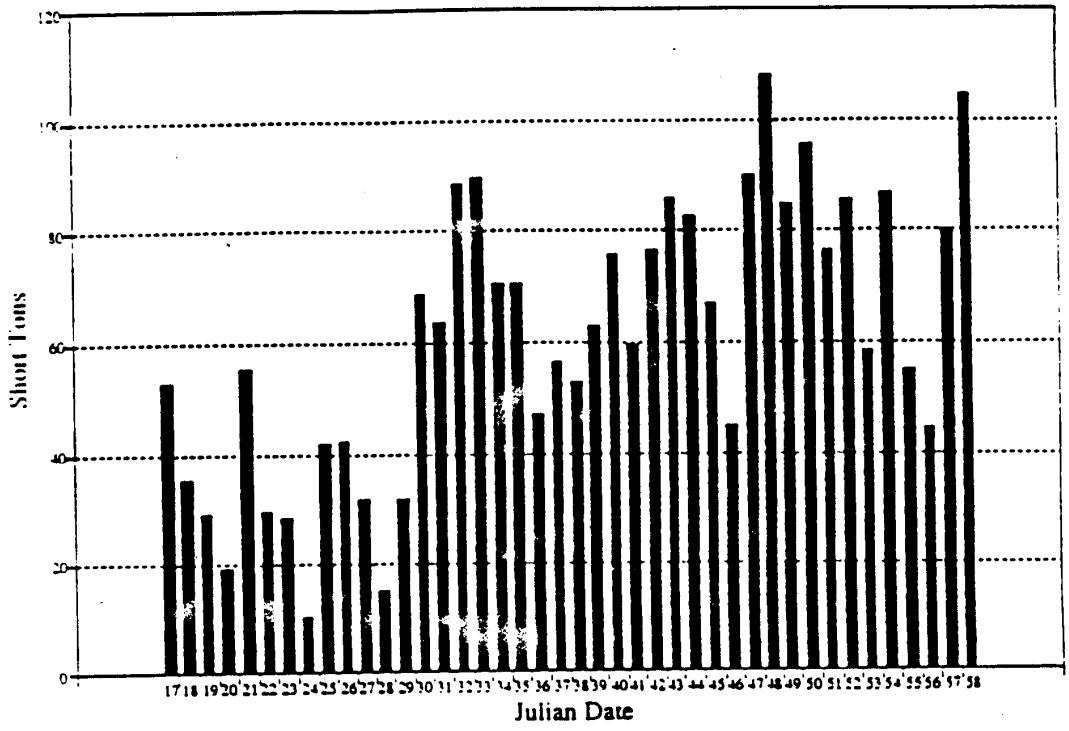

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Figure 3-4. Red Sea ordnance expenditures per carrier

along with ordnance transfers, outstripping the ability of the people maintaining the system to rid it of errors. Inaccuracies are also caused by the system's occasional failure to pick up ordnance entering inventory from production facilities and from interservice transfers [3-1].

(U) Second, some commanders, in the mistaken belief that Ammunition Transaction Report (ATR) messages should not be transmitted during Minimize, either did not send ATRs or sent them as NAVGRAMs. To correct the misconception and restore the flow of expenditures and inventory data, the Ships Parts Control Center (SPCC), on 29 January, advised the CINCs that ATRs can be transmitted during Minimize, and requested them to direct their subordinates to submit ATRs on time [3-11].

(U) Third, the organization and presentation of data in CAIMS makes it difficult to track inventories of commands other than the fleets and numbered fleets. CAIMS cannot provide inventory totals for component commands such as NAVCENT and MARCENT. Nor can it provide inventories for operational commands, such as task forces and task groups. To determine the inventories of such organizations, CAIMS users must retrieve the data for each ship and unit in the organization from CAIMS and aggregate it offline—a time-consuming task that must be repeated every time an inventory update is required. To add to the chore, CAIMS provides hull numbers, but does not provide ship names [3-1].

(U) Finally, NAVCENT did not have a CAIMS terminal, and could only get CAIMS data through CTF-63, CTF-73, CINCPACFLT, or the CNO (OP-04).

SECTION 4

PASSENGER, MAIL, AND CARGO MOVEMENT

(U) This section documents the movement of PMC. It describes the distribution system that was established for the NAVCENT AOR, quantifies the performance of various pieces of this distribution system, and gives observations on the workings of the system.

FINDINGS

(U) The following are the primary findings:

- Starting essentially from a zero base in August 1990, the Navy logistics support system in theater by February 1991 had average daily throughput of 366,417 pounds of cargo, 102,330 pounds of mail, and 398 personnel.

- Overall, PMC moved through the system in an expeditious manner. Personnel generally moved through the FLSSs within one to three days, mail in less than two days, and cargo in less than two days. Outbound PMC from Cubi Point tended to take somewhat longer to process than outbound PMC from Sigonella.

- Mail movement was a problem in that a significant portion of it was mishandled. Mean and median delivery times were acceptable (in the range of 10 to 12 days), but a significant fraction of the mail experienced very long delivery times. (Almost one-fourth of the mail bound for Bahrain from CONUS took more than 20 days to arrive.)

- The movement of high-priority aircraft repair parts to deployed units was very successful overall, with an average delivery time well within standards. Parts movement to the amphibious ships, however, was significantly slower than it was to the carriers. This difference may be due to the amphibious ships not being INMARSAT capable.

- The information systems used to track the movement of PMC through the system require a systematic examination to determine how best to use the technology available.

DISTRIBUTION SYSTEM

Customer Base and Logistics Concept of Operations

(U) The overall responsibility for shore-based logistics support was assigned to COMUSNAVLOGSUPFOR, who was located in Bahrain. Figure 4-1 shows the sites from which logistics support was provided. Units deployed in the Red Sea were supported from Hurghada (Egypt) and Jiddah (Saudi Arabia). Those deployed in the Persian Gulf were supported from Bahrain, Jebel Ali (UAE), and Fujayrah (UAE). Units deployed in the Gulf of Oman and the NAS were supported from Fujayrah and Masirah (Oman). At the end of Operation Desert Shield/Storm, there were 19 Navy ships operating in the Red Sea and 99 Navy ships operating in the Persian Gulf.

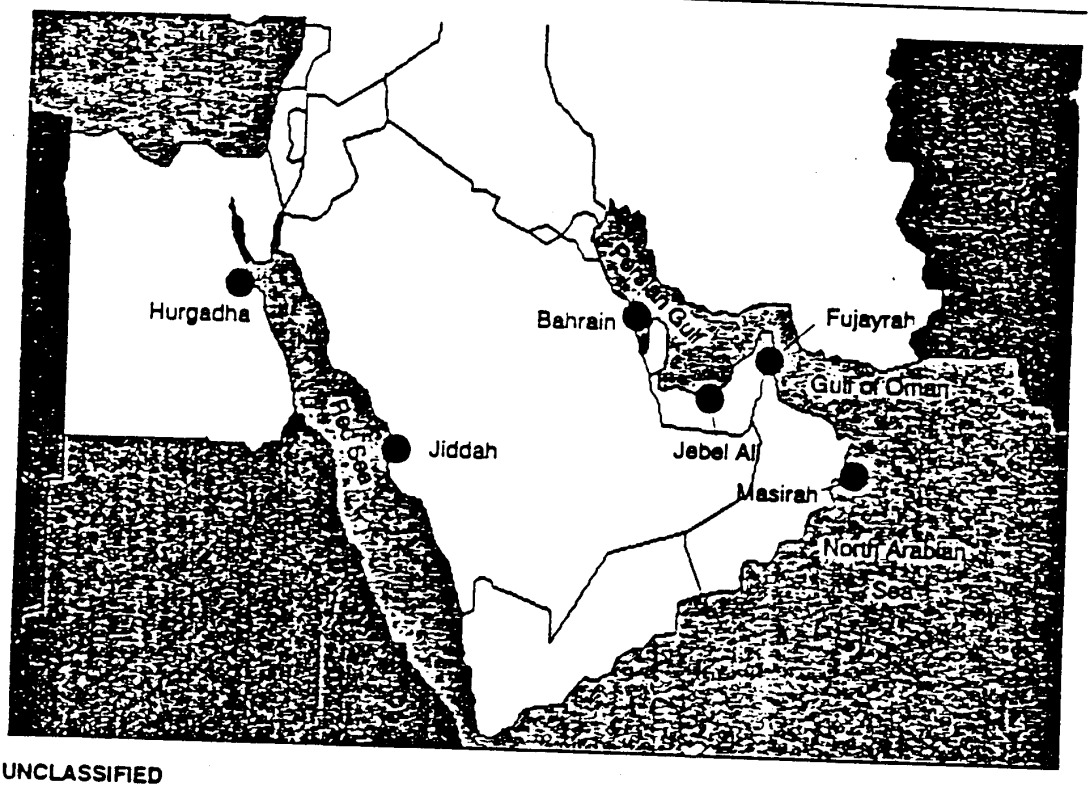

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Figure 4-1. NAVCENT operating areas and logistics bases

(U) Figure 4-2 shows the basic concept of operations for logistics support in the Persian Gulf. MAC channel flights carried airworthy material into theater from Norfolk and Cubi Point. CONUS material bound for units operating in the Persian Gulf went on MAC channel flights from Norfolk to Bahrain. Material coming from Cubi Point went by MAC channel flights to Fujayrah, UAE. Shipments then were delivered by carrier onboard delivery/vertical onboard delivery (COD/VOD) aircraft to the units at sea. COMUSNAVLOGSUPFOR also managed an intratheater channel lift of C-130s and C-9s to move cargo between Bahrain and Fujayrah, depending on the location of the receiving unit as indicated in figure 4-2.

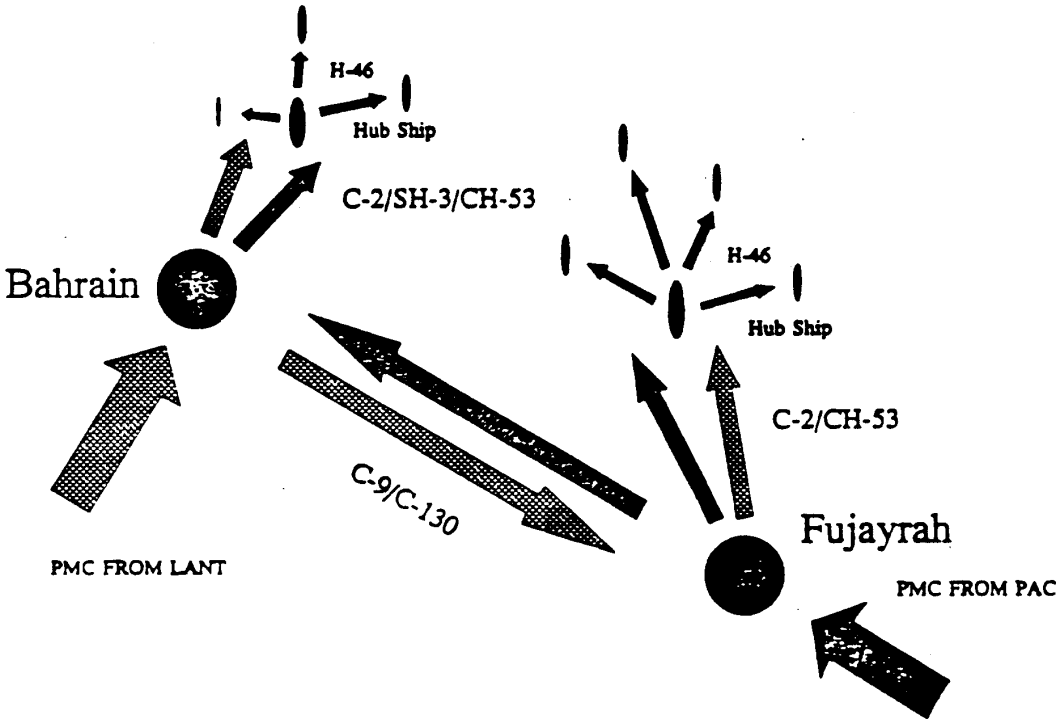

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Figure 4-2. PMC flows in the Persian Gulf

(U) As figure 4-3 shows, nonairworthy cargo was received at the Jebel Ali seaport and either distributed directly to the fleet, or trucked to Fujayrah for subsequent airlift.

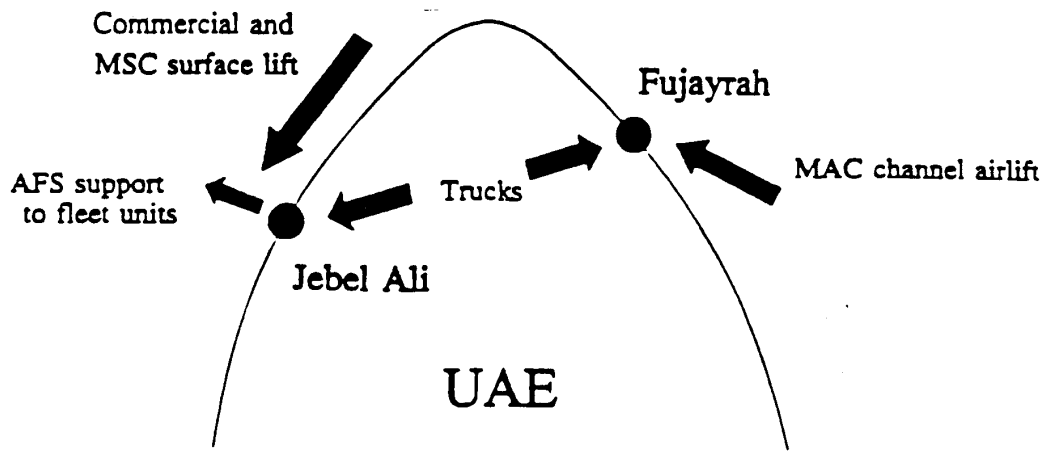

Figure 4-3. Logistics support sites in the UAE

(U) Figure 4-4 portrays the basic concept of operations for logistics support in the Red Sea. . Units in the northern Red Sea were supported from Hurghada, while those farther south were supported from Jiddah. Both sites received C-130 and C-9 flights from Sigonella, and Jiddah could accommodate C-141s.

Site Operations

Bahrain

(U) Airworthy cargo was received from outside the theater at the south ramp at Bahrain International Airport (BIA). This ramp supported C-5A, C-141, C-130, C-9, and C-12 aircraft, as well as contract commercial, charter, and Civil Reserve Air Fleet (CRAF) aircraft. From the south ramp, cargo was trucked to the warehouse located at the Mina Sulman commercial pier area, about 10 miles distant. Airworthy cargo outbound to ships at sea was trucked from the warehouse to the COD/VOD ramp at the north side of the airport. Other air cargo was trucked from the warehouse to the south ramp at BIA.

Fujayrah

(U) Fujayrah was the primary transshipment resupply port during the initial phase of Desert Shield when the CVBG and amphibious task force operated in the NAS and the Gulf of Oman. Surface resupply operations were shifted to Jebel Ali with

the buildup of NAVCENT forces in the Persian Gulf. The local COMUSNAVLOGSUPFOR detachment operated out of the Fujayrah International Airport, using existing ramp, warehouse, and cargo-handling facilities. Fujayrah was the airport of debarkation (APOD) for air cargo inbound from Cubi Point. Material bound for units serviced out of the seaport at Jebel Ali was trucked there across the central UAE (a distance of about 150 km). Material bound for units in the northern Persian Gulf was flown via the C-130/C-9 channel to Bahrain.

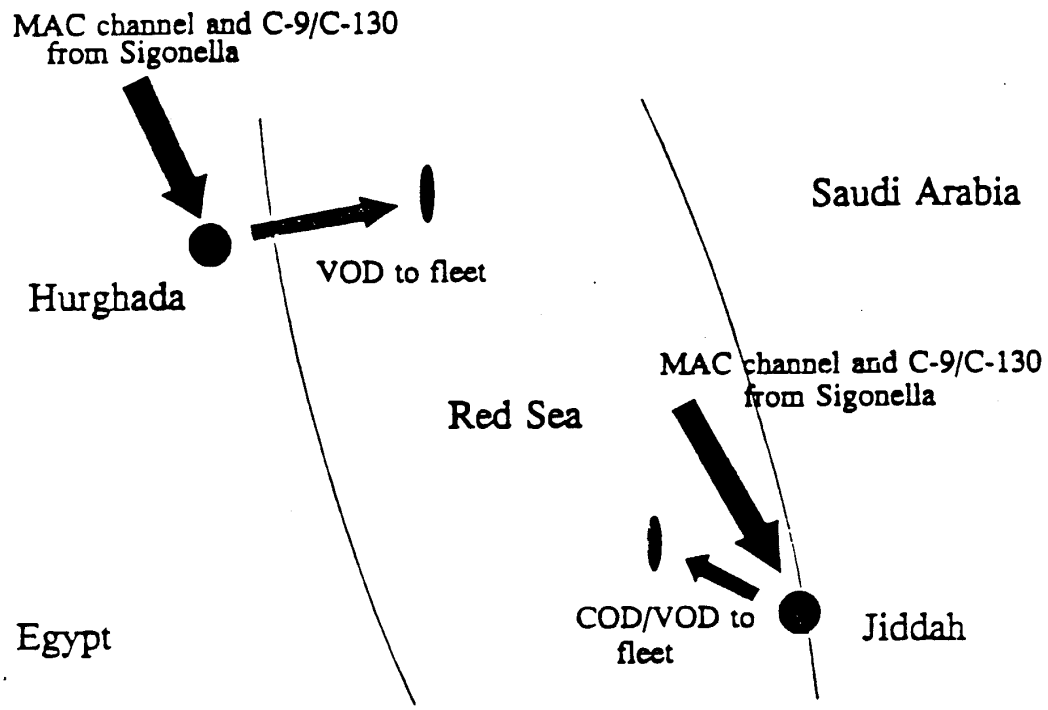

Figure 4-4. Logistics support of units in the Red Sea

Jebel Ali

(U) Jebel Ali was the primary seaport used to support Navy units in the Persian Gulf. Most cargo arrived at the west commercial container pier, to be trucked to the warehouse located at the east pier. From the east pier, material was loaded onto one of the five AFSs operating out of Jebel Ali, for delivery to units in the Persian Gulf. All surface lift to ships in the Persian Gulf was handled from Jebel Ali.

Jiddah

(U) Jiddah provided both airlift and AFS resupply services to units deployed to the Red Sea. The CLF warehouse was based in the commercial port, while the air operation was based at King Faisal NAS. Jiddah received air cargo from both Bahrain and Sigonella. Surface lift cargoes then were trucked to the CLF warehouse.

Hurghada

(U) Hurghada was probably the most primitive site, as it was located off the north side of the commercial airport and as the Navy was not permitted to use the existing cargo-handling facilities. The sides of one of the disused taxiways served as the cargo laydown area. The ramps for VOD and channel lift aircraft were simply adjoining sections of one of the inactive runways. Spacesavers and tents served as shelters.

(U) Because of the primitive facilities available at Hurghada, the flow of PMC through Hurghada was very tightly controlled. The cycle for this control was as follows. Sigonella would inform the officer in charge (OinC) at Hurghada of the PMC available for movement to Hurghada on the following day. The OinC would pass this information on to the TF-155 Battle Force Logistics Coordinator (BFLC) along with an indication of the number of COD and VOD flights that could be flown the next day. The BFLC would then communicate to the OinC the number of COD and VOD flights that could be accommodated and what PMC should be sent. The OinC would then tell Sigonella what PMC to send to Hurghada. The next day the aircraft from Sigonella would remain on the ground in Hurghada until the COD and VOD aircraft had returned with retrograde PMC so that this PMC could be returned to Sigonella. This concept minimized the berthing and warehousing requirements at Hurghada.

THROUGHPUT AT SITES

(U) Figures 4-5 and 4-6 show the personnel movement through each of the five major FLSSs. (Throughput is calculated as the simple average of personnel received and personnel shipped out.) Bahrain had by far the largest number of personnel movements, with an average of 197 personnel moving through per day. Fujayrah was next with an average of 87 per day, with the other sites averaging 30 to 50 persons per day. The large numbers in Bahrain and Fujayrah are due to their being the APOD/APOE for all passengers entering and leaving the Persian Gulf

portion of the theater. The exceptionally large numbers of passengers moved through Bahrain after 8 March (Julian 67) included personnel redeploying to CONUS from the theater.

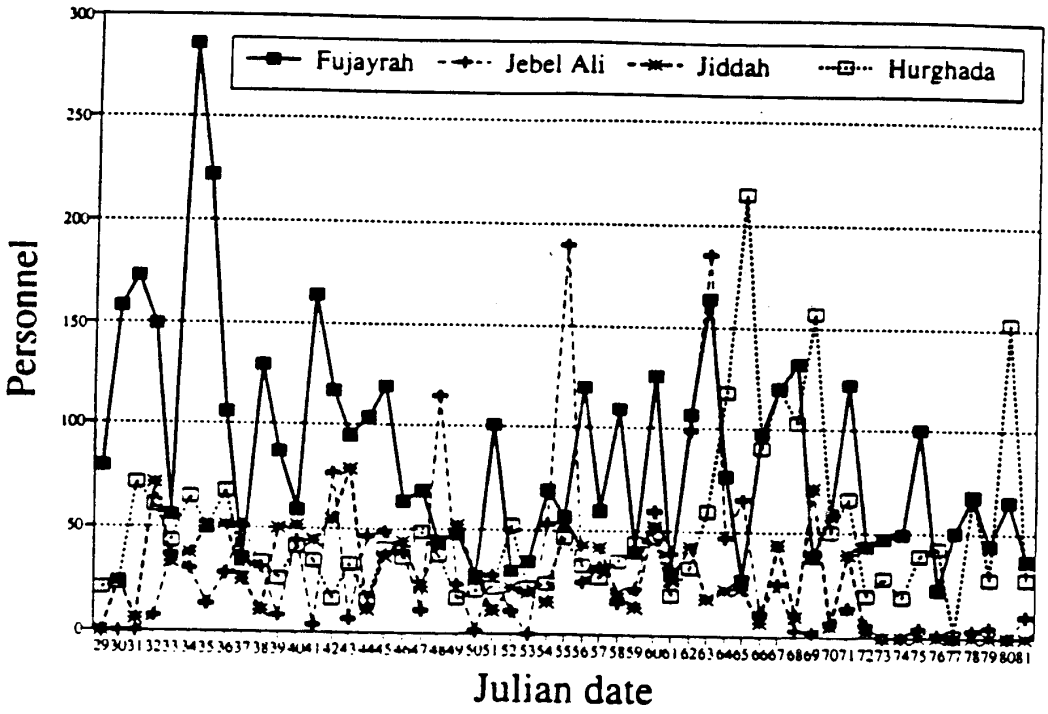

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Figure 4-5. Daily passenger throughput (excluding Bahrain)

(U) Figure 4-7 shows the mail throughput for the sites. Bahrain and Fujayrah handled all inbound and outbound mail for CONUS that originated in or was destined for units operating in the Persian Gulf, Gulf of Oman, or NAS, and therefore had by far the highest average mail throughput, about 41,000 pounds per day and 38,000 pounds per day, respectively.

(U) Figures 4-8 and 4-9 present analogous throughput data for cargo. The large "spikes" in these data correspond to the arrival of multiple large cargo aircraft, usually C-5As, or in the case of Jebel Ali, the arrival of one of the AFSs servicing ships in the Persian Gulf. Average daily cargo throughput at Bahrain (210,000 pounds per day) was more than three times that of the next largest operation, Jebel Ali (67,000 pounds

[redacted]

per day). Based on average daily throughput, Jiddah (22,000 pounds per day) was the smallest FLSS.

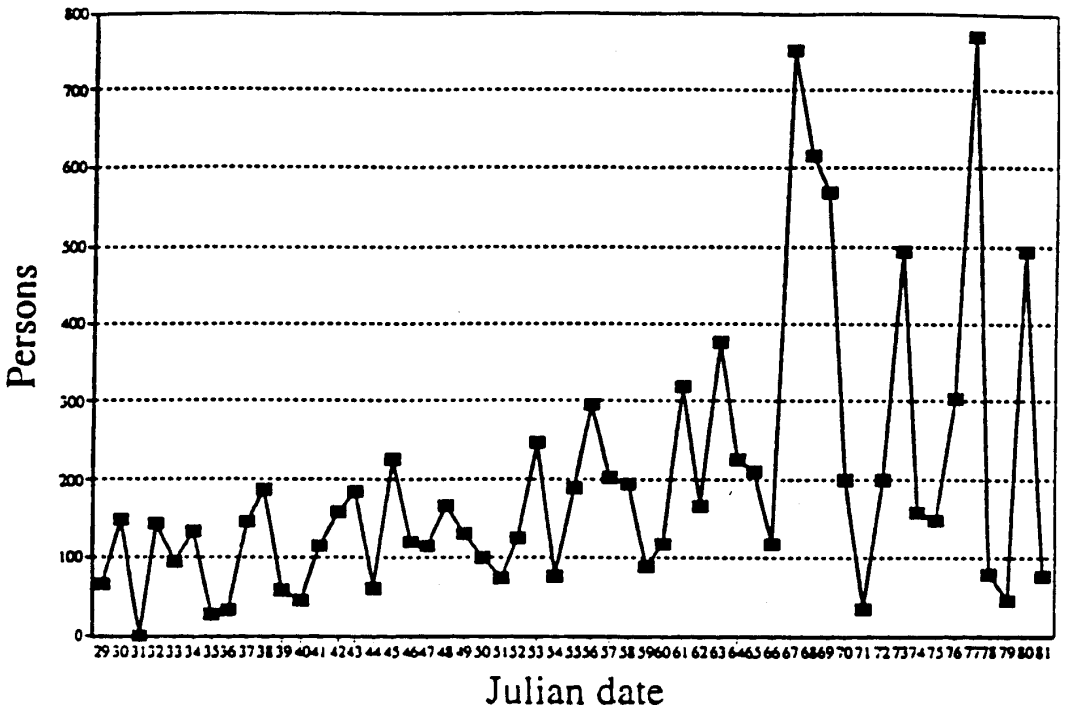

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Figure 4-6. Daily passenger throughput (Bahrain only)

PROCESSING TIMES AT SITES

(U) Receiving units often voiced concern regarding PMC delivery times, particularly for mail. Figures 4-10, 4-11, and 4-12 present data bearing on the speed with which PMC were processed through each of the FLSSs. The concept represented in these figures is that of average processing time, defined for each commodity as the aggregate commodity on hand divided by the throughput.

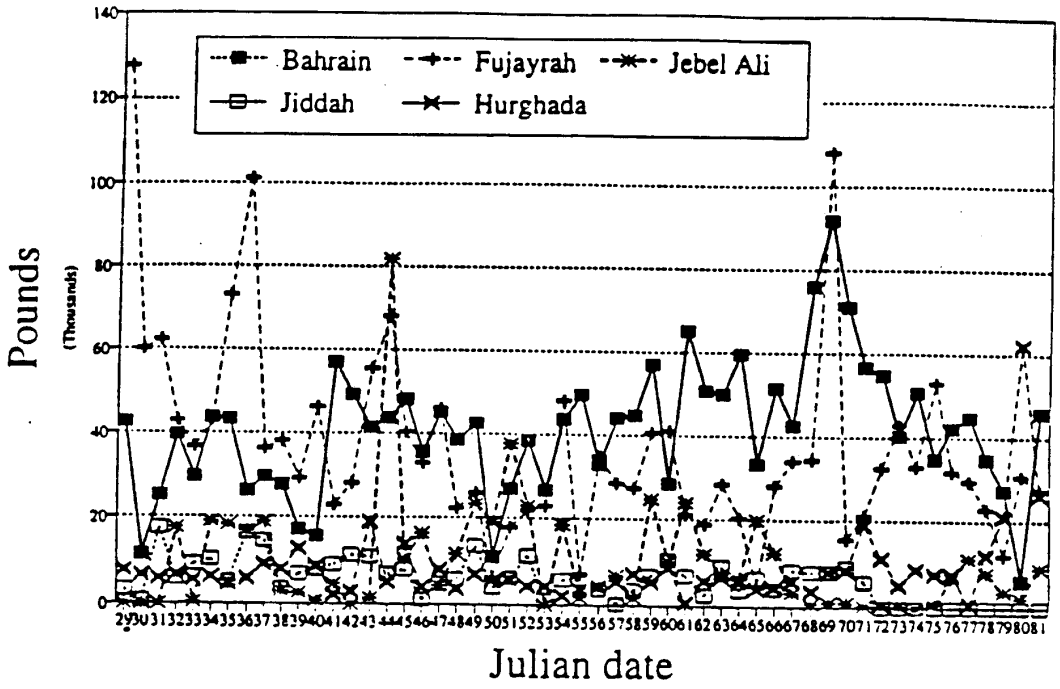

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Figure 4-7. Daily mail throughput

(U) Figure 4-10 provides the average processing times for passengers at each of the sites. Bahrain consistently had the longest passenger-processing times, on average about three days. Jebel Ali, however, experienced exceptionally long passenger-processing times toward the end of this period, which were caused by a small number of personnel waiting for their ship to arrive at Jebel Ali.

(U) Figure 4-11 shows the average processing times for mail. Jebel Ali and, to a lesser extent, Jiddah, consistently displayed longer processing times for mail because these sites supported surface lift, so that mail could easily be held up awaiting a ship. On average, mail moved through Bahrain and Hurghada in less than one day, through Fujayrah in about one day, and through Jebel Ali and Jiddah in about two days.

