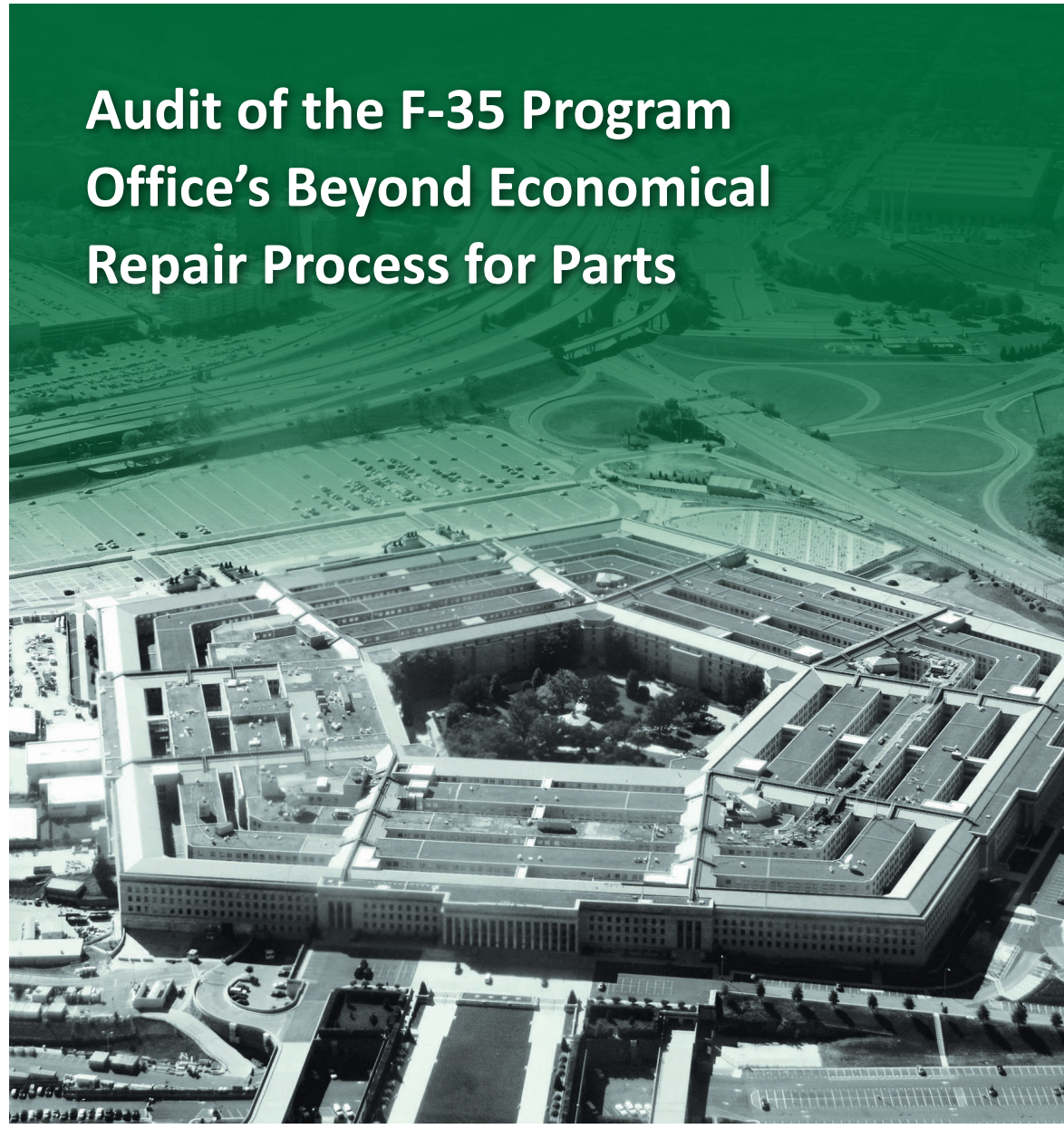


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INSPECTOR GENERAL

U.S. Department of Defense

SEPTEMBER 4, 2020



Audit of the F-35 Program Office's Beyond Economical Repair Process for Parts

INTEGRITY ★ INDEPENDENCE ★ EXCELLENCE

The document contains information that may be exempt from
mandatory disclosure under the Freedom of Information Act.

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Results in Brief

Audit of the F-35 Program Office's Beyond Economical Repair Process for Parts

September 4, 2020

Objective

The objective of this audit was to determine the extent that the F-35 Program Office's Beyond Economical Repair (BER) process identified parts that were damaged and determined whether a part could be economically repaired, and whether a DoD official approved the contractor's determination that a part could not be economically repaired.

Background

The F-35 Program is a multiservice and multinational acquisition to develop and field the next-generation strike fighter aircraft, the F-35. The F-35 Program Office, led by the Program Executive Officer, is responsible for total life cycle management of the F-35 Joint Strike Fighter Program, including coordination of program objectives, requirements, schedules, and budgets. The prime contractor, Lockheed Martin Aeronautics, provides sustainment support for the F-35 aircraft, including supply, logistics, and maintenance.

The decision-making process that maintenance and supply organizations use to determine whether to repair a part, or to dispose of it and buy a new part is a complex one. The specific term "beyond economical repair" describes when a part generally should not be restored to a serviceable condition because the repair costs would exceed an agreed-upon percentage of the part's total acquisition cost. Generally, the organization must weigh the cost to repair, the cost of buying a new part, the time to repair the part, the time to acquire a new part, and the overall readiness posture of the supported organization.

Background (cont'd)

In 2017, the Defense Contract Management Agency (DCMA), the administrative contracting office for the F-35 sustainment contracts, announced an audit of the contractor's BER process for the F-35 Program. The DCMA's audit identified discrepancies in the contractor's BER process that led to the DCMA issuing corrective action requests related to the contractor's lack of data and documentation to support BER determinations. We performed this audit of the BER process, in part, because of these problems identified by the DCMA in 2017.

Finding

The F-35 Program Office did not implement a BER process that ensured that the decision to either replace or repair damaged parts was the most economical decision. Specifically, from October 2001 through December 2019, F-35 Program Officials had not implemented a BER process that: 1) identified the replacement cost for repairable parts, 2) established a threshold for use in determining whether it was economical to repair a part, or 3) required DoD approval for replacing damaged parts that the contractor determined could not be economically repaired. The F-35 Program officials had not implemented a complete BER process because:

- F-35 Program Officials allowed the prime contractor to make the decisions on whether damaged parts were replaced or repaired, without DoD approval;
- F-35 Contracting Officials did not include in the sustainment contracts a list for repairable parts (needed for BER analysis) until August 2019; and
- DCMA officials had not validated the contractor's responses to the DCMA's corrective action requests to provide specific data and records for the BER process until April 27, 2020, so the DCMA would not rely on the contractor's data or records before that time.

As a result, from January 2016 through June 2019, the prime contractor reported that it disposed of at least 688 parts, categorized as beyond economical repair and valued at \$34.5 million, without DoD oversight or approval to ensure replacing the part was the most economical action. Another result from the delay in implementing a process is that, as of February 2020, the F-35 Program Office had more than



Results in Brief

Audit of the F-35 Program Office's Beyond Economical Repair Process for Parts

Finding (cont'd)

500 parts waiting for a DoD official to approve the contractor's determination that replacing the damaged part is the most economical decision. A nonfunctioning BER process contributes to the reduction of available spare parts when a backlog of parts waiting for BER approval accumulate, which delays the final repair or replace decision and negatively affects warfighter readiness. The lack of available spare parts prevent the F-35 fleet from performing required operational and training missions.

Recommendations

We recommend that the Under Secretary of Defense for Acquisition and Sustainment (USD[A&S]) develop DoD-wide BER guidance, aligned with existing DoD guidance on repairing repairable parts, including considering non-cost factors.

In addition, we recommend that the F-35 Program Executive Officer direct officials to:

- fully develop and formalize its BER process with specific goals, procedures, and metrics;
- update sustainment contracts to incentivize repairing of repairable spare parts within specific timeframes; and
- determine accurate costs for DoD replacement parts to use in making BER determinations.

Management Comments and Our Response

The Assistant Secretary of Defense for Sustainment (ASD[S]), responding for the Under Secretary of Defense for Acquisition and Sustainment and for the F-35 Program Executive Officer, agreed with the recommendations to develop DoD-wide guidance and update the sustainment contracts to incentivize

repairing parts. Therefore, the recommendations are resolved but will remain open. We will close the recommendations once we receive documentation showing that the actions have been completed.

The ASD(S), responding for the F-35 Program Executive Officer, agreed with the recommendation to fully develop and formalize its BER process; however, the ASD(S) did not address the specifics of the recommendation. The ASD(S) did not provide the F-35 Program Office's specific goals for the BER process, whether the program office will create procedures for DoD personnel's specific roles and responsibilities, or the specific data elements and other information that the contractor must provide to comply with the substantiating data requirement in the contract. Therefore, the recommendation is unresolved. We request that the ASD(S) provide additional comments to the final report that identify the non-cost factors that DoD officials should consider when analyzing BER determinations and the desired outcome of the BER process.

The ASD(S), responding for the F-35 Program Executive Officer, agreed with the recommendation to determine accurate costs for DoD replacement parts; however, comments from the ASD(S) partially addressed the recommendation. The ASD(S) did not explain how the F-35 Program Office would "refine the cost data as the effort matures." Therefore, the recommendation is unresolved. We request that the ASD(S) provide additional comments to the final report that identify how the F-35 Program Office proposes to refine the sub-optimal pricing over time.

Please see the Recommendations Table on the next page for the status of recommendations.

Recommendations Table

Management	Recommendations Unresolved	Recommendations Resolved	Recommendations Closed
Under Secretary of Defense for Acquisition and Sustainment	None	1	None
Program Executive Officer, F-35 Joint Program Office	2.a, 2.c	2.b	None

Please provide Management Comments by October 5, 2020.

Note: The following categories are used to describe agency management's comments to individual recommendations.

- **Unresolved** – Management has not agreed to implement the recommendation or has not proposed actions that will address the recommendation.
- **Resolved** – Management agreed to implement the recommendation or has proposed actions that will address the underlying finding that generated the recommendation.
- **Closed** – OIG verified that the agreed upon corrective actions were implemented.





**INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
4800 MARK CENTER DRIVE
ALEXANDRIA, VIRGINIA 22350-1500**

September 4, 2020

**MEMORANDUM FOR UNDER SECRETARY OF DEFENSE FOR ACQUISITION
AND SUSTAINMENT
DIRECTOR, DEFENSE CONTRACT MANAGEMENT AGENCY
DOD PROGRAM EXECUTIVE OFFICER JOINT STRIKE FIGHTER**

**SUBJECT: Audit of The F-35 Program Office's Beyond Economical Repair Process for Parts
(Report No. DODIG-2020-123)**

This final report provides the results of the DoD Office of Inspector General's audit. We previously provided copies of the draft report and requested written comments on the recommendations. We considered management's comments on the draft report when preparing the final report. These comments are included in the report.

This report contains recommendations that are considered unresolved because the Assistant Secretary of Defense for Sustainment, responding for the Under Secretary of Defense for Acquisition and Sustainment and for the F-35 Program Executive Officer, did not fully address the recommendations presented in the report. Therefore, as discussed in the Recommendations, Management Comments, and Our Response section of this report, the recommendations remain open. We will track these recommendations until an agreement is reached on the actions to be taken to address the recommendations and adequate documentation has been submitted showing that the agreed-upon action has been completed. DoD Instruction 7650.03 requires that recommendations be resolved promptly. Therefore, the Assistant Secretary of Defense for Sustainment should provide us within 30 days your response concerning specific actions in process or alternative corrective actions proposed on the recommendations. Your response should be sent to either audrgo@dodig.mil if unclassified or rfunet@dodig.smil.mil if classified SECRET.

For recommendations that are resolved but remain open, as described in the Recommendations, Management Comments, and Our Response section of this report, the recommendations may be closed when we receive adequate documentation showing that all agreed-upon actions to implement the recommendations have been completed. Therefore, please provide us within 90 days your response concerning specific actions in process or completed on the recommendations. Your response should be sent to either followup@dodig.mil if unclassified or rfunet@dodig.smil.mil if classified SECRET. If you have any questions, please contact [REDACTED]

A handwritten signature in blue ink, reading "Richard B. Vasquez", is located below the text.

Richard B. Vasquez
Assistant Inspector General for Audit
Readiness and Global Operations

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Acronyms and Abbreviations

Introduction

Objective

The objective of this audit was to determine the extent that the F-35 Program Office's Beyond Economical Repair (BER) process identified parts that were damaged and determined whether a part could be economically repaired, and whether a DoD official approved the contractor's determination that a part could not be economically repaired.¹

Background

The F-35 Program is a multiservice and multinational acquisition to develop and field the next-generation strike fighter aircraft for the Marine Corps, Navy, Air Force, and seven international partners (the United Kingdom, Italy, Netherlands, Canada, Australia, Denmark, and Norway). In addition to these international partners, the program has six Foreign Military Sales customers (Belgium, Israel, South Korea, Poland, Singapore, and Japan).

The F-35 aircraft augments the fleet of a variety of fighter aircraft, such as the F/A-18E/F and F/A-22 and replaces other aircraft, such as the A-10 and F-16. As of April 2020, there were over 510 F-35 aircraft delivered to 23 bases worldwide with greater than 275,000 flight hours logged. The F-35 Program represents the DoD's largest cooperative development program with an estimated lifecycle cost of about \$1.4 trillion. See Figure 1 for a picture of the F-35A.



Figure 1. F-35A Aircraft in Flight
Source: F-35 Program Office.

¹ We use the phrase "BER process" throughout this report in lieu of the longer phrase stated in the 2020 F-35 sustainment contract "Repair of Repairables (ROR) and Beyond Economical Repair (BER) Process." F-35 Program parts include repairable parts, consumable parts, engines, and engine modules.

The F-35 Program Office, located in Arlington, Virginia, is responsible for total life cycle management of the F-35 Joint Strike Fighter Program, including coordination of program objectives, requirements, schedules, and budgets. The Program Executive Officer directs the F-35 Program Office. The F-35 Program has no lead Service; instead, the Program Executive Officer alternates between the Navy and Air Force and reports to the Service Acquisition Executive of the opposite Military Service. As of July 2019, the Air Force assumed the Program Executive Officer role for the F-35 Program. In addition, the F-35 Program Office manages and oversees the support and sustainment functions, such as engineering, logistics, and information management required to deliver and maintain the readiness of all three variants of the F-35. The F-35 Program Office receives sustainment support for the F-35 aircraft, including the supply chain, logistics system, depot maintenance, and pilot and aircraft maintenance training from the prime contractor, Lockheed Martin Aeronautics, located in Fort Worth, Texas. The contractor provides sustainment support through annual sustainment contracts. F-35 Program Office contracting officials and Defense Contract Management Agency (DCMA) officials ensure that the contractor complies with the terms of the contract, safeguard the program office's interests, and conduct appropriate oversight and surveillance on the contractor's performance as required by the Federal Acquisition Regulation.

The DCMA is the contract administrator for the F-35 sustainment contract. The DCMA monitors contractor performance and management systems to ensure that cost, product performance, and delivery schedules comply with the terms and conditions of the sustainment contracts. In addition, the DCMA can issue contract modifications to make administrative changes to the contract, for example, adding clarifying information to the contract such as a price list, as long as those modifications do not require additional funds. If the DCMA identifies contractor noncompliance, it can issue a corrective action request to the contractor asking for a remedy or solution for contract noncompliance. The DCMA also notifies the F-35 Program Office when it issues a corrective action request. The DCMA administration office for the F-35 Program is located with Lockheed Martin in Fort Worth, Texas.

F-35 Sustainment Contracts

Since April 2018, the F-35 Program Office has awarded three cost-plus-incentive-fee contracts to the F-35 prime contractor for sustainment of the F-35 that included contractual language describing its BER process. A cost-plus-incentive-fee contract is a cost reimbursement contract in which the Government pays the contractor for incurred costs plus an adjustable, performance-incentive fee based on cost and performance. Part repairs are funded on the sustainment contracts based

on projected flying hours of the aircraft. Since April 2018, the three sustainment contracts for the F-35 totaled \$3.5 billion, with the contract award value for each year noted below.

- 2018 for a not-to-exceed amount of \$1.4 billion
- 2019 for a not-to-exceed amount of \$1.1 billion
- 2020 for a not-to-exceed amount of \$1 billion²

Beyond Economical Repair Process

The decision-making process that maintenance and supply organizations use to determine whether to repair a part or to dispose of it and buy a new part is a complex one. The specific term “beyond economical repair” describes when a part generally should not be restored to a serviceable condition because the repair costs would exceed an agreed-upon percentage of the part’s total acquisition cost.³

Although there is no DoD-wide requirement for the information or specific calculations to use to determine whether to repair or replace a part, generally, the organization must weigh the:

- cost to repair the damaged part,
- cost of buying a new part (total acquisition cost),
- time to repair the damaged part,
- time to acquire a new part, and
- overall readiness posture of the supported organization.

The process to weigh these factors and determine what to do with the damaged part is called the “the BER process.” By weighing these different factors against specific thresholds for acceptable costs and times to repair, the BER process is designed to ensure the best economical outcome for the DoD when deciding whether to repair or replace a part.

When applying the BER process, a percentage of the replacement cost (threshold) is generally established to help supply managers determine at what point buying a new spare part is more advantageous than repairing the damaged part. When it is more advantageous to buy a new part rather than repair the damaged part, that damaged part is considered beyond economical repair. When a part is determined

² Sustainment contracts reviewed: N00019-18-C-1041, N00019-19-C-1022, and N00019-20-C-0006. We also reviewed N00019-17-C-0045 to verify that the BER process language was not included in the 2017 sustainment contract estimated at \$1.1 billion.

³ DoD Regulation 7000.14-R, “DoD Financial Management Regulation (FMR),” volume 4, chapter 4, states, “Acquisition cost is the amount, net of both trade and cash discounts, paid for the property, plus transportation costs and other ancillary costs to bring the items to their current condition and location.” Some other examples of ancillary costs include labor costs for parts produced, engineering design costs, and interest paid directly to providers of goods or services related to the acquisition.

to be beyond economical repair, the part must be replaced by purchasing a new part or by deciding to complete the repairs instead; for example, in cases where the amount of time to procure a new part would negatively impact a mission. Those parts deemed beyond economical repair are to be replenished within a specific timeframe, while those deemed repairable are inducted (sent in) for repair and should be returned to the global spares pool in a ready-for-issue status within a specific timeframe.

DCMA Identified Problems With the F-35 BER Process in 2017

In 2017, the DCMA announced an audit of the contractor's BER process for the F-35 Program. The DCMA's audit scope covered all processes, data, and documentation related to BER determinations made by the contractor to determine the contractor's compliance with Federal Acquisition Regulation (FAR) provisions for reviewing costs and retaining records. The DCMA provided us the results of its audit.

The DCMA's audit identified discrepancies in the contractor's process that led to the DCMA issuing three corrective action requests. Specifically, the DCMA found inconsistencies in the three following areas.

- Contractor-Requested Data. The contractor provided insufficient records to ascertain the validity of the BER determinations.
- Cost Data. The contractor did not collect labor, material, and ancillary cost data to provide a basis for repair estimates.
- Roles and Responsibilities. The contractor did not comply with a FAR clause that requires the contractor to allow auditors to examine contract costs and did not comply with the FAR requirement to retain records.⁴

In March 2017, in response to the DCMA's audit, the contractor stated that it lacked basic internal controls that would provide meaningful data to support its own BER determinations. Specifically, the contractor stated that it:

- lacked any contractor-specific BER procedures for individual spare parts, and
- approved its suppliers' and manufacturers' BER requests to dispose of and replace spare parts without verifying the underlying evidence to support the final BER determination.

⁴ FAR Part 52, "Solicitation Provisions and Contract Clauses," Subpart 52.215, "Reserved," 52.215-2, "Audit and Records – Negotiation," 52.215-2(b), "Examination of costs," states that the contractor must maintain "records and other evidence sufficient to reflect properly all costs" related to contract performance and the Government has the right to examine these records. FAR Part 4, "Administrative and Information Matters," Subpart 4.7, "Contractor Records Retention," 4.703, "Policy," states that contractors must make their records available to satisfy audit requirements.

