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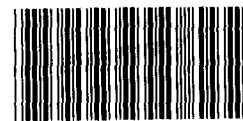
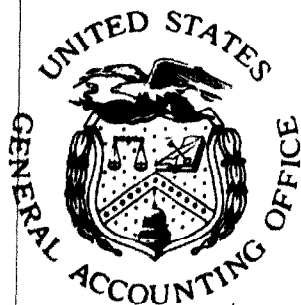
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BY THE U.S. GENERAL ACCOUNTING OFFICE

Report To The Secretary Of The Air Force

Improved Processes Can Reduce Requirements For Air Force War Reserve Spare Parts

This report contains recommendations for improving Air Force processes in determining war reserve spare parts requirements. War reserve requirements computed at the Warner Robins Air Logistics Center were inaccurate and unrealistic because computations were not adjusted to reflect changes in item failure rates or changes in configuration of aircraft components. In our opinion, these problems caused an overstatement in war reserve requirements amounting to about \$12.6 million for items sampled. Deficiencies noted during this review may also exist at other air logistics centers.



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JULY 8, 1983

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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

NATIONAL SECURITY AND
INTERNATIONAL AFFAIRS DIVISION

B-211873

The Honorable Verne Orr
The Secretary of the Air Force

Dear Mr. Secretary:

This report discusses ways for improving Air Force processes in determining requirements for war reserve spare parts.

We discussed a draft of this report with representatives of the Office of the Secretary of Defense (Manpower, Reserve Affairs, and Logistics) and the Air Force. Their comments have been incorporated, where appropriate, in the report.

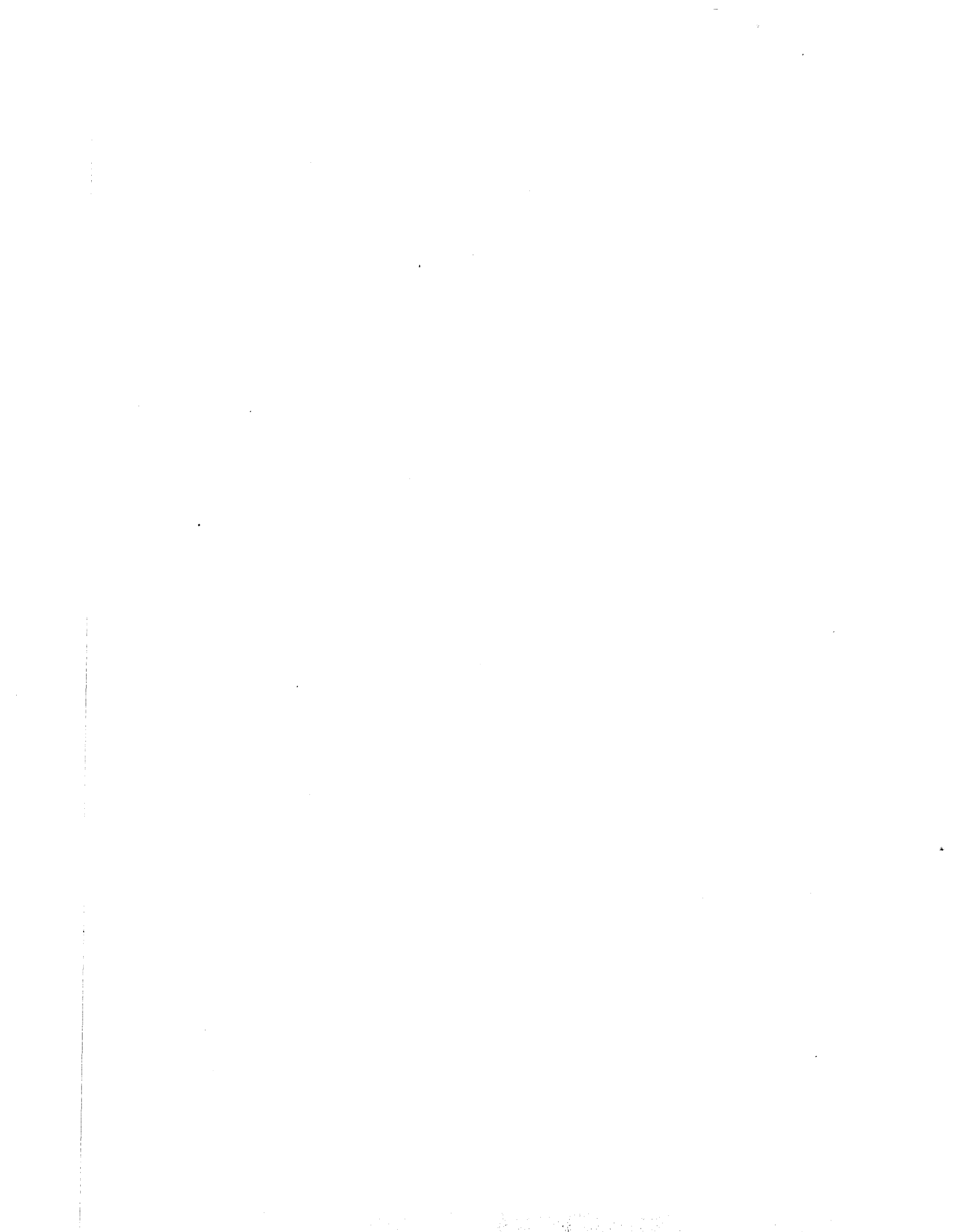
The report contains recommendations to you on pages 8 and 13. As you know, 31 U.S.C. § 720 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the House Committee on Government Operations and the Senate Committee on Governmental Affairs not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to the Director, Office of Management and Budget; the Chairmen, House Committee on Government Operations, Senate Committee on Governmental Affairs, and House and Senate Committees on Appropriations and on Armed Services; and the Secretary of Defense.