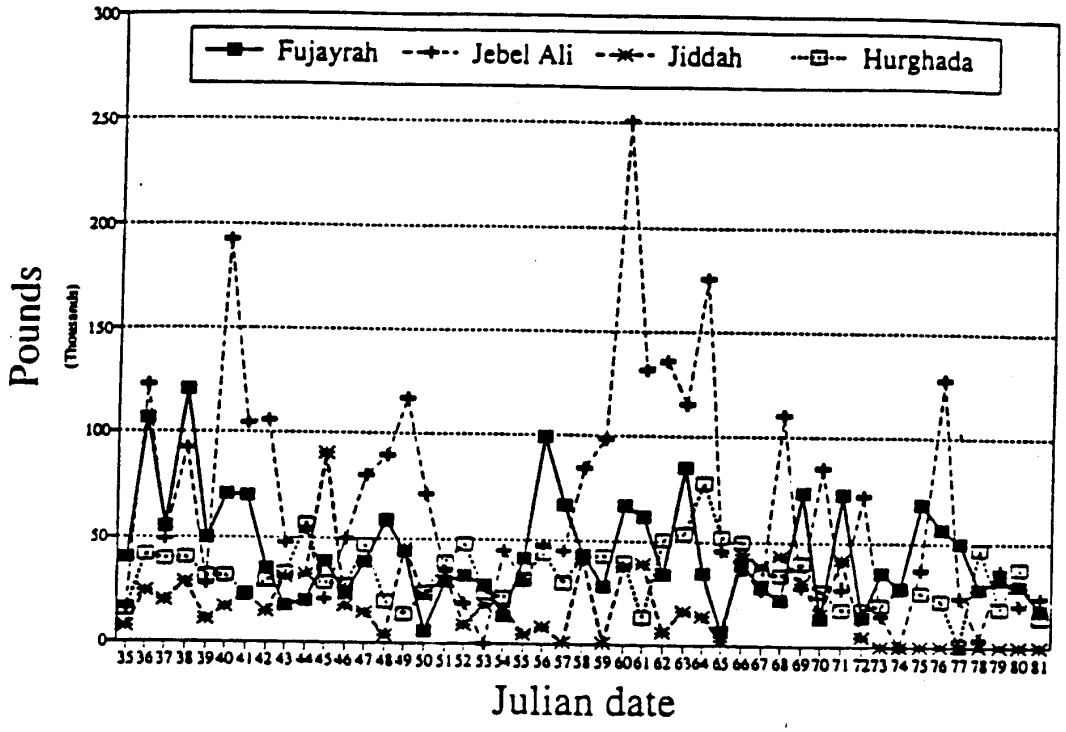

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Figure 4-8. Daily cargo throughput (excluding Bahrain)

(U) Figure 4-12 reports the average processing times for cargo. As with passengers, these processing times tended to be short, with the exception of the times for Jebel Ali. Again, the delays at Jebel Ali were caused by cargo waiting for its surface lift to arrive. Average processing times for cargo ranged from a high of three days in Jebel Ali to half a day in Hurghada.

(U) Figure 4-13 summarizes the PMC processing data for the five FLSSs during the period.

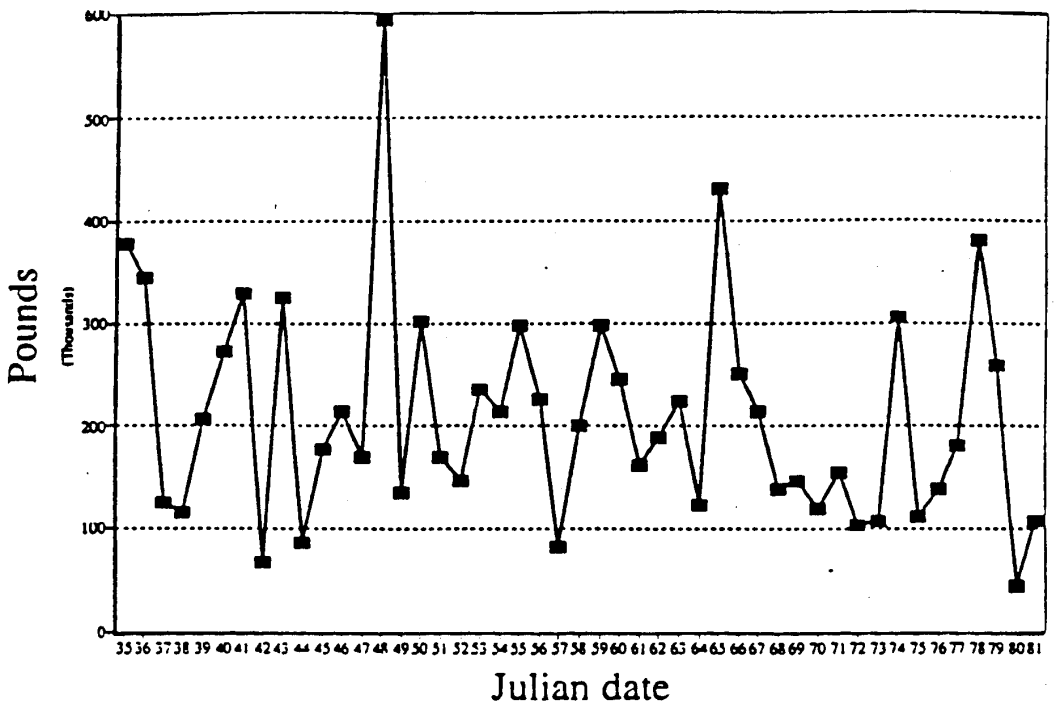

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Figure 4-9. Daily cargo throughput (Bahrain only)

(U) It is interesting to compare the PMC processing times experienced in theater with those experienced by air terminals farther back in the supply chain. Figure 4-14 compares the processing times from three MAC terminals: Bahrain, Cubi Point, and Sigonella. (Bahrain is the only comparable air terminal in theater.) On the whole, Cubi Point experienced longer processing times than either Bahrain or Sigonella. Personnel and cargo waited an average of four or more days at Cubi; mail tended to move faster, with an average processing time of two days.

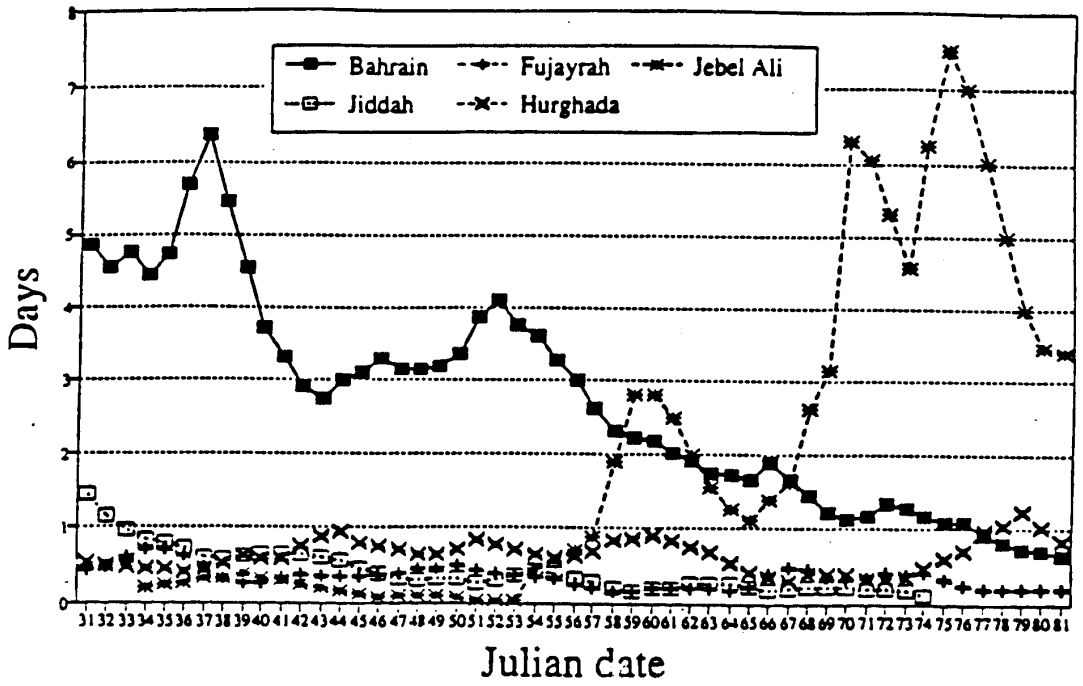

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Figure 4-10. Average processing time for passengers

(U) With respect to Bahrain and Sigonella, personnel moved faster through Sigonella (1.8 days on average in Sigonella vice 3.0 days in Bahrain), but mail moved faster through Bahrain (0.5 days in Bahrain vice 1.8 days in Sigonella). The probable explanation for the difference in personnel processing times is that personnel often were obliged to stay in Bahrain for several days while lift to their shipboard destination was arranged. In contrast, the personnel moving through Sigonella needed only wait for the next cargo plane configured for personnel or contract carrier with seats. Mail in Bahrain generally was taken directly from the mail-processing facility at the south cargo ramp to the COD/VOD area at the north ramp, for lift to the ships. Thus, the short processing time observed makes sense. The longer processing time observed for Sigonella, however, cannot be explained.

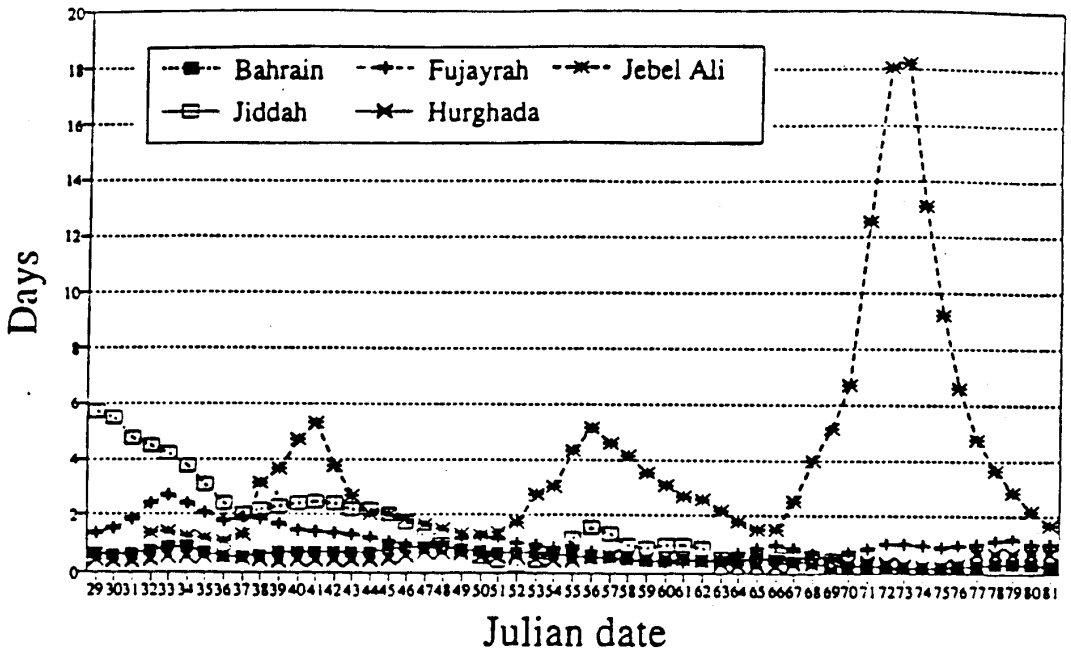

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Figure 4-11. Average processing time for mail

(U) Although the Navy has had a presence in Bahrain since 1948, the change in the quantity of people and material handled in Bahrain since August 1990 was phenomenal. Figure 4-15 shows the quantities of PMC handled by the Bahrain FLSS from August 1990 through February 1991.

PMC SHIPMENT TIMES

(U) The primary shipping-time issues arose with respect to mail and priority repair parts. Estimates of shipment times for these items are discussed in this section.

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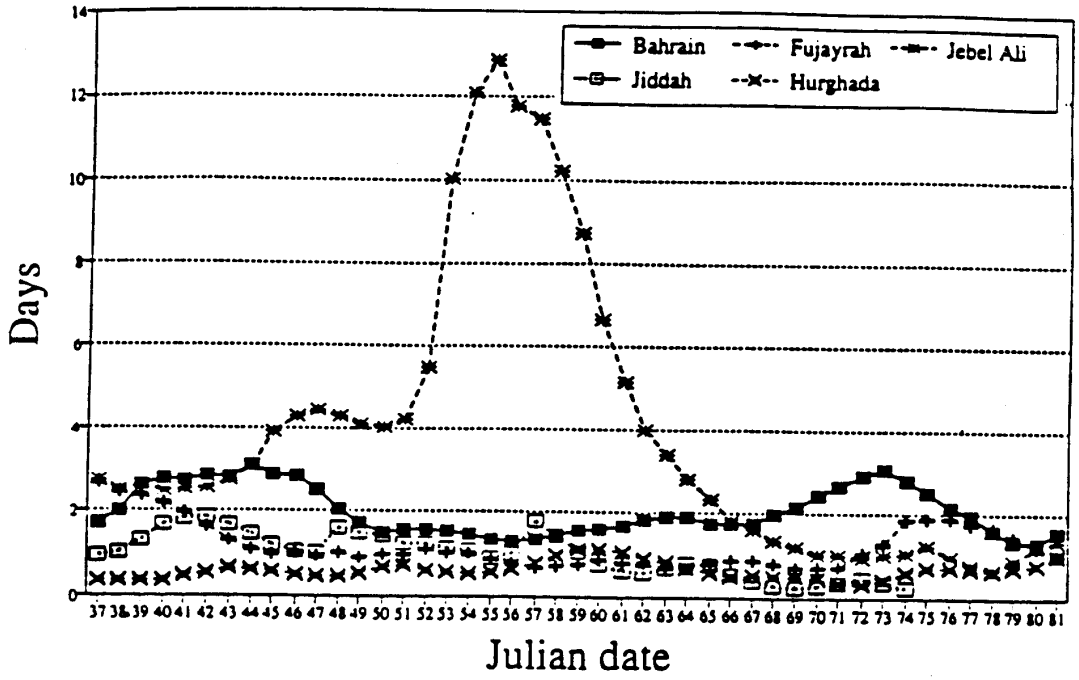

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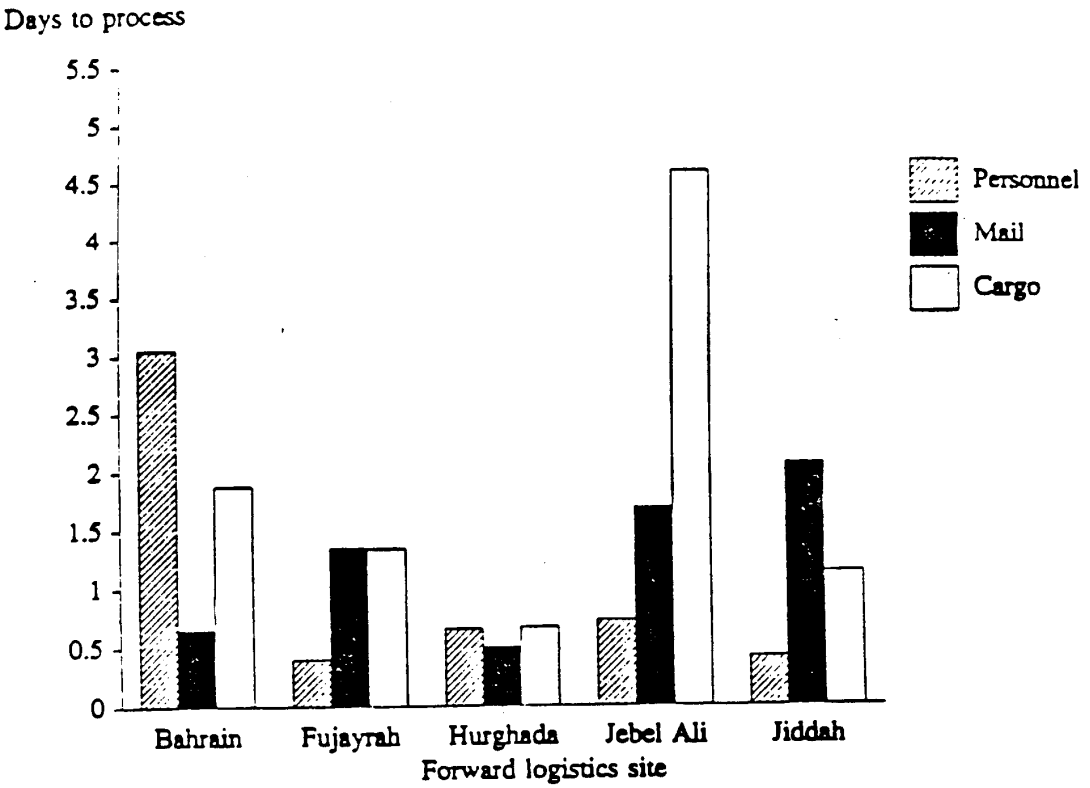
Figure 4-12. Average processing time for cargo

Mail

(U) In response to high-level interest in mail delivery times to the fleet deployed in support of Desert Shield/Storm, and a perception that mail delivery times were unacceptably long (see, for example, COMUSNAVCENT msg 211040Z Feb 91), COMUSNAVLOGSUPFOR undertook a study based on letter mail received at ASU Bahrain. It was found that, on average, letter mail was taking about 12 days from initial mailing to receipt at ASU Bahrain. More than half this time, on average, was required for shipment after the letter cleared the CONUS fleet mail processing center (FMPC).



SOURCE: Daily cargo-on-hand reports

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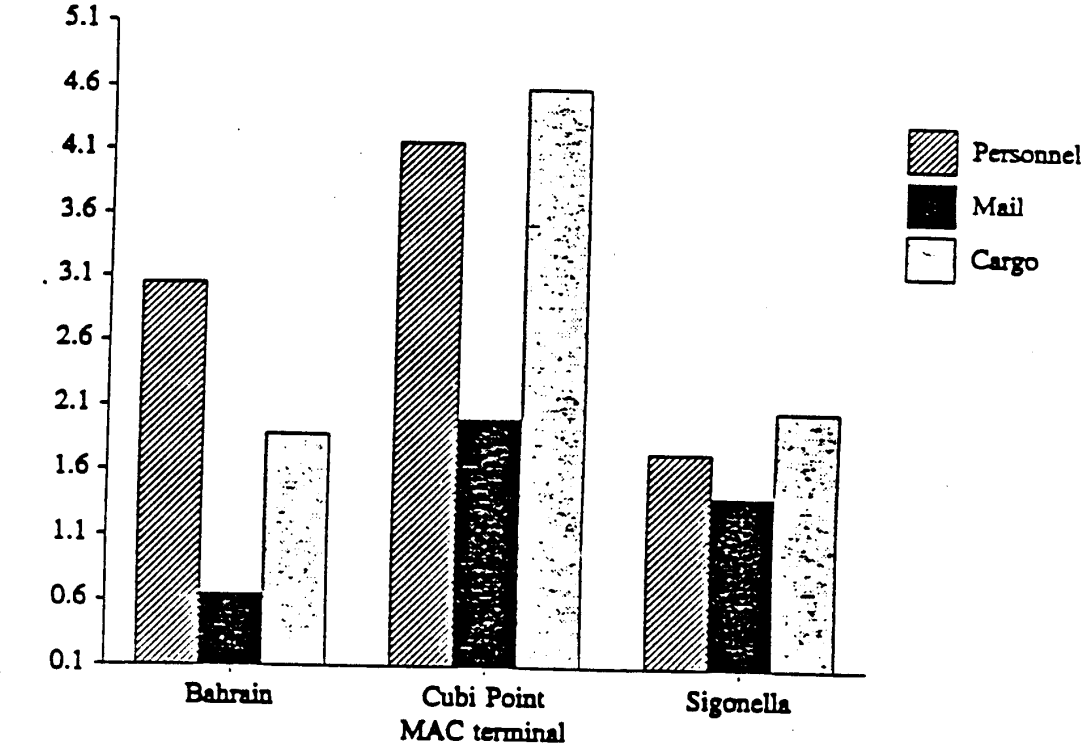
Figure 4-13. Average processing times for PMC forward logistics sites

(U) The sampling procedure for letter mail involved identifying bags of letter mail that had complete FMPC data on the mail bag tag, then drawing a random sample of ten letters from the bag selected. The FMPC data and postmark date for each individual letter was then recorded. It was assumed that initial mailing dates, FMPC processing dates, and dates of receipt at ASU Bahrain corresponded to the date the letter left that location. In this fashion, data for 81 letters were obtained over the period from 24 February to 5 March 1991.



SOURCE: Daily cargo-on-hand reports

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Figure 4-14. Average processing times for PMC at selected MAC terminals

(U) Figure 4-16 represents the overall distribution of mailing times, from initial mailing to receipt at ASU Bahrain. In 18 percent of the cases observed, the letter was received within eight days of being postmarked. The modal (most common) mailing time was nine to ten days, while the average was about 12 days. Unfortunately, almost a quarter of the letters sampled required more than 20 days to be delivered to ASU Bahrain.

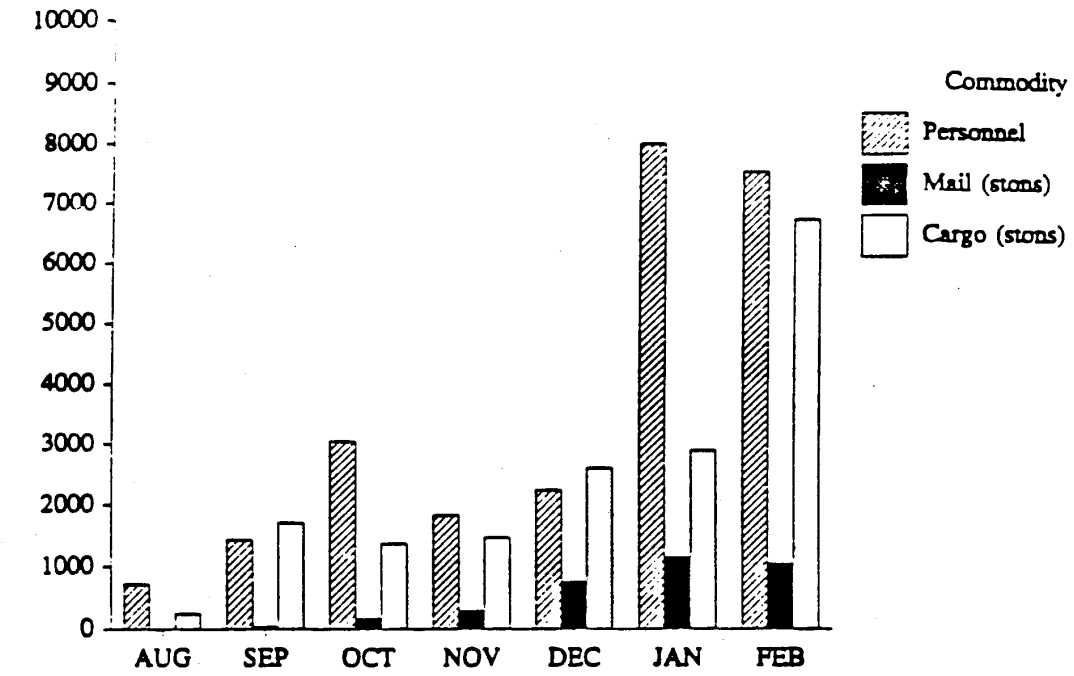

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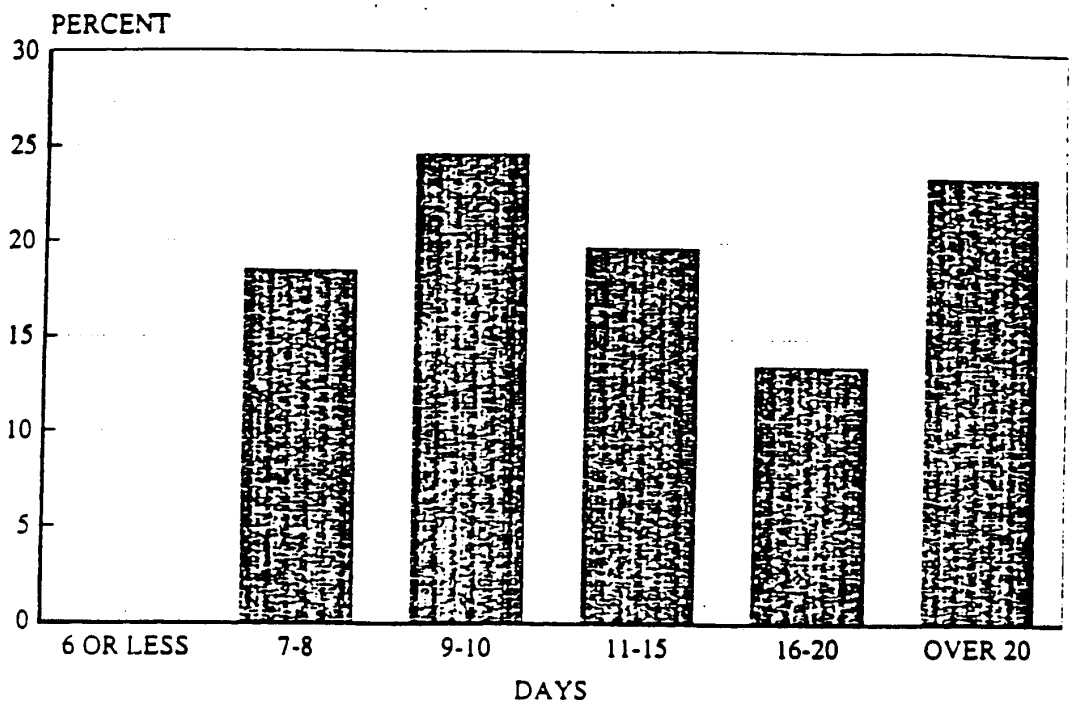
Figure 4-15. PMC growth at Bahrain

(U) Why did some letters take so long to arrive? Some limited information is available from the sample. As figure 4-17 shows, part of the explanation appears to be slow processing at the FMPC. The median time for a letter to clear the FMPC (from initial mailing) was about four days. In about 20 percent of the cases observed, however, at least ten days elapsed between initial mailing and clearing the FMPC. (We do not know from the sample data how long it took for the FMPC to receive the letter, but intra-CONUS mailing times typically are three to five days. It also is worth noting that the sample period does not include the Christmas mailing period.) About 13 percent of the letters sampled required more than 20 days to clear the FMPC.



Data for ASU Bahrain only

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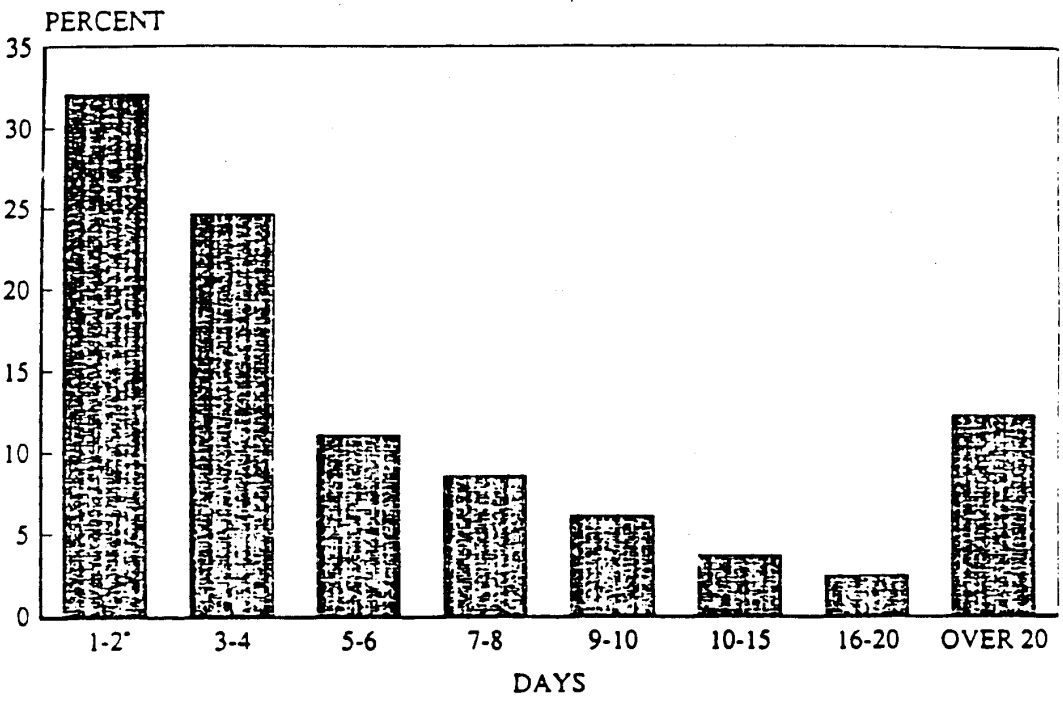
Figure 4-16. Days from initial mailing to receipt at Bahrain

(U) Figure 4-18 suggests another reason why some letters took much longer to arrive than others. The median time required for a letter to get from the FMPC to ASU Bahrain was seven days. But, more than 30 percent of the letters took at least ten days to be shipped from CONUS to Bahrain. This suggests that mail may have been frustrated at the APOE or at an intermediate point such as Sigonella.



Data for ASU Bahrain only

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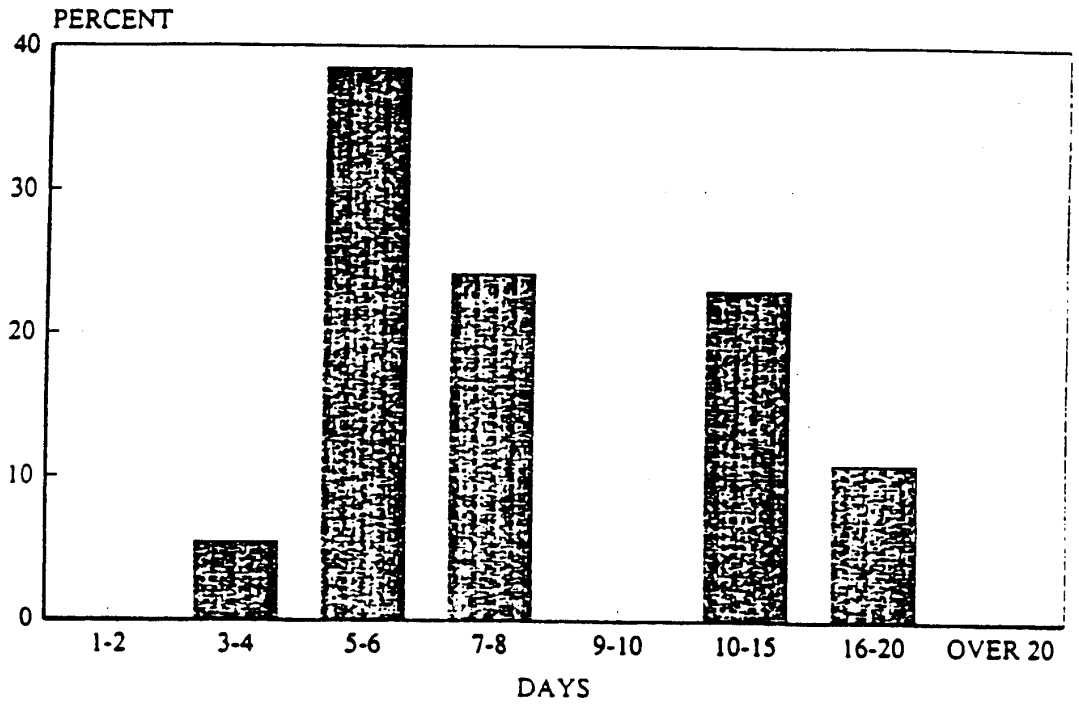
Figure 4-17. Days required to clear fleet mail processing facility after initial mailing

(U) How do these estimates compare to other estimates of mail delivery times? Table 4-1 compares data from the COMUSNAVLOGSUPFOR study, the Standard DOD Transit Time Information Standards for Military Mail (TTISMM) studies,[1] a study performed on USS *Blue Ridge*, and a study performed on data collected by CINCLANTFLT. All of the letters examined in the COMUSNAVLOGSUPFOR study and the CINCLANTFLT studies were shipped through New York to Bahrain; all of the USS *Blue Ridge* letter mail was shipped from San Francisco. Overall, the studies are basically consistent with the observation that, during the peak of Desert Shield/Storm, letter delivery to Bahrain required, on average, 10 to 12 days, with

1. TTISM studies are conducted on an on-going basis by DOD. Samples of letters are drawn at each APO and FPO destination (e.g., 09526 for Bahrain) and the dates of postmark are compared to the dates of receipt. Monthly reports are distributed based on these data to the CINCLANTFLT and CINCPACFLT staffs, among others.

another 2 to 3 days required to deliver letters from Bahrain to the addressees. There was, however, considerable variation in the experience of different ships and units. For example, USS *Blue Ridge* reported mean and median delay times about 7 days longer than these averages, during the same periods.