DoD Policy for Repair of Repairable Parts

The DoD established a goal to make meaningful efforts to repair repairable parts before procuring new replacement parts. Specifically, DoD Manual 4140.01, volume 2, states that repair is the preferred source of supply for repairable items.⁵

The Manual also states:

For repairable items, DoD Components should only use procurement to replace unserviceable items condemned during repair, to meet new demand that will not have the return of an unserviceable asset, or to support obsolete equipment through a life of type buy.

In addition, volume 4 states:

When making decisions regarding public and private agreements, DoD materiel managers: (5) Use procurement only to replace unserviceable assets that cannot be repaired economically and to meet new customer requirements not addressed in initial provisioning.

According to a representative with the Office of the Deputy Assistant Secretary of Defense for Logistics, the policy outlined in DoD Manual 4140.01 protects against driving up excess inventory. The representative stated that if an item can be repaired, it is an asset that the DoD can use to satisfy a demand or to fill a required level. In addition, the representative stated that if the DoD does not repair repairables first, unserviceable parts would sit in a warehouse. The representative also stated that buying new parts instead of repairing the parts on-hand results in buying more than the DoD needs (an excess of what is required). Finally, the representative stated that because of the previous reasons, the DoD only buys new parts to replace parts that can no longer be repaired through maintenance actions.

A fully developed and functioning BER process helps achieve the DoD's preference to exhaust all reasonable options for the repair of repairable parts before deciding to procure new replacement parts, as described in DoD Manual 4140.01.

Review of Internal Controls

DoD Instruction 5010.40 requires DoD organizations to implement a comprehensive system of internal controls that provides reasonable assurance that programs are operating as intended and to evaluate the effectiveness of the controls. We identified a lack of internal controls related to the F-35 Program Office's

⁵ DoD Manual 4140.01, "DoD Supply Chain Materiel Management Procedures: Demand and Supply Planning," volume 2, November 9, 2018. DoD Manual 4140.01, volume 4 "DoD Supply Chain Materiel Management Procedures: Make and Maintain Materiel," February 10, 2014, (Incorporating Change August 31, 2018).

management of the BER process. The F-35 Program Office did not establish controls to ensure that BER guidance was in place and that standards were established in the contract prior to April 30, 2018. In absence of these controls, there was a reliance on the contractor to fulfill these functions. We will provide a copy of the report to the senior official responsible for internal controls in the F-35 Program Office.

Finding

The F-35 Program's Beyond Economical Repair Process Was Not Implemented Until December 2019

The F-35 Program Office did not implement a Beyond Economical Repair (BER) process that ensured that the decision to either replace or repair damaged parts was the most economical decision. Specifically, from October 2001 through December 2019, F-35 Program Officials had not implemented a BER process that: 1) identified the replacement cost for repairable parts, 2) established a threshold for use in determining whether it was economical to repair a part, or 3) required DoD approval for replacing damaged parts that the contractor determined could not be economically repaired. The F-35 Program officials had not implemented a complete BER process because:

- F-35 Program Officials allowed the prime contractor to make the decisions on whether damaged parts were replaced or repaired, without DoD approval;
- F-35 Contracting Officials did not include in the sustainment contracts a price list for repairable parts (needed for BER analysis) until August 2019; and
- DCMA officials had not validated the contractor's responses to the DCMA's corrective action requests to provide specific data and records necessary for the BER process until April 27, 2020, so the DCMA would not rely on the contractor's data or records before that time.

As a result, from January 2016 through June 2019, the prime contractor reported that it disposed of at least 688 parts, categorized as beyond economical repair and valued at \$34.5 million, without DoD oversight or approval to ensure replacing the part was the most economical action. Another result from the delay in implementing a process is that, as of February 2020, the F-35 Program Office had more than 500 parts waiting for a DoD official to approve the contractor's determination that replacing the damaged part is the most economical decision. A nonfunctioning BER process contributes to the reduction of available spare parts when a backlog of parts waiting for BER approval accumulate, which delays the final repair or replace decision and negatively affects warfighter readiness. The lack of available spare parts prevent the F-35 fleet from performing required operational and training missions.

BER Process for F-35 Evolved From 2001 Through 2020

The F-35 Program Office did not implement a BER process that ensured that the decision to either replace or repair damaged parts was the most economical decision from October 2001 through December 2019. Because the BER process for the F-35 program has evolved over time, we have separated the timeframe for the BER process into two periods.

First, between October 2001 and April 2018 the F-35 Program Office did not have a BER process defined in the sustainment contracts and did not require DoD

F-35 Program Officials allowed the prime contractor to make the decisions on whether damaged parts were replaced or repaired, without DoD approval.

approval for replacing damaged parts. This occurred because F-35 Program Officials allowed the prime contractor to make the decisions on whether damaged parts were replaced or repaired, without

DoD approval. Also, we concluded that a contributing factor was that the DoD did not have an overarching BER policy or procedure.

Second, in April 2018, the F-35 Program Office implemented the following guidelines in the 2018, 2019, and 2020 sustainment contracts: a 75-percent threshold to use in calculating when a part was beyond economical repair; a requirement for substantiating data to support the BER analysis; a requirement for DoD approval for disposing of a part that was beyond economical repair; and 30, 60, and 90-day metrics for repairing damaged parts. However, the DoD still did not implement these contract requirements for the BER process until the 2020 sustainment contract, which was awarded in December 2019. This occurred because:

- F-35 contracting officials did not include in the sustainment contracts a price list for repairable parts (needed for BER analysis) until August 2019; and
- DCMA officials had not validated the contractor's responses to the DCMA's corrective action requests to provide specific data and records for the BER process until April 27, 2020, so the DCMA would not rely on the contractor's data or records before that time.

Table 1 shows the 2017 through 2020 sustainment contracts and the BER-specific requirements.

Table 1. Summary of BER Process Contract Requirements

Sustainment Contract	Contract Number	Award Date	BER Process Requirements		
			Threshold (Percent)	Approvals	Price List
2017	N00019-17-C-0045	3/1/2017	None	None	None
2018	N00019-18-C-1041	4/30/2018	75	F-35 Contracting Officer	None
2019	N00019-19-C-1022	4/30/2019	75	DCMA ACO	None
2019	N00019-19-C-1022, Modification 5	8/21/2019	75	DCMA ACO	Yes
2020	N00019-20-C-0006	12/30/2019	75	DCMA ACO	Yes

LEGEND

ACO Administrative Contracting Officer

Note: Although modification 5 for the 2019 sustainment contract included a price list for 1,830 repairable parts (which was also included in the 2020 sustainment contract), the F-35 Program Office does not know the complete number of repairable F-35 parts.

Source: Electronic Data Access system and the DCMA.

Lack of a BER Process From October 2001 Through April 2018

From October 2001 through April 2018, the F-35 Program Office did not have a BER process in its sustainment contracts or a process that required DoD approval for replacing damaged parts. As shown in Table 1, the 2017 sustainment contract for the F-35 Program did not have any BER process requirements. Because the 2017 sustainment contract did not have any BER process requirements, we asked the F-35 Program officials and DCMA officials to provide all agreed upon procedures related to the BER process for the F-35 Program. However, F-35 and DCMA officials did not identify to us any agreed-upon process that existed before April 2018. Until April 2018, the F-35 Program Office relied on the prime contractor to determine whether a part should be repaired or replaced.

Although the F-35 Program Office relied on the contractor to perform BER analyses, the contractor could not provide the DCMA with records or data, including cost data, related

to the BER analyses and determinations that the contractor had previously made.

On July 2, 2018, the DCMA issued three corrective action requests to the contractor because the contractor could not provide the DCMA with records or data related to BER analyses.

Although the F-35 Program Office relied on the contractor to perform BER analyses, the contractor could not provide the DCMA with records or data, related to the BER analyses.

The F-35 Program Office giving control of the BER process to the contractor for the F-35 Program led to barriers in the DoD's ability to provide oversight of the contractor's BER process. The barrier was evidenced by the DCMA corrective action reports that stated the contractor did not have records or data for BER analyses. Also, the F-35 Program Office assigned the maintenance and repair responsibilities for spare parts (which includes repairable parts that go through the BER process) to the prime contractor and subcontractors as part of the business strategy for the F-35 Program. Therefore, the prime contractor, and not the DoD, had direct influence over the BER process through the contractor's control and custody of the records and data that it used to make decisions for managing spare parts.

Because the F-35 Program Office started to include BER process requirements in the sustainment contracts beginning in April 2018, we are not making a recommendation to develop a BER process. However, there was another factor that we have concluded contributed to the lack of a contracted or otherwise agreed-upon BER process—a lack of overarching DoD policy.

Lack of Overarching DoD Guidance for BER Processes

The USD(A&S) lack of coverage or emphasis on BER guidance contributed to the F-35 Program Office's failure to develop BER procedures over the 17-year timeframe from October 2001 through April 2018.

The Under Secretary of Defense for Acquisition and Sustainment (USD[A&S]) did not have overarching BER process guidance for DoD joint-acquisition programs that officials from the F-35 Program Office could

use as a basis for developing BER procedures and thresholds. We concluded that the USD(A&S) lack of coverage or emphasis on BER guidance contributed to the F-35 Program Office's failure to develop BER procedures over the 17-year timeframe from October 2001 through April 2018.⁶

DoD Manual 4140.01, originated and approved by USD(A&S), states that for repairable parts, the DoD should make meaningful efforts to repair parts before procuring new replacement parts.⁷ A representative with the Office of the Deputy Assistant Secretary of Defense for Logistics stated that the policy outlined in DoD Manual 4140.01 protects against driving up excess inventory. The representative also stated that if an item can be repaired, it is an asset that the DoD can use to

⁶ According to an official at the F-35 Program Office, the contractor delivered the first aircraft to the Air Force in 2011 and as a result, BER determinations would not have been applicable during a portion of the 17-year timeframe.

⁷ DoD Manual 4140.01, "DoD Supply Chain Materiel Management Procedures: Demand and Supply Planning," volume 2, November 9, 2018. DoD Manual 4140.01, Volume 4 "DoD Supply Chain Materiel Management Procedures: Make and Maintain Materiel," February 10, 2014, (Incorporating Change August 31, 2018).

satisfy a demand or to fill a required level. The representative further stated that if the DoD buys a new part instead of repairing the part that the DoD has on-hand, the DoD is spending additional funds to buy a new part that then becomes excess to what the DoD actually needs.