Sincerely yours,

A handwritten signature in cursive script that reads "Frank C. Conahan".

Frank C. Conahan
Director



D I G E S T

WHY THE REVIEW WAS MADE

The purpose of this review was to determine whether the Air Force used valid data to compute war reserve requirements for reparable items. To achieve this objective, GAO randomly sampled 75 items from an F-15 war readiness spares kit, 32 of which related to the F-15's radar system. The Warner Robins Air Logistics Center manages radar items on a worldwide basis and GAO's review emphasized those items. Although GAO performed its review at only one air logistics center, the results indicate that deficiencies noted may exist at the other four air logistics centers.

WHAT THE REVIEW DISCLOSED

GAO's review showed that war reserve requirements on 20 of the 32 sample items used on the F-15's radar system were overstated by about \$12.6 million. Requirements were inaccurate and unrealistic because computations were not adjusted to reflect (1) changes in item failure rates or (2) configuration changes in aircraft components.

Of the 20 radar items with overstated requirements, Warner Robins had initiated purchase action on 10 items having planned procurements valued at about \$10.1 million. Of this amount, about \$6.7 million was for unneeded parts. At GAO's suggestion, Warner Robins reviewed these and certain other radar items to see if additional stock was needed. From this review, Warner Robins terminated purchases for 13 items. The terminations totaled about \$2.6 million, of which about \$942,000 related to two items in GAO's sample. No action was taken on other items because the Air Force Logistics Command imposed a freeze on terminating procurements of war reserve items in August 1982. Examples of overstated requirements follow.

Changes in failure rates

War reserve requirements are computed only once a year, and any changes in failure rates (how often

parts break) or other factors are not reflected until the following year. Because failure rates greatly influence needs, requirements can become overstated and unnecessary purchases can occur when failure rates drop significantly. Of the 20 sample items with erroneous requirements, 12 had failure rate decreases of 20 percent or more.

One item, a \$6,778 circuit card assembly, had a failure rate twice as low as the rate used to compute the requirement. More current demand data and failure rate trends consistently supported a lower rate. Because managers used incorrect and unadjusted rates, a purchase request was initiated to buy 49 more circuit cards at a total cost of about \$332,000. At GAO's suggestion, Warner Robins reevaluated this request, and agreed to terminate the planned procurement of the 49 circuit cards. (See pp. 5 to 7.)

Changes in configuration

Warner Robins significantly overstated war reserve quantities of F-15 radar items because it did not determine whether certain parts were actually going to be used on the aircraft. This condition occurred when the configuration of certain radar components changed after the F-15 was deployed to operating squadrons.

To illustrate, different versions of radar receivers can be used in any F-15, but the individual parts of the receivers are not interchangeable with the parts in other receivers. However, Warner Robins computed additional quantities, sometimes up to twice the amount, as if they were interchangeable. GAO estimates that this process, on just 10 items, resulted in excess requirements of about \$11.4 million. (See pp. 9 to 12.)

RECOMMENDATIONS

The Air Force needs to incorporate realistic failure rate and configuration change data in its reparable (DO-41) and war reserve (DO-29) requirements computation systems. To do so, GAO recommends that the Secretary of the Air Force direct the Commander, Air Force Logistics Command, to:

- Devise a technique which identifies significant variations in failure rate data recorded in the DO-29 and DO-41 systems. (See p. 8.)

- Require item managers to (1) review, at least quarterly, the propriety of war reserve requirements from the latest failure rate data available, (2) coordinate the data with system managers and using commands, and (3) make adjustments in requirements computations. (See p. 8.)
- Strengthen existing quality controls to insure that requirements are properly adjusted and that purchases for items in excess of requirements are terminated. (See p. 8.)
- Determine the extent to which the configuration change problem exists on other F-15 avionics items and other aircraft weapons systems, and develop the means to compute realistic war reserve parts requirements. (See p. 13.)

AGENCY COMMENTS

On April 7, 1983, GAO met with Department of Defense and Air Force officials to obtain their official oral comments on a draft of this report. They agreed with GAO's recommendations and outlined some of the actions planned to improve processes for determining war reserve spares requirements. On the configuration change recommendation, the officials agreed with its intent but expressed concern that it was not feasible to keep track of all the interchangeable parts installed on every aircraft. Since its mission is to support aircraft in a wartime deployed environment, the Air Force feels that it must be prepared to support them in their potential deployed configuration, even though additional costs may be involved.

GAO believes the Air Force can take steps to support deployed aircraft logistically at minimum cost. One way of doing this is to tailor war reserve kit requirements to the actual aircraft configuration at wings or squadrons scheduled to deploy overseas during wartime. An Air Force working group recognizes the problem and is addressing ways to tailor the kits to the configuration, wartime tasking, and maintenance capability of each operating squadron.

In view of the potential unnecessary procurement costs involved, GAO believes the Air Force should act promptly to complete its evaluation and identify specific solutions to this problem.



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ABBREVIATIONS

AFLC	Air Force Logistics Command
BLSS	base level self-sufficiency spares
GAO	General Accounting Office
LRU	line replaceable unit
NSN	national stock number
SRU	shop replaceable unit
WRSK	war readiness spares kit



CHAPTER 1

INTRODUCTION

The Air Force invests substantial sums in aircraft spares and repair parts to sustain peacetime operations and to support war reserve material requirements. In fiscal year 1982, for example, the Air Force received \$2.2 billion to buy aircraft spare parts for peacetime operations and an additional \$1.1 billion for war reserves. Most of the money appropriated is invested in items which can be economically repaired at air bases or at depots. These items are generally referred to as recoverable (reparable) items.