Data for ASU Bahrain only

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Figure 4-18. Days from fleet mail processing facility to receipt in Bahrain

Table 4-1. Letter mail delivery times to the Persian Gulf for February 1991

UNCLASSIFIED

Length of postal channel	Source of data	Median delivery time (days)	Percentage over 10 days	Percentage over 20 days
Initial mailing in CONUS to Bahrain	COMUSNAVLOGSUPFOR study	12	57	24
	TTISMM	10	43	N/A
Initial mailing in CONUS to addressee on ship	USS *Blue Ridge*	14	80	20
	CINCLANTFLT[a]	13	70	21

a Persian Gulf deployers only

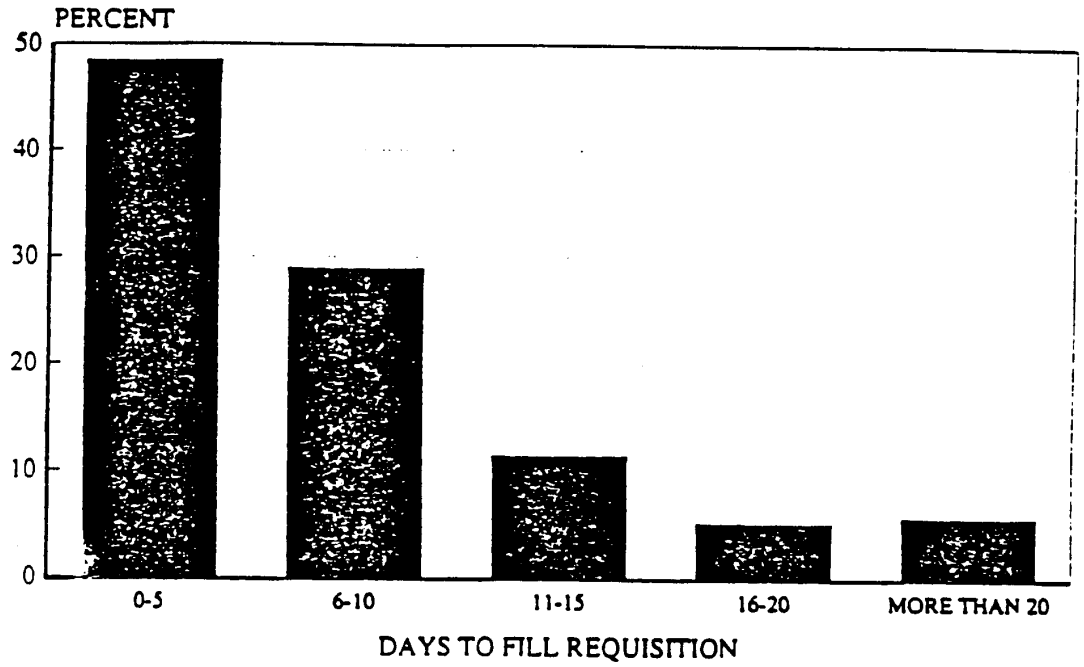
(U) Unfortunately, it is very difficult to determine the causes for mail delays, especially those between Bahrain and the ships at sea. An effort was made at COMUSNAVLOGSUPFOR to check mail bags and letters to ships deployed in the Persian Gulf, but no data tags were ever returned by the ships to COMUSNAVLOGSUPFOR. Anecdotal evidence suggests that mail sometimes "bounced" back and forth between ships, but such instances were nearly impossible to document in any comprehensive way.

Priority Repair Parts

(U) One of the most important logistics successes in Desert Shield/Storm was the ability of the deployed units to keep their organic aircraft at high levels of readiness. Carrier air wings in particular reported MC and FMC rates that consistently exceeded 90 percent, a rate seldom observed during peacetime. A key element in maintaining such high levels of readiness was expeditious shipment of high-priority repair parts for aircraft.

(U) Figure 4-19 shows the overall distribution of the time required to fill priority parts requisitions so that parts can be obtained to repair repair aircraft in either a not-mission-capable supply (NMCS) or a partially-mission-capable supply status.

The distribution is computed for a sample of deployed units including carriers and amphibious ships from both LANTFLT and PACFLT. As is clear from figure 4-19, almost half of the requisitions were filled in five or fewer days (the median time was six days). About 75 percent were filled in ten or fewer days. Thus, overall, the performance of the logistics supply chain for aircraft repair parts was good. On the other hand, some failures also occurred, as evidenced by the 6 percent of the requisitions observed that required more than 20 days to fill.



SOURCE: AMRR data

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Figure 4-19. Overall shipment time required to fill aircraft repair parts requisitions for CV-60, CV-61, CV-71, LHA-4, and LPH-3

(U) Table 4-2 reports mean and median times to fill requisitions, broken down by ship, ship type, and shipment route. Clearly, on average, amphibious ships filled their priority parts requisitions much more slowly than the carriers, by about ten days. Within ship type, there does not seem to be much variation in average times.

[redacted]

(U) It is worth noting that the three carriers in table 4-2 were all equipped with INMARSAT and were, most likely, communicating directly with the Aviation Support Office (ASO) in Philadelphia. *Nassau* (LHA-4) did not receive INMARSAT capability until late in the war and *Okinawa* (LPH-3) was never equipped with INMARSAT. Although the data surveyed here are insufficient to conclude that INMARSAT-equipped ships can reduce the time to fill their requisitions by ten days, the data suggest that INMARSAT-equipped ships may be able to significantly reduce the time required to fill their off-ship requisitions.

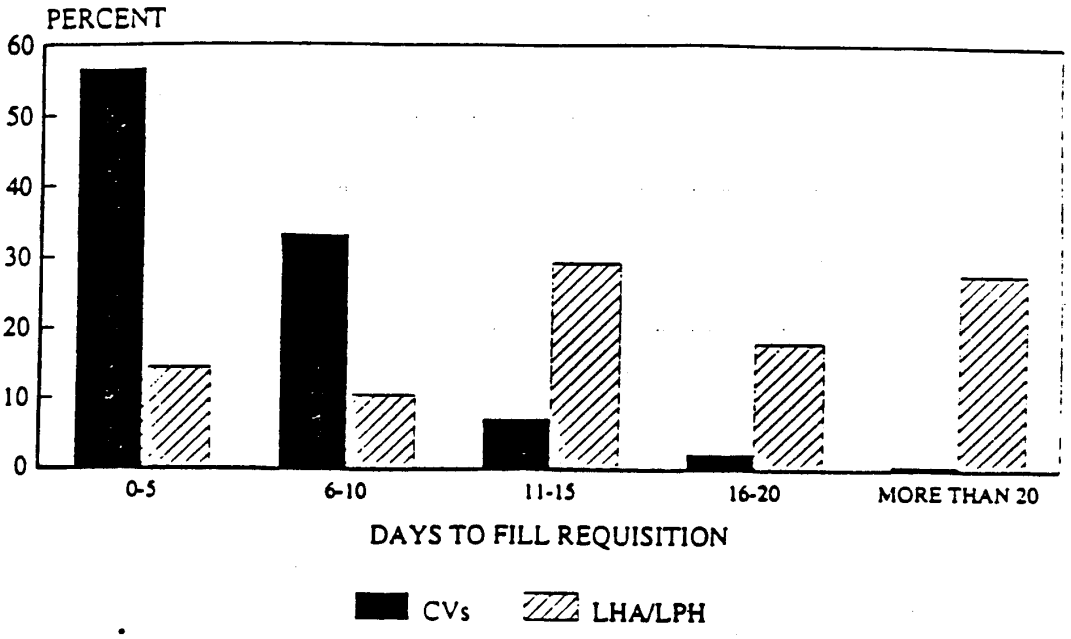
Table 4-2. Time to fill aircraft repair parts requisitions (mean in days, median in parentheses)

UNCLASSIFIED

	All routes	Norfolk/ Bahrain	Cubi Point/ Fujayrah	Unknown
CV-60	4.8 (4)			
CV-61	7.0 (5)			
CV-71	5.9 (5)			
LHA-4	15.3 (12)			
LPH-3	19.5 (18)			
All carriers	6.0 (5)	7.7 (7)	4.7 (4)	5.2 (5)
All amphibious	17.1 (15)	16.2 (14)	18.8 (17)	17.4 (16)
All ships	8.2 (6)	9.6 (7)	8.2 (5)	7.2 (5)

(U) Interestingly, there does seem to be a difference in delivery times depending on how the part is routed, but it is not consistent between ship types. For carriers, parts coming from the supply center at Subic via Cubi Point and Fujayrah arrived about three days sooner. For amphibious ships, however, the reverse is observed; the Norfolk/Bahrain route appears faster by about two days.

(U) Figure 4-20 shows the distribution of shipment times broken down by ship type. It is obvious from figure 4-20 that the longer average shipment time for amphibious ships is systematic, and not merely due to a few very long waits for parts. For amphibious ships, about 45 percent of these requisitions took more than 15 days to fill. By contrast, for carriers, almost 60 percent were filled within five days.

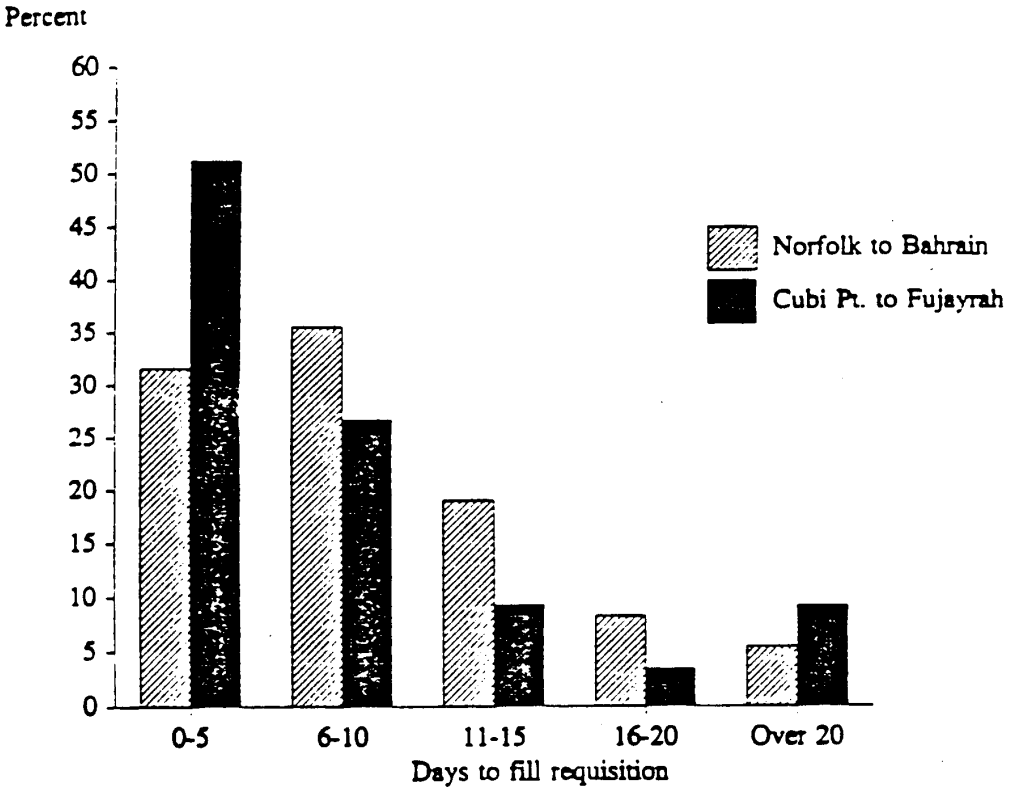


SOURCE: AMRR data

UNCLASSIFIED

Figure 4-20. Shipment times required to fill aircraft repair parts requisitions by ship type for CV-60, CV-61, CV-71, LHA-4, and LPH-3

(U) Figure 4-21 compares shipment times by route. A majority of priority aircraft parts shipped from Cubi Point arrived within five days of requisition, while only about 30 percent of those shipped from Norfolk arrived quickly. Nevertheless, the Cubi Point route had its occasional problems; in 10 percent of the requisitions observed, the requisition filled from Subic required more than 20 days.



SOURCE: AMRR data

UNCLASSIFIED

Figure 4-21. Shipment times to fill aircraft repair parts requirements by route for CV-60, CV-61, CV-71, LHA-4, LPH-3

ORGANIC AIRLIFT RESOURCE USE

(U) Table 4-3 presents data on the use of Navy logistics aircraft in theater during January, February, and March 1991. Focusing on the month of February (for which the entire month of data are available), heavy use of all available logistics aircraft is observed. By number of lift legs, the HC-2 SH-3 helicopters were the most active, with 302 total legs flown. However, based on intensity of aircraft use, which is measured by hours flown per aircraft, the VRC-40 C-2 leads with an estimated 120 hours flown, with the CH-53Es of HC-1 second at 102 hours per aircraft. (These averages are hours flown by the squadron divided by the number of aircraft assigned to the squadron, and do not take into account aircraft downtime.)

Table 4-3. Use of Navy logistics aircraft in theater

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Squadron	Aircraft	Number of aircraft	Personnel/ leg	Cargo/ leg	Total legs flown	Total hours[a]	Hours/ aircraft
			January 1991				
VRC 40	C-2A	1	5.1	2,393.5	27	43.4	43.4
VRC 50	C-2A	2	5.4	1,987.4	142	206.2	103.1
Total	C-2A	3	5.4	2,051.6	169	249.6	83.2
VR 59	C-9B	2	15.9	5,996.9	90	124.7	62.4
HC 1	CH-53E	2	16.4	5,495.5	30	66.1	33.1
HM 15	MH-53E	3	5.8	3,040.2	64	76.6	25.5
HC 2	SH-3G	4	4.8	578.5	173	237.0	59.3
C 12 BAH	UC-12B	4	2.6	213.7	100	172.6	43.2
VRC 50	US-3A	1	2.9	441.3	14	19.6	19.6
			February 1991				
VRC 40	C-2A	1	5.8	2,504.4	104	120.0	120.0
VR 55	C-9B	1	13.2	4,062.2	76	98.7	98.7
VR 57	C-9B	1	9.9	3,555.6	81	78.7	78.7
VR 59	C-9B	2	11.9	5,695.9	90	108.2	54.1
Total	C-9B	4	11.7	4,537.4	247	285.6	71.4
HC 1	CH-53E	2	10.8	5,729.4	134	204.2	102.1
HM 15	MH-53E	3	8.1	4,106.6	166	212.9	71.0
HC 2	SH-3G	4	5.2	613.6	301	360.3	90.1
C 12 BAH	UC-12B	4	2.6	95.8	247	367.6	91.1
			March 1991				
VR 59	C-9B	2	13.6	6,363.2	63	86.2	43.1
HC 1	CH-53E	2	13.9	7,047.6	27	36.5	18.3
HM 15	MH-53E	3	7.4	4,519.8	28	39.2	13.1
CH 2	SH-3G	4	4.2	513.6	69	86.0	21.5

a Data for January and March are for half months (i e , data are from 15 January to 15 March).

[redacted]

(U) If the figures for January and March are doubled to account for half-month data availability, distribution trends in aircraft use can be observed. Relative to February, high levels of C-2A, C-9B, and CH-53E use occurred in January. Use of C-9Bs remained relatively high in March, although use of other logistics aircraft declined significantly after the suspension of hostilities.

(U) Table 4-4 compares the monthly flight hours per aircraft of the COMUSNAVLOGSUPFOR logistics aircraft listed in table 4-3 to the averages for all Navy and Marine aircraft of the same type for the three-month period covering the war and the year preceding the Iraqi invasion of Kuwait. All aircraft, except the US-3A and the C-9Bs, flew many more hours per aircraft than other aircraft of the same type both during the war and the year preceding the invasion. All the Navy's C-9s flew 39 percent more hours per aircraft during the war than the year before the invasion.

Table 4-4. Monthly flight hours for logistics aircraft

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Aircraft type	COMUSNAV-LOGSUPFOR aircraft 1/15-3/15	All Navy and Marine Corps 1/91-3/91	All Navy and Marine Corps 8/89-7/90
C-2A	147.8	47.3	45.2
US-3A	39.2	60.2	51.7
CH-53E	76.7	22.7	25.9
MH-53E	54.8	28.1	35.1
SH-3G	85.4	28.6	35.7
C-9B	82.7	228.3	163.9
UC-12B	90.0	64.6	59.0

(U) As can be seen from table 4-3, a variety of Navy aircraft were available in-theater lift. PMC on the Bahrain/Fajairah channel was carried on Navy C-9Bs (and Air Force C-130s). The average C-9B mission leg carried about 12 personnel and 4,500 pounds of cargo on pallets. C-2A CODs were used to support the carriers, carrying on average about five personnel and 2,000 pounds of cargo per mission leg. SH-3Gs provided the all-purpose vertical lift to service non-carrier ships, with an average load per leg of about five personnel and 600 pounds of cargo. H-53Es (both CH-53s and MH-53s converted to cargo use) provided heavy vertical replenishment capability.

[redacted]

(U) H-53E performance in particular was an important aspect of the overall success of Navy air logistics. According to figure 4-22, on an average day during February 1991, each H-53E (either CH-53E or MH-53E) carried about 8,500 pounds of cargo and 18 personnel outbound from Bahrain and 2,800 pounds of cargo and 4 personnel back to Bahrain from the ships. Thus, a lack of H-53Es would have had a significant effect on organic lift. On the other hand, the H-53Es obviously were not capacity constrained on average, since loads in the 11,000- to 12,000-pound range are relatively light for this aircraft (i.e., 8,500 pounds of cargo plus 3,500 pounds of personnel). Thus, planning factors for H-53E use should assume relatively light loading in this kind of role.

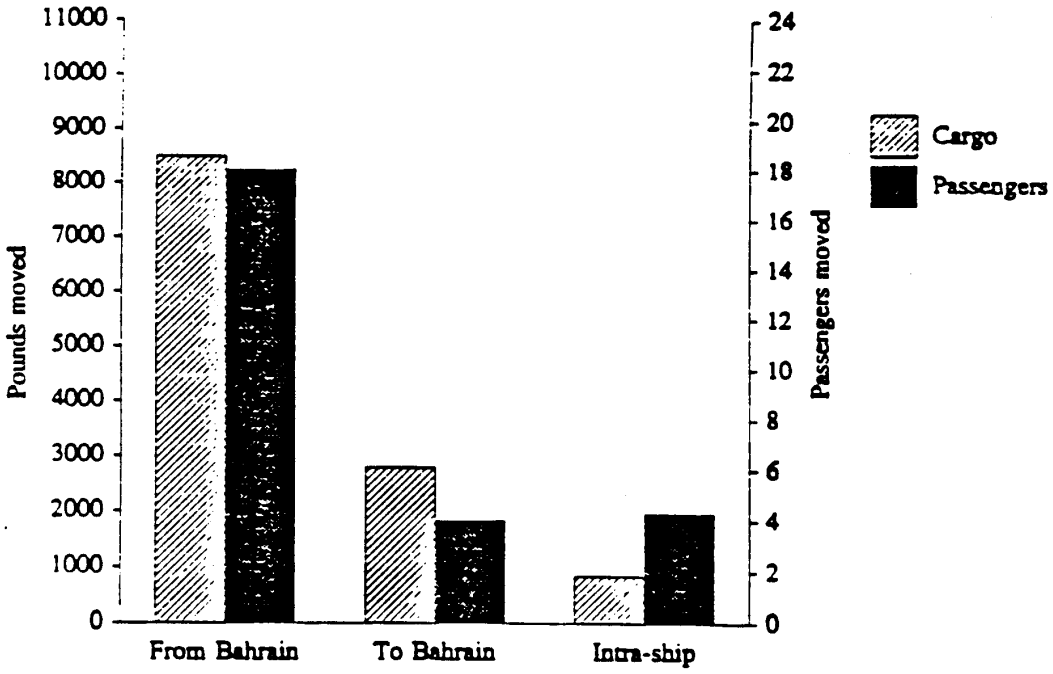


Figure 4-22. H-53E lift statistics from 2 to 15 February

(U) Another dimension of H-53E performance in this role was its mechanical reliability. On an average day during February 1991, 3.2 of the 5 H-53Es were up, with an effective MC rate of 64 percent (figure 4-23). By comparison, figure 4-24 shows

that three of the four SH-3Gs were up on an average day during this period, for an effective MC rate of 75 percent. Based on the small number of aircraft, the H-53s were not significantly less reliable than the SH-3Gs.

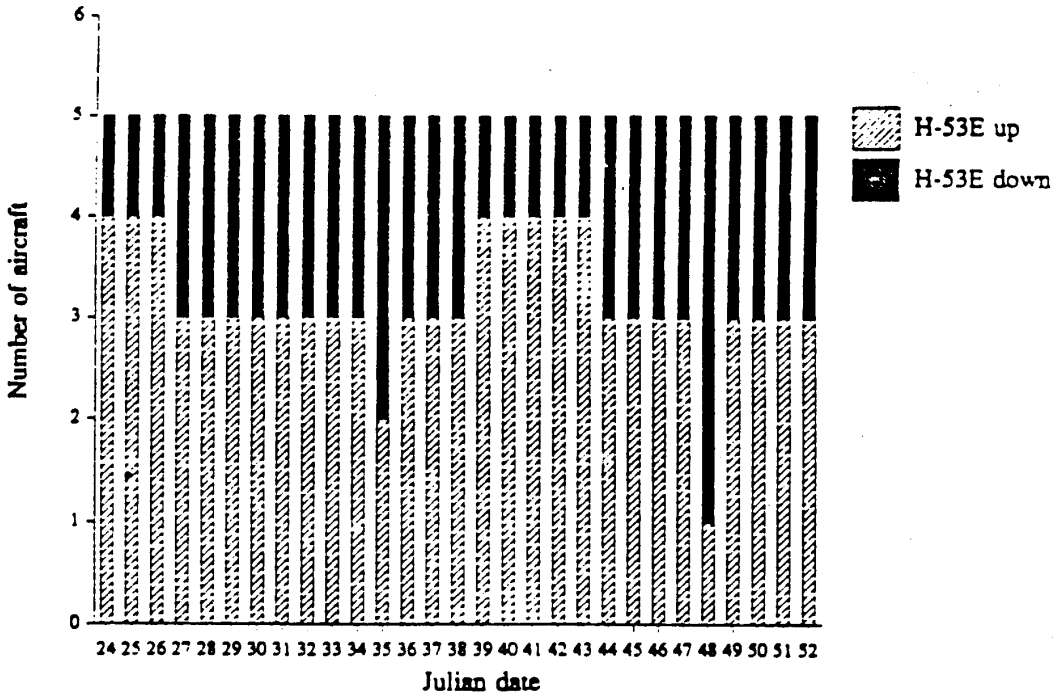
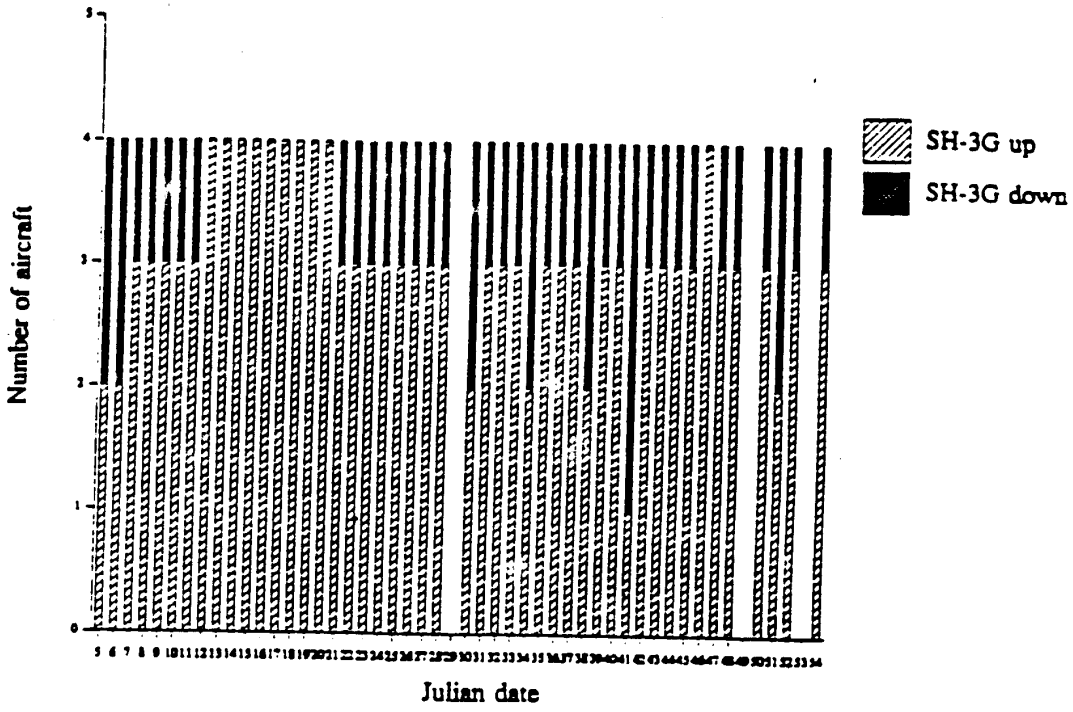


Figure 4-23. H-53E readiness from 24 January to 21 February

(U) The Navy Air Logistics Coordination Center (NALCC) in Bahrain scheduled its fleet of aircraft using the standard Navy system, the Navy Air Logistics Information System (NALIS). On the whole, NALIS worked reasonably well.



UNCLASSIFIED

Figure 4-24. SH-3G readiness from 5 January to 23 February

MANAGEMENT INFORMATION SYSTEMS

(U) Several management information systems were employed in the NAVCENT AOR to support the distribution of PMC. These included NALIS, which was used to schedule cargo and passengers into MAC and Navy organic airlift aircraft; the Port Asset Control Environment (PACE) system, a single-user cargo-tracking system used by the FLSSs; and the Remote Consolidated Aerial Port Subsystem (RCAPS), the multi-user computer system used at the Navy MAC terminal in Bahrain. Large numbers of very powerful, desktop computers were used throughout the NAVCENT AOR to support logistics. Unfortunately, their use could not be coordinated. In their individual applications, these computers were very valuable, but there was not enough time to develop networks so that information could be shared.

(U) A specific example of the problems created by these systems not sharing data is the difficulty that aircraft schedulers working out of the NALCC had in developing daily flight schedules on NALIS because the demand data for cargo movement resided in the RCAPS system at the Bahrain warehouse complex. The reliability of the RCAPS data is another issue, but even if it were reliable, NALIS could not access it.

(U) RCAPS is a U.S. Air Force system. It was mandatory that it be used by the Navy in Bahrain because the volume of material going through Bahrain was too large to be tracked by the PACE system. Unfortunately, RCAPS had bugs and did not produce useful reports that could be used by COMUSNAVLOGSUPFOR to manage the flow of material through the Bahrain complex. Programs were developed locally to extract the needed information from the RCAPS database. In the long run, the Navy must develop its own set of systems to be used in this type of contingency.

(U) Finally, there is information in CONUS that can be of great value to the fleet if it can be obtained. For instance, knowing the transportation control numbers (TCNs) for items being shipped on a MAC flight from Norfolk to Bahrain can be very helpful to the maintenance officer on a carrier so that he can plan his maintenance and repair activities based upon the parts he will soon be receiving. This type of information was obtained in Bahrain from MAC manifest data that had been posted on a bulletin board system (BBS) in Norfolk. The data was extremely useful, but the steps involved in obtaining it on a regular basis seemed too cumbersome to institutionalize.

(U) The U.S. Navy needs to examine its use of information systems for forward deployment to determine what changes would be worth considering. Networked systems require communication channels to share data. At present, the military communications capacity allocated for logistics is inadequate and certainly will not support additional demands for computer networking. The MAC manifest data that were downloaded from the Norfolk BBS were obtained by making a long-distance phone call from Bahrain to Norfolk. Easy access to commercial long-distance circuits will not be the case in all contingencies.

[redacted]

SECTION 5

COMBAT LOGISTICS FORCE AND FLEET SUPPORT OPERATIONS

(U) This section examines the concept of CLF and fleet support operations, the forces to carry out that concept, and their effectiveness in supporting NAVCENT, during Desert Shield/Storm.

FINDINGS

(U) The following are findings concerning CLF and fleet support capabilities and shortcomings, as a result of Desert Shield/Storm operations:

- The heavy commitment of CLF ships to NAVCENT left a minimal mobile logistics support capability to respond to a contingency in another theater.

- NAVCENT CLF ships, especially the AFSs and TAFSs, conducted RASs with major CVBF ships much more frequently than they normally do during peacetime forward deployments.

- The proximity of FLSSs to NAVCENT operating areas simplified the problem of sustaining the afloat naval forces in theater. Had these FLSSs not been available or been severely damaged by enemy activity, sea lines of communication (SLOCs) to alternate Advanced Logistics Support Bases (ALSBs)/FLSSs would have been greatly extended, requiring significantly more CLF shuttle ships than were committed to Desert Shield/Storm.

- The mobility of fleet support ships (tenders and repair ships) and hence their ability to relocate quickly within the combat theater, assisted in maintaining the operational effectiveness of supported ships. That mobility also enabled the tenders to service ships deploying through their theater.

CONCEPT OF OPERATIONS

[redacted] NAVCENT's CLF operations were based on support principles developed and used by Navy forces in the CINCENT AOR during Operation Earnest Will (in 1986

and 1987). These principles, which were included in COMUSNAVCENT's planning in support of [redacted] follows:

- CTF-73 was to coordinate the resupply and sustainability of U.S. naval forces operating in the Persian Gulf and NAS, including the ships of the Middle East Force. This operation was an extension of the PACFLT logistics pipeline under CTF-73's cognizance.

- CTF-63 was to coordinate the resupply and sustainability of naval forces operating in the Red Sea, as an extension of the Mediterranean logistics pipeline that originated in LANTFLT; POL support of Red Sea forces was to remain the responsibility of CTF-73.

