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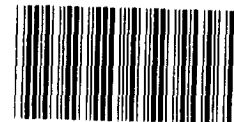
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LOGISTICS AND COMMUNICATIONS
DIVISION

B-200044

AUGUST 22, 1980

General Bryce Poe, II
Commander, Air Force Logistics
Command
Wright-Patterson AFB, Ohio



113119

Dear General Poe:

Subject: (Millions of Dollars Can Be Saved By Storing
Air Force Inventories Nearer the User and
Improving Distribution Practices) (LCD-80-105)

We reviewed how the Air Force Logistics Command (AFLC) positions and distributes its multi-billion dollar spare parts inventory and how it controls the shipment of reparable items to repair centers. We found problems and opportunities for substantial savings which warrant your attention.

AFLC has not positioned its spare parts inventories at the air logistics centers which could best service customers while still minimizing distribution cost. Most of this inventory is first stored at an air logistics center with item management responsibility and then shipped long distances to using activities located at or near other air logistics centers. The Air Force can save up to \$28.7 million on inventory investment costs and \$1.8 million yearly in handling, transportation, and inventory holding costs by storing spare parts at the air logistics center located nearest the ultimate user. Up to \$835,000 more yearly can be saved by eliminating reshipments of reparable items to repair centers.

Although new AFLC regulations address the problems, we are concerned about effective implementation because a similar policy promulgated 4 years ago was not followed.

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BACKGROUND

AFLC carries out its technical and logistics support responsibilities at Wright-Patterson Air Force Base, Ohio, and five subordinate air logistics centers. Item managers at the centers have exclusive control over their assigned items of supply. For the Air Force's 837,000 supply items, the managers determine worldwide requirements, acquire the supplies, and decide where the supplies should be stocked.

The five air logistics centers have large maintenance facilities which are major users of AFLC spare parts inventory. Other users are located throughout the world, and include Air Force bases, other Defense services, and foreign governments. In the year ended June 2, 1979, the air logistics centers shipped \$6 billion worth of items via air, rail, and truck to users located in the continental United States.

Air Force Manual 67-1 discusses policy for determining supply requirements, distributing supplies, and controlling stock levels. The manual requires keeping information that allows item managers to ship parts to users from the nearest storage site.

Appendix I describes the scope and methodology of our work in detail.

MANY SHIPMENTS TO FIELD LOCATIONS ARE NOT FROM THE NEAREST AIR LOGISTICS CENTER

A GAO analysis of shipments from the Oklahoma City, Sacramento, and Warner Robins centers showed that over 70 percent of shipments to Air Force bases were not shipped from the nearest center. During the year ended June 2, 1979, the three centers shipped material valued at \$2.3 billion to Air Force bases (excluding shipments to other centers).

Our analysis of shipments to bases that received material valued at more than \$500,000 during this period showed that stocks valued at \$1.7 billion were shipped from centers other than the nearest one.

Centers could reduce shipping time to bases from 1 to 19 days and bases could reduce inventory investment by about \$14 million, if spare parts were stored at the nearest center. The potential for reducing inventory arises because users must increase inventories to assure that supplies are available to sustain operations while awaiting the arrival of replenishment

stocks. Therefore, for every day that the replenishment cycle can be shortened, investment in sustaining inventory can be reduced.

To arrive at our estimated savings we scheduled the average order-ship-time by priority group to these bases from the center from which the material was shipped and the nearest center. The difference between the two was considered the avoidable order-ship-time that would result if items were stored and shipped from the center nearest the customer.

An example of the improved timeliness which can be realized is presented below.

Shipments to Ellsworth AFB, South Dakota

During the 12-month period ending June 2, 1979, the Oklahoma City Air Logistics Center made 9,251 shipments valued at \$13.1 million to Ellsworth AFB. At the same time, the Ogden Air Logistics Center made 5,414 shipments to Ellsworth AFB valued at \$35.5 million. The following table shows by priority group the average order and ship times for shipments from each center.