COMPUTING REQUIREMENTS FOR REPARABLE ITEMS

Requirements for aircraft spares and repair parts are dynamic and fluctuate constantly with the passage of time. Therefore, deciding what items to buy and how much to buy becomes a difficult process. To compute item needs effectively and efficiently, managers must have current, accurate data and must know how the data is used in the requirements determination process.

The Air Force uses a complex computerized system--the Recoverable Consumption Item Requirements System (DO-41)--to determine both peacetime and wartime requirements for reparable spare parts. Item managers use this system to compute the quantity of each spare part needed. If shortages of usable parts exist, the system identifies the need for repairing unserviceable parts or purchasing new ones. If enough usable parts are available to fill the expected demand, the system forecasts the quantity of each item that can be used as replacement parts before onhand unserviceable items are scheduled for repair.

The WRSK/BLSS Requirements Computation System (DO-29) determines quantitative requirements for war reserve material in support of war and mobilization plans. War reserves of spares and repair parts for units which plan to operate in place within their assigned theaters are called base level self-sufficiency spares (BLSSs). Units that deploy within or to another theater use air transportable packages of parts which support planned wartime operations of a weapon system for a specified time frame and are called war readiness spares kits (WRSKs). DO-29 computations, run annually, are "overlaid" into the DO-41 system and ultimately form the basis for budgeting and funding action.

RECENT GAO REPORT ON
INACCURATE REQUIREMENTS

A report entitled "More Credibility Needed in Air Force Requirements Determination Process" (PLRD-82-22, Jan. 7, 1982) illustrated the effect of inaccurate requirements determinations at the Warner Robins Air Logistics Center. We reported that the Center personnel (1) overstated and understated requirements by \$77 million and \$8 million, respectively, (2) bought items which were not needed, and (3) did not fully understand the DO-41 system.

We recommended various actions to correct personnel and system problems which caused the misstated requirements and procurement actions noted during that review. The Air Force said that it is making improvements in its requirements computation system and providing item manager training in computation methodology.

OBJECTIVES, SCOPE, AND METHODOLOGY

Our objective was to determine whether the Air Force used valid data to compute war reserve requirements for reparable items. The validity of this data is imperative since it constitutes a major input to the DO-41 requirements computation system which computes worldwide requirements from parts usage and stock level data collected through various data systems. Invalid data could result in (1) overstated or understated wartime needs where certain peacetime rates are erroneous, (2) items computed for the wrong aircraft, or (3) unneeded war reserve requirements not being phased out of the computations.

To determine the extent of invalid war reserve requirements data in the DO-29 system, we selected a WRSK used on the F-15 aircraft. The F-15 was selected because the costs of war reserve items for this aircraft are rising sharply. Also, the majority of items in WRSKs are avionics spares and repair parts, for which item management responsibility rests primarily at Warner Robins. From a universe of 195 avionics items in the WRSK selected, we took a random sample of 75 items. Thirty-two items related to the F-15's radar system. We concentrated on these 32 items because our preliminary review of all 75 sampled items indicated that radar items had the greatest potential for requirements and procurement problems. We reviewed items for which requirements were computed in the DO-29 system in July 1981 and extracted from the DO-41's December 1981 quarterly cycle.

Although we performed the review at only one air logistics center, we believe that the deficiencies noted may exist at other air logistics centers since the DO-29 operates as a standard system within the Air Force Logistics Command (AFLC) and failure rates are not automatically updated in the system.

Our review was performed in accordance with generally accepted government audit standards.

CHAPTER 2

AIR FORCE WAR RESERVE REQUIREMENTS

DETERMINATION PROCESSES

War reserve requirements must be accurate to insure the material readiness of aircraft and equipment. At the same time, the requirements should be realistic so that unneeded material is not bought and stored. When requirements are understated, parts shortages may occur at the time when parts needs are most important, that is, during a combat environment. Conversely, overstated requirements unnecessarily absorb funds needed to buy more critical parts and create a greater strain on the supply system when the unneeded material is transported to wartime operating locations.

HOW REQUIREMENTS ARE DETERMINED

On a first line fighter aircraft like the F-15, the Air Force holds an annual review meeting to select parts to include in war reserve kits. Personnel from the operating commands, system manager's office, and item management organizations usually attend the review. In addition to determining what parts are required for the kits, the attendees decide on the propriety of data used to compute the requirement, such as anticipated failure rates and whether the aircraft will use the part in the future.

Pertinent data on the selected items is input to the WRSK/BLSS Requirements Computation System (DO-29). This system computes item quantities needed in each kit to support a predetermined number of aircraft. The quantities are later input to the War Readiness List System (DO-40) which basically records and stores the requirements without making any changes to the quantity. Every quarter, DO-40 quantities overlay to the Recoverable Consumption Item Requirements Computation System (DO-41) when the requirement is computed for future kits.

In the DO-41, peacetime and wartime requirements are compared to available assets. Only the shortfall remaining between the requirements and what the supply system can already provide (assets and repairs) is considered for purchase. Thus, a computed war reserve requirement may not be bought unless a shortfall exists and funds are available.