- Middle East Force ships in the Persian Gulf were to be sustained by in-port replenishments (INREPs) and by logistics helicopters, with periodic support in the Gulf from CLF ships present when CVBGs were operating in the NAS.

- Consol tankers were to sustain CLF oilers whenever CVBGs were operating in the AOR.

- Shuttle ships (chartered commercial ships for the PACFLT pipeline, CLF ships for the LANTFLT/Mediterranean pipeline) were to be used to sustain station ships with provisions, fleet freight, and nonairworthy cargo, with a shore transshipment point in the AOR required for the PACFLT delivery pipeline.

- Airheads were to be used to support any major force concentrations (e.g., CVBG, Amphibious Task Force (ATF)).

These principles of logistic support made excellent sense, in that they reflected organizational responsibilities and operational arrangements that had been developed and used in the past.

(U) Some of these logistic support principles endured throughout Desert Shield/Storm, despite the major expansion of naval forces that ensued. As forces expanded in the Persian Gulf, however, the distinction concerning replenishment (INREPs and log helos) of Middle East Force ships there was soon abandoned, with logistics support arrangements for these forces paralleling those for other ships in the Persian Gulf. Late in 1990, two commercial shuttle ships became available for ammunition resupply

of NAVCENT ships in the Red Sea. In early December 1990, COMUSNAVCENT reassigned to CTF-63 the responsibility for managing fuel support for the Red Sea CVBGs, a function that was being coordinated by the FLSS at Jiddah.

[redacted] COMUSNAVCENT stated his intention to parallel as closely as possible the proven relationships in the COMSIXTHFLT and COMSEVENTHFLT structures with respect to operational control/tactical control (OPCON/TACON) of afloat assets. His guidance essentially affirmed the NAVCENT logistic support principles cited earlier. The guidance [redacted]:

- Assigned CTF-63 and CTF-73 responsibilities for managing the flow of material into the AOR, which included coordinating resupply for CLF ships and managing the flow of fuel, ammunition, stores, parts, and maintenance materials.

- Made COMUSNAVLOGSUPFOR NAVCENT's principal agent for managing all logistics support ashore in the AOR, including all airhead and FLSS operations.

- Directed the CVBF commanders, Commander, Amphibious Task Force (CATF), and Commander, Middle East Force (CMEF), to assign Task Group Logistics Coordinators (TGLCs) who would coordinate the CLF assets (including logistics helos), schedule replenishment at sea/fueling at sea (RAS/FAS), and coordinate with CTF-63/73 for consol and resupply of their respective CLF ships. He also assigned OPCON of all CLF ships in NAVCENT to these major task group commanders, and listed the CLF and CLF-augment (e.g., Military Sealift Command (MSC) consol tankers) ships assigned to CTF-63, CTF-73, and COMSCSWA (Commander Military Sealift Command Southwest Asia).

- Identified the need for significantly increased shore-based logistics capabilities to support the expanding NAVCENT force structure. Consequently, the FLSSs at Jiddah, Fujayrah, and Bahrain would have both an airhead operation and a collocated surface resupply port. An additional surface resupply port would be established at Jebel Ali for the resupply of the Persian Gulf and NAS AFSs, and to pre-position a spare AFS load (FILL) there for contingencies. (A spare FILL was also pre-positioned at Jiddah.)

(U) The regional (Red Sea and NAS/Gulf of Oman/Persian Gulf) plans for using CLF station ships were essentially the same, in that these ships (AOEs, AORs, and some

[redacted]

AEs) operated close to their "parent" carriers (in the carrier operating box). Station ships were replenished by shuttle ships at frequent intervals, as will be discussed later.

(U) The FLSSs played an essential role in the execution of the CLF concept of operations. They were the transshipment points for commercial shipping that brought resupply material from CONUS or other theaters. The CLF AFSs called at these surface resupply ports on a scheduled frequency to load resupply materiel and fresh provisions for subsequent delivery to the carriers and other ships. By late February 1991, the FLSSs at Bahrain, Jebel Ali, and Fujayrah channeled support to over 100 U.S. and multinational ships in the Persian Gulf. The FLSS at Masirah was used primarily to support the ATF until the entire ATF moved into the Persian Gulf in January 1991; at that time, the Masirah FLSS was essentially closed down.

CLF SHIPS IN DESERT SHIELD/STORM

(U) Almost 60 percent of the Navy's CLF ships participated in Desert Shield/Storm. Over 40 percent were there during the peak period from January to March 1991. All of the ammunition ships forward deployed were assigned either to NAVCENT or to the Mediterranean during the eight months of the SWA contingency. Table 5-1 reflects the total inventory of CLF ships by ship type assigned to LANTFLT and PACFLT, and the number of ships by type and fleet that participated in this contingency.

(U) As the requirement for significantly expanded NAVCENT force levels became apparent, the need for concomitant increases in CLF ships to provide sea-based logistics support was recognized by the sourcing fleet commanders. Concern over the availability of additional CLF ships, and the need for CLF augmentation from the Ready Reserve Force (RRF) and the Afloat Prepositioned Force (APF) was voiced by these commanders in messages to higher authority early in Desert Shield. Table 5-2 depicts the buildup of CLF ships over time in the NAVCENT AOR. RRF ships and APF tankers used for consol and other CLF support operations are not reflected in these data; their contribution will be addressed separately. During this major regional contingency, the Navy demonstrated its ability to surge sufficient CLF ships to provide adequate logistic support to the expanding NAVCENT forces.

[redacted]

Table 5-1. CLF ships assigned to NAVCENT

UNCLASSIFIED

Ship type	LANTFLT		PACFLT	
	Total	Assigned[a]	Total	Assigned
AOE	2	2	2	1
AOR	3	1	4	1
AE	5	2	7	6
T-AE	0	–	1	1
AFS	3	3	4	4
T-AFS	2	2	1	1
T-AF	1	1	0	–
AO	3	1	2	1
T-AO	10	5	7	5
Total	29	17	28	20

a Includes four ships deployed in TF-63 during Desert Shield/Storm

Table 5-2. Number of CLF ships operating in support of Desert Shield/Storm

UNCLASSIFIED

CLF types	7 Aug 90	17 Nov 90	17 Jan 91	24 Feb 91
AE/T-AE	1	2	5	7
AFS/T-AFS	1	2	6	6
AO/T-AO	2	3	6	6
AOE	0	1	3	3
AOR	0	0	2	2
Total	4	8	22	24

(U) Many of the CLF ships assigned to NAVCENT during Desert Shield/Storm deployed to that AOR as units of CVBGs. USS *White Plains* (AFS-4), USS *Cimarron* (AO-177), USNS *Andrew J. Higgins* (TAO-190), and USS *Flint* (AE-32) were the initial CLF ships to join NAVCENT, arriving with the *Independence* CVBG in early August 1990. To the extent possible, operational control of CLF ships was left to the parent CVBG. During the course of the contingency, these ships were dispersed

among as many as four operating areas where their "customers" were located. Table 5-3 shows the geographic areas of all CLF and customer ships in NAVCENT on 7 August (C-day), 17 November (end of phase I), 17 January 1991 (D-day), and 24 February (G-day). In a few instances, one or two customer ships were out of their assigned area on the date shown, but the data reflect the approximate number of NAVCENT ships in each of the areas at that time during the contingency. The number of ships assigned to NAVCENT doubled within two months of the beginning of phase II on 17 November, with a threefold increase in the number of CLF ships during that period. Table 5-3 data for 24 February in the Persian Gulf reflect the movement of TF-156 (the ATF) into that region in preparation to begin the ground campaign and the movement of an additional CVBG into the Gulf to support the air campaign.

Table 5-3. Geographic disposition of CLF and other NAVCENT ships (customer ships/CLF ships)

[redacted]

Area	7 Aug 90	17 Nov 90	17 Jan 91	24 Feb 91
Persian Gulf	8/0	31/2	36/8	71/18
NAS/Gulf of Oman	4/4	3/5	25/5	1/1
Red Sea	0/0	7/1	21/9	17/5
Total	12/4	41/8	82/22	89/24

BATTLE FORCE LOGISTICS COORDINATION

(U) In November 1990, COMUSNAVCENT established a decentralized logistics management structure to cope with the complex logistics requirements of a rapidly expanding force. He directed his task force commanders to establish TGLCs for logistics coordination and management of logistics assets. CTF-154 and CTF-155, who commanded the CVBF in the NAS, Gulf of Oman, and Persian Gulf and the CVBF in the Red Sea, respectively, implemented a BFLC concept to coordinate the multi-CVBG logistics support within each of these battle forces. In early January 1991, CTF-154 and CTF-155 promulgated standing OPTASKs for logistics [5-4 and 5-5]. These OPTASKs set forth the guidance and procedures that would govern logistics support of their battle forces and of other U.S. naval forces in their

[redacted]

respective geographic areas. These OPTASKs were comprehensive in that they addressed the procedures and planned use of logistics assets to effect a full range of support.

(U) The CTF-154 and CTF-155 OPTASKs described the concept for using the CLF ships. The following summarizes the CTF-154/155 OPTASK concept and procedures and the CLF operations in support of NAVCENT forces.

Persian Gulf, Gulf of Oman, and NAS CLF Operations

[redacted] The CTF-154 BFLC promulgated periodic logistics plans for air and surface resupply of the battle force, and weekly in-theater PMC routing messages for the battle force to COMNAVLOGSUPFOR. The BFLC also scheduled CLF ships into resupply ports and anchorages, and put out weekly schedules for consol tanker resupply of battle group station oilers. The battle force logistics plans did not include detailed replenishment evolutions for individual battle groups (which remained the responsibility of the battle group commander), but provided windows for battle-group-level schedules between the events the BFLC scheduled (e.g., resupply port visits and consol operations).

[redacted] Each of the CVBGs were assigned dedicated CLF ships to the extent possible. These ship assignments were later modified, and the CLF ships were used as necessary among the several CVBGs (and other task forces) in the Persian Gulf once hostilities began on 17 January. For example:

- *Spica* supported both the *Midway* and *Ranger* CVBGs following arrival of the *Roosevelt* CVBG in the Persian Gulf on 20 January. In her capacity as commodity manager for the *Roosevelt* and *Ranger* CVBGs, *San Diego* shuttled fresh fruits and vegetables (FFV) to both of those CVBGs and to the *America* CVBG as well. *Niagara Falls* was primarily employed in cylical resupply of non-CVBG units throughout the Persian Gulf, including Fleet Hospital 5 and other U.S. Navy units in Bahrain.

- *Kansas City* primarily supported the *Ranger* CVBG, but also refueled and resupplied the *Midway* CVBG. Although nominally a station ship for the CVBF, *Sacramento* provided multi-product support for the battleships *Missouri* and *Wisconsin* and other ships in the northern Persian Gulf. *Kalamazoo*, the *America* CVBG station ship, replenished *Roosevelt* and northern Persian Gulf ships in February.

[redacted]

- *Hassayampa* primarily supported *Midway*, but also refueled *Ranger* and northern Persian Gulf ships on several occasions. *Platte* was employed almost exclusively in shuttling fuel to the four Persian Gulf carriers.

also Roosevelt

AFS Operations

[redacted] USS *San Diego* (AFS-6) was assigned as MATCONOFF for the CVBF and MATCONOFF for the *Roosevelt* CVBG. *San Diego* also became commodity manager for the *Ranger* CVBG upon addition of the *Roosevelt* CVBG to the Persian Gulf CVBF on 20 January. USNS *Spica* (TAFS-9) was the commodity manager for the *Midway* CVBG. Operational control of USS *Niagara Falls* (AFS-3) was assigned to CTF-151 for support of Middle East Force and Maritime Interdiction Force ships in the Persian Gulf; the CTF-154 BFLC assisted by coordinating *Niagara Falls'* operating schedule with that of the CVBF AFSs. USS *Mars* (AFS-1) and USS *San Jose* (AFS-7) were assigned to support TF-156 (the ATF), including the embarked Marines of the NAVCENT Landing Force (TF-158).

[redacted] Fleet freight, provisions, and resupply for the AFSs were received every week to ten days at Jebel Ali via container ship from Subic Bay. (Fujayrah had been the primary transshipment resupply port for the CVBGs while they operated in the Gulf of Oman and NAS.) The BFLC scheduled the AFSs into Jebel Ali weekly for pickup of FFV, stores, and other materiel (e.g., PMC). The AFSs then conducted RAS of the CVBF ships by the "delivery boy" method (the AFS proceeded to the operating areas rather than having customer ships leave their station to rendezvous with the AFS for "gas station" RAS). Container ships also delivered containers to Jebel Ali earmarked for *Niagara Falls* and the ATF AFSs. The contents of these containers were stored in warehouses, chill and cold-storage facilities until they were issued to an AFS during a subsequent port call. Because the ATF operated predominantly outside the Persian Gulf through January, the weekly resupply port visits of *Mars* and *San Jose* continued into Fujayrah until late January, with their resupply and provisions being moved by truck from Jebel Ali to Fujayrah for pickup. The data contained in tables 5-4 and 5-5 reflect the containerized cargo offloaded in Jebel Ali by shuttle container ships from Subic Bay for the five AFSs in the Persian Gulf and Gulf of Oman between 12 January and 2 February. These data illustrate the major resupply operation that was in place to support NAVCENT operations in the eastern part of the AOR. The detailed data contained in table 5-5 reflect the different densities of the several types of containerized cargo, as well as the relative proportions of cargo types, requested by the AFSs to support NAVCENT forces.

[redacted]

Table 5-4. Container deliveries to Jebel Ali, January 1991

UNCLASSIFIED

Date	Number of containers	Total weight (tons)
12 January	29	573
20 January	308	5,572
30 January	311	4,321

Table 5-5. Breakdown of containerized cargo delivered to Jebel Ali, January 1991

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Cargo type	Number of containers	Percent of total	Total weight (tons)	Percent of total	Total volume (100 ft^3)	Percent of total	Average container weight (lb)	Sample standard deviation (lb)	Average container volume (ft^3)	Sample standard deviation (ft^3)
Chill	63	10	568	5	433	5	19,938	9,723	760	389
Dry	197	31	3,732	36	2,536	31	45,794	7,538	1,556	270
Freeze	112	17	1,764	17	958	12	34,588	12,360	939	320
General	219	34	3,428	33	3,722	45	33,278	15,743	1,807	235
Soda	54	8	943	9	546	7	48,360	5,389	1,400	147
Totals	645		10,435		8,195		32,357		1,271	

(U) AFS/TAFS operations during Desert Shield/Storm were more intensive than those normally conducted by these ships during peacetime forward deployments in several respects. First, they loaded resupply and provisions in port at the FLSSs much more frequently (once a week vice every three to four weeks). Second, the operating areas in which customer ships were located were close to the FLSSs, so that RASs began relatively soon after the AFSs were under way. This meant that they were probably having to make up loads for transfer to their first few customer ships in the next operating period while they were in port and still onloading and storing their resupply and provisions. Third, in the course of their five days at sea every week, the AFSs often serviced a significantly greater number of customer ships. Carriers in the Persian Gulf were replenished by an AFS or TAFS once every seven days on average, much more often than during peacetime deployments. (When AOE

and AOR replenishments are added to this resupply frequency, TF-154 carriers averaged a RAS every four days.) Table 5-6 presents RAS data for USNS *Spica* for the period 17 January through 3 March 1991 that are probably representative of the pace of operations experienced by all AFSs supporting NAVCENT forces in the Persian Gulf and Gulf of Oman area during Desert Shield/Storm. "RAS days" indicate the number of days during the operating period that *Spica* conducted RAS.

Table 5-6. USNS *Spica* CLF Operations in support of NAVCENT forces in the Persian Gulf, 17 January through 4 March 1991

UNCLASSIFIED

Operating period	RAS days	Number of customers	Pallets delivered	Maximum customers per day	Maximum pallets per day
1/17-21	3	9	178	4	104
1/24-28	5	17	982	6	277
1/31-2/4	5	20	954	7	440
2/7-11	5	16	694	5	247
2/14-16	3	15	570	6	287
2/21-26	4	13	854	7	386
3/1-4	3	11	800	5	387

The scheduling of more frequent AFS/TAFS deliveries to CVBF ships allowed for more frequent delivery of FFV, minimal disruption of carrier flight operations, and timely distribution of PMC. Had sufficient AOEs been available to assign one to each carrier, it would have been possible to achieve the same effect with 30-day AFS deliveries to the AOEs and letting the AOEs make weekly deliveries to the carriers. Delivery of FFV would not have been as frequent under this latter scheme.

Oiler/Consol Tanker Operations

(U) The number of oilers—AO/TAO, AOE, and AOR—was sufficient to meet the needs of NAVCENT forces operating in the northern Red Sea, Gulf of Oman, and Persian Gulf. Ships were refueled as often as necessary (about once every three days) to keep them well above 60 percent DFM. The carriers were refueled every two to three days, especially to replenish their JP-5 because of the heavy air operations. The availability of oilers precluded the carriers having to provide fuel to other battle force ships. The delivery-boy method of RAS was used by the oilers for refueling operations.

[redacted]

[redacted] MSC consol tankers were assigned to provide POL support to the CVBF. The number of consol tankers approximately kept pace with the number of CVBGs assigned to the CVBF, with four of these tankers available to TF-154 between 18 February and early March. Frequent fuel transfers were conducted from the consol tankers to TF-154 (and to ships of the multinational force in the Persian Gulf) to enable the fleet oilers to replenish the carriers and other combatants as often as cited above. In January, there were 26 consols, and, in February, there were 30 of these transfers. Table 5-7 shows the products and quantities delivered by these consol tankers to the CVBF. CTF-154 noted that consol tankers with segregated ballast tanks were preferred, because in tankers not so configured, the 50 to 80 mbbls of cargo fuel needed for ballasting is unavailable for consol. Consequently, tankers with segregated tanks can remain on station longer and can be used more flexibly.

Table 5-7. Consol POL support for Persian Gulf battle force (in thousands of barrels)

[redacted]

Month	JP-5	DFM
November	[redacted]	[redacted]
December		
January		
February		

AE Operations

[redacted] Each carrier was assigned a station AE. Two other AEs were assigned as TF-154 AEs. The TAE *Kilauea* provided CLF support to the ATF and then relieved *Nitro* as *Roosevelt* station AE. Rearming of CVBG ships was coordinated by the CVBG commanders, when their ordnance requirements could be met by the inventory on the station AE. Requirements that could not be met by the station AE were passed to the BFLC. Based on reports of issues and reorders, the BFLC coordinated redistribution of the ordnance on the station AEs and battle force AEs. Resupply of ordnance from outside of the theater was provided by inchopping AEs, by an RRF ship (SS *Cape Ann*) activated for assignment as a point-to-point ammunition shuttle ship, and by *Nitro*, which went to [redacted] in February to pick up an AE load that had been pre-positioned earlier in 1990 by *Haleakala*.

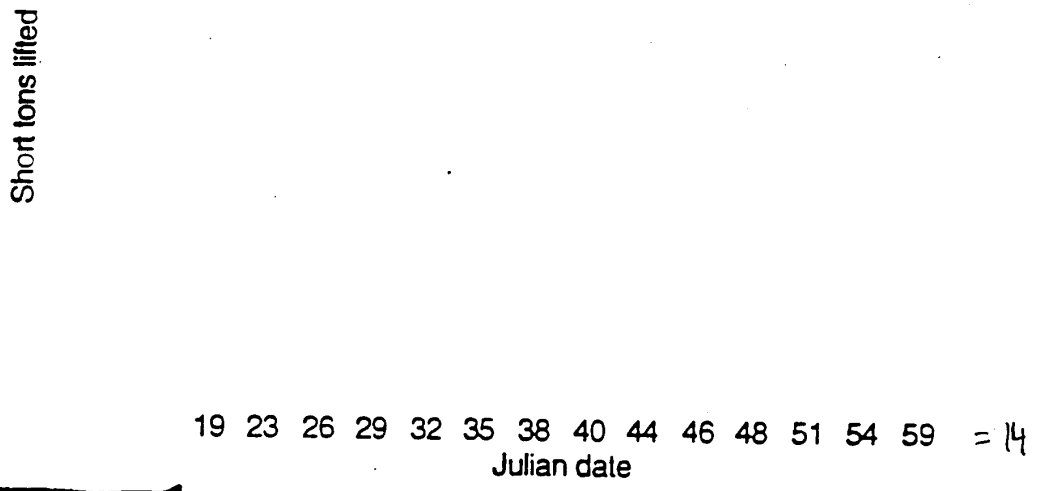
[redacted] Rearmings at sea were conducted every three days by the battle group station AEs. Most of these rearmings at sea were with the carrier to replace aviation ordnance. A number of the rearmings at sea entailed redistribution of ordnance within the CVBF, as well as retrograde. Over 10,000 pieces of retrograde were generated as a result of ordnance expenditures, which caused a significant problem in transferring this materiel from the CVBF ship to a CLF ship (usually an AFS) for further transfer to one of the NAVLOGSUPFOR detachments ashore (e.g., Jebel Ali). Table 5-8 contains data on rearmings at sea of *Ranger* by her station AE, *Shasta*, and reflects both service ordnance delivered and retrograde backloaded by *Shasta*. Figure 5-1 provides these data. (The retrograde portion of the Julian date 54 is truncated because of the ordinate scale, and the stovepipe should extend to a point over 1,000 tons, as shown in table 5-8.) As indicated in table 5-8, *Ranger* received [redacted] transfers from *Shasta*; however, *Ranger* expended [redacted] ordnance, so *Shasta* was not keeping up with *Ranger*'s expenditures. This may be a result of the very high expenditure rates that occurred during the ground war. The weapons used were not replenished because the fighting was terminated before replenishment could take place.

Table 5-8. *Shasta* ammunition lift data

[redacted]

	Transfer		Retrograde		Totals	
Date	Lifts	Short tons	Lifts	Short tons	Lifts	Short tons
19 Jan			54	34.6		
23 Jan			24	9.6		
26 Jan			47	17.1		
29 Jan			44	4.4		
1 Feb			81	20.8		
4 Feb			88	30.1		
7 Feb			57	10.3		
9 Feb			87	51.5		
13 Feb			49	37.8		
15 Feb			44	24.9		
17 Feb			34	13.5		
20 Feb			59	32.1		
23 Feb			638	820.1		
29 Feb			179	73.1		
Totals = 14			1,485	1179.9		
Averages			106.1	84.3		

[redacted]



[redacted]

Figure 5-1. *Shasta-Ranger* ammunition reloads

(U) *Kilauea* CLF support of *Roosevelt* during the last 20 days of February resulted in seven rearmings at sea that delivered over 1,600 short tons of ordnance to the carrier and relieved her of nearly 140 tons of retrograde material. *Kilauea* also transferred over 600 tons of ordnance to other Persian Gulf AEs during ammunition consolidations, and received about 450 tons of ordnance from them. 9 [redacted]-28

Red Sea

[redacted] CTF-155's OPTASK was not as definitive as that of CTF-154, but it was supplemented by daily logistics summaries that covered logistics events completed in the past 24 hours, and scheduled events for the ensuing 24-hour period. CTF-155's concept of logistics support was similar to that of CTF-154. The delivery-boy method of underway replenishment was to be used for off-duty carriers (and presumably accompanying surface combatants). However, provision for "gas-station" deliveries of fuel and support for the off-cycle carrier/escorts and for Maritime Interdiction Force

[redacted]

(TF-151) ships was included in the OPTASK. Principal CLF ships for replenishing CVBF ships were intended to be the multiproduct (AOE, AOR) ships. *Sylvania* was the MATCONOFF for the Red Sea CVBF until relieved of these duties by *Sirius* in mid-February.

(U) The composition and use of the Red Sea CLF differed in some respects from those in the Persian Gulf region. These differences resulted from a number of factors: the number of ships in the CVBF; the proximity of Mediterranean logistics support; the disposition of Red Sea operating areas and the distance of those areas to the FLSSs at Jiddah and Hurghada; and Sixth Fleet support concepts of logistics support. The CLF/customer ship population in the Red Sea is shown in table 5-3, and reflects the redeployment of the *America* CVBG to the Persian Gulf in early February. Logistics resupply of Red Sea operations from outside the theater was organized somewhat differently, using AFSs and TAFSs, TAFs, and opportune commercial shipping rather than regularly scheduled shuttle operations by container ships as was done from Subic Bay. The availability of pre-positioned ships with fuel and ordnance in the Red Sea was more extensive than in the Persian Gulf, and was used to good effect.

Refueling Operations

[redacted] Initially, [redacted] was the primary source of fuel for the Red Sea CVBG. Later in Desert Shield, the major refinery and storage capacity of [redacted] became available, and it was subsequently used as a source for both DFM and JP-5. One consol tanker was used as a pre-positioned ship with JP-5 at [redacted] Two MSC tankers were used as shuttle ships, loading weekly at [redacted] and topping off the station ships and the TAO until the shuttle oilers' cargo loads were empty. It was planned that the carriers and principal battle force combatants would refuel every five days. In practice, these refuelings occurred more frequently (about every two to three days), with the carriers refueling JP-5 at every opportunity in view of their high consumption of this product.

Rearming

[redacted] The carriers rearmed nearly every one to two days, except when they were off duty. Other rearmings at sea events involved exchange of ordnance and retrograde of containers and other materiel, principally from the carriers. By January 1991, there were four station ships—two AOEs, one AE, and one AOR (until it redeployed to the Persian Gulf in early February)—available to rearm the Red Sea CVBF. When their ammunition loads were depleted through issues, *Seattle* and *Santa Barbara* replenished their cargo ordnance from two RRF ships configured as ammunition

ships that were pre-positioned in January and February in the Red Sea. The initial effort to use SS *Cape Archway* was frustrated when a part of the ship's crew returned to CONUS, leaving the ship without the capability to operate its rigs. Navy personnel were temporarily placed aboard this ship to restore its offload capability until replacement merchant crewmen arrived from CONUS.

Resupply and AFS Operations

(U) Jiddah was the Red Sea surface resupply pickup point for provisions, parts, fleet freight, cargo, and low-priority mail. The Mediterranean TAF extended its periodic shuttle operation from CONUS to include Jiddah, bringing resupply material and provisions from CONUS and the Mediterranean into the Red Sea. During the last several months in 1990, an AFS or TAFS made a monthly swing from the Mediterranean to resupply the Red Sea CVBF. Commencing in January, the AFS or TAFS was continuously present in the Red Sea. The AFS and a TAO shuttled resupply material and provisions to the battle force and MIF ships on staggered ten-day cycles, each ship remaining in the operating areas five days before returning to Jiddah for reload. Provisions/ FILL/HULL were provided the CVBF/MIF ships by a combination of the AFS/TAFS/TAO and the associated multiproduct station ship. Red Sea carriers received replenishments from the AFS, TAFS, or TAO much more frequently than they experienced during forward deployments in peacetime: almost once every seven days. (They were also replenished by the AOE or AOR at the same frequency, hence TF-155 carriers averaged a RAS of provisions, parts, or cargo at least once every four days.) The AO deck load was replenished by the TAO, TAFS, or AFS as required. Table 5-9 depicts the CLF operations of the Red Sea TAFS from the time she joined the CVBF until 3 March. Although *Sirius* delivered significantly less pallets per operating period than *Spica* did in the Persian Gulf, her maximum pallets per day were comparable with those delivered by *Spica*.

Table 5-9. USNS *Sirius* CLF Operations in support of NAVCENT forces in the Red Sea, 17 January-4 March 1991

UNCLASSIFIED

Operating period	RAS days	Number of customers	Pallets delivered	Maximum customers per day	Maximum pallets per day
2/11-12	3	4	234	3	206
2/15-19	5	21	689	11	467
2/25-3/2	2	13	408	7	210

entrance to the Strait of Hormuz. The small CTF-63 repair detachment at Bahrain, a planning and coordinating staff, was augmented to about 20 commercial surveyors. Throughout the contingency, this office coordinated various types of technical assistance from commercial, fleet, and material community sources. As many as 72 technical specialists worked out of the SRU.

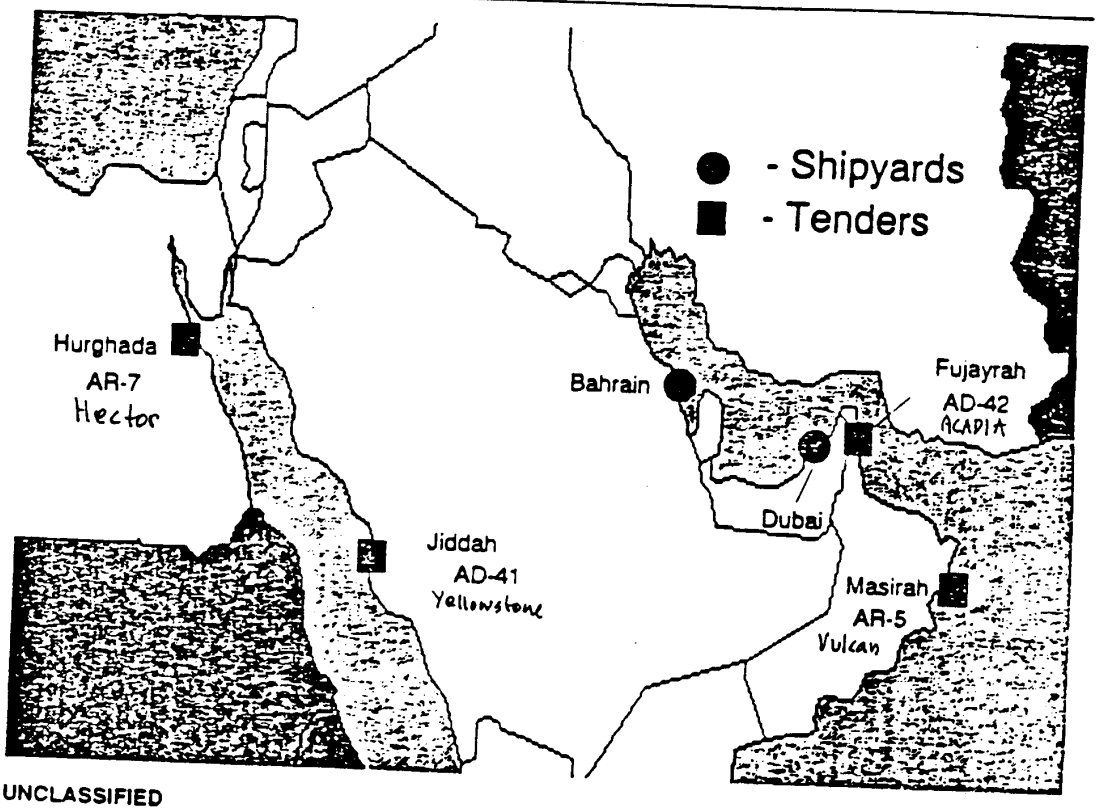


Figure 5-2. Ship repair and maintenance

Tender Deployments

(U) The nine destroyer tenders (ADs) and two repair ships (ARs) are designed to service Navy surface ships. From time to time, some of the 12 submarine tenders (ASs) also repair surface ships. Four ASs are forward deployed. Both USS *Proteus* at Guam and USS *Orion* at La Maddalena, Sardinia, were appropriately positioned to support deploying surface ships. To free USS *Yellowstone* from its Mediterranean

deployment for service in the Red Sea, the Sixth Fleet flagship USS *Belknap* was repaired by *Orion*.