Therefore, the USD(A&S) has provided the standard in DoD Manual 4140.01, which sets the DoD-level goal that DoD components repair a part before replacing it, but the Manual does not give guidance on how to make a decision when to repair a part versus replace a part (which would include a BER process).

Although the USD(A&S) did not have overarching BER process guidance, each Service has its own BER policy to determine whether parts should be repaired or disposed of and replaced with new parts. We believe the USD(A&S) could use the Services' BER policies to identify the best aspects and develop overarching DoD BER guidance, such as how to identify the data elements needed and how to design a calculation to substantiate BER decisions for parts.

The Services' BER policies generally define what is the: 1) replacement cost for parts, 2) BER threshold (percent), 3) data requirements, 4) BER approval authority, and 5) non-cost considerations. These five factors are all key components of a BER process but without standardization, the factors are applied inconsistently across the DoD. Even though each Service has a defined BER process, there are differences between the Services' BER requirements. Table 2 shows common factors from the BER processes for the Services, the F-35 Program Office, and the DCMA.

Table 2. Examples of Major Factors Included in Existing BER Processes

	Replacement Cost of Part	Threshold of Replacement Cost of Part (Percent)	Data Elements Required for Decision Making	Approval Authority for BER Decisions
DoD	Not Defined	Not Defined	Not Defined	Not Defined
F-35 Program Office	Before August 2019 – none identified After August 2019 - Contractor's direct cost found in contract price list	Before April 2018 – none After April 2018 - 75	Before April 2018 – none After April 2018 – The contractor shall provide the BER recommendation with substantiating data. Individual data elements not identified.	Before April 2018 – Contractor After April 2018 – DoD

Table 2. Examples of Major Factors Included in Existing BER Processes (cont'd)

	Replacement Cost of Part	Threshold of Replacement Cost of Part (Percent)	Data Elements Required for Decision Making	Approval Authority for BER Decisions
DCMA	Fully burdened cost or reasonable estimation thereof	75	Technical disposition, Part description, fully burdened replacement cost	DCMA
Army	Unit Price (from Federal Logistics Data [FEDLOG])	Varies	Repair cost, Price in FEDLOG, Expenditure limit	Army
Navy	Component replacement cost	85	Analysis and replacement cost documentation	Naval Supply Systems Command Weapon Systems Support
Air Force	Stock list price (specified in the contract)	75	Part description, Repair cycle time, Cost of labor, Benefits of laborer, Material cost, Indirect costs, Formula	Air Force
Marine Corps	Current standard unit price	65	Current replacement cost, "other relevant factors"	Marine Corps Materiel Command

Note: While the DoD does not specifically recommend a BER replacement cost definition or threshold percentage for parts, DoD Manual 4140.01, volume 2 implies BER considerations by requiring DoD Components to review and update a part's designation as a repairable item whenever the repair costs become greater than 75 percent of a part's replacement costs (that is, the sum of the cost to order and the acquisition price).

Source: The DoD OIG.

As Table 2 shows, there are inconsistencies in all aspects of the BER process across these DoD Components. Specifically, the DoD Components use different cost or pricing information in BER analysis: contractor's direct cost, stock list price, unit price, or component replacement cost. Also, the DoD Components have different thresholds to apply to the price or cost when performing BER calculations. In addition, while most BER processes shown in Table 2 demonstrate that a DoD official is the approval authority for BER determinations, the F-35 Program Office allowed the contractor to fully manage the BER process for the F-35 Program from October 2001 until April 2018, without DoD approvals. DoD-wide BER guidance would clarify the previously described inconsistencies.

Specifically, DoD-wide guidance would promote that the cost or price used in BER calculations is the cost or price that would result in the DoD achieving the DoD Manual 4140.01 goal of repairing parts rather than replacing parts. In addition to considering the cost of repairing versus replacing a part, DoD-wide guidance must consider other factors such as the:

- overall readiness requirements of the system or end item,
- lead time to obtain the part,
- available sources to supply the part, and
- remaining useful life or age of the part.

Finally, DoD-wide BER guidance, will promote that DoD officials consistently apply the BER process for all programs (joint or not). However, the lack of a DoD-wide BER policy is of larger concern for a joint-acquisition program with no lead Service, such as the F-35 Program. Certain business processes, like the BER process, could be neglected in situations like this when the joint program does not have a formal agreement regarding which policies, procedures, and business processes would be used at its start.

Because the F-35 is a joint program, with no lead Service, the F-35 Program Office did not follow any of the Services' policies. If a large joint-acquisition program like the F-35 can exist for almost two decades without a defined BER process, then that vulnerability is also possible with other DoD joint-acquisition programs. Therefore, the USD(A&S) should develop DoD-wide guidance that aligns with DoD Manual 4140.01 to establish minimum data and documentation requirements for the BER process, to include a method for defining the replacement price or cost that should be used in BER calculations, the responsible party for approving the BER decision, and any other considerations outside of cost factors.

Contract Language for BER Process Added to Sustainment Contracts Beginning in April 2018

Recognizing the need for a BER process to be required by contract, the F-35 Program Office added requirements for the BER process in the 2018, 2019, and 2020 F-35 sustainment contracts, as shown in Table 1. The 2018, 2019, and 2020 sustainment contracts included the following guidelines for the BER process.

- A 75 percent threshold for the contractor to apply to the damaged part's replacement cost when determining whether a part could be economically repaired.
- A requirement for the contractor to provide "to the maximum extent possible" substantiating data to the DoD along with the BER analysis when the contractor determined that a part could not be economically repaired.

- A requirement for DoD approval to dispose of a part that the contractor determined was beyond economical repair.
- A 30, 60, and 90-day metric clause for the contractor to “endeavor” (attempt) to repair damaged parts. However, the contractor must repair all parts within the time designated by the contract.

An August 21, 2019, contract modification to the 2019 sustainment contract included a price list for 1,830 repairable parts. Despite including these requirements in the 2018, 2019, and 2020 sustainment contracts, the F-35 Program Office and the DCMA still did not implement the contract requirements for the BER process until the 2020 sustainment contract, awarded in December 2019. Furthermore, the requirements for repairing parts within the 30, 60, and 90-day metrics are not truly requirements, but just “best effort” guidelines because of the specific language used in the contract. Finally, both F-35 Program Office and DCMA officials stated that they were not sure of the accuracy of the price list and the price list may not include all repairable parts for the F-35 Program.

BER Process Not Implemented Until December 2019

With the addition of the contract language in April 2018, the F-35 Program Office stopped relying on the prime contractor to make BER determinations without DoD input and approval. However, the F-35 Program Office and the DCMA still did not implement these contract requirements for the BER process until the 2020 sustainment contract, awarded in December 2019. This occurred because:

- F-35 Contracting Officials did not include in the sustainment contracts a price list for repairable parts (needed for BER analysis) until August 2019; and
- DCMA officials had not validated the contractor’s responses to the DCMA’s corrective action requests to provide specific data and records for the BER process until April 27, 2020, so the DCMA would not rely on the contractor’s data or records before that time.

The 2018 sustainment contract established a repair threshold of 75 percent of the replacement cost of a new part. Based on this threshold, a part would be considered beyond economical repair if the cost of the repair exceeded 75 percent of the replacement cost of a new part. Thus, a key aspect of applying the 75-percent threshold is having a known replacement cost on which to apply the 75 percent. DoD Instruction 5000.64 requires DoD Components to establish accountable property records, which includes the cost of parts.⁸ DoD OIG previously reported that the F-35 Program Office did not establish accountable

⁸ DoD Instruction 5000.64, “Accountability and Management of DoD Equipment and Other Accountable Property,” April 27, 2017 (incorporating change 3 June 10, 2019).

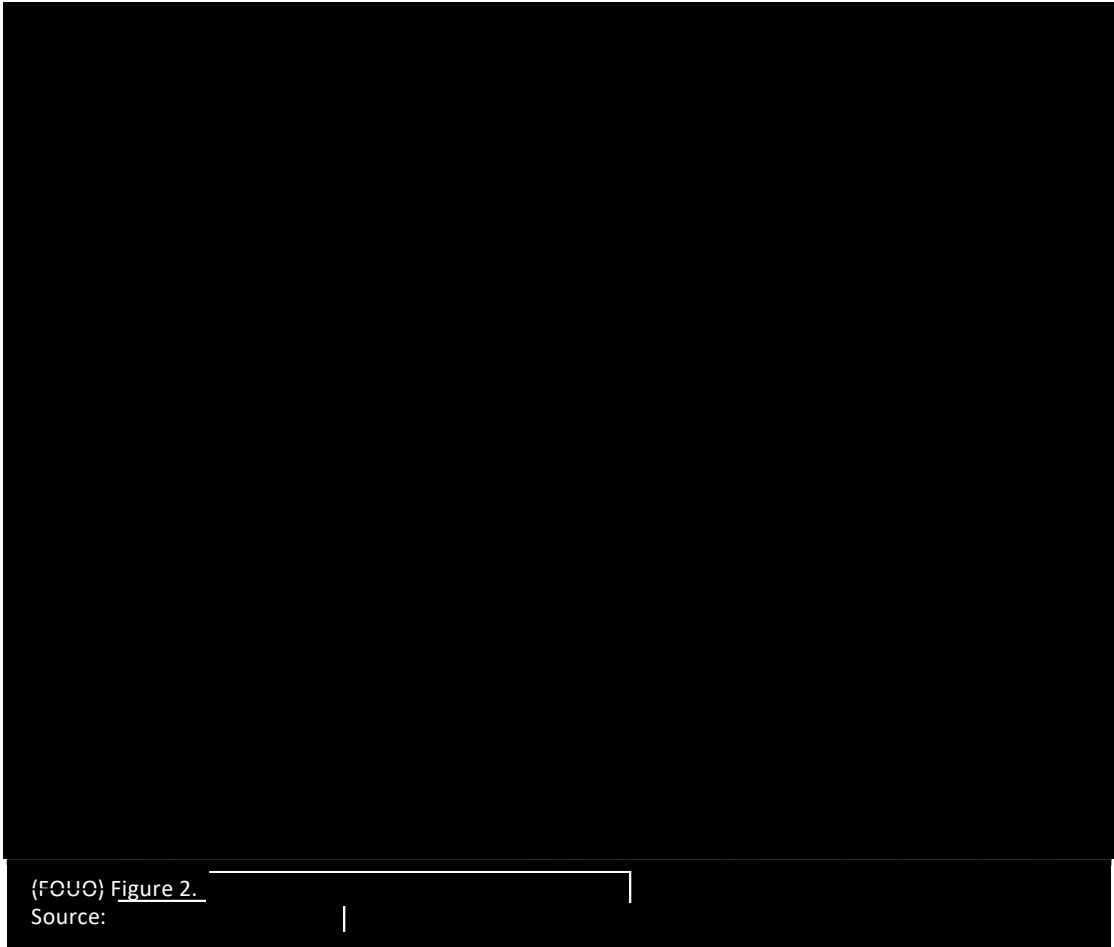
property records as required by the DoD; instead, officials relied solely on the prime contractor to account for all of the F-35 Program Government furnished property.⁹ Without accountable property records to rely on, a complete and accurate listing of current replacement parts and their costs is the appropriate alternative on which the 75 percent threshold could be applied. However, the F-35 Program Office did not include a replacement price list for parts in the 2018 or the initial 2019 sustainment contracts.