The DO-29 calculations are made as though each part is used on every aircraft supported by a given war reserve kit. The DO-29 system is not programmed to compensate for the fact that each aircraft does not use the same parts because production changes and modifications create differences in many aircraft systems. The DO-41 system reduces quantities based on codes (called "note codes") in the DO-29 identifying whether or not an item is used on all aircraft or is planned for such use in the

future. When properly used, the codes can cause the requirement to be correctly adjusted. Note codes are established at the annual war reserve kit review.

The DO-29 generally computes war reserve requirements only once a year on each weapon system. Thus, whatever requirement is computed based on decisions at the weapon system's annual war reserve review remains until the next annual review is made and the DO-29 computation is updated. The requirements we reviewed were on items selected for kits during the F-15's July 1981 review and first overlaid to the DO-41 in September 1981.

IMPACT OF INACCURATE REQUIREMENTS

Air Force managers have the difficult task of determining what future requirements will be for a particular item based on past data and future predictions. It is important, therefore, that managers make intelligent decisions on what and how much to buy.

The Air Force has consistently shown large shortfalls in WRSK/BLSS funding levels for aircraft requirements over the last few fiscal years. When funds provided are substantially below the level required, management should exercise tight control over the use of limited resources to ensure that funds are not wasted on buying unnecessary items or on those in excess of requirements.

Our review demonstrated, however, that the Air Force had not used accurate and up-to-date information to determine its war reserve requirements at Warner Robins. Based on December 31, 1981, requirements data, Warner Robins overstated prepositioned (WRSK/BLSS) war reserve requirements on the F-15's APG-63 radar system by about \$12.6 million for 20 of the 32 items in our sample. Requirements computed for the remaining 12 items were reasonably accurate.

Of the 20 items, Warner Robins had initiated purchase action on 10 items having planned procurements valued at \$10.1 million, including about \$6.7 million for unnecessary purchases. This "overbuy" represented about 53 percent of the \$12.6 million in overstated needs we identified. Thus, the inaccurate and outdated information used in the requirements determination process not only overstated war reserve needs but also resulted in unnecessary procurement action.

Specific examples illustrating cases identified during our review where items were procured but not needed are discussed in chapters 3 and 4. A listing of overstated requirements for the 20 radar items in our sample is included as appendix I.

CHAPTER 3

REQUIREMENTS NOT UPDATED

IN A TIMELY FASHION

The DO-29 system computes war reserve requirements on each weapon system only once a year. It is not automatically updated for subsequent changes in failure rates or for other factors. This means that item managers and others may not recognize needed adjustments in war reserve quantities until a year later. Based on December 31, 1981, requirements data, this condition resulted in Warner Robins overstating prepositioned (WRSK/BLSS) war reserve requirements on the F-15's APG-63 attack radar system by about \$4.6 million on 12 of the 32 radar items in our sample.

INACCURATE FAILURE RATES

About 38 percent of the radar items we sampled experienced failure rate decreases of at least 20 percent and higher over the previous year. Such changes were not reflected automatically in the DO-29 system nor did item managers adjust them manually. The managers apparently did not realize that manual adjustments were necessary to overcome this system limitation.

At our suggestion Warner Robins officials reviewed radar items on procurement to determine if current requirements supported the need for buying additional stock. As a result, Warner Robins terminated procurements for 13 radar items valued at about \$2.6 million, of which \$942,000 related to two items in our sample. These two items, which highlight problems with inaccurate failure rates, are discussed below.

Circuit card for signal processor

In July 1981, the DO-29 computed a requirement for 56 circuit cards (NSN 5841-01-058-9033) used in the radar's programmable signal processor. At a \$9,769 unit cost, the requirement was valued at \$547,064. However, subsequent reductions in failure rates resulted in needs being overstated by 41 units valued at \$400,529.

Three circuit cards are used in each processor rather than one as stated in the DO-29 computation. Thus, the requirement at the time of the computation was 168 units (56 X 3) rather than the 56 units actually computed. By December 1981, the estimated failure rate, however, had decreased 91 percent. Therefore, the requirement in December 1981 should have been 15 units valued at \$146,535 (9 percent of 168 units). However, the DO-29 still reflected the 56 unit figure.

On December 31, 1981, Warner Robins was in the process of buying 82 circuit cards--31 for war reserves and 51 for peacetime use. The war reserve purchase was valued at about \$319,000. It had not been adjusted to consider the decrease in the requirement.

At the next F-15 review in June 1982, the review group decided to delete the item from all war reserve kits, apparently because of low usage. This meant the war reserve requirement was now zero. Although the item manager attended the review, we found that 68 units were still being bought in late September 1982. After we discussed the matter with Warner Robins personnel, they took immediate action to terminate 59 units valued at about \$610,000 from existing contracts. Twenty-nine of these units, valued at about \$300,000, were for war reserves.

In this case, information was available in March 1982 (the December 1981 DO-41 requirements cycle) to show the requirement had dropped from what had been computed earlier in the DO-29. The quantities needed to be manually reduced. However, the item manager did not recognize the need for the adjustment nor did four higher level supervisory personnel who reviewed and signed the same computation. Later, the manager had information concerning the need to terminate the procurement when the requirement went to zero. They did not take any action, however, and material continued to be bought even though it was not needed for its intended purpose.

Circuit card assembly for digital processor

A \$6,778 circuit card assembly (NSN 5841-00-539-1870) used on the radar's digital processor had an 83-unit war reserve requirement valued at \$562,574. As of December 1981, however, the failure rate had dropped about 53 percent from the rate used in the July 1981 DO-29 computation. The requirement, therefore, was overstated by 42 units valued at \$284,676.