(U) In the Atlantic, all but the out-of-action tenders deployed. USS *Yosemite* started a depot overhaul on 12 July 1990. In the Pacific, USS *Gompers* was essential for preparing CLF ship deployments because her home port, San Francisco, did not have a full-service SIMA. She subsequently deployed to relieve USS *Jason*. Similarly, in the Atlantic, USS *Shenandoah* relieved USS *Vulcan*.

(U) During the early period, USS *Prairie*, the oldest ship in the Navy, was positioned at Subic Bay to sustain the surface ships that were deploying forward to the CENTCOM AOR. This function was similar to that provided by the ASs at Guam and La Maddalena. Meanwhile, USS *Acadia* was sent to the NAS and *Yellowstone* oscillated between the eastern Mediterranean and the Red Sea. These events occurred while the coalition was building and before much of the eventual HNS from NATO countries was available. Upon arrival, *Acadia* was dispatched to Bahrain to rectify a faulty repair in USS *Iwo Jima*.

(U) By January 1991, tenders were located in the regions shown in figure 5-3, with *Vulcan* at the Red Sea entrance to the Suez Canal, and *Yellowstone* at Jiddah. PACFLT assets were: *Jason*, which was at Masirah with the ATF, and *Acadia*, which was operating between Fujayrah and Dubai and at various anchorages in the Persian Gulf.

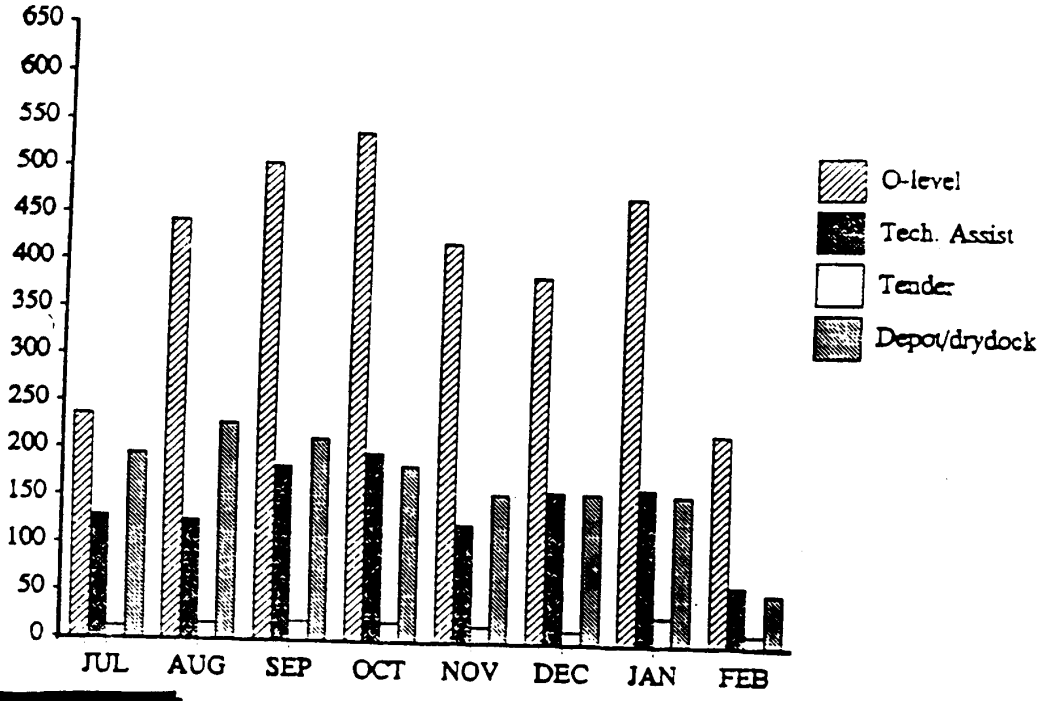
(U) Toward the end of February and the beginning of March, with turnovers and reliefs, two tenders were in the Red Sea and one was in the eastern Mediterranean. At about the same time, four tenders were in the Persian Gulf. Thus, if more extensive battle damage had occurred, especially to side damage by debris from defeated antiship missiles, the repair assets were available.

Battle-Damage Repair

[redacted] During Desert Shield/Storm there were five major ship-damage events in the AOR. These include:

- An engineering casualty with ten fatalities on *Iwo Jima* (LPH-2) at Bahrain on 30 October 1990
- The grounding of the *Andrew J. Higgins* (TAO-190) south of Masirah on 2 January 1991

[redacted]



[redacted]

Figure 5-3. C-2, C-3, and C-4 CASCORs from the Sixth and Seventh fleets

- A collision at sea during underway replenishment between *Harry W. Hill* (DD-986) and *Kansas City* (AOR-3) in the NAS on 14 January 1991
- A mine hit to *Tripoli* (LPH-10) on 18 February 1991
- A mine hit to the *Princeton* (CG-58) about two hours later.

Both mine actions occurred in the northern Persian Gulf while preparing for an amphibious raid.

[redacted] Ten crewmen of the *Iwo Jima* were killed when a main steam line broke away. The steam line had just been repaired by foreign national laborers in the Iraqi/Liberian-owned shipyard at Bahrain. After this incident, the *Acadia*, the on-scene tender, was sent to Bahrain from the NAS to complete the steam line repair. *Higgins* was both a fuel spill incident and a salvage event. She was freed and

[redacted]

[redacted]

eventually repaired commercially in the AOR. *Hill* suffered significant damage to the sonar dome and a 31-foot crack at the collision bulkhead. Following underwater repairs by divers from USS *McKee* (AS-41) and USS *Cape Cod* (AD-43), *Kansas City* was retained in theater and *Hill* left the area at a reduced speed without assistance. Four days later, the two mine events became a significant test for the expeditionary ship-repair capability in theater. Following initial damage assessments both ships received heavy industrial repair by commercial enterprises in theater under the cognizance of the ship repair unit (SRU) at Bahrain.

(U) Throughout the period of shipyard work on the battle-damaged ships, the tenders provided special military industrial skills to the repair process. Much of this battle-damage support effort was an extension of the tender fly-away team concept.

(U) As the heavy industrial repair work to the mine-damaged ships neared completion, the tenders were used to complete tank coatings, repair diesel generators, and change-out main propulsion gas turbines. *Acadia* assisted in repairing *Princeton* at Bahrain and *Jason* assisted in repairing *Tripoli* at Dubai.

(U) On 23 February 1991, USS *Virginia* (CGN-38) collided with a small craft seaward of Soudha Bay, Crete, slightly damaging the sonar dome. Divers from *Vulcan* (AR-7) performed the damage survey.

(U) As tenders deployed for Desert Shield/Storm, their repair-parts allowances were augmented by 243 tons of structural repair materials, such as metal plates and shapes, wire and piping. Four packup kits (containers), each containing about 16 tons of additional battle-damage industrial equipment (welding machines, staging, etc.), were created and staged to the tenders in the forward areas. Additionally, a special emergency wave guide repair container was assembled. This new emergency repair process can rectify cheap kills such as hits by antiradiation missiles. None of the potential blue-on-blue HARM strikes registered as U.S. Navy battle-damage events. Consequently, this system was not tested. LANTFLT SIMAs also augmented the repair staffs of the deploying tenders with additional technicians for battle-damage repair.

(U) The entire battle-damage-repair augmentation concept, in which additional people, material, tools, and equipment are put on the tender, currently focuses on emergency repairs to damage above the waterline of combatants. Consequently, as structured, the emergency tender repair capability is focused on combat system and sensor restoration and a return to the battle. All the damage incidents reported in

[redacted]

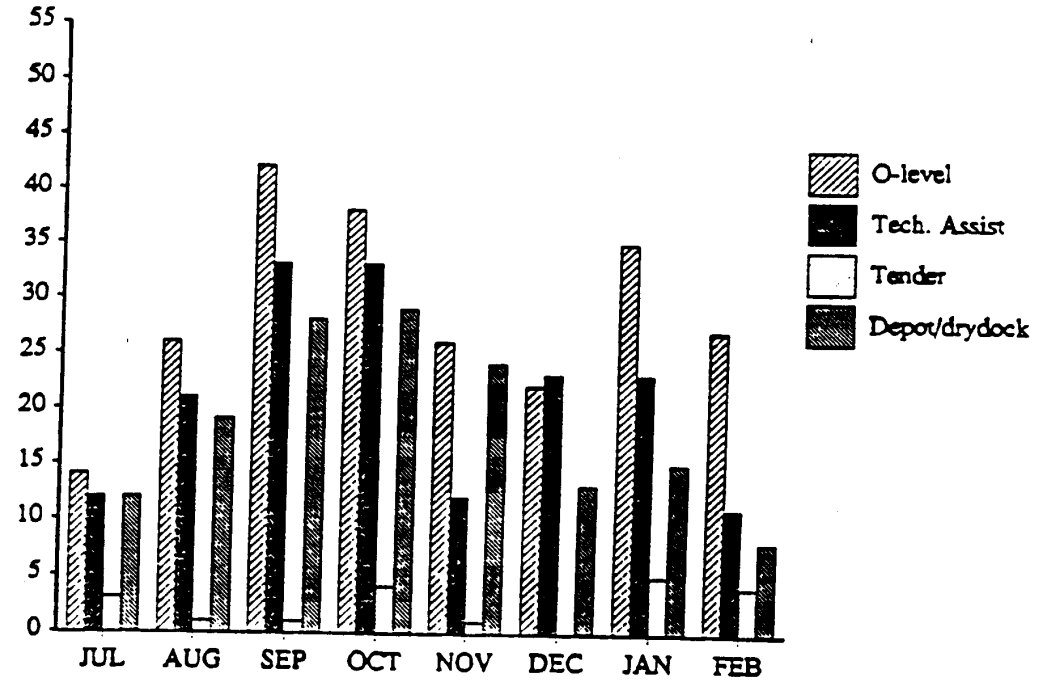


Figure 5-4. C-3 and C-4 CASCORs from the Sixth and Seventh fleets

Cross-Decking and Loading Ordnance

In December, two destroyers were loaded with TLAMs by *Acadia*. After the TLAM attacks in January, the tenders in both the Red Sea and the Persian Gulf reloaded combatants as availability of missiles and customers permitted.

Following the mine hit, a plan was developed for a tender to remove large missiles and other valuable ordnance from *Princeton* for transfer to another surface combatant. Safety considerations and concerns for the stability of shock-damaged ordnance, however, prevailed. Instead, the ordnance from *Princeton* was downloaded by *Acadia* and shipped to the Weapon Station at Yorktown, Virginia, for rework.

[redacted]

Forward-Area Maintenance

(U) From an industrial performance standpoint, the tenders are underused when deployed. Typically, only about 25 percent of their capability is used. Tenders, deployed in peacetime, offer three- and four-week availabilities to customer ships in the forward areas. It is essential to have a long enough work period to inactivate the more complex shipboard systems for repair. During Desert Shield/Storm, ships needing repair could not be freed for long periods. Consequently, repair efforts concentrated on the work that could be done with double shifts in very short periods (about three days) alongside the tenders.

(U) In the Red Sea, the number of jobs performed by tenders doubled when compared to those performed during peacetime deployments. In the Persian Gulf, the number of jobs performed by tenders increased by about 30 percent. In both fleets, the number of customers served at any given time was substantially larger than normal.

Even more significant than the expansion of the work effort by each deployed tender was the frequency of shifting repair sites. Typically, an entire six-month peacetime deployment for a tender will involve providing fleet repair services at two or three sites. During Desert Shield/Storm, *Jason*, which had operated from two sites (Subic Bay and Diego Garcia) on its previous deployment, changed locations six times in January and February 1991. *Acadia* had operated at three sites on its previous deployment, including the repair work to a battle-damaged frigate at Bahrain in 1987. She operated at Fujayrah during October 1990 and, during the next four months, relocated 12 times, providing repair services at a variety of sites throughout the Persian Gulf. Similar site changes as a result of international political pressures were experienced by the Red Sea and Mediterranean tenders.

SECTION 6

SHIP READINESS RESULTS

(U) This section discusses the readiness of the ships used in Desert Shield/Storm and rotary-wing aircraft assigned to them. Ship readiness is evaluated using CASREPs at the beginning of the deployment and again during Desert Shield/Storm. Aircraft readiness and usage rates derived from Maintenance and Material Management (3M) data are displayed for the entire Desert Shield/Storm period.

[redacted] The major findings of this section are as follows:

- Ship material readiness during Desert Shield/Storm, as measured by the percentage of time ships were free of C3 and C4 CASREPs, was near the levels that have been achieved by ships deployed over the past few years.

- The average time to repair CASREPs (including C2 CASREPs) during Desert Shield/Storm was one week shorter than the average time over the two years before Desert Shield/Storm. Downtime due to supply was reduced on average by three days.

- Rotary-wing detachments on Desert Shield/Storm ships generally had high MC and FMC rates during Desert Shield/Storm These readiness rates were comparable to rates normally achieved by detachments deployed in the Middle East region. Rotary-wing detachment flight-hour rates, however, were 20 to 40 percent higher than what is normally flown.

CASREP READINESS STATISTICS

(U) Table 6-1 lists the ships considered in this analyses. Only those ships assigned to the CVBGs that were part of the operation and those assigned to COMIDEASTFOR in the Persian Gulf are included. Support ships not attached to a CVBG and the amphibious ships that also participated in Desert Shield/Storm are not examined here. The ships assigned to COMIDEASTFOR are divided into two groups—those that were deployed before the start of Desert Shield/Storm and those that deployed afterwards.

(U) Table 6-2 gives the material condition of Desert Shield/Storm ships in the first month of their deployment. Material condition is measured by the percentage of time a ship is free of C3 or C4 (mission-degrading) CASREPs.

[redacted]

Table 6-1. Desert Shield/Storm ship assignments and deployment dates

[redacted]

Eisenhower CVBG		*Independence* CVBG		*Roosevelt* CVBG	
CVN-69	3/8-9/7	CV-62	6/23-12/19	CVN-71	12/28-6/28
CG-47	3/8-9/12	CG-54	6/20-12/19	CG-20	12/28-6/28
DD-983	3/8-9/7	CG-29	6/20-12/19	CG-55	12/28-6/28
FF-1080	3/8-9/7	DDG-20	7/5- 12/11	DD-970	12/28-6/28
FFG-32	3/8-9/7	FF-1086	7/5- 12/12	FF-1068	12/28-6/28
DDG-995	3/9-9/8	FF-1063	6/20-12/19	FFG-53	12/28-7/1
DDG-19	3/9-9/7			AE-28	12/28-6/28
				AO-186	12/28-6/29

COMIDEASTFOR		*Midway* CVBG		*Ranger* CVBG	
AGF-3	a	CV-41	10/2-4/16	CV-61	12/8-6/7
CG-22	4/27-12/18	CG-53	10/2-4/16	CG-50	12/8-6/7
DD-955	7/25-10/25	DD-972	10/9-4/16	CG-59	12/8-6/7
FFG-30	6/4- 1/18	DD-991	10/2-4/16	DD-964	12/8-6/7
FFG-48	3/16-10/11	FFG-38	10/2-4/16	DD-986	12/8-6/7
FFG-49	6/4- 10/11	FF-1067	12/8-6/7		
FFG-50	6/4- 12/03	AE-29	12/10-5/17		
FF-1088	6/19-12/03				

RED SEA

Saratoga CVBG		*Kennedy* CVBG		COMIDEASTFOR (Desert Shield/ Storm deployers)	
CV-60	8/7-3/28	CV-67	8/15-3/28	BB-63	11/13-5/12
CG-58	8/7-3/28	CG-51	8/15-3/28	BB-64	8/7-3/28
CG-34	8/7-3/21	CG-56	8/16-3/28	CG-18	9/25-3/24
DD-963	7/1-3/28	CGN-40	8/16-3/28	CG-30	12/7-6/6
DDG-10	7/1-3/28	DD-980	8/16-4/6	CG-52	10/2-4/7
FF-1082	8/7-3/28	FFG-58	8/15-3/28	DD-984	10/30-4/10
FF-1092	8/7-3/28			DDG-39	9/21-3/22
AOE-4	8/7-3/28			FF-1066	9/17-3/17
				FFG-33	12/7-6/6
				FFG-47	9/21-3/22

America CVBG	
CV-66	12/28-4/18
CG-60	12/28-4/18
CGN-38	12/28-6/28
DDG-44	12/28-6/14
DDG-46	12/28-6/14
FFG-40	12/28-5/1
AE-23	12/28-4/30
AOR-6	12/28-4/18

a Deployed continuously to Persian Gulf

[redacted]

[redacted]

Table 6-2. Percentage of time Desert Shield/Storm ships were free of C3 and C4 CASREPs during the first month of deployment

[redacted]

Ship	Percentage	Ship	Percentage
Eisenhower CVBG		*Independence* CVBG	
CVN-69	100	CV-62	100
CG-47	73	CG-54	100
DD-983	100	CG-29	100
FF-1080	23	DDG-20	100
FFG-32	40	FF-1086	100
DDG-995	52	FF-1063	100
DDG-19	100		
Average	70	Average	100
Saratoga CVBG		*Kennedy* CVBG	
CV-60	13	CV-67	100
CG-58	100	CG-51	92
CG-34	3	CG-56	37
DD-963	100	CGN-40	63
DDG-10	100	DD-980	13
FF-1082	83	FFG-58	77
FF-1092	100		
AOE-4	30	Average	64
Average	66		
MIDEASTFOR		MIDEASTFOR (post-Desert Shield/Storm)	
AGF-3	100	BB-63	40
CG-22	10	BB-64	93
DD-971	43	CG-18	83
DD-975	90	CG-30	43
FFG-30	100	CG-52	100
FFG-48	100	DD-984	100
FFG-49	100	DDG-39	87
FFG-50	100	FF-1066	100
FF-1088	100	FFG-33	100
		FFG-47	77
Average	83	Average	82

(Continued on next page)

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[redacted]

Table 6-2. (*Continued*)

[redacted]

Ship	Percentage	Ship	Percentage
Midway CVBG		*Ranger* CVBG	
CV-41	100	CV-61	100
CG-53	100	CG-50	100
DD-972	100	CG-59	100
DD-991	100	DD-964	100
FFG-38	3	FF-1067	100
		AOR-3	80
Average	81	AE-33	100
		Average	97
Roosevelt CVBG		*America* CVBG	
CVN-71	100	CV-66	100
CG-20	0	CG-60	100
CG-55	80	CGN-38	100
DD-970	100	DDG-44	100
FF-1068	23	DDG-46	3
FFG-53	100	FFG-40	100
AE-28	100	AE-23	80
AO-186	100	AOR-6	100
Average	75	Average	85

[redacted] The average percentage of time free of CASREPs for all ships was 80 percent. This level is comparable to other newly deployed ships over the last few years. The three CVBGs assigned to PACFLT had an average time free of over 90 percent while the five LANTFLT CVBGs had an average of over 70 percent. This difference reflects a recent divergence in reporting policy between the fleets.

(U) The Navy deployed more ships during Desert Shield/Storm than usual and in a relatively short period of time. Nevertheless, the material condition of the ships used was comparable to the material condition of ships deployed over the last few years. Additionally, the ships that deployed earlier than scheduled during Desert Shield/Storm had no substantial difference in material condition than the ships that deployed on schedule.

READINESS DURING DESERT SHIELD/STORM

(U) Ships from six CVBGs and ships assigned to COMIDEASTFOR participated in Operation Desert Storm. Some of the ships had been in theater for more than four months when the war began while others had arrived only days before.

[redacted] Table 6-3 shows the material readiness of ships during the war. Material readiness is measured by the percentage of time a ship is free of C3 and C4 CASREPs. The average percentage for all the ships used in the war was 73 percent. This rate is only slightly lower than the rate achieved during the first month of each ship's deployment during the operation. The readiness of PACFLT CVBGs (free of mission-degrading CASREPs 86 percent of the time) differed from the readiness of the LANTFLT (69 percent of the time).[1] The average readiness levels by fleet during the war was very close to those during the first months of deployment (table 6-2), which indicates that readiness levels were maintained quite well throughout the operation.

(U) Downtime due to CASREPs depends on both the number of CASREPs and the time necessary to correct them. Given the number of ships deployed and the distance to the area, the time necessary to repair CASREPs might be expected to be longer than normal.

(U) Table 6-4 shows the average length of time required to correct a CASREP (table includes C2, C3, and C4 CASREPs) for each month of the operation. Some CASREPs, particularly from the later months, are not yet corrected. The percentage of CASREPs that had not been corrected by the end of March is indicated as the percentage censored for each month. This censoring of the data will affect the observed average length of time to correct a CASREP by eliminating those CASREPs that take an unusually long time to correct. As a result, the average length of time to correct a CASREP will be understated for the last month or two. Long-standing CASREPs will affect the mean length of time much more than the median. For that reason, the median CASREP time is also reported. For comparison purposes, the mean and median lengths of CASREPs reported by deployed ships for the year before the beginning of Desert Shield/Storm are also displayed.

(U) The average length of time necessary to correct a CASREP remained remarkably stable at about 25 days throughout the operation. This percentage is about a week shorter than the average for deployed ships in the previous year. Downtime due to supply for parts-related CASREPs was comparable to that for deployed ships

1. This difference is attributed to different CASREP reporting policies used by the fleets.

Table 6-3. Percentage of time Desert Shield/Storm ships were free of C3 and C4 CASREPs

[redacted]

Ship	Percentage	Ship	Percentage
Saratoga CVBG		*Kennedy* CVBG	
CV-60	0	CV-67	63
CG-58	77	CG-51	67
CG-34	81	CG-56	100
DD-963	30	CGN-40	93
DDG-10	63	DD-980	28
FF-1082	93	FFG-58	100
FF-109	100		
AOE-4	74	Average	75
Average	65		
Ranger CVBG		*America* CVBG	
CVN-61	100	CV-66	86
CG-50	100	CG-60	100
CG-59	77	CGN-38	100
DD-964	100	DDG-44	81
DD-986	0	DDG-46	0
FF-1067	84	FFG-40	77
AE-33	100	AE-23	93
AOR-3	100	AOR-6	100
Average	83	Average	80
Midway CVBG		*Roosevelt* CVBG	
CV-41	100	CVN-71	100
CG-53	100	CG-20	0
DD-972	100	CG-55	49
DD-991	100	DD-970	100
FFG-38	58	FF-1068	0
Average	92	FFG-53	86
		AE-28	53
		AO-186	100
		Average	61
MIDEASTFOR			
AGF-3	19		
BB-63	63		
BB-64	100		
CG-18	65		
CG-30	0		
CG-52	91		
DD-984	100		
DDG-39	30		
FF-1066	100		
FFG-33	100		
FFG-47	86		
Average	69		

[redacted]

[redacted]

Table 6-4. Average length of time required to correct a CASREP for Desert Shield/Storm ships

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	All CASREPs			Parts-related CASREPs			
	Downtime (days)			Downtime (days)		Supply downtime (days)	
	Mean	Median	Percentage censored	Mean	Median	Mean	Median
August 1990	27.0	16	1.1	25.9	17	13.8	9
September 1990	24.0	15	1.1	24.4	16	14.4	9
October 1990	25.3	15	2.2	25.2	16	16.1	10
November 1990	25.4	16	2.4	26.2	16	16.7	10
December 1990	28.1	18	7.8	27.5	19	18.7	12
January 1991	27.5	18	11.3	27.7	19	19.0	10
February 1991	21.5	17	23.4	21.6	17	16.7	11
All deployed ships Jul 1989-Jun 1990	33.3	19	–	34.4	20	15.0	8

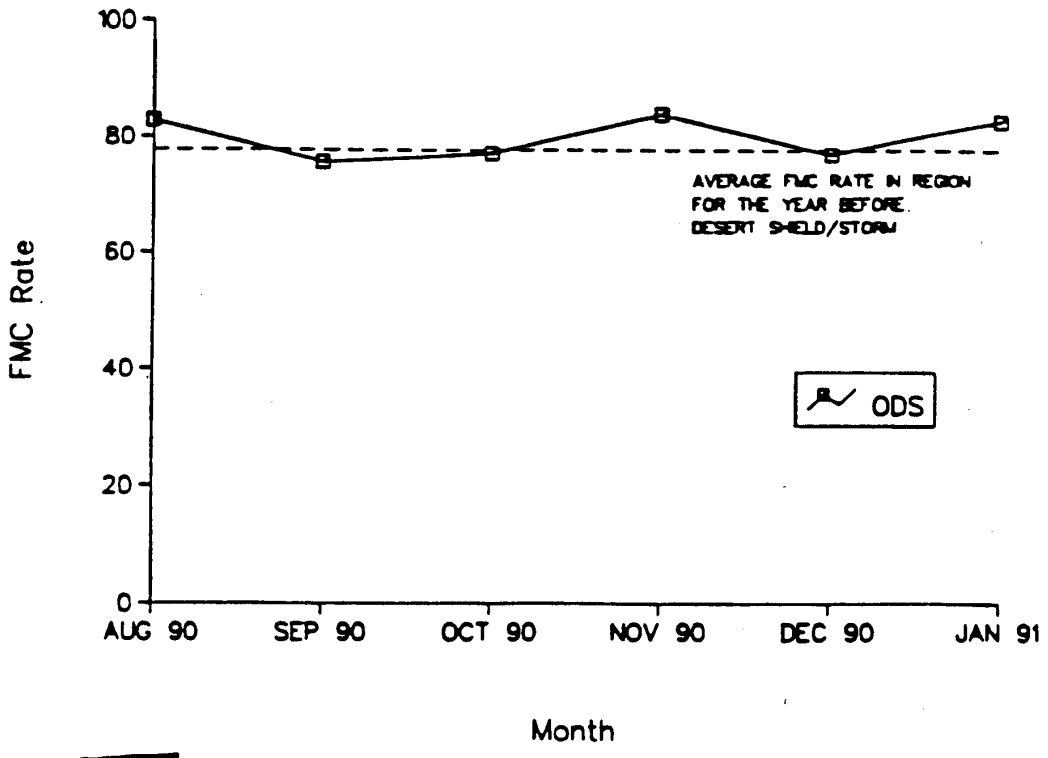
in the previous year. The data on CASREPs indicate that logistics support for the ships assigned to Desert Shield/Storm was as good or better than that normally available to deployed ships, despite the extraordinary number of ships and distances involved in the operation.

ROTARY-WING DETACHMENT

(U) Readiness and usage rates are given for rotary-wing detachments deployed on ships during Desert Shield/Storm. These statistics were computed from 3M data. Detachments usually consisted of one or two aircraft assigned to ships other than carriers. The rotary-wing detachment types used in Desert Shield/Storm were SH-2F(G)s, CH-46Ds, HH-46Ds, UH-46Ds, and SH-60Bs.

(U) The FMC and MC rates for the rotary-wing detachments during Desert Shield/Storm were generally high. Figures 6-1 and 6-2 show the FMC and MC rates for all rotary-wing detachments deployed on ships (other than carriers) during Desert Shield/Storm. The MC rates ranged from 82 to 90 percent, and the FMC rates ranged from 78 to 85 percent. These rates were near the average rate attained for rotary-wing detachments in the region one year before Desert Shield/Storm.

[redacted]



[redacted]

Figure 6-1. FMC rates for shipboard rotary-wing detachments

(U) Although the readiness rates for rotary-wing detachments were average for the region, flight-hour usage rates (monthly flight hours per aircraft) were much higher than average. Figure 6-3 shows the monthly usage rates for rotary-wing detachments used in Desert Shield/Storm and the average usage rate for rotary wing used in the region one year before Desert Shield/Storm. Except for November, the usage rates for rotary-wing detachments were 20 to 40 percent higher during Desert Shield/Storm than is normally achieved in the region.

[redacted]

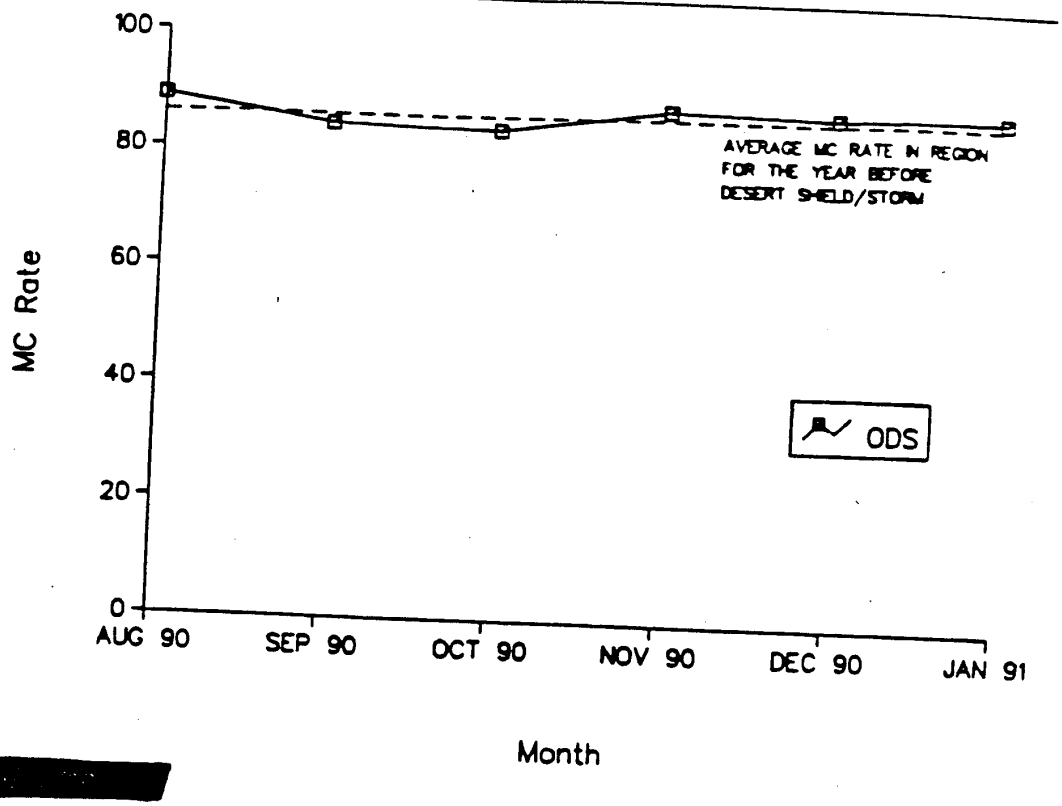


Figure 6-2. MC rates for shipboard rotary-wing detachments

CONCLUSION

(U) Ship material readiness during Desert Shield/Storm was at nearly the same level as that of ships deployed over the past few years. The average time to repair CASREPs (including C2 CASREPs), however, during Desert Shield/Storm was reduced by a week from that for ships deployed during the two years before Desert Shield/Storm.