<u>Priority Group</u>	<u>From Oklahoma City</u>	<u>From Ogden</u>	<u>Difference</u>
	----- (Days) -----		
A	6.5	3.5	3.0
B	6.9	4.4	2.5
C	27.9	8.6	19.3

As shown above, if items positioned at the Oklahoma City Center were positioned at Ogden instead, the order and ship times to replenish stock could be reduced from 3 to 19.3 days. Thus, Ellsworth AFB could correspondingly reduce its stockage level of items it must carry to cover the stock replenishment cycle because it would not have to wait as long for replacement items.

To estimate the dollar value of the reduction in inventory investment represented by this reduced order-ship-time we stratified by priority group the annual dollar value of shipments to each base. We divided this figure by 365 to arrive at an average daily sales figure. The average daily sales figure multiplied by the avoidable order-ship-time represents our estimate of the possible reduced dollar investment in inventories. In this

estimate we have assumed that the average daily sales to the bases approximates the value of average daily usage and that there is no build-up or reduction of base inventories.

Using Ellsworth AFB again as an example, the following demonstrates how we arrived at our estimate.

<u>Priority Group</u>	<u>Avoidable Days</u>	<u>Annual Value of Shipments</u>	<u>Daily Value (Col 3 ÷ 365)</u>	<u>Avoidable Investment (Col 2 x Col 4)</u>
A	3.0	\$7,137,332	\$19,554	\$58,662
B	2.5	567,084	1,554	3,885
C	19.3	5,412,940	14,830	286,219

If the observations at the three centers are representative of conditions at all five centers, then potential savings to Air Force bases from inventory reductions could be as much as \$23.4 million. This figure does not include additional savings which result because of the recurring cost of holding such inventory. Although the annual holding cost for air logistics centers was estimated by AFLC to be 15 percent of inventory value, such an estimate was not available for individual Air Force bases.

MANY SHIPMENTS AMONG AIR LOGISTICS CENTERS ARE UNNECESSARY

Over one-third of the 187,000 shipments made among the five air logistics centers could be eliminated by positioning more inventory at the using center. Appendix II illustrates the manner in which resh Shipments have occurred. A GAO sample of 150 shipments from Oklahoma City valued at \$7.5 million showed that

--materiel managed by the Oklahoma center but used entirely by maintenance activities at other centers comprised 17 shipments (11 percent), and

--materiel managed by the Oklahoma center but used mainly (50 percent or greater, but less than 100 percent) at other centers comprised 43 shipments (29 percent).

We estimate that positioning spare parts at the Oklahoma center rather than at the sole or predominant using center resulted in an additional inventory investment of about \$1.5

million. 1/ This estimate is based on the value of spare parts used while the requisitions for mispositioned parts were being filled. We also estimate that this practice resulted in additional inventory holding, transportation, and handling costs of about \$520,000 2/ during the year ended June 2, 1979. Our estimate of these additional annual recurring costs is based on 1) the application of an AFLC supplied factor (15 percent) to the additional inventory investment for inventory holding costs, 2) the difference between the actual transportation costs and the estimated direct shipping costs, and 3) the average handling cost per receipt and issue at the Oklahoma City center.

Limited tests indicate other centers' practices are similar. If our projection for the Oklahoma City center held true for all five centers, then a one-time inventory reduction could total \$5.3 million and potential recurring annual savings could total \$1.8 million.

EMPHASIS NEEDED TO ASSURE THAT
NEW REGULATIONS ON STOCK POSITIONING
ARE IMPLEMENTED

During our review AFLC issued Regulation 500-35, dated October 1, 1979, to provide for better inventory positioning at logistics centers. The regulation directs item managers to review distribution patterns and store stocks at the most appropriate locations.

Oklahoma City Air Logistics Center officials have corrected some of the specific items included in our sample. At the close of our review, the center's item managers had changed vendor shipping instructions. Items should now be shipped from vendors directly to the using centers for the 17 items in our statistical sample that were used entirely at one center. Also, item managers and supervisors agreed that economies were available by storing all or part of stocks at the air logistics center which is the predominant user. The managers have taken or promised action to store all or part of stocks at the predominant user for the 43 items in our statistical sample where another center was the main user.