Warner Robins used a failure rate twice as high as the latest DO-41 rate to compute the DO-29 requirement. The higher failure rate was based on increased demands experienced between July 1 and December 31, 1980. Persons reviewing the item apparently relied on a computer worksheet showing requirements data as of December 31, 1980, in making the DO-29 computation.

More current data was available to demonstrate that the requirement was actually decreasing rapidly, not increasing. The DO-41's March 31, 1981, requirements cycle showed that demand had dropped from 33 units in the December 1980 quarter to 6 units in the March 1981 quarter--an 82 percent decrease during the 3-month period. Further, the data showed demands had decreased 42 percent in the most current six months, between October 1, 1980 and March 31, 1981.

In addition to a trend in decreasing failures during the most current two quarters, the DO-41 computations from December 1980 to March 1982 consistently showed a lower rate than the rate used in the DO-29--at least 41 percent lower in each of these six quarters. However, this data cannot automatically enter the DO-29 to update the requirement.

Warner Robins had 17 war reserve units on purchase request or contract in December 1981. In February 1982, the item manager initiated a purchase request to buy 49 more circuit cards costing about \$332,000 based on the higher failure rates. The purchase request was still being processed when we reviewed the item in October 1982.

At that time, we discussed the overstatement with the unit chief who immediately initiated action to reevaluate the need for the circuit card and all other items on the same purchase request. Since contract award was imminent, the contractor agreed to accept a no-cost termination after the requirements were reevaluated rather than delay award of the total procurement. When the reevaluations were completed in November 1982, 49 circuit cards valued at about \$332,000 were terminated. In addition, due to reduced requirements, quantities of nine other items, not in our sample, were terminated at an additional value of about \$1.5 million.

The rates used to compute the DO-29 requirement were not justified when the computation was made. Further, the higher rates continued to be used after information in DO-41 computations showed the rates were too high.

These two examples show that the requirements process perpetuates errors because the DO-29 system is not automatically updated as current information becomes available, and item managers do not input the new data. Updating is particularly important for items experiencing high rate decreases (20 percent or higher) over the previous year. If item managers exercised better quality control over their input data, especially for items which experienced wide variations in rates from one year to the next, and coordinated the data with the applicable system manager and using command before making changes, the problems could be minimized.

CONCLUSIONS

During our earlier review of peacetime requirements at Warner Robins, we identified items being procured but not supported by current computations because requirements were not adjusted for decreases or errors once the items were on purchase requests. Basically, the same condition existed during this review in that quantities overlaid by the DO-29 system to the

DO-41 system were not routinely adjusted. However, the present situation has been difficult to control principally because failure data in the DO-29 and DO-41 systems are compared at different points in time and manual recomputations are needed.

Since war reserve requirements are computed in the DO-29 system only once a year, the system does not compensate for dramatic decreases in failure rates which may subsequently occur. Thus, the DO-41 system may compute a shortfall between requirements and available assets when, in fact, a shortfall may not really exist. When this condition occurs, overstated requirements and unnecessary procurements can result. The Air Force should devise ways to enable its item managers to recognize wide variations in failure rates impacting on what and how many war reserve spares should be bought. Once this is done, item managers should then verify rate changes, coordinate them with system managers and using commands, and make the necessary adjustments in requirements computations.

RECOMMENDATIONS

We recommend that the Secretary of the Air Force direct the Commander, AFLC, to:

- Devise a technique which identifies significant variations in failure rate data recorded in the DO-29 and DO-41 systems.
- Require item managers to (1) review, at least quarterly, the propriety of war reserve requirements from the latest failure rate data available, (2) coordinate the data with system managers and using commands, and (3) make adjustments in requirements computations.
- Strengthen existing quality controls to insure that requirements are properly adjusted and that purchases for items in excess of requirements are terminated.

AGENCY COMMENTS

DOD and Air Force officials agreed with our recommendations. In providing official oral comments on April 7, 1983, they indicated that steps will be taken to (1) recognize and act on significant variations in failure rate data as reflected in the DO-29 and DO-41 systems, (2) ensure that personnel involved in the war reserve determination process are aware of their responsibilities to make changes to war reserve levels when the circumstances require it, and (3) improve and reemphasize the importance of quality control procedures.

CHAPTER 4

NEED TO CONSIDER EFFECTS OF

AIRCRAFT PART CONFIGURATION CHANGES

War reserve requirements on a number of F-15 radar items were significantly overstated because item and system managers did not know what changes were made in the configuration of components once aircraft were deployed to operating squadrons. To compensate, Warner Robins computed extra war reserve quantities of up to 100 percent to ensure adequate support on each radar component. On just 10 parts, this process resulted in requirements being overstated by about \$11.4 million. Of this amount, \$8 million related to six items in our sample and \$3.4 million related to other items we used for comparison.

RELATIONSHIP BETWEEN LRUS AND SRUS

The APG-63 radar system has 10 line replaceable units (LRUs). Generally LRUs, such as the radar's receiver, are high-cost items primarily repaired at base level. In turn, the LRUs contain parts called shop replaceable units (SRUs), such as the radar's amplifiers, which are cheaper items primarily repaired at the depot level. As a simple example, a television set is comparable to an LRU while a circuit card inside the set is comparable to an SRU.

When F-15 aircraft were delivered to operating squadrons, the Air Force initially knew which LRUs were in each aircraft. Later, modifications to the LRUs and repairs to failed LRUs created a situation where Warner Robins did not know which LRU version had been placed in any particular F-15 aircraft. For example, two versions of radar receivers existed with part numbers ending in -125 and -130. The -125 part was in the first 376 F-15 systems produced. Then, the design changed to the -130 version and the remaining systems delivered to the Air Force included this configuration.