(U) Rotary-wing detachments on ships generally had high MC and FMC rates during Desert Shield/Storm despite flying at a much higher optempo. These readiness rates were near rates normally achieved by detachments deployed in the Middle East region.

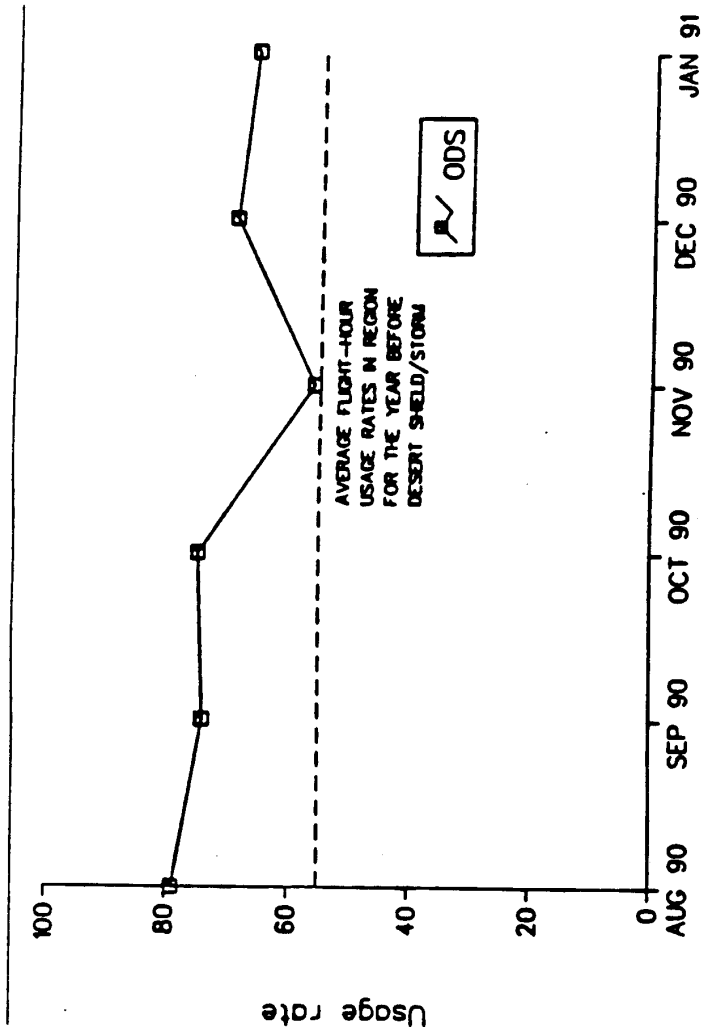


Figure 6-3. Monthly flight-hour usage rates (monthly flight hours per aircraft) for shipboard rotary-wing detachments

SECTION 7

NAVY AIRCRAFT READINESS

(U) This section examines the readiness rates, flight hours, and sortie rates for Navy aircraft operating in Desert Shield/Storm. The statistics, which are based on Aviation Material Readiness Reports (AMRRs), are presented for all aircraft, by carrier and by aircraft type. Specific problems related to the support of these aircraft are documented when possible.

[redacted] The major findings of this section are as follows:

- MC and FMC rates were generally high throughout Desert Shield/Storm. These rates were as high as those obtained during peacetime for these aircraft.

- For most aircraft types, actual sortie rates were slightly below planned wartime rates, but actual flight hours were above planned wartime rates. The high number of flight hours was primarily due to aircraft, especially aircraft in the Red Sea, flying longer sorties than normal because of long distances to targets in Iraq. (CV-60 CV-66 CV-67)

- Despite the surge in deployments, the type commanders were able to outfit the ships with adequate supplies of spare parts, support equipment, aircraft engines, and armament equipment. Some deficiencies existed in avionics systems used primarily in a hostile environment (e.g., electronic warfare systems). These deficiencies can be attributed to procurement levels not meeting the total requirements of six deployed carriers.

AMRR READINESS AND OPTEMPO STATISTICS

(U) The following results are based on AMRR data. Eight carriers participated in Desert Shield/Storm. CNA statistics are based on data from the following carriers and time periods:

Eisenhower	16 Aug 1990– 2 Sep 1990
Independence	16 Aug 1990– 4 Nov 1990
Saratoga	16 Aug 1990– 28 Feb 1991
Kennedy	16 Aug 1990– 28 Feb 1991
Midway	31 Oct 1990– 28 Feb 1991

Ranger	1 Jan 1991 - 28 Feb 1991
America	1 Jan 1991 - 28 Feb 1991
Roosevelt	1 Jan 1991 - 28 Feb 1991

These dates give the approximate time period during which these carriers were used in Desert Shield/Storm.

(U) The method used in this report to compute MC and FMC rates is consistent with the Navy's method of computing MC and FMC rates. This method divides the total number of MC and FMC aircraft by the number of aircraft in material condition reporting status. This includes aircraft that are temporarily ashore.

[redacted] Based on AMRRs, the Navy was able to sustain adequate overall readiness levels for aircraft used in Desert Shield/Storm. Figure 7-1 shows weekly FMC and MC rates for all Navy fixed-wing aircraft participating in the operations. The time periods during which different carriers were deployed are indicated on the graph. The overall MC and FMC rates for fixed-wing aircraft fluctuated little (between 80 and 90 percent). During the war, the overall MC and FMC rates were above 85 percent.

[redacted] Although readiness rates remained high and experienced little fluctuation, the total number of sorties and flight hours surged in January with the arrival of three more carriers. Table 7-1 shows overall readiness and sortie rates for three time periods: October through November of Operation Desert Shield, the remaining part of Operation Desert Shield, and the war. These time periods were chosen arbitrarily to show overall trends in readiness and optempo. The overall readiness rates changed little through these different periods. The number of daily sorties flown, however, increased from 191 per day before the war to 457 during the war (figure 7-2 shows in more detail the total weekly sorties flown during Desert Shield/Storm). When the war began, flight hours increased at a higher rate than sorties because the average sortie length increased by 25 percent.

[redacted] The increased average sortie length after the war started was caused by the long distances required to reach targets from the Red Sea. Throughout the war, two to three carriers operated in the Red Sea. Table 7-2 displays the differences in readiness and sorties for aircraft from the Red Sea compared to those from the Persian Gulf. Before the war, aircraft in the Red Sea did not need to reach targets in Iraq and flew shorter sorties than those required during the war. Although Red Sea aircraft had sortie lengths that were 42 percent higher than Persian Gulf aircraft, Persian Gulf aircraft flew so many more sorties that they still flew 26 percent more total flight hours.

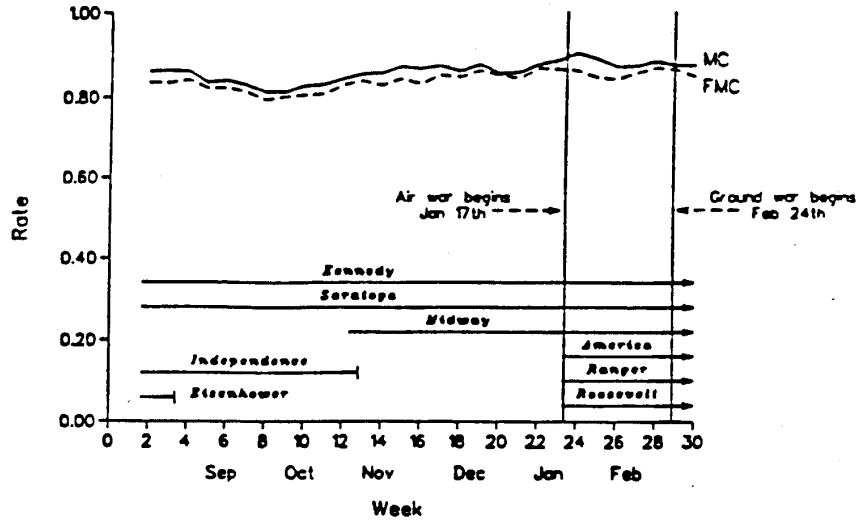


Figure 7-1. MC and FMC rates for all Desert Shield/Storm Navy aircraft

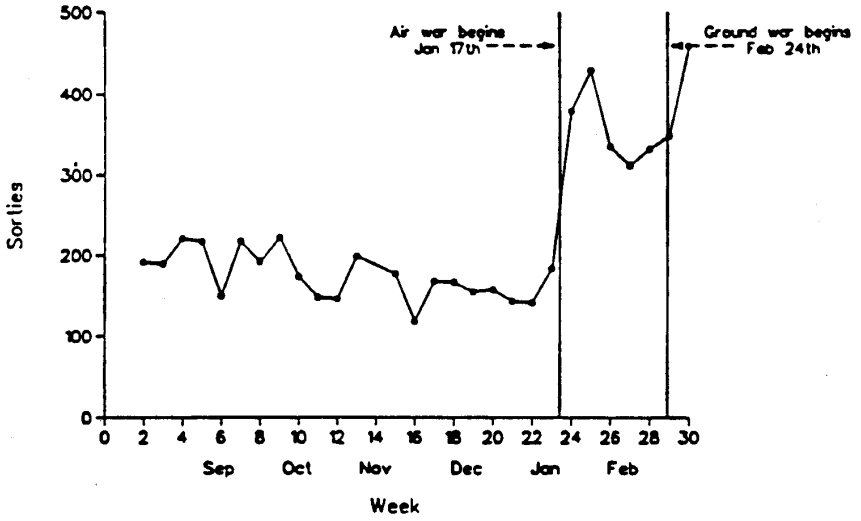


Figure 7-2. Total sorties for all Desert Shield/Storm Navy aircraft

Table 7-1. Naval aircraft readiness and sortie statistics for three different time periods during Desert Shield/Storm

[redacted]

Time period	10/1-11/31	12/1-1/16	1/17-2/28
MC rate	85	87	88
FMC rate	83	85	85
Sorties/day	158	191	457
Flight hours/day	385	455	1,376
Average sortie length (hr)	2.4	2.4	3.0

Table 7-2. Naval aircraft readiness and sortie statistics for the Red Sea and Persian Gulf during Desert Shield/Storm

[redacted]

	Persian Gulf	Red Sea	Total
MC rate	88	88	88
FMC rate	86	85	85
Sorties/day	290	167	457
Flight hours/day	767	609	1,376
Average sortie length (hr)	2.6	3.7	3.0

[redacted] Although the total number of sorties surged substantially in January, the number of daily sorties per aircraft (sortie usage rate) increased only slightly during this time. Figures 7-3 and 7-4 show the daily sortie and flight-hour rates (daily flight hours per aircraft) throughout Desert Shield/Storm. The sortie rates were actually higher at different times before the war than during the first few weeks of the war. Flight-hour rates, however, did surge during the war. This surge was due primarily to the increased sortie lengths from aircraft in the Red Sea. When the ground war started, the sortie and flight-hour rates both surged drastically.

[redacted] Figures 7-5 through 7-10 illustrate FMC, MC, flight-hour, and sortie rates for the F-14, F/A-18, A-6, A-7, EA-6, and E-2. In each flight-hour figure, the average flight-hour usage rate is given for aircraft flying in the Middle East region one year

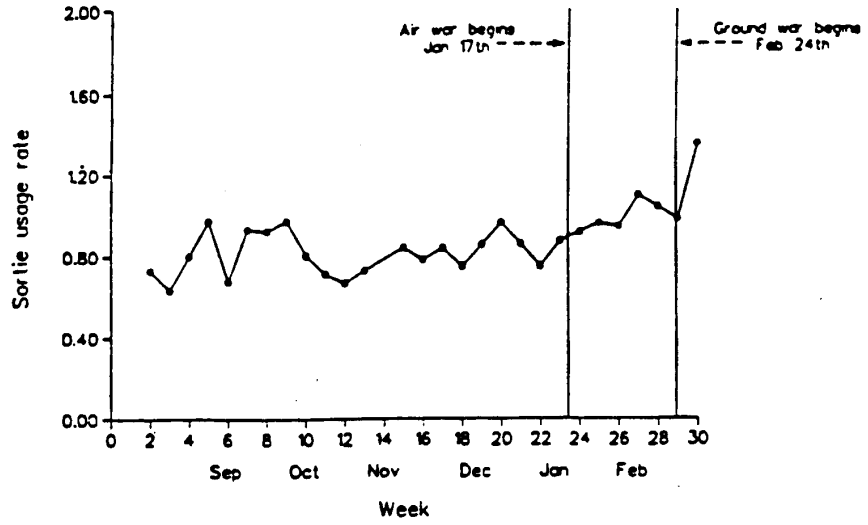


Figure 7-3. Daily sortie usage rates (sorties per aircraft per day) for all Desert Shield/ Storm Navy aircraft

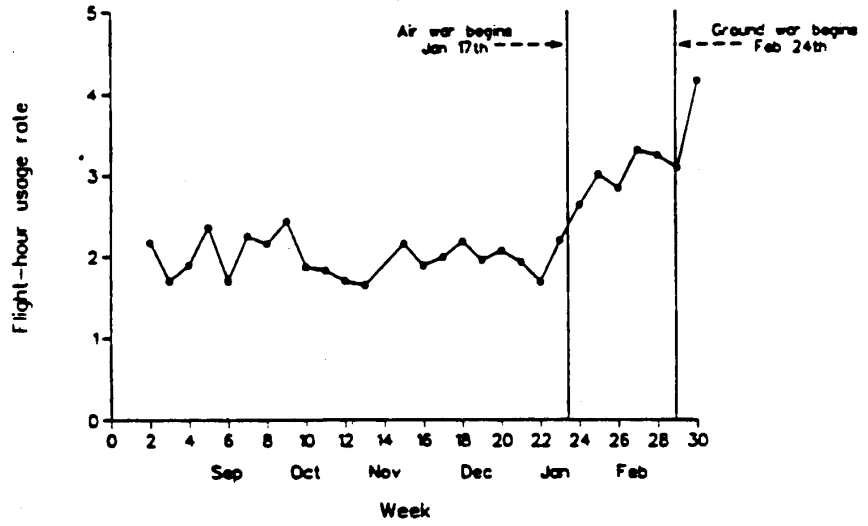
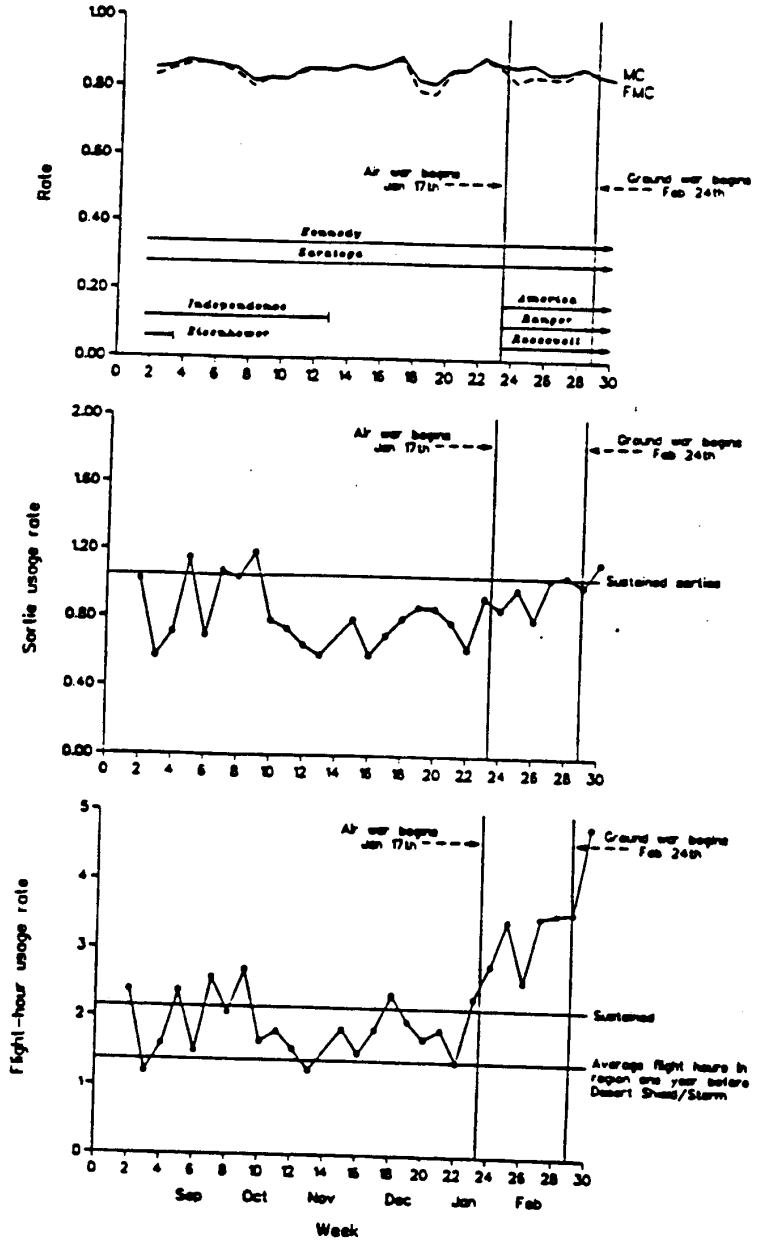


Figure 7-4. Daily flight-hour usage rates (flight hours per aircraft per day) for all Desert Shield/Storm Navy aircraft



[redacted]

Figure 7-5. FMC, MC, daily sortie usage, and daily flight-hour usage rates for all Navy Desert Shield/Storm F-14 aircraft

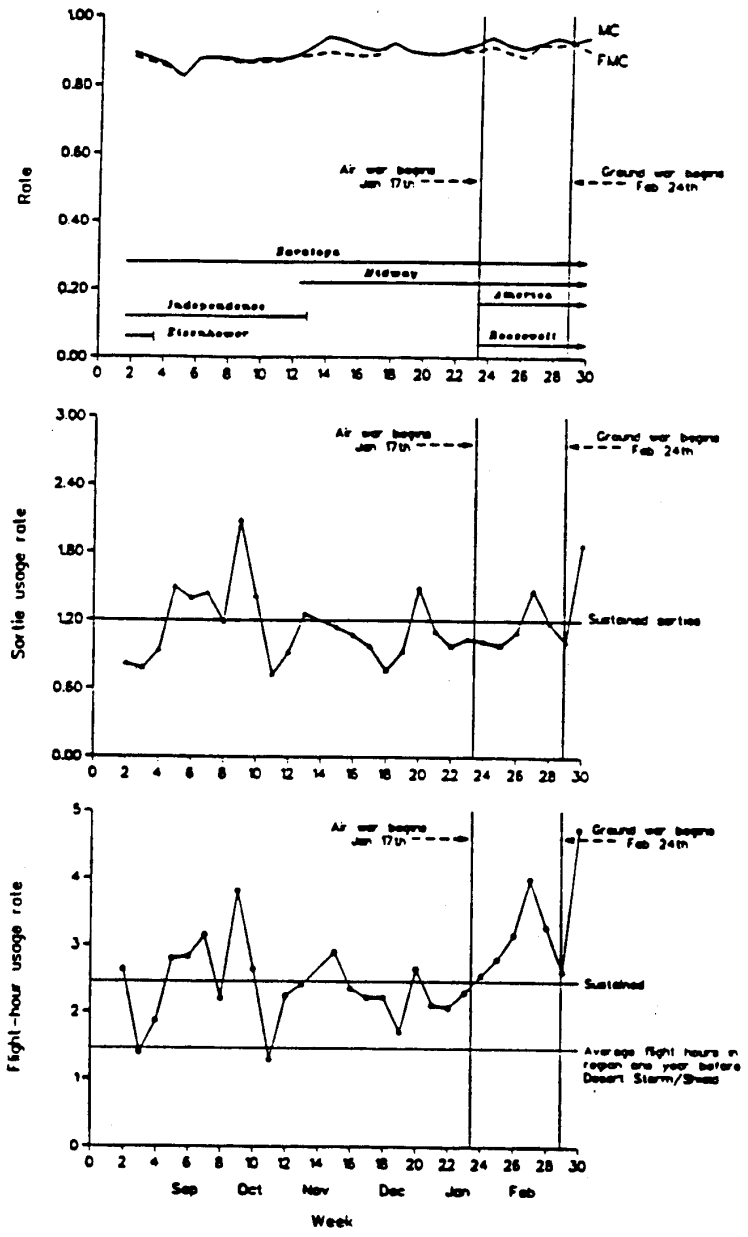


Figure 7-6. FMC, MC, daily sortie usage, and daily flight-hour usage rates for all Navy Desert Shield/Storm F\A-18 aircraft

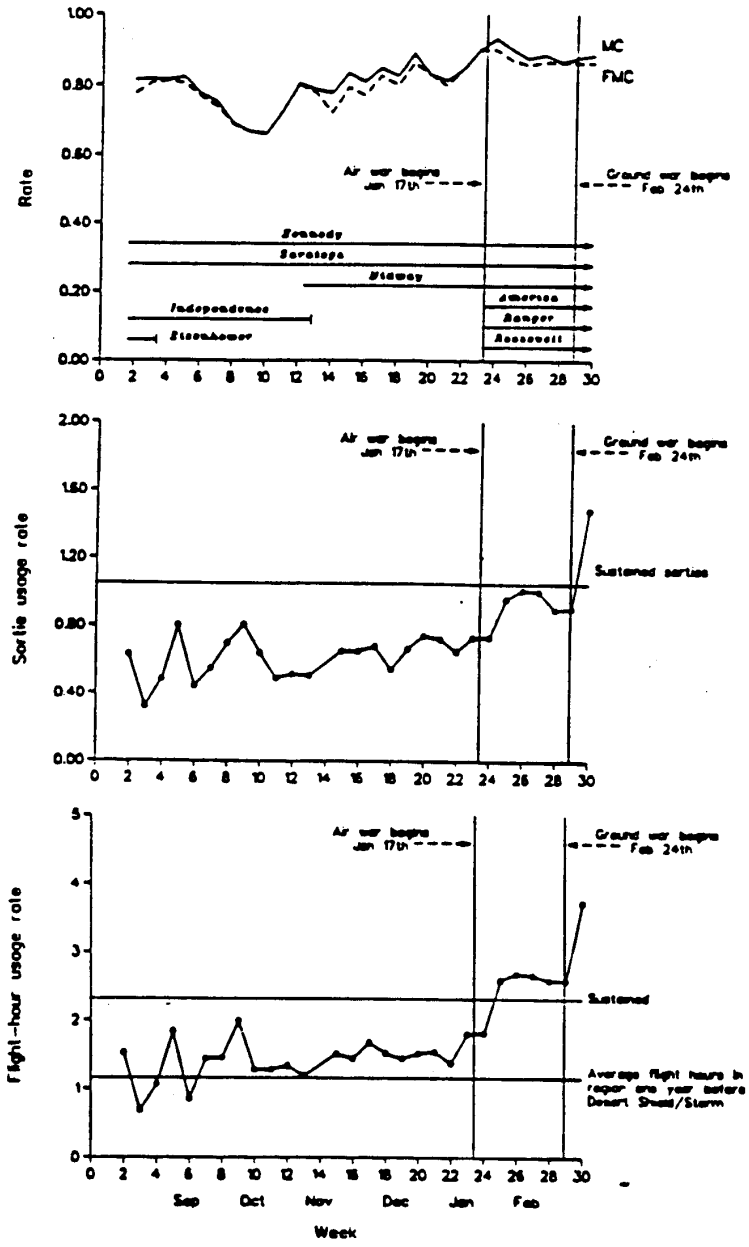


Figure 7-7. FMC, MC, daily sortie usage, and daily flight-hour usage rates for all Navy Desert Shield/Storm A-6E aircraft

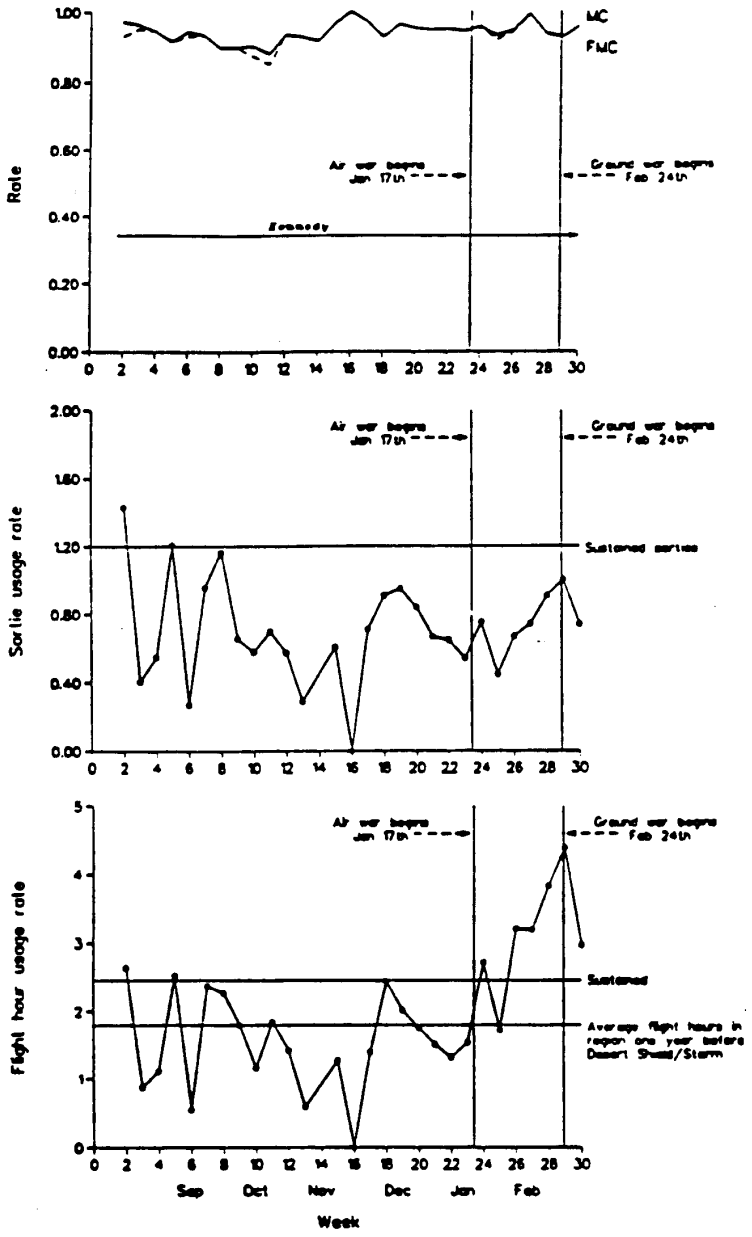
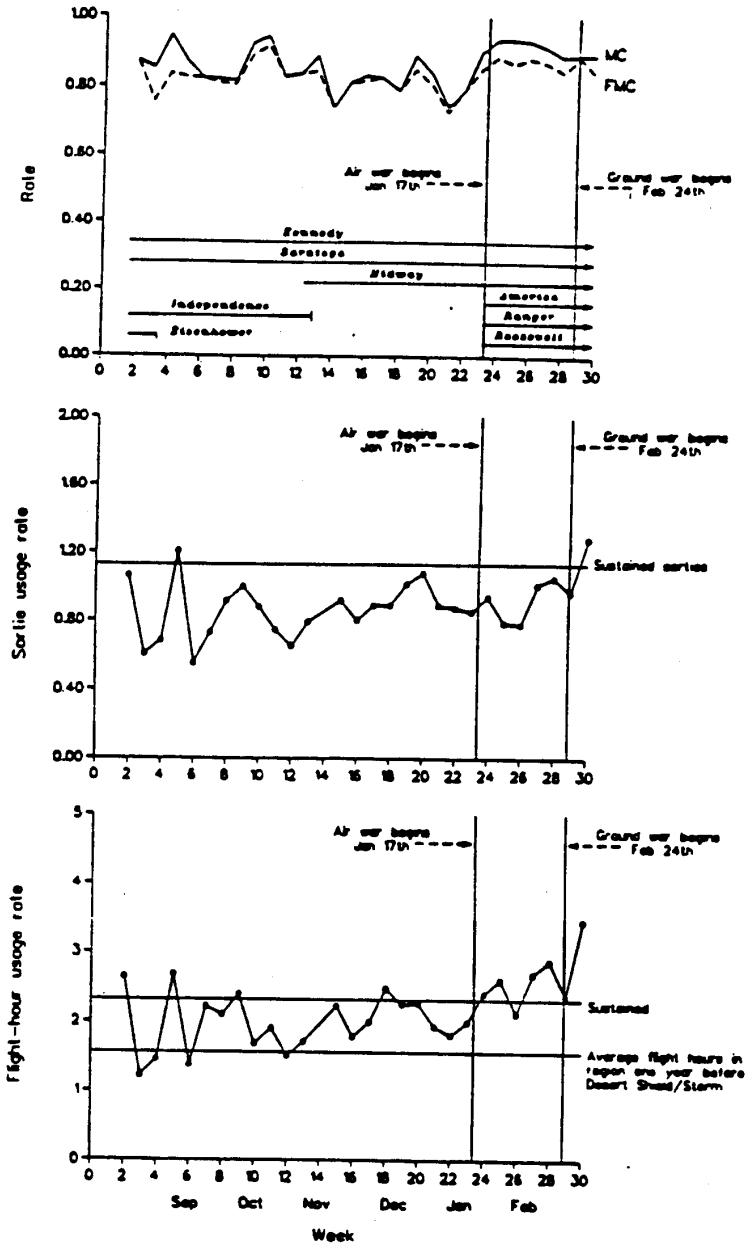


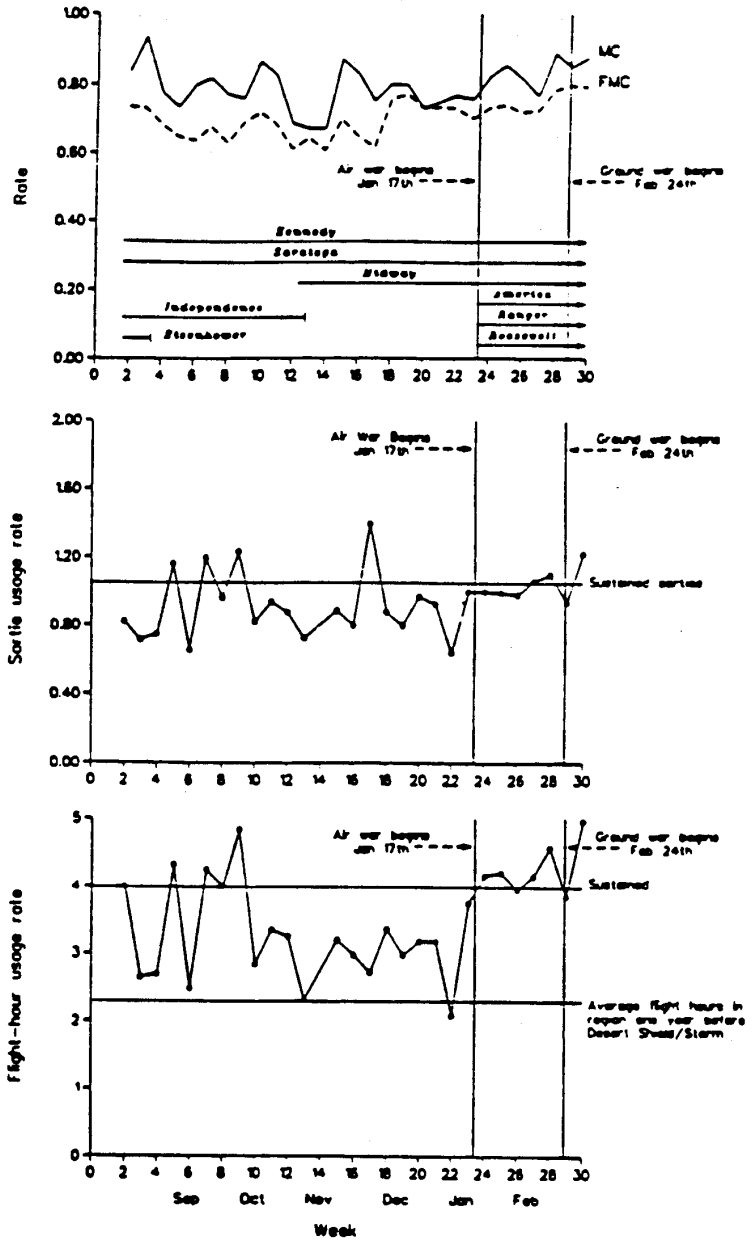
Figure 7-8. FMC, MC, daily sortie usage, and daily flight-hour usage rates for all Navy Desert Shield/Storm A-7E aircraft

KENNEDY



[redacted]

Figure 7-9. FMC, MC, daily sortie usage, and daily flight-hour usage rates for all Navy Desert Shield/Storm EA-6B aircraft



[redacted]

Figure 7-10. FMC, MC, daily sortie usage, and daily flight-hour usage rates for all Navy Desert Shield/Storm E-2C aircraft

before Desert Shield/Storm. The planned number of daily flight hours and sorties per aircraft required for a sustained wartime operation [7-1] is also shown.