1/ The amount could vary up or down by about \$459,000 at the 95 percent confidence level because of sampling error.

2/ The amount could vary up or down by about \$165,000 at the 95 percent confidence level because of sampling error.

We are concerned whether changes required by the new regulation will be properly implemented throughout the system, however, because a more limited, but similar policy promulgated 4 years ago was not followed. AFLC policy, established in January 1976, directed item managers to position materiel at the using center rather than at the center with item management responsibility, if the using center was the only user for an item. A 1978 internal review, however, showed that managers were not positioning inventories at the most appropriate air logistics center. Even after a September 5, 1978, directive from the Commander AFLC, centers' management officials were not using available data (user locations and use rates) to determine whether item managers effectively implemented the 1976 policy. Our review showed that item managers had not fully implemented the policy.

MISROUTED REPARABLE ITEMS INCREASE HANDLING COST

Field activities annually ship millions of dollars worth of items needing repair to the air logistics center with item management responsibility, which, in turn, reships the items to the appropriate repair centers. AFLC can eliminate about 14,900 reshipments and save up to \$835,000 in handling costs yearly by assuring that reparable items are shipped directly to repair centers.

An automated system directs reparable items to appropriate repair centers. Item managers determine shipping instructions and enter these instructions into the system. AFLC consolidates shipping instructions from the five air logistics centers and distributes the instructions to users.

We sampled 135 of 22,000 reparable item shipments from the Oklahoma City center and found that 31 (23 percent) consisted entirely of misrouted items. Another 9 shipments (7 percent) included both misrouted items and items generated locally. We project that increased handling cost for misrouted items received at this center totaled about \$287,000 1/ in the year ended June 2, 1979. We did not determine the increased transportation cost resulting from misrouted items.

If the Oklahoma City center results are representative of all centers, AFLC could save about \$835,000 in yearly handling costs alone and eliminate 14,900 of the 64,700 nationwide shipments of reparable items.

1/ The amount could vary up or down by about \$76,000 at the 95 percent confidence level because of sampling error.

Misrouting was due to lack of proper instructions in half the cases. In the remaining cases, instructions provided to shippers were not followed.

Of 40 cases of misrouting in our sample, 19 were attributed to missing or incorrect instructions. In 3 of the 19 cases, item managers failed to enter correct instructions into the system. In 7 cases, instructions were entered, but were dropped by the computer system when it consolidated all centers' data. In 2 cases users were not on the distribution list for instructions, and in 1 case the reparable item was not controlled by AFLC's system. The cause of error in the remaining 6 cases was not determined because of the lack of historical records.

Of the 40 sample cases of misrouting, 21 resulted from users not following shipping instructions. According to the center's officials, item managers are not expected to detect occasional receipts of misrouted items. Rather, the problem is noticed and action taken if reparable items accumulate to such an extent as to disrupt repair operations. The existing system does not seem to be working.

Item managers already have the data needed to identify problem cases. A listing of reparable items received at the center could be used to identify items which should have been shipped directly to repair centers. The item managers could then identify users who were not following shipping instructions and, where appropriate, take corrective action.

CONCLUSIONS AND RECOMMENDATIONS

The up to \$28.7 million one time and \$2.6 million potential annual savings discussed above underscores the importance of properly positioning and routing Air Force materiel. In each case, AFLC managers already have data at hand to aid in correcting the problems we noted, so the key is management emphasis to assure continual attention to the problems of positioning and routing.

We recognize that positioning all stocks at the center nearest the customer may not be practical because of varying use rates, and increased transportation and handling costs when prorating some shipments. However, we believe that future investments in inventory can be substantially reduced and supply responsiveness improved by better positioning stocks.

The new regulations which address the stock positioning problems described in this letter, would, in our opinion, result in a more efficient and responsive system, if properly implemented. However, the failure of the air logistics centers to implement a similar 1976 policy, indicates that the new regulations may also not be properly implemented unless management further intervenes.