Both LRU part numbers can be used in any aircraft since they are totally interchangeable. However, most SRUs are not interchangeable; they are peculiar to a specific LRU and cannot be substituted in the repair of another LRU. This means that most parts used in the -125 receiver cannot be used to replace parts used in the -130 receiver.

The war reserve kit concept generally plans for removing and replacing failed SRUs during the first 30 days of war. SRUs are not repaired by the field activity and reinstalled. Thus, in wartime, field activities must be able to replace failed SRUs with serviceable SRUs. In the case of the radar receiver, they

need to know which version of the receiver (-125 or -130) is in each aircraft. If interchangeable LRUs have migrated, personnel may not know which version is in the aircraft. In other words, when base maintenance tries to repair the radar system, it may find the -130 receiver (delivered in the aircraft) was exchanged for a -125 receiver during past repairs.

REQUIREMENTS FOR SRUs
ARE OVERSTATED

To compensate for this uncertainty, Warner Robins ensures that war reserve kits contain enough parts to repair failures on both LRU versions. To do this, Warner Robins logistics personnel put incorrect note codes in the DO-29 to prevent the DO-41 from reducing the requirement to that needed to support estimated failures. In other words, data in DO-41 reflects that the part is used on all aircraft even though this is not the case.

Since an aircraft cannot contain both LRUs, the effect of this misinformation is that up to 100 percent additional support is computed in the DO-29. Hypothetically, if both receiver versions contain a peculiar amplifier, and a total of 10 amplifiers are expected to fail on aircraft supported by a kit, the kit will contain 20 amplifiers (10 of each type). In actuality, however, the quantities computed will not be identical due to differences in failure rates.

To demonstrate the additional support computed using this technique, we compared SRU quantities that should have been computed on two SRUs used in radar receivers with those quantities Warner Robins computed when the LRU version is unknown. The results of our comparison are shown below:

Comparison of War Reserve Requirements
Computations on Two F-15 SRU Radar Items

SRU name	Unit cost	Aircraft using SRU	Percent having SRU	Units computed by		Dollar Difference
				Air Force	GAO	
Mixer preamplifier (5841-00-274-9855)	\$14,759	F-15A	84	43	36	\$ 103,313
		F-15C	-	57	-	841,263
Mixer IF amplifier (5841-01-047-5879)	35,886	F-15A	16	50	7	1,543,098
		F-15C	100	66	66	-
Total				216	109	\$2,487,674

Warner Robins' technique to compute support is very costly because of the large quantities of expensive parts involved. To show the added cost, we compared the total war reserve requirement computed by Warner Robins on some F-15 items when the LRU version is unknown with the requirement computed if the LRU version in the aircraft had been known. Our comparison on four SRU parts for the radar receiver showed that an additional \$5 million in unneeded SRU support is computed as follows:

<u>War Reserve Requirements for Radar Receiver SRU Parts</u>							
<u>SRU part</u>	<u>Unit cost</u>	<u>Unknown LRU</u>		<u>Known LRU</u>		<u>Difference</u>	
		<u>Units</u>	<u>Cost</u>	<u>Units</u>	<u>Cost</u>	<u>Units</u>	<u>Cost</u>
		(millions)		(millions)		(millions)	
Parametric amplifier (5841-00-138-7640)	\$35,558	108	\$3.8	43	\$1.5	65	\$2.3
Mixer preamplifier (5841-00-274-9855)	14,759	100	1.5	36	0.5	64	1.0
RF amplifier (5841-01-047-5953) (note a)	10,799	34	0.4	24	0.3	10	0.1
Mixer IF amplifier (5841-01-047-5879)	35,886	<u>116</u>	<u>4.2</u>	<u>73</u>	<u>2.6</u>	<u>43</u>	<u>1.6</u>
Total		<u>358</u>	<u>\$9.9</u>	<u>176</u>	<u>\$4.9</u>	<u>182</u>	<u>\$5.0</u>

a/Item not in our sample

We also compared the war reserve requirement on six items used in two LRU versions of the analog processor (part no. 3173039-125 and 3173039-130). On these LRUs, the unneeded SRU requirements were about \$6.4 million as shown below:

War Reserve Requirements for
Analog Processor SRU Parts

<u>SRU part</u>	<u>Unknown LRU</u>		<u>Known LRU</u>		<u>Difference</u>	
	<u>Units</u>	<u>Cost</u>	<u>Units</u>	<u>Cost</u>	<u>Units</u>	<u>Cost</u>
		(millions)		(millions)		(millions)
Tracking amplifier (5841-01-003-6768)	76	\$ 1.1	32	\$0.5	44	\$0.6
Wide band amplifier (5841-00-149-1396)	90	1.5	47	0.8	43	0.7
Detector (5841-01-007-4201) (note a)	97	1.6	42	0.7	55	0.9
Tracking amplifier (5841-01-058-7295) (note a)	76	2.1	42	1.2	34	0.9
Wide band amplifier (5841-01-058-7297) (note a)	137	3.5	77	2.0	60	1.5
Detector (5841-01-116-0768)	<u>120</u>	<u>4.2</u>	<u>70</u>	<u>2.4</u>	<u>50</u>	<u>1.8</u>
Total	<u>596</u>	<u>\$14.0</u>	<u>310</u>	<u>\$7.6</u>	<u>286</u>	<u>\$6.4</u>

a/Items not in our sample.