The FMC and MC rates were generally high for these six aircraft types. F-14, F/A-18, and A-7 aircraft always had weekly FMC and MC rates above 80 percent. A-6s and EA-6s experienced periods during which their readiness rates dropped, but always had rates above 80 percent after the war began. E-2Cs had the most erratic and lowest readiness rates of these six aircraft types, but they also stabilized after the war started.

The six aircraft types were all flying above their planned wartime flight-hour optempo. With the exception of the A-7s, which were only on *Kennedy*, aircraft had an additional surge in flight hours when the ground war began. Before the war, F-14s and F/A-18s had extended periods during which their flight-hour usage rates were near or above their wartime flying-hour levels.

Although the aircraft were flying above their wartime flight-hour optempo, they were flying below their planned wartime sortie optempo. Table 7-3 summarizes the Desert Shield/Storm average monthly sortie and flight-hour usage rates and compares them to the planned wartime rates.

Table 7-3. Monthly wartime sortie and flight-hour rates (all Desert Shield/Storm carriers)

[redacted]

	Sorties per aircraft per month		Flight hours per aircraft per month	
t/m/s	Actual	Planned	Actual	Planned
A-6E	[redacted]			
E-2C				
EA-6B				
F-14A(A+)				
F/A-18A				
A-7E				

[redacted]

[redacted] Aircraft aggregated by individual carriers all had reported monthly MC rates above 80 percent and, with only a few exceptions, had rates above 85 percent. Tables 7-4 and 7-5 show monthly MC and FMC rates for all carriers that were used in Desert Shield/Storm. Only *Saratoga*'s and *Roosevelt*'s aircraft had MC rates below 85 percent during any stage of Desert Shield/Storm. *Saratoga*'s aircraft had rates between 81 and 82 percent during the early months of Operation Desert Shield (September to November) and *Roosevelt*'s aircraft had the lowest wartime MC rates—between 81 and 83 percent. These two carriers also had the lowest FMC rates during the same time periods, although *Saratoga*'s aircraft MC and FMC rates increased to 84 percent and above after the war started. The differences in MC and FMC rates were not found to be statistically significant.

Table 7-4. Monthly MC rates by carrier for Desert Shield/Storm

[redacted]

	Aug	Sep	Oct	Nov	Dec	Jan (1-16)	Jan[a] (17-31)	Feb	Average for war	Average for Desert Shield/ Storm
America	–	–	–	–	–	89	89	88	88	88
Kennedy	89	86	85	89	86	87	88	87	87	87
Midway	–	–	–	91	88	90	93	94	94	91
Ranger	–	–	–	–	–	89	91	91	91	91
Roosevelt	–	–	–	–	–	88	83	81	82	83
Saratoga	85	81	82	82	85	88	91	87	85	84
Eisenhower	88	–	–	–	–	–	–	–	–	88
Independence	83	83	82	–	–	–	–	–	–	83
Average	86	84	83	87	86	88	89	88	88	87

a January is divided into pre-war (1-16 January) and war (17-31 January).

[redacted] Aircraft from *Roosevelt*, *Ranger*, and *Midway*, which were the only carriers stationed in the Persian Gulf throughout the entire war, flew more sorties than aircraft from the other three carriers used in the war. Tables 7-6 and 7-7 display the monthly sorties and flight hours for all carriers that were used in Desert Shield/Storm. Although *Roosevelt*'s aircraft had the lowest MC and FMC rates during the war, they also flew the most sorties and flight hours during this time. *Ranger*'s and

[redacted]

Table 7-5. Monthly FMC rates by carrier for Desert Shield/Storm

[redacted]

	Aug	Sep	Oct	Nov	Dec	Jan (1-16)	Jan[a] (17-31)	Feb	Average for war	Average for Desert Shield/ Storm
America	–	–	–	–	–	86	86	87	86	86
Kennedy	86	84	83	87	85	86	86	86	86	85
Midway	–	–	–	86	86	87	87	91	90	87
Ranger	–	–	–	–	–	88	88	89	88	88
Roosevelt	–	–	–	–	–	83	79	79	79	80
Saratoga	82	80	80	81	84	85	85	84	85	82
Eisenhower	86	–	–	–	–	–	–	–	–	86
Independence	81	81	81	–	–	–	–	–	–	81
Average	83	82	82	84	85	86	85	86	85	84

a. January is divided into pre-war (1-16 January) and war (17-31 January).

Table 7-6. Monthly sorties flown by aircraft on carriers used in Desert Shield/Storm

[redacted]

[redacted]

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Midway's aircraft, however, had MC rates above 91 percent during the war despite high sortie rates. *Kennedy*'s aircraft, which were stationed in the Red Sea during the war, flew the second highest number of flight hours among the Desert Shield/Storm carriers.

Table 7-7. Monthly flight hours for aircraft on carriers used in Desert Shield/Storm

[redacted]

[redacted] One reason for the high readiness is that the Navy buys logistics support for its carriers (e.g., spare parts) to sustain a wartime flying optempo. Because flight-hour and sortie usage rates was near planned wartime numbers, the assumptions on wartime usage rates used to compute spares allowances were met but not exceeded.

[redacted] Another possible reason for the high readiness numbers despite a six-carrier presence in the region was the sharing of Intermediate Maintenance Activities (IMAs) among carriers. This sharing provided assets from two carriers in the Red Sea and four carriers in the Persian Gulf to repair components.

[redacted] A measure of spare-parts availability on carriers is the status of the Aviation Coordinated Allowance List (AVCAL). One measure of the AVCAL's status is the AVCAL's range and depth. The range corresponds to the fraction of distinct number

of items listed on the AVCAL that were actually stocked on the carrier. Similarly, depth corresponds to the fraction of the total number of items listed on the AVCAL that were actually stocked. Another measure of the AVCAL's status is the rotable pool's range and depth. The rotable pool represents the repairable end items considered most important for keeping aircraft ready. These items have failure-rate and repair characteristics requiring continuous attention by the carriers' supply and maintenance officers.

[redacted] Table 7-8 illustrates the range and depth of the AVCAL and rotable pool for all carriers deployed during the war. Deployed LANTFLT ships were slightly above AVCAL range and depth goals, and deployed PACFLT ships were slightly below goals. All deployed carriers were above rotable pool range and depth goals.

Table 7-8. Percentage of spare parts on hand (range/depth)

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		AVCAL	Rotable pool
AIRLANT and AIRPAC goals		95/93	100/96
Saratoga	(L)[a]	96/93	100/98
Kennedy	(L)	96/93	100/99.8
Midway	(P)	92/87	100/96
Ranger	(P)	92/88	100/96
America	(L)	96/93	100/98
Roosevelt	(L)	96/93	100/96

a L stands for LANTFLT, P stands for PACFLT.

[redacted] Despite what appeared to be adequate supplies of spare-parts allowances on the deployed carriers, problems existed in outfitting squadrons with some avionics systems, particularly those used primarily in a hostile environment. Examples

squadron). Consequently, these systems were not available for every aircraft. This condition was further aggravated by deploying six carriers.

OTHER SUPPORT ISSUES

In addition to problems with outfitting and sustaining some avionics systems, AIRLANT staff related the following supply-related problems to the study team:

- Sustainment lift suffered during both phases of the Desert Shield buildup.
- Consumables used to fix repairables were shipped air parcel post, and the U.S. mail system experienced delays throughout the operation. As a result, the awaiting-parts count on carriers increased by over 70 percent.
- Repairable retrograde flow was slow until a daily retrograde channel between Bahrain and Norfolk (via Sigonella and Rota) was established.
- Delays in the initial establishment of airheads at Fujayrah and Hurghada added days to the logistic pipeline.
- Increased IPG-1 (items with highest priority) requirements at Defense Logistics Agency activities caused a significant increase in issue times for IPG-1 material.
- Long-standing problems with some systems, including H-53/H-46 rotorheads and transmissions and F/A-18 attitude reference indicators/heat exchangers, were magnified during Desert Shield/Storm.

Other supply issues included the loadout of aircraft engines and allowance of weapons equipment. Aircraft engines for all deployed ships in both fleets were considered to be at 100 percent of allowances. For example, the projected loadout for AIRLANT ships included one for each CV for E-2C engines, two with spare modules for F/A-18 engines, four for F-14A+ and A-6 engines, and six for F-14A engines. Weapons equipment was generally at or near 100 percent.

No shortages in support equipment were reported by either AIRPAC or AIRLANT. Much of this success was due to the Navy's Support Equipment Resource Management Information System (SERMIS) and the cross-decking of support equipment from returning carriers to newly deployed carriers.

[redacted] For systems that have been in the fleet and have reached organic support, AIRPAC and AIRLANT supply personnel were able to outfit and sustain carriers through several different means. These include cross-decking, robbing the production line, getting quicker responses from contractors, and workarounds, either at shore-based IMAs or depots.

CONCLUSION

[redacted] Although the Navy deployed more carriers than normal and in a short amount of time during Desert Shield/Storm, the overall readiness of these carrier air wings was high. This high level of readiness was due to effective AVCALs augmented by special efforts by the Navy to sustain operations such as cross-decking and sharing IMAs.

[redacted] Despite the high readiness numbers, the Navy had difficulty supporting some avionics systems that are intended primarily for use in hostile environments. These systems are used sparingly in peacetime and are expensive. Consequently, some of these systems and their support were bought so that one system would be available for every two or three aircraft.

[redacted] Sortie rates were slightly below planned rates but flight-hour rates were slightly above planned rates. This high number of flight hours was due primarily to Red Sea aircraft flying sorties that were 42 percent longer than Persian Gulf sorties. These rates are significant compared to planning numbers, because the wartime planning numbers are used to compute AVCAL levels.

SECTION 8

PERSIAN GULF SALVAGE SUPPORT

INTRODUCTION

[redacted] Persian Gulf naval operations took place in a relatively benign environment. The air threat, although partially significant, was minimal. After Desert Storm began, air action against allied naval forces was virtually nil. The same was true of surface opposition. No submarine threat existed and no amphibious landing was undertaken. Nonetheless, major naval casualties were sustained. According to the Supervisor of Salvage and Diving (NAVSEA OOC/SUPSALV), salvage assets arrived in theater only just in time and would have been only marginally adequate to clear lanes of damaged units for an amphibious landing or deal with casualties that might have resulted from a more aggressive Iraqi air campaign against naval forces. The major lesson to be learned is that salvage requirements must be anticipated and planned for in the standing orders and operating plans, and salvage assets must be in place commensurate with the level of naval activity.

BACKGROUND

(U) In the Persian Gulf War, the potential demand for salvage services included the following:

- Combat casualties to in-theater naval forces, primarily from mines, missiles, and small craft. Initially, an attack-aircraft threat existed.
- Combat casualties, breakdowns, and marine accidents to sealift forces as a result of the above factors and increased shipping concentrations in both CONUS and in the Gulf, and the age of shipping activated for the crisis.
- Harbor clearance and wreck removal, either for high-priority logistics access through ports to support ground forces or restoration of ports for commercial use.
- Search and recovery. Used to recover aircraft casualties, missiles for analysis, or other material for exploitation.

- Environmental management. Minimal U.S.-sponsored efforts were made to combat offensive oil spills. Inquiries were referred to the U.S. Coast Guard and the Kuwaiti government.

(U) The initial belief among allied logistics planners was that salvage requirements could be met using contracted assets. This assumption was based on commercial salvage activity during Operation Earnest Will. Historically, commercial salvage operators work on a no-cure-no-pay basis;[1] the salvor's payoff (salvage award) is determined by an impartial arbitrator, usually at Lloyds, based on the risk to the salvor and value of the property (ship and cargo) saved. Although saving a loaded tanker from small arms and light missile fire is fiscally very attractive (awards up to 12.5 percent of vessel and cargo value), for a number of reasons the U.S. government does not participate in this form of salvage agreement. Hence, there is no major fiscal incentive for a salvor to put himself at risk for a U.S. government ship. Moreover, local commercial assets were not making themselves available for combat salvage. Those commercial assets that were used to support the Navy salvage ship and for noncombat operations were arranged through standing contracts with SUPSALV. The willingness of contracted assets to venture into dangerous areas (minefields) was not tested.

DIVING AND SALVAGE ASSET REQUIREMENTS

[redacted] Salvage personnel representing SUPSALV arrived in theater in early January 1991. [redacted] the evolving concept of salvage assist response teams (SARTs) (see Salvage 2010, Navy Force-Level Requirements for Salvage Ships, a study being produced concurrently for SUPSALV), and applying their experience, these personnel developed the following list of salvage asset requirements:

- Two to three ATS/ARS Navy salvage ships. These versatile towing and diving and salvage platforms were to be used for combat support and amphibious support. This requirement was vindicated by the *Princeton* and *Tripoli* operations. These salvage ships are also required to keep lanes clear during amphibious operations. As they are Navy ships, there is no question of whether they will go "in harm's way." They can be used both for salvage operations and as recovery and clearance platforms.

1. The salvage operator only benefits if he salvages the ship. He receives no reward if the effort is unsuccessful.

- Three to four commercial tugs. These tugs would receive casualties from Navy salvage ships and transport the casualties to repair points, freeing Navy ships to return to the combat or high-hazard areas. Commercial tugs also provide equipment transport services and serve as platforms for clearance and recovery operations.

- A 50-man Mobile Diving and Salvage Unit (MDSU) detachment made up of personnel from MDSU-1 (Pearl Harbor) and -2 (Norfolk). The detachment would include personnel whom SUPSALV funded to attend commercial offship firefighting training in September 1990 at Boots and Coots, Inc., an industry leader in marine firefighting.

- Working and berthing barge. This barge was used to billet MDSU team personnel and provide a platform for clearance operations.

- Emergency ship salvage material (ESSM). Augment and replacement salvage equipment drawn from CONUS ESSM pools and positioned ashore in theater to support emergent salvage equipment requirements and operations.

[redacted] The salvage assets in place during Operation Desert Storm consisted of the following:

- One Navy salvage ship, USS *Beaufort* (ATS-2), one of the most capable class of ships for salvage and towing in the U.S. inventory. *Beaufort* is equipped for towing, salvage, firefighting, and air and mixed-gas diving.

- Two SMIT TAK ocean-going tugs, *SMIT New York* and *SMIT Madura*. These two, very capable ocean-going tugs were under contract to SUPSALV and paid for by the Dutch government. *SMIT New York* was fitted out with salvage gear from ESSM. *SMIT Madura* carried portable offship fire-fighting equipment hired from SMIT. Each tug was to carry SART teams from the MDSU detachment, had the MDSU detachment been deployed.

- Three offshore-supply boats, *Gala*, *Stella*, and *Big Orange*. These boats were under contract to SUPSALV through SMIT and were to act as logistic support craft and provide tows to safe haven, freeing the SMIT tugs for more critical casualties. They would also act as platforms for search and recovery and salvage operations. Four other vessels were also put on standby but never activated.

- One working and berthing barge, the *Subtec 1*. This barge was contracted to SUPSALV through SMIT TAK in anticipation of the arrival of the MDSU detachment and was to be used to support any major salvage or harbor clearance operation.

- ESSM equipment. Salvage equipment, totaling 325 tons and consisting of various size pumps, generators, wire, hydraulic pullers, anchors, POL pumps, air compressors, hoses, winches, water purification equipment, light stands, etc., was located in [redacted] with selected equipment loaded out aboard *SMIT New York*. It was to be used to support salvage and harbor clearance from vessels of opportunity such as TATFs, offshore supply boats, and barges.

(U) Table 8-1 contrasts the requirements for diving and salvage assets as prepared by the SUPSALV personnel in January to the assets that were actually put in place. Although the total number of ships, tugs, and boats actually put in place is comparable to the total number requested, the offshore supply boats are not direct substitutes for tugs or salvage ships. The offshore supply boats do complement the tugs by allowing them to be utilized more efficiently under the concept of operations described in the next section. Nevertheless, the in-place assets were a less capable diving and salvage package than the stated requirements package.

Table 8-1. Required vs. in-place diving and salvage assets

[redacted]

Asset	Stated requirements for asset	Assets put in place
Navy salvage ships (ATS/ARS)	2-3	1
Commercial tugs	3-4	2
Offshore supply boats	0	3
Mobile diving and salvage unit	50-man unit	6 officers, 1 enlisted, 47 Army divers
Working and berthing barges	1	1
Emergency ship salvage material	325 tons	325 tons

[redacted]

CONCEPT OF OPERATIONS AND ORGANIZATIONAL RELATIONSHIPS

(U) Concepts of operations and operating plans were not written until January 1991. Because of logistics and transportation requirements, the concept of operations and operating plans had to use assets already in theater. This ad hoc approach made salvage planning less efficient.

(U) COMNAVSURFGRUMED SRU DET BAHRAIN functioned as the Force Salvage Coordinator (FSC), CTG-151.12, in the absence of an FSC assigned directly to either CTF-151 or CTF-150 afloat staffs. The staff organization is shown in figure 8-1. Personnel assigned included an 1140 captain from CINCLANTFLT staff, and an ED salvage engineer Commander from SUPSALV office. Other salvage personnel assigned to this organization included the commanding officers of MDSU-1 and -2, a master diver from MDSU-2, and two lieutenant commanders from SUPSALV's office.

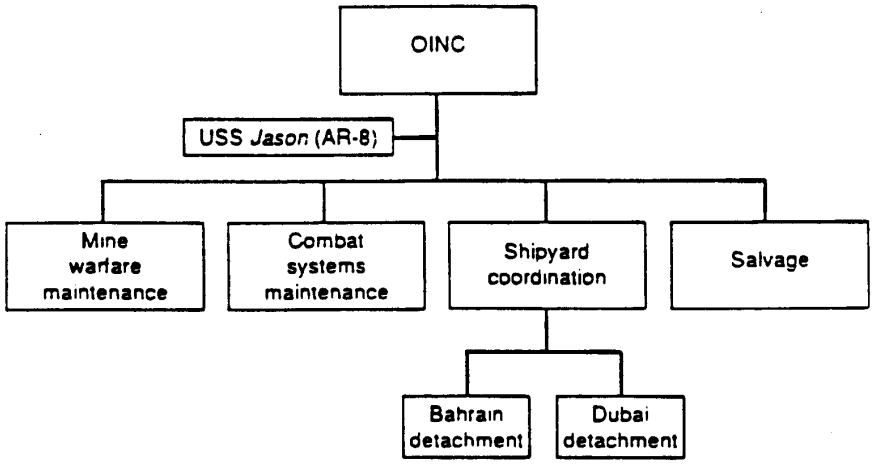

Figure 8-1. SRUDET Bahrain (CTG-151.12) organization

(U) Forty-seven Army divers joined CTG-151.12, establishing bases of operation in Dammam and Jubayl. The Army divers and their equipment performed the harbor clearance function in the absence of the MDSU team. The Navy salvage officers became harbor clearance advisors to the Army diving detachment, enabling them to perform salvage work on Shuaybah harbor.

(U) As envisioned, the rudimentary organization actually brought into being would function as follows:

- Upon notification of a casualty, a SART from *Beaufort* would be transported by helicopter to the casualty to assist and stabilize it. If the damaged ship was close enough, *Beaufort* would go alongside immediately to stabilize the casualty.

- *Beaufort* would then extract the damaged ship from danger, be it within range of enemy weapons or in a mine field.

- *Beaufort* would then pass the tow to *SMIT New York* or *SMIT Madura*. The SMIT tug would continue providing support and move the casualty well clear of the hazardous area, freeing *Beaufort* to return to action.

- Depending on the situation, the SMIT tug would either complete the tow to the tender or shoreside repair activity or pass the casualty to one of the logistics supply tugs, which would then complete the transit.

Beaufort would be the lead unit in a continuum of support vessels. Activities at each stage would further stabilize the casualty, move it toward a rear repair point, and free up more capable assets to assist other casualties.

(U) Other vessels that were needed to support salvage operations were contracted through the SUPSALV WESTPAC salvage contract. Certain SUPSALV personnel in theater were delegated authority to contract for salvage assets. With this arrangement, additional commercial salvage assets could be put on hire on short notice.

SALVAGE ASSISTANCE PROVIDED

(U) The following is a summary of support provided by diving and salvage assets during Desert Shield/Storm.

USS *Princeton* (CG-59)/USS *Tripoli* (LPH-10)

[redacted] On February 18, USS *Princeton* and USS *Tripoli* hit mines in the Persian Gulf off Kuwait. Both ships received damage from blast, shock, flooding, and whipping. USS *Tripoli* was holed and experienced flooding and structural damage. USS *Princeton* received major structural damage, with minor flooding and damage

to propulsion and steering systems. In both instances, the salvage response was immediate, involving Navy salvage officers, a Navy salvage ship, and two commercial salvage tugs. USS *Beaufort* (ATS-2) proceeded directly to the area, sending a salvage officer and master diver ahead by helicopter. The ship repair unit detachment (SRUDET) in Bahrain dispatched the SUPSALV commander, a salvage engineer, as the officer in charge of a combination SART battle-damage assessment team (BDAT) from USS *Jason* (AR-8).

[redacted] When the commander arrived aboard *Tripoli*, he reviewed damage reports for both ships from USS *Beaufort* divers. Performing a triage function, he determined that *Princeton* had the more significant damage. After discussing the situation, the commanding officer of *Princeton* said that his primary requirement was to determine his hull's structural integrity. He immediately sent a helicopter to *Tripoli* for the commander.

[redacted] SUPSALV had developed the POSSE (Program of Ship Salvage Engineering), a computer program to assist salvage engineers in dealing with groundings, flooding, and other ship casualties. Based on the ship's plans and an assessment of the damage, including many inspections in small compartments below the waterline with the ship still in the minefield, the SUPSALV commander used POSSE to develop a model of the ship and its damage on his laptop computer. He determined that the ship had been severely weakened and was in danger of breaking up. He was able to advise the commanding officer on the structural condition of the ship.

(U) This was the first occasion that a Navy salvage engineer has been able to provide accurate, real-time, onsite analysis of ship damage and structural integrity. The POSSE analysis was confirmed the following day when a similar analysis was received by message from NAVSEA.

[redacted] The SUPSALV commander continued to advise the commanding officer. In fact, his input was instrumental when, en route to Dubai, the weather deteriorated and his continuing analysis showed the ship to be unable to withstand the heavy weather that was developing. He advised the commanding officer of this and the ship altered course to Bahrain for installation of temporary structural strengthening before proceeding to Dubai. The SUPSALV commander left the ship in Bahrain, flew back out to *Tripoli*, and confirmed his initial analysis that *Tripoli*'s damage, while serious, would still allow her to continue her mission. *Beaufort*, MV *SMIT New York*, and MV *SMIT Gala* assisted with escort and towing of *Princeton*. *Beaufort* towed *Princeton* clear of the minefield and subsequent handoffs moved *Princeton* toward rear repair areas.

(U) These were classic salvage actions in which organic and commercial salvage assets provided an effective and successful response to combat casualties.

USNS *Andrew J. Higgins* (TAO 190) Grounding

(U) On 2 January, USNS *Andrew J. Higgins* went hard aground on an uncharted pinnacle in the Gulf of Oman just south of Masirah. The ship was directly supporting the amphibious force. At that time, no Navy salvage response capability was in the Gulf region except MV *SMIT New York*, which was not scheduled to go on hire until three days later. *SMIT New York* was put on hire immediately and proceeded to the casualty to provide assistance. The U.S. Seventh Fleet salvage officer flew in from Subic Bay. He arrived on 4 January, two days after the grounding. Along with MV *Courier*, which received the fuel that was offloaded to lighten *Higgins*, *SMIT New York* and the fleet salvage officer assisted *Higgins* in getting free and *SMIT New York* escorted *Higgins* to her repair port.

SH-60B Helicopter Recovery

[redacted] On 18 March, USS *Beaufort*, with SUPSALV personnel aboard, located and recovered a U.S. Navy SH-60B helicopter from the bottom of the Persian Gulf in a classified operation. The straightforward operation was accomplished within 24 hours.

TLAM Recoveries

[redacted] From 23 March through 10 April, SUPSALV and SUPSALV Remote Operated Vehicles (ROV) contractor-personnel assisted *Beaufort* in finding and recovering four TLAMs from depths of 200 to 225 feet. All four missiles were located, and [redacted] recovered.

Harbor Clearances

[redacted] The brevity of the ground fighting and cease-fire took harbor clearance and wreck removal out of the tactical arena and into the humanitarian and economic assistance arena. Shuaybah harbor had a Soviet-made OSA II fast-attack missile boat sunk with two live missiles aboard in the launchers. To render the harbor safe, the missiles had to be made safe and removed. This joint effort involved Navy EOD, CTG 151.12 salvors, and a U.S. Army diving detachment. The commanding officer of MDSU-1 was designated the officer in tactical command for moving two supertankers clear of North Al Ahmadi pier. Towing bridles were rigged on both

vessels, using equipment from MV *SMIT New York* and *SMIT Madura*. The empty tankers were then moved to designated, mine-swept anchorages by *SMIT New York*.

LESSONS LEARNED

(U) Plans for salvage should be included in standing documentation, in operating orders, and in operating plans. Such planning precludes a lengthy identification and justification process in the heat of buildup or battle. It also allows time for desired assets to transit into theater. Planning should include force types and levels and define scenarios and required assets (e.g., combat, salvage, marine accidents, mines, amphibious support, search and recovery, and harbor clearance). ESSM equipment should be maintained in areas of interest. (SUPSALV has established an ESSM base in Bahrain.)

SECTION 9

SEABEES

INTRODUCTION

(U) Four kinds of major CB units were deployed in support of Operation Desert Shield/Storm. The largest group, the four Naval Mobile Construction Battalions (NMCBs), were under I MEF control in February 1991. Those battalions were NMCB-40, NMCB-5, NMCB-24 (reserves), and NMCB-74.

(U) A second major group of CBs, Amphibious Construction Battalions 1 and 2 (ACB-1 and ACB-2), was assigned to the deployed PHIBGRUs to support Maritime Prepositioning Ships (MPS) offloading, logistics over the shore (LOTS), and the OPDS. LOTS and OPDS are programs to support Marine Corps units ashore as a result of an amphibious operation.

(U) The third major group of CBs deployed included two Underwater Construction Teams, UCT-1 and UCT-2. The UCT members were to support OPDS installation and to assist in port repair and other contingency repairs in Kuwait.

(U) The fourth major group of CBs, Construction Battalion Units (CBUs) 411 and 415, deployed to erect Fleet Hospital 5 in Saudi Arabia. In addition, reserve Construction Battalion (Hospital) Unit 20 (CBHU-20) and CBHU-22 deployed to erect Fleet Hospitals 15 and 6, respectively.

(U) In addition to these major units, the following CB units also deployed in support of Operation Desert Storm. The Third Naval Construction Regiment staff (3rd NCR) was attached to the I MEF staff for command and control of the NMCBs under I MEF control. A detachment from PWC Subic provided public works support in Bahrain, and Naval Construction Force Support Unit (NCFSU) 4 provided equipment maintenance services in Al Jubayl.

(U) Table 9-1 lists these CB units and the approximate number of personnel deployed with each. As shown in table 9-1, peak CB force strength in Southwest Asia was about 4,070 personnel.

[redacted]

Table 9-1. CB units deployed to Southwest Asia during Operation Desert Storm (February 1991)

UNCLASSIFIED

CB unit	Personnel
NMCBs	
NMCB-5	677
NMCB-24	701
NMCB-40	565
NMCB-74	705
Total NMCB	2,648
ACBs	
ACB-1	150
ACB-2	890
Total ACB	890
UCTs	
UCT-1	26
UCT-2	15
Total UCT	41
CBUs	
CBU-411	41
CBU-415	42
CBHU-20	81
CBHU-22	81
Total CBU	245
Other	
3rd NCR	36
NCFSU-4	59
PWC Subic Detachment	150
Total other CBs	245
Total CBs in theater	4,069

SOURCE OP-44, ACB-1, ACB-2.

[redacted]

DEPLOYMENT AND REDEPLOYMENT SCHEDULE AND LOCATIONS

(U) Deployments in support of Operation Desert Shield were based on which units were active in the peacetime CB rotation among the four CB peacetime deployment sites: Okinawa, Guam, Roosevelt Roads, and Rota. The deployment strategy early in Operation Desert Shield was to deploy the units from Okinawa (NMCB-7), Guam (NMCB-40), and Roosevelt Roads (NMCB-4) directly to Southwest Asia and subsequently to "backfill" those sites with CB reserve battalions. An additional CB battalion (NMCB-5) was deployed from the Port Hueneme, California, home port. These initial deployments occurred during September, October, and November of 1990. Two reserve NMCBs were activated—NMCB-23 to backfill the Guam site and the Okinawa and other detachment sites, and NMCB-24 to relieve NMCB-4 in Southwest Asia. NMCB-7 subsequently was relieved by NMCB-74 from the Gulfport, Mississippi, home port.