Misrouting the shipment of items needing repair results equally from the lack of instructions and from lack of compliance where instructions are provided. As such, this problem warrants increased management emphasis, as well.

We recommend that you stress the importance of proper positioning of spare parts and monitor air logistics center progress in implementing the latest regulations.

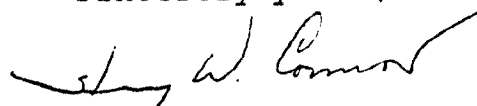
To correct problems in routing reparable items to repair centers, we recommend that you

- increase efforts to insure that users are provided accurate shipping instructions.
- establish procedures for isolating misrouted items so the items can be quickly identified and resolved, and
- issue shipping instructions to users who do not have them.

We discussed these matters with your staff at the air logistics centers involved. Their courtesy and cooperation during the review was appreciated.

Please advise us of any additional thoughts on the matters discussed, and of any actions taken regarding our recommendations. We would be glad to further discuss this report with you or your staff.

Sincerely yours,



Henry W. Connor
Associate Director

SCOPE AND METHODOLOGY OF REVIEW

We reviewed Air Force policies, procedures, and practices at Headquarters, AFLC, and at selected air logistics centers for positioning spare parts and shipping reparable items to repair centers. We also interviewed headquarters and center officials responsible for carrying out these activities and made computer analyses to compare and select random samples.

During March 1979 through March 1980, we worked at the following locations:

- Oklahoma City Air Logistics Center, Tinker Air Force Base, Oklahoma;
- Sacramento Air Logistics Center, McClellan Air Force Base, California; and
- Warner Robins Air Logistics Center, Robins Air Force Base, Georgia.

STATEMENT OF APPROACH

We obtained computer tapes from each of the five air logistics centers showing the 12-month history of inventory activities through June 2, 1979. The dollar value of the inventory transactions was priced at May 1979 prices. Our approach was to examine the Air Force stock distribution practices of this period and to show the advantages of positioning stock closer to air logistics center maintenance activities and other customers.

We determined our universe data to be reliable through a comparison with Air Force transaction occurrence reports for March 1979 and through interviews with item managers and supervisors. For example, the variance between our Oklahoma City universe of the number and value of shipments and the Oklahoma City Air Logistics Center transaction occurrence report for March 1979 was less than 1 percent. Each of the 34 Oklahoma City center item managers and supervisors interviewed confirmed the accuracy of the universe data used for items in our statistical sample.

To determine the potential benefits of positioning stock at an air logistics center located nearer the user, we analyzed order and ship times from the Oklahoma City, Sacramento and Warner Robins Logistics Centers during the 12-month period ending June 2, 1979, for all customers shipped stock valued at more than \$500,000.