As shown in Table 1, the F-35 Contracting Officer first added a price list on August 21, 2019, on modification 5 to the 2019 sustainment contract. Without a list of replacement costs for parts, the 75 percent BER threshold could not be applied and the DoD could not compare the cost to repair a part to the cost to buy a new part. Furthermore, when the F-35 Contracting Officer modified the sustainment contract to add the replacement price list, the list only included pricing information for 1,830 repairable parts. According to F-35 and DCMA officials, the price list does not include all repairable parts for the F-35 Program, and the specific number of repairable parts was not known as of February 2020.

Although the price list contained information for 1,830 repairable parts, the DCMA still did not begin to review and approve the contractor's BER analyses after the contract modification on August 21, 2019. DCMA officials stated that they could not rely on the contractor's data or records because of the contractor's previous inability to provide the DCMA with documentation or data to support BER analyses, as documented in the corrective action requests.

(FOUO) Although the DCMA did not complete its validation of the contractor's corrective action plans until April 27, 2020 the DCMA began to review contractor submittals for the BER process in December 2019. A DCMA official stated that as of December 2019 the submittals contained enough information to make a decision whether to approve the determination, with the stated exception that he could not validate the part's replacement cost used to apply the 75 percent BER threshold. From December 2019 through February 2020, a DCMA official stated that he reviewed 22 submittals. The DCMA official agreed with the contractor's determination on all 22 submittals that the part was beyond economical repair, meaning that the part could not be economically repaired and should be replaced. For example, on December 2, 2019, the DCMA official approved the contractor's requests to designate 10 [REDACTED] as beyond economical repair. Figure 2 shows the [REDACTED]

⁹ DoD OIG Report No. DODIG 2019 062, "Audit of Management of Government Owned Property Supporting the F 35 Program," March 13, 2019.



(FOUO) According to the documentation that the contractor provided to the DCMA, the replacement price for the [REDACTED] was \$110,732 each. The BER threshold is 75 percent, so the [REDACTED] would be beyond economical repair if it cost more than \$83,049 to repair the [REDACTED] (\$110,732 x 75 percent). The contractor determined that it would cost between \$83,823 (76 percent) and \$88,144 (80 percent) each to repair the [REDACTED]. Therefore, the DCMA official properly approved the contractor's determination that the 10 [REDACTED] were beyond economical repair.

(FOUO) On February 19, 2020, the DCMA official agreed with the contractor's assessment that 12 [REDACTED] were beyond economical repair. However, due to the extended acquisition lead time for this part, the DoD decided to repair the part. According to the documentation that the contractor provided to the DCMA, the replacement cost for [REDACTED] \$23,539 each. The BER threshold is 75 percent, so [REDACTED] be beyond economical repair if it cost more than \$17,654.25 to repair [REDACTED] (\$23,539 x 75 percent). The contractor determined that it would cost between \$17,825.77 (76 percent) and \$24,780.41 (greater than 100 percent) to repair [REDACTED].

(FOUO) However, the cost of the repair and the cost of the replacement part are not the only factors that affect the DoD's decision to repair or replace a part. There are also other factors to consider, such as the ability to purchase a replacement part at the time the part is needed. Although the cost to repair [REDACTED] more than the 75-percent threshold, the DCMA official stated that he agreed the parts were beyond economical repair, but authorized the repairs on the basis that the F-35 fleet was critically affected by a shortage of that part. These factors that the DCMA must consider, such as parts that have a shortage or maintaining a specific readiness level for parts or the fleet, were not included in the sustainment contracts as part of the BER process. These factors should be a part of the BER process and either included in the sustainment contract or some other agreed-upon policy document between the F-35 Program Office and the contractor.

The DCMA official stated that the BER submittals he reviewed contained the information he required to verify the substantiating data used for the contractor's recommendation, with the exception of the replacement cost for parts provided. The sustainment contracts required the contractor to provide substantiating data "to the maximum extent possible" along with the BER analysis. The sustainment contracts also included FAR 52.215-2(b), "Examination of costs," which states that the contractor must maintain "records and other evidence sufficient to reflect properly all costs claimed to have been incurred or anticipated to be incurred directly or indirectly" in the performance of a contract and that the Government has the right to examine these records. Furthermore, FAR 4.703, requires contractors to make their records available to satisfy audit requirements. However, none of the F-35 sustainment contracts specified the type of data or the documentation the contractor must:

- provide along with its BER analysis to the DCMA Administrative Contracting Officer, or
- maintain to comply with FAR Clause 52.215-2(b) and FAR 4.703.

Therefore, even with progress for the BER process since April 2018, the F-35 Program Office did not fully develop the:

- non-cost factors that the DCMA should consider when reviewing the contractor's BER analyses, such as the effect of repairing versus replacing a part on the readiness of the F-35 fleet; or
- specific information and data requirements that should be provided to the DoD by the contractor to support the contractor's determinations as part of the BER process.

The F-35 Program Executive Officer should direct F-35 Program Office logistics, sustainment, and contracting officials, in coordination with DCMA officials and the contractor, to fully develop and formalize the BER process with specific goals, procedures, and data and information requirements that provide the DoD information on the BER process's impact for achieving desired outcomes such as enhanced readiness and reduced costs.

F-35 Contract Language Does Not Incentivize Repairs

The F-35 Program Office did not incentivize the contractor to repair parts within specific timeframes. The 2018, 2019, and 2020 sustainment contracts stated that the contractor should “endeavor to,” rather than be required to meet specific timeframes identified for repairing parts. The lack of a measurable requirement to repair parts within a specific timeframe did not comply with DoD Manual 4140.01, because the F-35 sustainment contracts incentivized replacing a part over repairing a part. Furthermore, an F-35 Program Office official stated that the repair of repairables is a readiness multiplier and the BER process is a high priority issue within the repair process due to its possible impact to daily sustainment operations. Specifically, the 2018, 2019, and 2020 sustainment contracts state:

All items that are inducted for repair . . . shall be repaired and returned in a Ready-for-Issue status to the F-35 Joint Spares Pool under this contract . . . Accordingly, a minimum of 10 percent of the items will endeavor to have a Repair Cycle Time of 30 days or less, a minimum of 60 percent of items will endeavor to have a Repair Cycle Time of 60 days or less, and 100 percent to have a Repair Cycle Time of 90 days or less.

An F-35 Program Office contract specialist stated that the term endeavor in the contract language communicates a desired performance objective but does not hold the contractor accountable for not meeting this objective. In addition, an F-35 Procurement Contracting Officer stated that the “endeavor” language was a result of an impasse in negotiations between the F-35 Program Office and the contractor. The parties were unable to reach an agreement on the appropriate repair cycle time. So instead of a “must” requirement, the F-35 Program Office Contracting Officer included endeavor, which is essentially a “best effort” requirement in the 2018, 2019, and 2020 sustainment contracts.

For example, Table 3 shows the average repair cycle time for parts inducted (sent in) for repair under the 2019 sustainment contract, which was the current data available at the time we requested information on this subject.

Table 3. Average Repair Cycle Time for 2019 Sustainment Contract Parts Inducted

Repair Cycle Time	"Endeavor to" Percentage for Repair in the Contract	Percentage of Parts That Met the Repair Cycle Time
30 days	10	3.8
60 days	60	22.9
90 days	100	47.2
Greater than 90 Days		52.8

Source: F-35 Program Office.

The results in Table 3 demonstrate that over half of the parts inducted for repair (52.8 percent) under the 2019 contract, exceeded the longest cycle time set in the contract (90 days). Furthermore, on January 31, 2020, a representative from the F-35 Program Office stated that the average repair cycle time for parts inducted for repair under the 2019 contract was 109 days.

Although the 2018, 2019, and 2020 sustainment contracts only ask the contractor to try to meet the metrics for repairs, the contracts provide specific requirements for procuring new replacement parts. The 2018, 2019, and 2020 contracts state that the contractor "shall" replace the parts identified as beyond economical repair within a specific timeframe. Shall means must; therefore, the contractor must comply with the requirement. For example, the 2020 sustainment contract, awarded in December 2019, requires the contractor to replace the parts no later than December 31, 2023. Therefore, the contract contained specific measurable requirements for the replacement of parts but not for the repair of parts.

As previously mentioned, DoD Manual 4140.01 states that for repairable parts, the DoD should make meaningful efforts to repair parts before procuring new replacement parts. To better align the F-35 Program's BER process with the DoD's policy to repair repairable parts before procuring new replacement parts, the F-35 Program Executive Officer should direct the F-35 Procurement Contracting Officer to update the current and future sustainment contracts to incentivize repair of repairable spare parts within specific timeframes that have been negotiated with the contractor.