On the 10 items shown on the two charts, the computed requirement was about \$23.9 million when each part is assumed to be on all aircraft. The requirement is about \$12.5 million, or 48 percent less, when kits are planned based on the percentage of aircraft actually delivered with the LRUs. In addition to the extra cost, the number of parts requiring wartime transportation is almost doubled when total support is computed on each LRU.

We discussed the LRU/SRU matter with Warner Robins requirements personnel. Warner Robins wrote AFLC in June 1982 to determine whether an alternative to the support technique exists, and if not, to concur in continuing the present support technique. The LRU example used in the letter dealt with the radar receivers used on the F-15 aircraft. AFLC agreed with the method being used and pointed out that the only possible alternative was to stock SRUs to the percentage application of the LRU. It stated that, while less expensive, the result would be a much greater probability of grounded airplanes if the unit deploys in a configuration other than the worldwide percentage application.

We disagree with the AFLC position on this matter. The SRU support problem goes beyond more than one LRU type on the F-15 radar system and possibly involves other aircraft weapons systems. Further, the war reserve support technique used by Warner Robins to alleviate the problem is very costly and results in the purchase of unnecessary parts. We believe the potential significance of the SRU support problem requires thorough consideration of all feasible alternatives.

CONCLUSIONS

The possible "migration" of parts supporting LRUs is a support problem needing immediate attention to permit realistic determination of war reserve needs. Undoubtedly, some migration of parts has occurred. However, it is unrealistic to assume every LRU has been replaced with a version different than the one delivered with the aircraft. Warner Robins' method of computing war reserve requirements on the F-15 radar system is costly. We question whether the Air Force can continue to operate in this manner since aircraft other than the F-15 may have a similar support problem.

In this regard, relatively new aircraft, such as the F-16 and E-3, are undergoing production changes and modifications on systems and subsystems similar to those which have occurred on the F-15's radar system. Unless configuration changes and support techniques are managed differently on these aircraft, we believe problems similar to those at Warner Robins may exist at other centers managing these aircraft.

The Air Force should determine the magnitude of the problem and, if warranted, develop the means to provide more realistic support and reduce costs. This would involve keeping records of configuration changes on aircraft, learning more about parts actually used in aircraft supported by the kits, and making a concerted effort to maintain information on the changes. Then, the kits could be tailored to the aircraft and future items purchased accordingly. The key to such an alternative is whether configuration visibility can be realistically established.

RECOMMENDATIONS

We recommend that the Secretary of the Air Force direct the Commander, AFLC, to determine the extent to which the configuration change problem exists on other F-15 avionics items and other aircraft weapons systems, such as the E-3 and F-16, and develop the means to compute realistic war reserve parts requirements.

AGENCY COMMENTS AND OUR EVALUATION

DOD and Air Force officials agreed with the intent of our recommendation but expressed concern that it was not feasible to keep track of all the interchangeable parts installed on every aircraft. Since its mission is to support aircraft in a wartime deployed environment, the Air Force believes that it must be prepared to support them in their potential deployed configuration, even though additional costs may be involved.

We believe the Air Force can take steps to support deployed aircraft logistically at minimum cost. One way of doing this is to tailor war reserve kit requirements to the actual aircraft configuration at wings or squadrons scheduled to deploy overseas during wartime. By tracking configuration changes in aircraft assigned to specific units, those units can maintain visibility over parts migration and adjust kits accordingly. In fact, Air Force regulations require that war reserve kits be tailored to the specific requirements of units assigned kits. Also, Air Force officials said an Air Force working group recognizes the problem and is addressing ways to tailor the kits to the configuration, wartime tasking, and maintenance capability of each operating squadron.

In view of the potential unnecessary procurement costs involved, we believe the Air Force should act promptly to complete its evaluation and identify specific solutions to this problem.