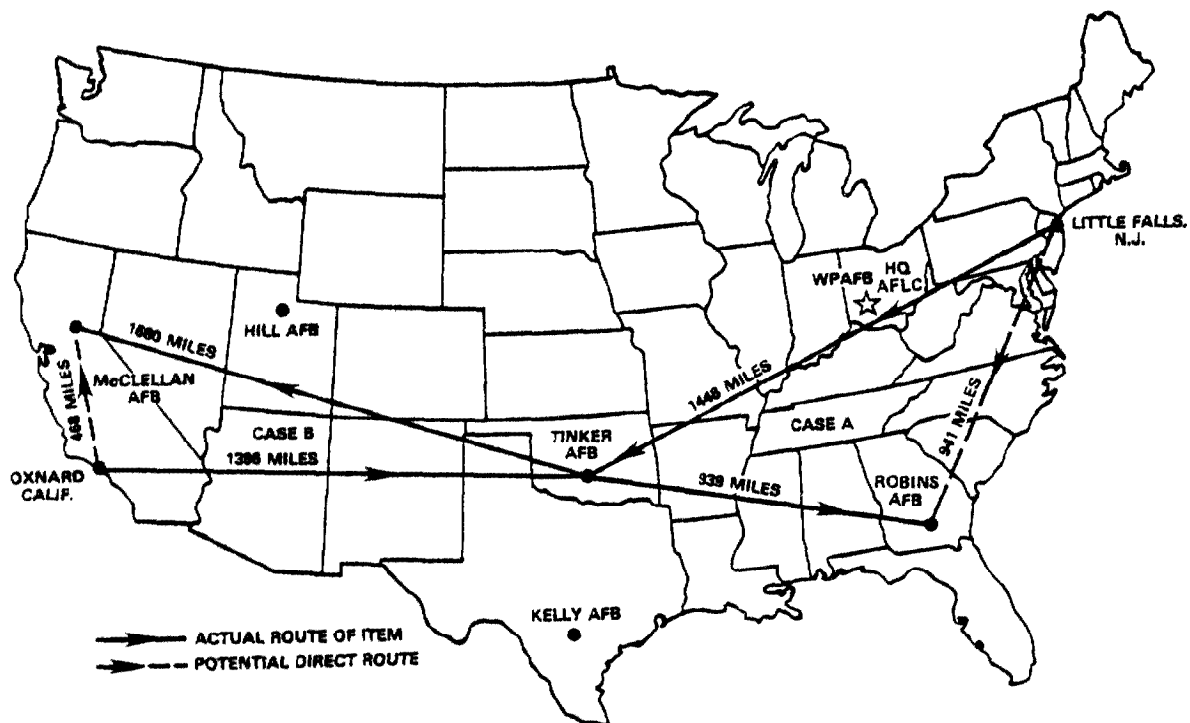
To determine the extent to which the Air Force could better store stock at the air logistics center which uses the materiel, we analyzed the 12-month history tapes to identify the number and value of shipments for each logistics center to each of the other centers. The shipments consisted of expendable items procured on an Economic Order Quantity basis, of investment or reparable items, and of equipment items. We stratified the shipments according to the dollar value of individual shipments and statistically sampled 150 shipments from the Oklahoma City Air Logistics Center to the other centers.

To determine the extent to which AFLC was unnecessarily shipping reparable items to the air logistics center with item management responsibility and then reshipping them to the repair station, we statistically sampled 135 shipments from the Oklahoma City Air Logistics Center to the other repair centers. During the 12-month period ending June 2, 1979, the Oklahoma City Air Logistics Center made 22,213 shipments valued at \$379,111,392 of reparable items needing repair to repair centers. The confidence level for projections based upon both above statistical samples is 95 percent.

We determined transportation costs from shipping documents, Government Bills of Lading, and logistics airlift rate schedules. We estimated the transportation costs of shipping items from vendors to air logistics centers using Transportation Automated Routing System guides.

EXAMPLES OF UNNECESSARY RESHIPPED ITEMS

The report cites thousands of unnecessary reshipments which result in millions of dollars in added inventory investment, holding, handling, and transportation cost. The following cases illustrate how such unnecessary reshipments occur for individual items in AFLC's inventory.

Case A

A \$321.21 item is sold by a vendor in Little Falls, New Jersey; managed and stocked by AFLC at Tinker Air Force Base, Oklahoma; and used solely at Warner Robins Air Force Base, Georgia. During the year ended June 2, 1979, 98 such items arrived in Georgia via Oklahoma--over twice the required distance--introducing a 15-day delay and adding at least \$89 total transportation cost.

Eliminating the 15-day delay could also result in reducing the AFLC inventory by \$1,285. Since Warner Robins uses about two such items a week, four items are needed to allow for the delay (4 times \$321.21 equals about \$1,285).

Case B

A \$169 item is sold by a vendor in Oxnard, California; managed and stocked by AFLC at Tinker Air Force Base, Oklahoma; and used predominantly at McClellan Air Force Base, California. During the year ended June 2, 1979, 228 such items (82 percent of the items shipped from Tinker to all users) arrived back in California via Oklahoma. The shipping distance was increased from less than 500 to over 3,000 miles--over 6 times the required distance--introducing almost 17 days delay and adding about \$274 transportation cost. By eliminating the delay, AFLC could also reduce its inventory by about \$1,700.