Price List of Replacement Costs is Incomplete and May Not be Accurate

When the F-35 Contracting Officer modified the 2019 sustainment contract to add the BER price list for 1,830 repairable parts, the F-35 Contracting Officer did not ensure that the BER price list was complete and had accurate costs. The BER price list on the 2019 sustainment contract included prices for 1,830 repairable parts, which officials from both the F-35 Program Office and the DCMA questioned. Specifically, the DoD officials questioned whether the BER price list contained:

- the appropriate cost to determine whether to replace the part; and
- all repairable parts for the F-35.

An F-35 contracting official stated that the goal with these BER replacement costs was to establish “meaningful cost of repair versus cost of replacement determinations.” However, the DCMA and the F-35 Program Office could not agree on the completeness and accuracy of the replacement costs included on the list.

DCMA officials expressed concerns on the accuracy of the replacement costs for the parts, which could result in the premature disposal of repairable parts because the repair threshold was based on a price that was too low.

DCMA officials expressed concerns to the F-35 Program Office on the accuracy of the replacement costs for the parts on the list, which could result in the premature disposal of repairable parts because the

repair threshold was based on a price that was too low. An F-35 contracting official stated that there is a greater, program-wide discussion about determining the real cost for parts and that it would help with DoD Financial Improvement and Audit Readiness compliance. The F-35 contracting official also stated, “There is a lot of interest in putting together a better, more comprehensive price list” and that the contract modification was the “best band-aid” the F-35 Program Office had in the meantime.

When the replacement cost for a part is too low, the repair threshold is reached more quickly in BER calculations than if the replacement cost was correct, resulting in more determinations to replace a part rather than repair a part. Figure 3 shows the effect of the replacement cost on BER analyses.

Figure 3. Comparison of BER Analysis with Different Costs for a Part

Lower Replacement Cost		Accurate Replacement Cost	
\$100	Replacement Cost	\$115	Replacement Cost
x 75%	BER Threshold	x 75%	BER Threshold
\$75	Cost at Which the Part Should be Replaced Instead of Repaired	\$86.25	Cost at Which the Part Should be Replaced Instead of Repaired
\$85	Cost of Repair	\$85	Cost of Repair
Decision: Replace the part because the cost of repair (\$85) is more than the threshold (\$75). Cost to the F-35 Program is \$100.		Decision: Repair the part because the cost of repair (\$85) is less than the threshold (\$86.25). Cost to the F-35 Program is \$86.25.	

Source: The DoD OIG.

With a difference in replacement cost of just \$15 (\$100 versus \$115), Figure 3 demonstrates that the decision to replace the part or repair the part would have changed. Therefore, the accuracy of the replacement cost used in BER analysis is important for making the most economical decision.

~~(FOUO)~~ The F-35 Program Office described the BER replacement parts price list on the contract as using the contractor's replacement cost for parts; however, a DCMA official identified parts on the BER replacement price list that had a lower cost than what the prime contractor reported for the same part in its own property management system in February 2020. For example, the DCMA identified an [REDACTED] that had a contract BER replacement cost of \$1,601,164; however, the contractor's property system reported that the prime contractor's cost to pay its supplier for this part was \$1,734,461. This is a discrepancy of \$133,297. Table 4 shows three F-35 repairable parts with the cost from the price list on the F-35 sustainment contract, the contractor's reported cost contained in its own property management system, the BER threshold amount, and the difference between those costs.

~~(FOUO)~~ Table 4. Examples of F-35 Parts Cost Differences Between the Cost on the Contract and the Contractor's Reported Cost In Its Property Management System

Part Name	Cost on the Price List	Threshold Based on Price List	Cost in Contractor System	Threshold Based on Contractor System	Overall Difference
(FOUO) [REDACTED]	\$164,891.22	\$123,668.42	\$189,496.80	\$142,122.60	(\$24,605.58)
(FOUO) [REDACTED]	\$325,925.51	\$244,444.13	\$440,835.00	\$330,626.25	(\$114,909.49)
(FOUO) [REDACTED]	\$1,601,164.41	\$1,200,873.31	\$1,734,461.00	\$1,300,845.75	(\$133,296.59)

Note: The DCMA queried the costs from the contractor's system in February 2020. Table 4 "Overall Difference" Column is the difference between the "Cost on the Price List" and "Cost in Contractor System" Columns.

Source: The DCMA and DoD OIG.

As shown in Table 4, the differences in costs for these parts ranged from \$24,606 to \$133,297. In addition, the 75 percent BER threshold cost, used for BER analysis, is different for each part, depending on the price used in the calculation.

~~(FOUO)~~ We also identified some examples where a part's BER replacement cost on the sustainment contract was considerably lower or higher than what the prime contractor reported that the part cost the DoD in 2018. For example, we identified a [REDACTED] that had a listed replacement cost on the contract of \$640.80; however, the contractor's property records from January 2018 reported that the DoD previously paid \$12,755.11 for this part. This is a discrepancy of \$12,114.31. Table 5 shows six F-35 repairable parts with the cost on the F-35 sustainment contract, the contractor's reported cost to the DoD paid in 2018, and the difference between those costs.

~~(FOUO)~~ Table 5. Examples of F-35 Parts Cost Differences Between the Cost on the Contract and the Contractor's Reported Price That the DoD Previously Paid

Part Name	Cost on the Contract	Price the DoD Previously Paid	Difference
(FOUO) [REDACTED]	\$2,211.87	\$33.81	\$2,178.06
(FOUO) [REDACTED]	\$898.79	\$20.66	\$878.13
(FOUO) [REDACTED]	\$22,268.80	\$991.51	\$21,277.29
(FOUO) [REDACTED]	\$697.46	\$12,980.76	(\$12,283.30)
(FOUO) [REDACTED]	\$640.80	\$12,755.11	(\$12,114.31)
(FOUO) [REDACTED]	\$119.74	\$12,689.90	(\$12,570.16)

Note: The price the DoD previously paid is from the contractor's records from January 2018. The figures in parenthesis represent negative amounts.

Source: The DoD OIG.

Inconsistencies in cost data for F-35 Program parts, as shown in the examples in Tables 4 and 5, demonstrate the difficulty in providing a fair and accurate determination on whether to repair or replace a part. Cost data are a foundational component to the BER process.

~~(FOUO)~~ In addition to requiring accurate costs for the repairable parts on the list, the list also needs to be complete. An F-35 Program Office contracting official stated that there were parts that went through the BER process that were not included on the price list which need to be identified and then included on the list. For example, the previously mentioned [REDACTED] and [REDACTED] [REDACTED] the contractor submitted for BER decisions were both not listed on the 2020 sustainment contract price list, demonstrating that the price list was incomplete.

Furthermore, the DoD OIG and the Government Accountability Office previously reported that the DoD could not identify individual costs for each F-35 spare part nor could the Military Services track the funds that they spent for F-35 spare parts to the financial statements and related documentation.¹⁰ This previously reported problem contributed to F-35 Program officials' difficulties in developing a complete and accurate price list for BER replacement costs for individual parts. An F-35 Program official stated that the F-35 Program Office is working with the DCMA on a method to identify

¹⁰ DoD OIG Report No. DODIG 2019 062, "Audit of Management of Government Owned Property Supporting the F-35 Program," March 13, 2019, and GAO Report No. GAO-19-321, "F-35 Aircraft Sustainment - DoD Needs to Address Substantial Supply Chain Challenges," April 25, 2019.

the replacement cost for parts used for BER determinations, but that there have been ongoing challenges between the F-35 Program Office, DCMA, and prime contractor on how to define what elements comprise the cost for parts. Therefore, the F-35 Program Executive Officer should direct the F-35 Procurement Contracting Officer, in coordination with the contractor, to determine accurate costs for DoD replacement parts to use in BER determinations and incorporate the methodology for determining those costs in the F-35 contracts.

Opportunities to Improve Decision Making and Warfighter Readiness With BER Process Improvements

The DoD relied on the contractor for 17 years to make decisions about whether to repair or replace parts and according to the F-35 Program Office and the DCMA, as of February 2019, the contractor had insufficient records to support these decisions. Therefore, the DoD did not know whether the contractor's decisions from 2001 through 2019 were the most economical decision for the F-35 Program and records did not exist to validate those decisions after the fact.

Even after the F-35 Program Office included contract language for the BER process in the sustainment contracts, the process still did not get implemented until December 2019. Additionally, the aspects of the BER process that were included in the sustainment contracts, allowed the contractor to:

- not comply with FAR requirements for maintaining data and information to support its costs, and
- “try” to repair parts within specific timeframes.

Furthermore, the sustainment contracts did not specify the type of documentation the contractor had to provide to substantiate BER analyses. Without complete and accurate information and supporting data about BER decisions and replacement costs for repairable parts, the F-35 Program will not be sure that repair or replace decisions are the most economical.

The prime contractor reported that it disposed of at least 688 parts, categorized as beyond economical repair and valued at \$34.5 million, without DoD oversight or approval.

Between January 2016 and June 2019, the prime contractor reported that it disposed of at least 688 parts, categorized as beyond economical repair and valued at \$34.5 million, without

DoD oversight or approval to ensure replacing the part was the most economical action. Another result from the delay in implementing a process is that, as of

February 2020, the F-35 Program Office had more than 500 parts that were waiting for a DoD official to approve the contractor's determination that replacing the damaged part is the most economical decision.

A nonfunctioning BER process contributes to the reduction of available spare parts when a backlog of parts waiting for BER approval accumulate, which delays the final repair or replace decision and negatively affects warfighter readiness. The lack of available spare parts prevent the F-35 fleet from performing required operational and training missions.

Contractor goals are often based on the profitability of the business that it manages, which does not necessarily align with DoD operational and readiness goals. That is why it is important that at a minimum, specific BER processes, data requirements, and responsibilities are written in the contract when using a cost-plus contract so that various stakeholder goals can be deconflicted to better provide the DoD with its desired operational and readiness outcomes.

Recommendations, Management Comments, and Our Response

Recommendation 1

We recommend that the Under Secretary of Defense for Acquisition and Sustainment, develop DoD-wide guidance that aligns with DoD Manual 4140.01 to establish minimum data and documentation requirements for beyond economical repair processes, to include a method for defining the replacement price or cost that should be used in beyond economical repair calculations, the responsible party for approving the beyond economical repair decision, and any other considerations outside of cost factors.