(U) Principal locations in NMCB deployment during Operation Desert Storm were northern Saudi Arabia (NMCB-5 and NMCB-74) and eastern Saudi Arabia (NMCB-24 and NMCB-40). Most of the ACB personnel (other than those who deployed in amphibious ships) deployed to eastern Saudi Arabia near Al Jubayl. UCT-1 was deployed to northern Saudi Arabia, with UCT-2 deployed to eastern Saudi Arabia. CBU-411, CBU-415, and CBHU-20 were deployed to the Al Jubayl fleet hospital sites in eastern Saudi Arabia. CBU-22 deployed to Bahrain, the site of Fleet Hospital 6. Figure 9-1 shows the February 1991 disposition of CB units by location in theater.

(U) Table 9-2 lists the approximate deployment dates for each of the major CB units.

PROJECTS BUILT BY DEPLOYED CBs

(U) Generically, the deployed CBs constructed five main kinds of projects. Those assigned to support I MEF worked on the infrastructure to support desert "tent cities" to house Marines, airfield improvements to support tactical and logistics aircraft, and road improvements and repair to maintain supply lines and combat unit mobility. "Troop beddown" infrastructure was an especially high priority during phase I of Operation Desert Shield (see USCINCCENT msg 160800Z Sep 90); airfield and road improvements became relatively more important during phase II. The CBs assigned to COMUSNAVLOGSUPFOR worked on the construction of fleet hospitals and public works and construction support to ASU Bahrain and the forward logistics sites.

[redacted]

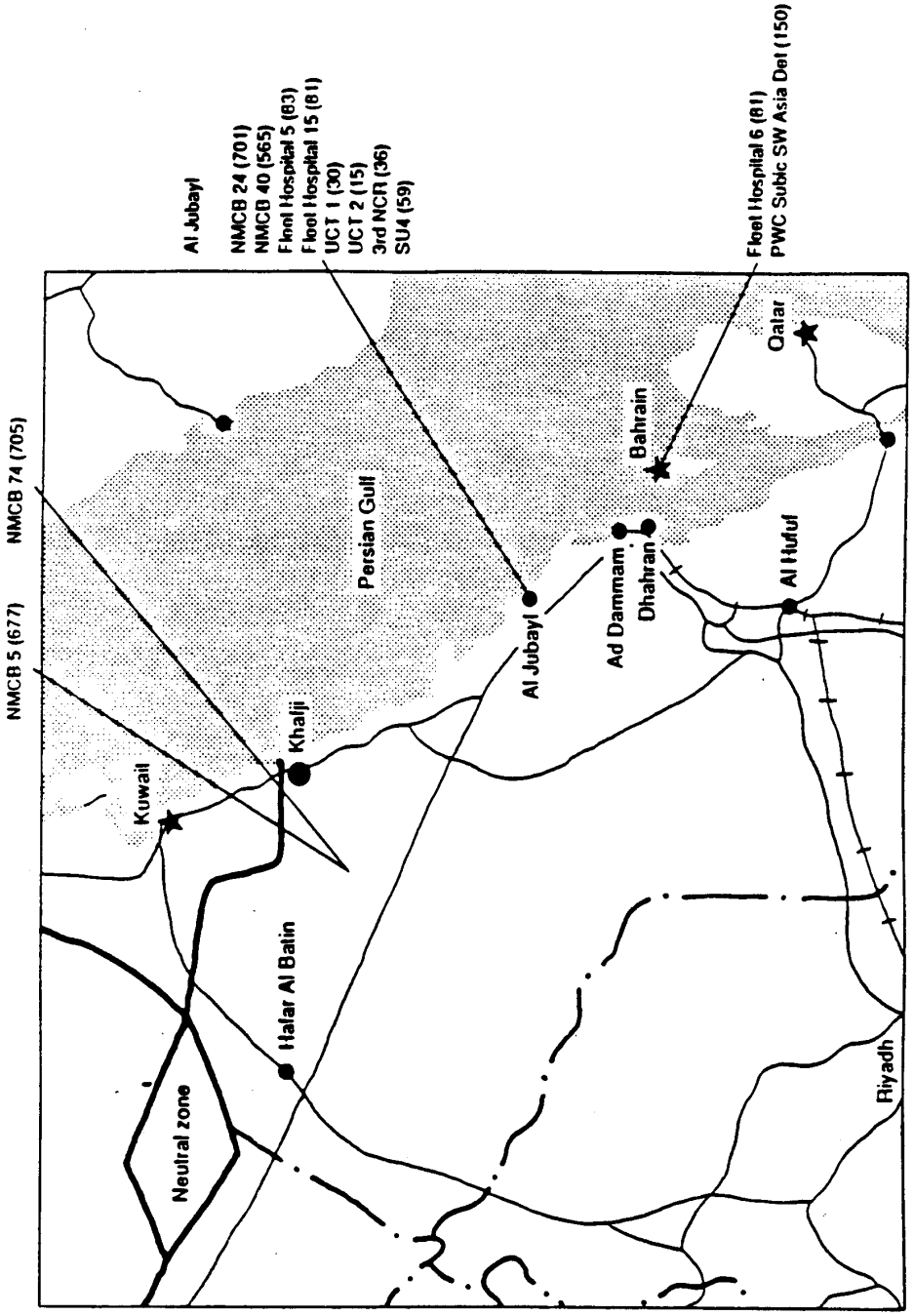

Figure 9-1. Seabee locations

[redacted]

Table 9-2. Approximate deployment dates for major CB units (all dates in days-C)

UNCLASSIFIED

CB unit	Deployment date
NMCBs	
NMCB-4	50
NMCB-5	55
NMCB-7	50
NMCB-24	25
NMCB-40	55
NMCB-74	115
ACBs	
ACB-1	
MPS unit	5
ATF unit	160
ACB-2	
AFT detachments	15
MPS detachment	60
LOTS unit	170
CBUs	
CBU-411	40
CBU-415	40
CBHU-20	165
CBHU-22	55
UCTs	
UCT-1	150
UCT-2	90
Other	
3rd NCR	135
NCFSU-4	175
PWC Subic detachment	45

SOURCE OP-44, CBLANT, CBPAC.

NOTE Dates are approximate because units deployed over a period of time

(U) CB units were involved in a variety of other projects as well, including:

- Offloading MPS ships and reconfiguring them for OPDS support, berthing, and other mission support functions
- Construction of holding facilities for enemy prisoners of war (EPWs) at Kibrit (Saudi Arabia)
- Preparation for repair of port facilities at Ash Shuaybah (Kuwait)
- Construction of runways and helicopter pads at expeditionary airfields
- Modification of truck trailers for EPW transport
- Road repairs in Kuwait and other forward areas
- Construction of retrograde equipment facilities for vehicle washdown at Al Jubayl (Saudi Arabia)
- Well-drilling to provide water supplies
- Airport improvements at BIA for U.S. personnel and cargo-handling operations.

ISSUES RELATED TO CB DEPLOYMENT

Arrival of CB Unit Equipment

(U) By most accounts, the deployment of CB personnel was accomplished expeditiously and with few problems. Specifically, the CB air detachments were airlifted into theater with their equipment fairly quickly. (Most CB units are configured to deploy in strategic airlift aircraft to the theater, where they marry up with the unit's heavy equipment that must be moved in strategic sealift ships.) There is a perception, however, that delivery of sealifted CB equipment presented some problems during Operation Desert Shield. (See, for example, the personal "quick-look" message from CINCPACFLT, 220030Z Mar 1991.) CINCPACFLT even ventured to suggest that CB equipment be included in the MPS set.

(U) It is difficult to assess the seriousness of this problem ex post, but the following sealift data may be enlightening. Table 9-3 shows sealifts for which CB equipment

was identified by MSC as the primary cargo. It appears from table 9-3 that NMCB unit equipment was delivered into theater between C+42 and C+69. Based on the approximate dates of deployment presented in table 9-2, it appears that NMCB-4 was obliged to wait the longest for its shipment of equipment, about 20 days (i.e., C+69 minus C+50). NMCB-5 and NMCB-7 each waited about a week by these figures, and the equipment for NMCB-40 actually arrived about two weeks ahead of the unit. In large measure, this coordination of personnel and equipment arrival was the result of deliberate planning by CBs on the CENTCOM staff (as evidenced by USCENTCOM msg 182210Z Sep 90). The fact that NMCB-4 is a Pacific Fleet CB unit, homeported in Port Hueneme, may account for CINCPACFLT's perception of CB equipment delivery delays as a more general problem.

Table 9-3. Sealifts of NMCB unit equipment (all dates in days+C)

UNCLASSIFIED

CB unit	Date cargo departed	Date cargo arrived	SPOD	Cargo (sq.ft.)
NMCB-40	26	42	Al Jubayl	46,000
NMCB-5	30	61	Ad Damman	37,000
NMCB-7	39	56	Bahrain	54,000
NMCB-4	45	69	Al Jubayl	35,000

SOURCE MSC data maintained by CNA

(U) Figure 9-2 presents OP-44 data on deliveries of CB equipment into theater.

CB Command Element as Reserve Unit

(U) With the introduction of multiple NMCB units to the theater, issues of command and control of CB units naturally arise. In the normal course of mobilization, I MEF would receive a CB regimental staff to command and control the NMCBs assigned. Because the Desert Shield/Storm operation did not involve full mobilization, the 3rd NCR had to be specially activated from the reserves to support I MEF to make this regimental staff part of the selected reserves for partial mobilization. The concept is that a core of active-duty staff would be joined by the major body of selected reservists. (The forthcoming NWP 22-9 is the reference for Navy doctrine on CB support to MAGTFs.)

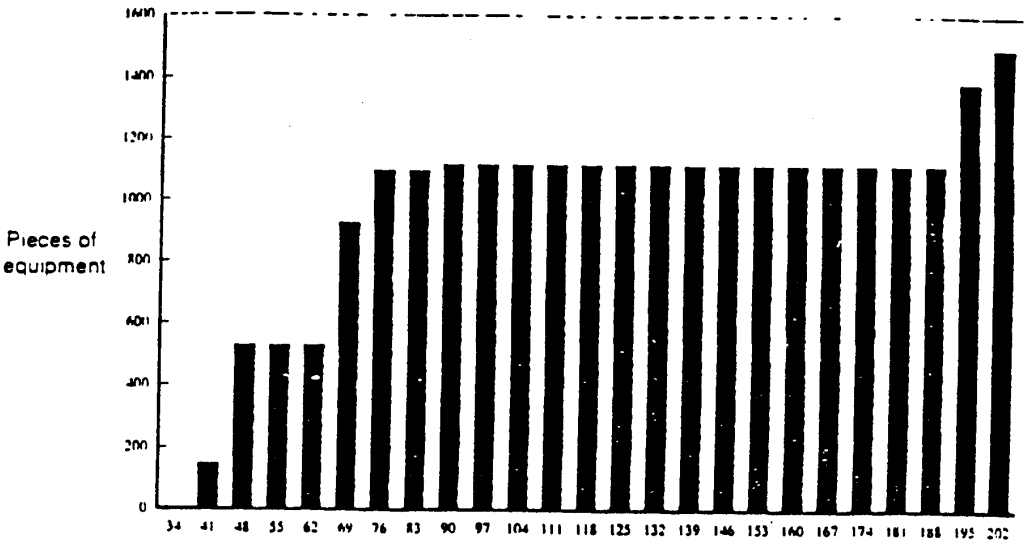

Figure 9-2. CB equipment in southwest Asia

Reliance on Host Nation Support

(U) CBs provided only limited support to NAVCENT during the operation, because of NAVCENT's reliance on HNS for many services, including construction, transportation, and cargo handling. MARCENT also made some use of HNS for long-haul transportation. The issue with respect to reliance on HNS is that it increases the vulnerability of those services to interruption when hostilities erupt. The Marines, for example, were obliged to cover vacancies in long-haul transportation when civilian drivers refused to drive near occupied territory. Furthermore, HNS equipment uses nonstandard parts (i.e., parts not available in the military supply system), which may not be available during hostilities.

(U) The "bottom line" with respect to HNS is that, although it was used successfully during Operation Desert Shield/Storm, this experience may not apply to other locations or even a more protracted conflict in the Gulf.

Implications of Operating Environment for Logistics Over the Shore

(U) LOTS was not tested extensively during Operation Desert Storm, because no amphibious landings were made; however, deployed amphibious CBs were available to exercise some of the LOTS techniques and equipment. One concern that surfaced during these exercises was support for amphibious operations in shallow water. In areas such as the Persian Gulf, where shallow water extends significant distances from the beach, the distance to be bridged by lighterage or OPDS hoses increases. For example, during one test, ACB-1 units successfully deployed a length of hose linking a tanker to the shore that was nearly twice the distance usually planned for (i.e., 18,000 feet vice 10,000). Although such successes are encouraging, they also serve to demonstrate possible vulnerabilities in amphibious support concepts.

SECTION 10

LOGISTICS PLANNING FACTORS AND OPERATION DESERT STORM

(U) It is beyond the scope of this study to attempt a comprehensive validation of Navy logistics planning factors against actual experience in Desert Storm. A few illustrative comparisons, however, can be offered that, in general, suggest ways in which the Desert Storm operation was similar to (or different from) the conflict represented in the available planning factors. Table 10-1 compares selected logistics planning factors or performance standards with actual war experience, with regard to material readiness, ordnance consumption, and mail and cargo delivery.

[redacted] Three variables associated with material readiness were examined. Turning first to MC rates for fixed-wing carrier-based aircraft, actual MC rates clearly were much higher than the usual 70-percent planning factors. Given the intensity of flight operations during the war, this high level of readiness undoubtedly represents intensive maintenance and expeditious shipment of aircraft repair parts. A similar explanation probably accounts for the observed improvement in ship CASREP repair times of about 25 percent over recent experience.

[redacted] Gross ordnance-consumption figures are always difficult to interpret, but it is suggested that the observed consumption rates were much lower than the wartime planning factors. The planning figure of [redacted] reflects assumptions from the early 1980s regarding ordnance expenditure in a global conventional conflict [redacted] with significant ordnance expended in air engagements to defend the CVBF and war-at-sea strikes [redacted] Neither of these kinds of engagements were important in Desert Storm, and so the 38 percent shortfall from the planning factors was not unreasonable. Furthermore, in Desert Storm, relatively more precision ordnance was used for strikes than the mix of precision ordnance (iron bombs) assumed in the planning factors, resulting in somewhat lighter average aircraft loads.

(U) Table 10-1 compares planning factors for cargo and mail airlift required to support a deployed CVBF with the cargo and mail actually delivered to the fleet in the Persian Gulf from Bahrain. As can be seen from the table, about 43 percent more mail and about 11 percent less cargo was delivered on the average day than would be expected. Probably the right conclusion to draw from this comparison is that it reflects the lack of restriction on mail delivery to deployed units. (Early on, CENTCOM decided not to restrict mail in Desert Shield.)

Table 10-1. A comparison of selected logistics planning factors with experience in Operation Desert Storm

[redacted]

Variable	Planning factors	Actual experience	Percent difference
Material readiness:			
Fixed-wing aircraft MC rates (CVWs deployed)	0.70	0.88	25.7
Time to fill aircraft repairs requisition (in days)	12[a]	8	-33.3
Ship CASREP repair time (average, in days)	33[b]	25	-24.2
Ordnance consumption:			
Tons/day of carrier operations at high intensity			
Persian Gulf			
Red Sea			
Mail and cargo delivery to deployed ships (Persian Gulf):			
Mail (pounds/day)	11,340[d]	16,282	43.6
Cargo (pounds/day)	143,900[d]	127,561	-11.4
Mail delivery times to Persian Gulf (days)	8[e]	12	33.3

a Based on table 8-23 [redacted]
b Recent fleet experience in year before war.
c Based on table I-5, Chief of Naval Operations, *An Analysis of Navy Logistic Planning Factors*, 1980
d Based on tables B-3, B-19, B-23 o[redacted]
e TTISMM standard for letter mail to Bahrain FPO

(U) The bottom entry in table 10-1 shows that, while the DOD TTISMM standard for mail delivery to the Persian Gulf is 8 days, the average actual time was about 12 days. Because the standard is seldom met, even in peacetime, it may make sense to adjust the standard upwards.

SECTION 11

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[5-5] CTF 154 message DTG 100748Z Jan 1991

[7-1] [redacted]

[redacted]

UNCLASSIFIED

APPENDIX A

A CHRONOLOGY OF SELECTED ISSUES IN LOGISTICS MANAGEMENT: DESERT SHIELD/STORM (U)

[redacted]

UNCLASSIFIED

[redacted]

APPENDIX A

A CHRONOLOGY OF SELECTED ISSUE IN LOGISTICS MANAGEMENT: DESERT SHIELD/STORM

[redacted]

PROLOGUE

1948 U.S. Naval Force, Persian Gulf, formed as TF-126 using support facilities ashore at Dhahran, Ras Tannurah and Bahrain. Because Bahrain was the only Gulf port allowing near "unrestricted use," it became a de facto home port.

1959 Most logistics support for the Middle East Force came from Atlantic and Mediterranean assets with heavy reliance on air deliveries. Naval Support Activity Naples coordinated air deliveries using VR-24 to Athens and Air Force transports from Athens to Dhahran, Saudi Arabia. Some fresh food provisions purchased at Mits'iwa, Eritrea.

1962 Diego Garcia developed as a communications and support facility in the Indian Ocean. [redacted]

1979 Following overthrow of Shah and the emergence of a radical Islamic regime in Iran, U.S. began periodic deployments of a CVBG to the NAS. Primary support for NAS forces came from PACFLT assets usually by MAC channel to Fujayrah via Diego Garcia.

1980 In response to further deterioration in SWA to include the Soviet invasion of Afghanistan and the collapse of the Shah of Iran, President Carter committed the United States to a more active military role in SWA by creating the Rapid Deployment Joint Task Force (RDJTF) and strengthening U.S. mobility programs.

1981 The RDJTF was formed for SWA. [redacted]

Congressionally mandated mobility study recommended the following for SWA contingencies:

[redacted]

- Acquisition of an additional 100,000 tons of roll-on/roll-off (RO/RO) shipping capacity
- MPS shipping sufficient for three Marine Corps brigades.

1983 U.S. Central Command formed with the forces and AOR from the RDJTF.

Eight SL-7 fast sealift ships, acquired by MSC, became operational.

1985 MPS Squadron 2 [redacted] replacing earlier deployed NTPF ships (near-term prepositioned force ships).

Oct 1986 Navy increased forces in Persian Gulf/Gulf of Oman from 3 to 19 combatants, and in Indian Ocean/NAS from 8 to 12 combatants in response to Iran-Iraq hostilities [redacted] The operation, designated Earnest Will, officially started 21 July 1987.

Logistics support for Earnest Will forces was complicated and constrained by host nation political sensitivities and limitations on base operations. Main support facilities were as follows

- The ASU Bahrain, which was the main supply terminus for Gulf forces with pier-side loading of combatants. Supplies reached Bahrain usually by MAC channel and charter flights from Norfolk via Rota.
- Diego Garcia for Indian Ocean NAS forces. Some use was made of Masirah and Fujayrah.

Apr 1990 [redacted]

[redacted]

DESERT SHIELD

2 Aug 1990 Iraq invades Kuwait.

Defense Logistics Agency (DFSC-0) identified JP-5 stocks in SWA as follows:

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

7 Aug 1990 C-Day, U.S. forces begin deployment to SWA.

Navy command relationships for Desert Shield (USCINCENT 071305Z Aug 90) clarified below on 8 and 9 August:

- COMSEVENTHFLT (VAdm. Mauz) with battle staff will embark in USS *Lasalle* as COMUSNAVCENT reporting directly to USCINCENT.
- CJTFME (RAdm. Fogarty) will become CMEF and report to COMUSNAVCENT.
- Current COMUSNAVCENT (RAdm. Sutton) will move to Bahrain with responsibilities for administrative/logistic support in the AOR.
- USS *Eisenhower* and USS *Independence* CVBG commanders (CTG-800.1 and CTG-800.4, respectively, and under CJTFME) will report directly to COMUSNAVCENT.

8 Aug 1990 MPS Squadron 2 [redacted] and MPS Squadron 3 [redacted], sail for SWA.

CINCUSNAVEUR's 081746Z Aug 1990 initiated requests to establish FLSS at Jiddah, Saudi Arabia.

9 Aug 1990 Defense Fuel Supply Center (DFSC) outlines likely problems for meeting fuel requirements of forces in SWA:

- Obtaining requirements by type of fuel and by location
- Ensuring that all requirements come to DFSC through CENTCOM's Joint Petroleum Office to avoid duplication
- Determining whether fuel provided by HNS agreements will be provided [redacted]

10 Aug 1990 CINCUSNAVEUR 101242Z Aug 1990 requested establishment of an FLSS [redacted]

SECNAV ordered activation of elements of the Ready Reserve Force (RRF).

USCINCENT 101100Z Aug 90, *Commanders Call on Operations in Southwest Asia*:

- Tasked the Department of State's embassies in the AOR with responsibility for arranging HNS
- Assigned COMUSARCENT responsibility for operating common-user sea ports
- Tasked COMUSNAVCENT to augment COMUSARCENT's terminal services with cargo-handling personnel and equipment
- Directed COMUSNAVCENT to support COMUSMARCENT with sea-based logistics and helicopter platforms.

12 Aug 1990 COMUSNAVCENT 120140Z Aug 1990 from Pearl Harbor:

- Directed CTF-73 to assume duties as principal logistics agent for naval forces in the CENTCOM AOR and to coordinate with CTF-63 for the forces in the Red Sea
- Assigned CTF-73 to sustain CVBGs and Middle East Forces in the Arabian Sea and the Gulf
- Assigned CTF-63 to sustain Red Sea forces with the exception of fuel, which would be provided by CTF-73
- Directed COMFAIRMED and COMFAIRWESTPAC to coordinate aviation support for their respective units in the AOR using logistics airheads [redacted]

13 Aug 1990 USCINCENT 130620Z Aug 1990 acknowledged lack of an approved plan for moving forces (TPFDD) and requested the military service chiefs to provide TRANSCOM with estimates of the airlift and sealift required for sustainment of their current and future forces in SWA.

USCINCENT 131215Z Aug 1990 *Logstat Number 001*, noted the need for a coordinated effort on HNS requests among the component commands and host nations. [redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

USCINCENT 132000Z Aug 1990, *Admin/Log*, provided policy and guidance for logistics support of U.S. and other friendly forces in the CENTCOM AOR. Highlights are as follows:

- Provided additional guidance [redacted]
- Noted that logistics support is a service responsibility
- Identified early arrangements for access to the theater and expected HNS
- Assigned administrative responsibilities to component commands
- Established priorities for arriving forces and support
- Set initial supply buildup policy at [redacted]

15 Aug 1990 MPS Squadron 2 arrived [redacted]

COMSEVENTHFLT (VAdm. Mauz) arrived in Bahrain and assumed command of USNAVCENT and operational control of all U.S. naval forces in the AOR.

17 Aug 1990 Use of CJTFME's 800 series task designators was discontinued for the duration of Desert Shield/Storm and new 150 series task designators were established for naval forces. (COMUSNAVCENT 171642Z Aug 1990).

22 Aug 1990 JCS 221545Z Aug 1990 (Joint Staff because J-4) noted that there were no sustainment requirements [redacted] Message called for a 23 August meeting "to address both short-term and long-term requirements and determination processes for resupply/sustainability for Operation Desert Shield."

USCINCTRANS 221200Z requested assistance of the Vice Chairman of the JCS in obtaining foreign flag ships for Desert Shield to make up for a shorfall in strategic sealift. Shortfall stemmed from a shortage of ready assets and the less than 50 percent ready-for-sea rate of the RRF ships.

6 Sep 1990 JCS (Joint Staff) 062157Z Sep 1990 announced that the first of two OPDS tankers, American Osprey, is being activated from the RRF.

7 Sep 1990 MSC area command established in SWA with Capt. Crooks (COMPSRON 2) as COMSCSWA. COMSCMED Naples forward is disestablished.

11 Sep 1990 COMUSNAVCENT 111300Z Sep 1990, *Naval Control of Shipping Liaison Organization in Support of Operation Desert Shield*, noted that a full naval control of shipping (NCS) effort currently was not needed and gave responsibility for NCS to CMEF if NCS were to be activated.

17 Sep 1990 JCS Logistics Brief reported that preparations were being made for a contractor to truck JP-5 from a Defense Logistics Agency fuel depot at [redacted] These preparations were to be completed no later than 6 October.

[redacted]

- Two MSC tankers would shuttle fuel to the fleet oilers [redacted]
- Surface-worthy cargo and FFV to be provided by an AFS and T-AO on staggered ten-day cycles
- Spare parts to be provided by CLF ships
- Passengers and high-priority cargo to be air-delivered [redacted]

10 Jan 1991 CTF-154 100748Z Jan 1991, *Standing Optask Logistics/CTF-154/001*:

- Set forth the routing of logistics messages and plans from the BFLC to CTF-73, COMFAIRWESTPAC, and COMUSNAV-LOGSUPFOR
- Identified [redacted] primary battle force resupply sites in the Persian Gulf and Gulf of Oman
- Noted the routing of air cargoes for PACFLT units would arrive daily in Fujayrah by MAC channel from Cubi Point. Air cargoes for LANTFLT units operating in the Persian Gulf and the Gulf of Oman would be delivered to Bahrain or Dhahran and repositioned in Bahrain for forwarding to the appropriate ships.

DESERT STORM

17 Jan 1991 D-day, U.S. air offensive operations commence.

21 Jan 1991 USCINCENT 2111737Z Jan 1991 ordered COMUSNAVCENT to commence NCS "as soon as possible."

24 Jan 1991 CNO (LPEC Brief) reported that COMUSNAVLOGSUPFOR initiated action to reload TLAMs [redacted] USS *Acadia* (AD-42) and USS *Yellowstone* (AD-41) will provide support [redacted]

[redacted]

CINCPACFLT asked USCINCPAC to transfer [redacted] HARMs from PACAF to support original Navy and Marine Corps [redacted] requirement for Desert Storm (CNO LPEC briefing).

26 Jan 1991 USCINCPAC reported that cross-servicing of HARMs requested 24 Jan not required at this time (CNO LPEC briefing).

MAC channel flights from Norfolk to Jiddah and to Cubi Point [redacted]

31 Jan 1991 [redacted]

USCINCENT staff reports JP-5 stocks now available [redacted] for Air Force tanker support of CVBG aircraft.

USCINCENT tasks COMUSCENTAF to establish JP-5 support [redacted]

9 Feb 1991 USCINCTRANS proposed change of Lead Agent for Sealift Joint Doctrine from Navy to TRANSCOM.

MTMC reported container shortage is increasing rapidly—decision to procure more will have to be made within five weeks due to lead time (9 Feb CNO LPEC brief).

11 Feb 1991 CINCAREUR has been directed to transfer stocks of 25-mm ammunition to Marine Corps (9 Feb CNO LPEC brief).

13 Feb 1991 USCINCTRANS began second daily "Desert Express" flight, with revised load allocations for the four services (9 Feb CNO LPEC brief).

15 Feb 1991 COMUSNAVCENT concurred with a request from CTF-154 to use assets on USS *Haleakala* to fill COMMARCENT requirement for [redacted] Mk 82s (16 Feb CNO LPEC brief).

16 Feb 1991 COMUSNAVLOGSUPFOR (CTG-150.3) 160804Z Feb 1991, *Concept of Operations Update*, cited [redacted] central logistics hubs

[redacted]

[redacted]

with intratheater connectivity to all other airheads and FLSSs. Also noted that a NALIS was set up 16 Jan to track air cargo movements.

19 Feb 1991 USCINCCENT considered cross-leveling of theater Mk 82s, and asked COMUSNAVCENT to provide inventories. Assets given away are to be repaid when COMUSCENTAF's first sustainment ship arrives (19 Feb CNO LPEC brief).

[redacted]

20 Feb 1991 COMUSNAVCENT responded to USCINCCENT request for Mk 82 inventory.

23 Feb 1991 G-Day, ground combat operations commence at 8 pm EST.

25 Feb 1991 CMC proposed ammunition load for MPS reconstitution (26 Feb CNO LPEC brief).

26 Feb 1991 NAVAIR proposed study of Marine Aviation Ground Support Equipment in preparation for MPS reconstitution (27 Feb CNO LPEC brief).

28 Feb 1991 Allied offensive operations stop.

COMUSNAVCENT requested that CENTCOM components conduct review of TPFFD, and ordered en route ammunition back to CONUS/WESTPAC.

COMUSMARCENT requested all sustainment Marine ammunition loading be halted.

USCINCTRANS identified key redeployment issues (1 Mar CNO LPEC brief):

- Container use and availability
- Daily airlift allocation
- Captured enemy equipment

[redacted]

- Ending date for "Desert Express"
- Cancellation of requisitions
- Use of seasheds/flatracks
- Cost vs. speed.

2 Mar 1991 CJCS 020016Z Mar 1991 ordered USCINCENT to redeploy forces to original commands and home stations.

2 Mar 1991 USCINCTRANS 031754Z Mar 1991 ordered all vessels en route to SWA with ammunition to return to seaport of embarkation to download.

4 Mar 1991 CINCCENT issues his redeployment plan (USCINCCENT).

CMC 042245Z and 042246Z Mar 1991 issued initial guidance for redeployment of Marine Corps forces, reconstitution of the Maritime Prepositioning Force, and demobilization of units and personnel.

10 Mar 1991 R-Day. USCINCCENT 211330Z Mar 1991 designated 10 March as day redeployment of forces commenced.

11 Mar 1991 USCINCENT 110650Z Mar 1991 requested component commands to submit requirements [redacted]

12 Mar 1991 COMUSNAVLOGSUPFOR (CTG-150.3) 120844Z Mar 1991, *Red Sea Air Logistics*, cites intent to close [redacted] facilities [redacted] but keep Hurghada operational.

19 Mar 1991 CMC 192019Z Mar 1991 issued execute order for reconstitution and redeployment of Marine forces and instructions for MPF reconstitution.

23 Mar 1991 USCINCENT 231400Z Mar 1991 issued *Logistics Planning Guidance for Redeployment*.

[redacted]

[redacted]

19 Apr 1991 COMUSNAVLOGSUPFOR (CTG-150.3) 191356Z Apr 1991 referenced COMUSNAVCENT 191050Z Apr 1991 direction to disestablish US-NAVLOGSUPFOR effective 21 April 1991.

[redacted]