LIST OF OVERSTATED WAR RESERVE REQUIREMENTS
FOR SAMPLE ITEMS AT THE
WARNER ROBINS AIR LOGISTICS CENTER

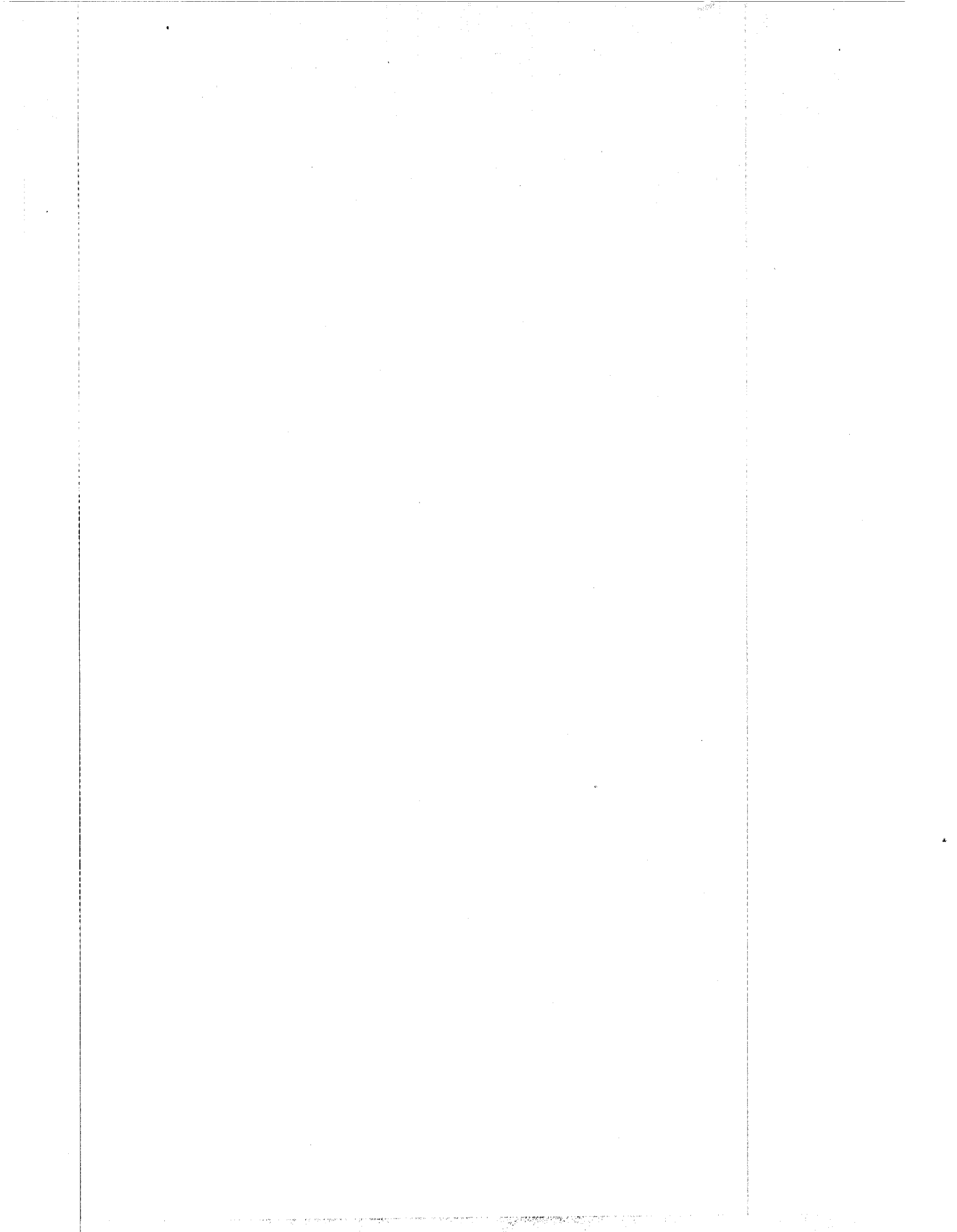
APPENDIX I

National stock number	Item	Unit cost	Requirement computed by		Difference overstated	Value of overstatement	Impact on procurement (note b)	Reason for overstatement
			Air Force	GAO (note a)				
1. 5841-01-039-0498	Generator	\$ 7,027	43	16	27	\$ 189,729	\$ -	SRU requirement erroneous
2. 5841-01-035-9692	Generator	13,586	37	23	14	190,204	-	Actual failure rate had decreased by 46%
3. 5841-00-274-9855	Mixer preamp-lifier	14,759	100	36	64	944,576	723,191	SRU requirement erroneous
4. 5841-01-045-1066	Circuit card	3,817	33	14	19	72,523	-	Actual failure rate had decreased by 74%
5. 5841-01-003-2897	Circuit card assembly	4,078	40	29	11	44,858	44,858	Actual failure rate had decreased by 29%
6. 5841-00-539-1870	Circuit card	6,778	83	41	42	284,676	264,342	Actual failure rate had decreased by 53%
7. 5841-00-613-2153	Filter	3,555	12	5	7	24,885	-	SRU requirement erroneous
8. 5841-01-046-1043	Circuit card assembly	2,989	9	5	4	11,956	-	Actual failure rate had decreased by 30%; items phased out of WRSKs
9. 5841-01-039-0497	Generator	6,350	58	16	42	266,700	107,950	Actual failure rate had decreased by 20%; SRU requirement erroneous
10. 5841-01-058-9033	Circuit card	9,769	56	15	41	400,529	422,306	Actual failure rate had decreased by 91%; no. per assembly erroneous
11. 5841-01-047-5879	Mixer preamp-lifier	35,886	116	44	72	2,583,792	2,575,833	Actual failure rate had decreased by 42%; SRU requirement erroneous
12. 5841-01-040-6638	Generator	6,274	60	20	40	250,960	50,192	SRU requirement erroneous
13. 5841-01-025-5361	Circuit card	5,534	30	11	19	105,146	-	Items phased out of WRSKs for certain aircraft types
14. 5841-01-003-6768	Amplifier	14,234	76	23	53	754,402	892,256	Actual failure rate had decreased by 28%; SRU requirement erroneous
15. 5841-01-009-5983	Gridded TWT	44,836	33	17	16	717,376	-	Actual failure rate had decreased by 39%
16. 5841-00-138-7640	Parametric amplifier	35,558	108	43	65	2,311,270	-	SRU requirement erroneous
17. 5841-00-149-1396	Amplifier	17,058	90	47	43	733,494	535,468	SRU requirement erroneous
18. 5841-01-051-3949	Amplifier	10,535	99	74	25	263,375	-	Actual failure rate had decreased by 22%
19. 5841-01-116-0768	Detector	34,780	120	51	69	2,399,820	1,078,180	Actual failure rate had decreased by 28%; SRU requirement erroneous
20. 5841-01-046-1044	Circuit card	3,647	18	5	13	47,411	-	Items phased out of WRSKs
Total			<u>1,221</u>	<u>535</u>	<u>686</u>	<u>\$12,597,682</u>	<u>\$6,694,646</u>	

a/The Air Force requirement was taken from the December 31, 1981, DO-41 requirements computation. GAO adjusted the Air Force figures to reflect errors/inaccurate data.

b/The dollars shown reflect purchase requests or contracts in process or action initiated to do so at the time of our review. Actual contract prices were used if available; unit prices were used when procurement items were unpriced.





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