Office of the Under Secretary of Defense for Acquisition and Sustainment Comments

The Assistant Secretary of Defense for Sustainment (ASD[S]), responding for the USD(A&S) agreed with the recommendation, stating that the Under Secretary will develop DoD-wide overarching policy for BER requirements to include processes, cost factors for BER calculations, approval authorities, and non-cost considerations. In addition, the updated policy will align with DoD Instruction 4140.01 and provide a clear method on how to make a decision on whether to repair or replace a part. Finally, the Office of the USD(A&S) will work with the F-35 Program Office to incorporate the BER analysis into the Life Cycle Sustainment Plan Performance-to-Plan process so that metrics, timelines, and progress will be tracked.

Our Response

Comments from the ASD(S) addressed the specifics of the recommendation; therefore, the recommendation is resolved but will remain open. We will close this recommendation once we have reviewed a copy of the Under Secretary's DoD-wide policy for beyond economical repair and determined that the updated policy establishes minimum data and documentation requirements and aligns with DoD Instruction 4140.01.

Recommendation 2

We recommend that the F-35 Program Executive Officer:

- a. **Direct F-35 Program Office logistics, sustainment, and contracting officials, in coordination with Defense Contract Management Agency officials and the contractor, to fully develop and formalize its beyond economical repair process with specific goals, procedures, and data and information requirements that provide the DoD information on the impact of the beyond economical repair process for achieving desired outcomes such as a minimum readiness level or reduced costs.**

Office of the F-35 Program Executive Officer Comments

The ASD(S), responding for the F-35 Program Executive Officer, agreed with the recommendation, stating that the F-35 Program Office, Defense Contract Management Agency, and contractor (Lockheed Martin) have collectively established and implemented a BER process for the F-35 program. The ASD(S) further stated the specific BER process guidelines from the FY 2020 sustainment contract were:

- 75- percent threshold to use in calculating when a part is beyond economical repair,
- requirement for substantiating data to support the BER analysis,
- requirement for DoD approval for disposing of a part that was beyond economical repair, and
- 30, 60, and 90-day metrics for repairing damaged parts.

Our Response

Comments from the ASD(S) did not address the specifics of the recommendation; therefore, the recommendation is unresolved. While the ASD(S) agreed with the recommendation, he did not explain how the F-35 Program Office would develop and formalize the BER process in context to the DoD's involvement. The Assistant Secretary's response provided the existing BER process language included in the sustainment contracts; however, he did not provide the F-35 Program Office's

specific goals for the BER process, whether the program office will create procedures for DoD personnel's specific roles and responsibilities, or the specific data elements and other information that the contractor must provide to comply with the substantiating data requirement in the contract.

For example, in our report we discuss a situation where the DCMA official reviewing and approving a BER determination that a part was beyond economic repair decided to have the contractor repair the part even though the repair was not economical based on the BER process in the contract. This example highlights that there are other circumstances, such as the difficulty in replacing a part with a new part, which is a consideration in BER determinations. However, the F-35 BER process, as outlined in the FY 2020 sustainment contract, does not mention these non-cost considerations. Furthermore, this indicates that the desired outcome of the BER process is not simply cost, but maintaining sufficient inventory of parts or meeting a particular readiness level.

The DoD cannot assess whether the BER process is successful unless the F-35 Program Office defines success. This inability to assess the BER process is why the F-35 Program Executive Officer must identify non-cost factors in the BER process and the desired outcomes for the BER process. Therefore, we request that the ASD(S) or the F-35 Program Executive Officer provide additional comments to the final report that identify the non-cost factors that DoD officials should consider when analyzing BER determinations and the desired outcome of the BER process.

- b. Direct the F-35 Procurement Contracting Officer to update the current and future sustainment contracts to incentivize repair of repairable spare parts within specific timeframes that have been negotiated with the contractor.**

Office of the F-35 Program Executive Officer Comments

The ASD(S), responding for the F-35 Program Executive Officer, agreed with the recommendation, stating that the F-35 Program Office established a 75-day objective and 90-day threshold target for the repair of repairables. In addition, the ASD(S) stated that the F-35 Program Office is evaluating the incentive structure for future contracts to ensure that the DoD targets contract improvements to increase fleet readiness. The ASD(S) anticipates the next F-35 sustainment contract will be awarded in December 2020.

Our Response

Comments from the Assistant Secretary addressed the specifics of the recommendation; therefore, the recommendation is resolved but will remain open. We will close the recommendation once we obtain and review either:

- the incentive structure for the repair of repairable parts in the December 2020 F-35 sustainment contracts; or
 - the F-35 Program Office's analysis and determination that shows that including specific contract incentives for the repair of repairable parts is not the correct solution to ensure that the DoD achieves increased fleet readiness.
- c. **Direct the F-35 Procurement Contracting Officer, in coordination with the contractor, to determine accurate costs for DoD replacement parts to use in making beyond economical repair determinations and incorporate the methodology for determining those costs in the F-35 contracts.**

Office of the F-35 Program Executive Officer Comments

The ASD(S), responding for the F-35 Program Executive Officer, agreed with the recommendation, stating that as an interim approach, the DoD is using the most recently available F-35 initial spares contract pricing for making BER decisions, and the DoD will refine the cost data as the effort matures. The ASD(S) stated that the F-35 Program Office acknowledged that this approach is "sub-optimal" and could result in more repairable parts being replaced with a new part instead of repairing the part.

The ASD(S) also stated that the F-35 Program Office acknowledged that the price list was incomplete because it did not include all repairable parts that could go through the BER process. The ASD(S) stated that the F-35 Program Office is actively working with the contractor and the DCMA to develop a process to determine pricing for the parts not included on recent initial spares contracts. The plan is to complete all actions by first quarter of FY 2021 to ensure incorporation into the FYs 2021 through 2023 sustainment contract.

Our Response

Comments from the ASD(S) partially addressed the specifics of the recommendation; therefore, the recommendation is unresolved. The Assistant Secretary agreed with the recommendation and identified a plan to develop a process to determine part pricing for parts not included on recent initial spares contracts. However, the ASD(S) did not explain how the F-35 Program Office would "refine the cost data as the effort matures."

Providing an explanation for refining the pricing for repairable parts is important because, as the DoD acknowledged, the current price list is based on sub-optimal pricing. Therefore, we request that the ASD(S) or the F-35 Program Executive Officer provide additional comments to the final report that identify how the F-35 Program Office proposes to refine the sub-optimal pricing over time. Refining the pricing will reduce the risk of repairable parts being replaced with a new part because of sub-optimal pricing.

Appendix

Scope and Methodology

We conducted this performance audit from April 2019 through July 2020 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Announced and Reported Audit Objective

Our announced objective was to determine whether DoD beyond economical repair processes, used for deciding whether to repair a part or purchase a replacement part for a weapon system platform, complied with the agreed-upon thresholds and procedures. We revised the announced objective after we determined that the DoD did not have overarching guidance for BER analysis and determinations. Instead of reviewing DoD's overall BER process, we modified our objective to focus on the F-35 Program. Therefore, our reported objective was to determine the extent that the F-35 Program Office's BER process identified parts that were damaged and determined whether the part could be economically repaired, and if that part could not be economically repaired, had a DoD official approve the purchase of a replacement part.

Audit Universe and Sample Determination

To identify the audit universe, we reviewed recent reports from the GAO and the Office of the Secretary of Defense, Comptroller that provided performance data for 57 of 86 major DoD weapon system programs.¹¹ We then focused on weapon systems programs that had a high-dollar value (expenditures) and represented Joint Programs (with a high-dollar emphasis) where multiple Services used the weapon system. The F-35 Program was the highest dollar value program among both joint and single Service programs with an original estimated total acquisition cost over \$234 billion. The two weapon system programs with the next highest original estimated acquisition cost were the Columbia Class Ballistic Missile Submarines at \$102 billion and the V-22 Osprey Joint Services Advanced Vertical Lift Aircraft at \$65 billion. The F-35 Program is a joint program with the Navy, Air Force, Marine Corps, and international partners from seven countries.

¹¹ GAO-18-360SP, "Weapon Systems Annual Assessment," April 25, 2018. Office of the Undersecretary of Defense (Comptroller)/Chief Financial Officer, "Program Acquisition Cost by Weapon System, United States Department of Defense Fiscal Year 2019 Budget Request," January 29, 2018.

We also analyzed the Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer's, "Program Acquisition Cost by Weapon System: United States Department of Defense Fiscal Year 2019 Budget Request," (FY 2019 Budget Request) February 2018. According to the FY 2019 Budget Request, there were 70 major weapon systems with a total combined budget (for FY 2017 and FY 2018) and budget request (for FY 2019) of \$244.3 billion. Of these 70 weapon systems, 21 were joint weapon systems with a total combined budget (for FY 2017 and FY 2018) and budget request (for FY 2019) of \$82.2 billion. The combined budget (for FY 2017 and FY 2018) and budget request (for FY 2019) totaled nearly \$33 billion for the F-35 Program, which was the highest total dollar value for a major weapon system by about \$14.6 billion. Of the 21 joint weapon systems, the F-35 Program's total was the highest by about \$27.5 billion. In addition, the F-35 Program's combined budget (for FY 2017 and FY 2018) and budget request (for FY 2019) accounted for more than 40 percent of the total amount for the 21 joint weapon systems. See Table 6 for a breakdown of the FY 2019 Budget Request information.

Table 6. Summary of FYs 2017 Through 2019 Actual and Proposed Budgets for Major Weapon Systems and the F-35 Program

Program	Total Amount (in millions)	Percentage of Total for the 70 Systems
70 Major Weapon Systems	\$244,262	100
21 Joint Weapon Systems	\$82,152	33.6
F-35 Program	\$32,979	13.5

Source: DoD OIG analysis of Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer's FY 2019 Budget Request.

We selected the F-35 program because it was the highest dollar value program among both joint and single Service programs and the largest combined budget (for FY 2017 and FY 2018) and budget request (for FY 2019) weapon system within the DoD.

Interviews, Documentation, and Analysis

To identify whether there was overarching DoD and Service guidance for the BER process, we conducted interviews with personnel from the following locations.

- Office of the Under Secretary of Defense for Acquisition and Sustainment, Alexandria, Virginia
- Headquarters of the Army, Logistics (G-4), Arlington, Virginia
- Headquarters of the Air Force, Logistics, Engineering, and Force Protection (AF/A4), Arlington, Virginia

- Assistant Secretary of the Army (Acquisition, Logistics and Technology), Arlington, Virginia
- Naval Supply Systems Command, Weapons Systems Support, Philadelphia, Pennsylvania

We interviewed officials from the F-35 Program Office to understand the goals and objectives of the F-35 BER process, how contract requirements for the BER process were developed and managed, including the procedures, data, and information necessary for the DoD to provide its concurrence and approval for the contractors BER requests. We also interviewed officials from the DCMA, Fort Worth, Texas to determine how they conducted the concurrence and approval process for the contractor's BER determinations on behalf of the F-35 Program Office.

We analyzed the following sections of the Federal Acquisition Regulation (FAR) to identify the requirements for contractor records retention and examination of costs.

- FAR Part 4, "Administrative and Information Matters," Subpart 4.7, "Contractor Records Retention," Section 4.703, "Policy," to identify contractor requirements to make records available to satisfy audit requirements.
- FAR Part 52, "Solicitation Provisions and Contract Clauses," Subpart 52.215, "Reserved," 52.215-2, "Audit and Records – Negotiation," 52.215-2(b), "Examination of costs," to determine contractors requirements to maintain information on all costs claimed when using a cost-reimbursement plus incentive contract and the Government's right to examine and audit all cost information, including inspections of the contractor's facilities.

We analyzed the following F-35 sustainment contracts and modifications to determine any BER specific requirements for the F-35 Program.

- Contract No. N00019-20-C-0006, awarded December 30, 2019
- Modification P00005 of Contract No. N00019-19-C-1022, effective August 21, 2019
- Contract No. N00019-19-C-1022, awarded April 30, 2019
- Contract No. N00019-18-C-1041, awarded April 30, 2018
- Contract No. N00019-17-C-0045, awarded March 1, 2017

We analyzed the F-35 Lightning II Sustainment Management Strategy, Version 1.0, November 2010, to identify parties' roles and responsible for maintenance and repair operations.

We analyzed the following Service-level maintenance policies, regulations, and memorandums for information used to determine economical repair for spare parts.

- DoD Manual 4140.01, Volume 2, "DoD Supply Chain Materiel Management Procedures: Demand and Supply Planning," November 9, 2018
- DoD Manual 4140.01, Volume 4, "DoD Supply Chain Materiel Management Procedures: Make and Maintain Materiel," February 10, 2014, (Incorporating Change 3 November 1, 2019)
- Army Regulation 750-1, "Army Materiel Maintenance Policy," August 3, 2017
- Marine Corps Order 4790.19, "Depot Maintenance Policy," January 18, 2001, (Incorporating Change December 10, 2012)
- "Memorandum of Understanding Between Commander, Defense Logistics Agency Aviation and Commander, Naval Supply Systems Command Weapon Systems Support, and Commander Fleet Readiness Centers," June 5, 2019
- Air Force TO 00-20-3, USAF Technical Manual, "Maintenance Processing of Reparable Property and the Repair Cycle Asset Control System," August 15, 2015, (Incorporating Change July 10, 2017)
- DCMA-INST 328, "Overhaul, Maintenance, Modification, and Repair (OMMR)," May 22, 2013, (Incorporating Change July 7, 2015)

In addition, we analyzed DCMA decisions on 22 BER requests from the contractor, completed between December 2019 and February 2020, to identify the rationale supporting the DCMA's concurrence or non-concurrence to repair or replace parts. We reviewed the substantiating data that the DCMA used to reach its conclusions for the 22 BER requests. However, we did not assess the accuracy of the data provided by the contractor.

Finally, we used the contractor's spare parts data to identify matching part numbers listed in the F-35 Program Office's BER spare parts pricing list attached to Modification 5 of Contract N00019-19-C-1022, effective August 21, 2019, and compared the spare part unit costs between both lists matching part numbers. However, we did not assess the accuracy of the contractor records. If our recommendations are implemented, the DoD will identify accurate spare parts acquisition unit costs to be used for BER determinations. The DoD's lack of property records did not impact the reliability of our conclusions, as discussed in the report.

Use of Computer-Processed Data

We used data from Electronic Data Access system and the F-35 prime contractor's property management systems to perform this audit. We used the system to retrieve some of the F-35 sustainment contracts. The system stores all DoD contracts. Most contracts are automatically uploaded to the system from contracting writing systems. We confirmed that the sustainment contracts we obtained and analyzed represented the full scope of the F-35 Program Office's BER process to date.

Because the Electronic Data Access system is a repository for contract documents and does not process the contract documents, there was no issue with reliability of the contract files stored in the system. We also received the contracts from F-35 contracting personnel and did not identify any discrepancies between the contracts retrieved from the EDA system and the contracts provided by the contracting personnel.

In addition, we used data from the F-35 prime contractor's property management systems to perform this audit. The data were contained in a January 2018 list of parts and required no additional processing. We did not test the accuracy and completeness of the F-35 Program Office's list of parts because the DoD did not maintain property records in an accountable property system of record to compare to the contractor's records.

Prior Coverage

No prior coverage has been conducted on the beyond economical repair process during the last 5 years.

Management Comments

Assistant Secretary of Defense for Sustainment



SUSTAINMENT

ASSISTANT SECRETARY OF DEFENSE
3500 DEFENSE PENTAGON
WASHINGTON, DC 20301-3500

August 19, 2020

MEMORANDUM FOR PROGRAM DIRECTOR, READINESS AND GLOBAL
OPERATIONS, OFFICE OF THE INSPECTOR GENERAL

SUBJECT: Response to the Office of the Inspector General Draft Report, "Audit of the F-35 Program Office's Beyond Economical Repair Process for Parts" (Project No. D2019-D000RK-0134.000)

As requested, I am providing responses to the general content and recommendations contained in the subject report.

Recommendation 1: The Office of the Inspector General (OIG) recommends that the Under Secretary of Defense for Acquisition and Sustainment develop a DoD-wide guidance that aligns with DoD Manual 4140.01: to establish minimum data and documentation requirements for beyond economical repair (BER) processes; to include a method for defining the replacement price or cost that should be used in BER calculations; the responsible party for approving the BER decision; and any other considerations outside of cost factors.

Response: Concur. The Office of the Under Secretary of Defense for Acquisition and Sustainment (OUSD(A&S)) will develop DoD-wide overarching policy for BER requirements to include: processes, cost factors for BER calculations, approval authorities, and non-cost considerations. The updated policy will align with DoD Instruction 4140.01 and provide a clear method on how to make a decision on whether to repair or replace a spare part. The OUSD(A&S) will work with the F-35 Program Office on incorporating the BER analysis into the Life Cycle Sustainment Plan Performance-to-Plan process so that metrics, timelines and progress will be tracked.

Recommendation 2(a): The OIG recommends that the F-35 Program Executive Officer direct F-35 Program Office logistics, sustainment, and contracting officials, in coordination with Defense Contract Management Agency officials and the contractor, to fully develop and formalize its BER process with specific goals, procedures, and data and information requirements that provide the DoD information on the impact of the BER process for achieving desired outcomes such as a minimum readiness level or reduced costs.

Response: Concur. The Joint Program Office (JPO), Defense Contract Management Agency, and Lockheed Martin have collectively established and implemented a BER process for the F-35 program. This process is documented in the H-Clause of the current FY20A contract and will be included in future sustainment contracts. Specifically, the F-35 Program Office implemented the following guidelines:

- 75 percent threshold to use in calculating when a part is beyond economical repair
- Requirement for substantiating data to support the BER analysis

Assistant Secretary of Defense for Sustainment (cont'd)

- Requirement for DoD approval for disposing of a part that was beyond economical repair
- 30, 60, and 90-day metrics for repairing damaged parts

Recommendation 2(b): The OIG recommends that the F-35 Program Executive Officer direct the F-35 Procurement Contracting Officer to update the current and future sustainment contracts to incentivize repair of repairable spare parts within specific timeframes that have been negotiated with the contractor.

Response: Concur. There are multiple performance incentives captured in the sustainment contract aimed at increasing aircraft availability and decreasing cost. Many of the metrics the program incentivizes are directly linked to improvements in the supply chain, including repair of repairable timelines, which we refer to as Depot Repair Cycle Time (DRCT). The JPO is actively pursuing multiple initiatives to improve DRCT and has established a 75-day objective and 90-day threshold target for DRCT. The details on incentive structure for future sustainment contracts including the FYs 21-23 Annual Air Vehicle Sustainment and Performance Based Logistics (PBL) Contracts are being evaluated to ensure we are targeting the proper improvements to increasing fleet readiness. The FY 21-23 Annual Air Vehicle Sustainment Contract is anticipated to be a one-year base and two one-year options with award planned for December 2020. The PBL is anticipated to be awarded no earlier than 2022.

Recommendation 2(c): The OIG recommends that the F-35 Program Executive Officer direct the F-35 Procurement Contracting Officer, in coordination with the contractor, to determine accurate costs for DoD replacement parts to use in making BER determinations and incorporate the methodology for determining those costs in the F-35 contracts.

Response: Concur. As an interim approach, the Department is using the most recently available F-35 initial spares contract pricing for making BER decisions, and will refine this cost data as the effort matures. The F-35 JPO acknowledges that this approach is sub-optimal in that the initial spares contract pricing can artificially lower the replacement cost, distorting the BER determination, and also that the spares contract does not include pricing for all parts. The Department acknowledges that the Government is required to maintain property account records detailing the cost of all units, and the contractor is required to keep records that enable an exact pricing determination. The JPO is actively working with the contractor and the Defense Contract Management Agency to develop a process to determine part pricing for all parts not included on recent initial spares contracts. The plan is to complete all actions by First Quarter FY 2021 to ensure incorporation into the FY 2021-2023 Annual Air Vehicle Sustainment Contract.

Please contact [REDACTED] if additional information is required.



W. Jordan Gillis

Acronyms and Abbreviations

ASD(S)	Assistant Secretary of Defense for Sustainment
BER	Beyond Economical Repair
DCMA	Defense Contract Management Agency
FAR	Federal Acquisition Regulations
USD(A&S)	Under Secretary of Defense for Acquisition and Sustainment



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