INTELLECTUAL PROPERTY

(This section must be signed)

Individuals **outside your company**, including the companies listed above and other third parties, potentially including your competitors and others in your industry, may receive and/or review award submissions. All information submitted should address the program's management, leadership, and processes in a manner that you are comfortable sharing with third parties freely and without restriction, and may not include any classified or proprietary information or materials. Do not include any materials marked Confidential or Proprietary or bearing any similar legend. All responses and other submissions, whether in whole or in part ("Submissions"), shall be deemed not to be confidential, proprietary, and/or nonpublic information of any sort for any purpose.

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Thank you for participating,

Gregory Hamilton
President
Aviation Week Network

Acknowledged, agreed, and submitted by

Mark J. Daly _____ June 6, 2023

Nominee's Signature Date

Nominee's Name (please print): **Mark Daly** _____

Title (please print): **External Communications Specialist Senior Principal** _____

Company (please print): **BAE Systems** _____

NOMINATION FORM

Name of Program: **F-22 – Sustaining EW** _____

Name of Program Leader: **Daniel Harrington** _____

Phone Number: **603-885-7768** _____

Email: **daniel.harrington@baesystems.com** _____

Postal Address: _____

_____

☒ Customer Approved

- Date: **June 6, 2023** _____
- Customer Contact (name/title/organization/phone): **Jennifer Edwards, Communications, Lockheed Martin, (817) 223-9687** _____

☐ Supplier Approved (if named in this nomination form)

- Date: _____
- Supplier Contact (name/title/organization/phone): _____

PLEASE REFER TO PROGRAM EXCELLENCE DIRECTIONS AS YOU COMPLETE THIS FORM.

EXECUTIVE SUMMARY: Make the Case for Excellence
Value: 10 points
Use 12 pt. Times Roman typeface.

What is the vision for this program/project? What unique characteristics and properties qualify this program for consideration?
[LIMIT YOUR NARRATIVE TO THIS PAGE.]

The F-22 Raptor was designed to rapidly project air dominance at great distances to defeat threats attempting to deny our nation's Air Force, Army, Navy and Marine Corps access to contested battlespaces. The BAE Systems and Lockheed Martin (LM) team have worked tirelessly to ensure that the F-22 outmatches any known or projected fighter aircraft. During the 25 years since the F-22 was first fielded, BAE Systems has partnered with LM and the United States Air Force (USAF) to provide the most advanced fifth-generation electronic warfare (EW) suite to meet the needs of the USAF.

BAE Systems' AN/ALR-94 digital EW system geolocates potential threats by detecting adversary radars at significant ranges, allowing the F-22 to limit its own radar emissions, enabling it to better conceal its location when operating in hostile territory.

As the original equipment manufacturer (OEM) for the ALR-94 EW Suite, BAE Systems is responsible for the full complement of life cycle support services, including supply support, repair, spares, parts management, and critical system upgrades that ensure the systems' relevancy against evolving adversaries. Working closely with both LM and the USAF, the BAE Systems team manages the overall supply support, meeting the necessary supply response time to keep the warfighter ready and the EW technology relevant to meet mission capability requirements.

BAE Systems has supported F-22 EW systems since being selected by the prime integrator, LM, in the late 1990s. BAE Systems continues to support the systems at the speed necessary to keep the platform flying and mission-ready. The BAE Systems team manages repairs, retrofits, Diminishing Manufacturing Sources and Material Shortages (DMSMS), delivery and/or repair of Line Replaceable Units (LRU) and Shop Replaceable Units (SRU) spares in support of the F-22 Raptor Program. The BAE Systems team has not rested since delivering the first system over 20 years ago. Significant life cycle management effort is required to complete repairs, retrofits, spare LRUs and lay-in material to maintain the availability of F-22 EW hardware.

BAE Systems works with critical suppliers to **restart cold production lines** at both OEM and supplier locations to **assess and mitigate challenges** through a proactive DMSMS program. Support also entails establishing and assisting the U.S. Government with continued maintenance of the organic depot repair capability. BAE Systems provides routine life cycle management that guarantees a viable and robust organic depot capability. This cross-functional team of sustainment professionals is dedicated to applying best practices to keep the F-22 EW systems ready and relevant to the warfighter.

DIRECTIONS

- **Do not exceed 10 pages in responding to the following four descriptions**.
  - Allocate these 10 pages as you deem appropriate, but it is important that you respond to all four sections.
- DO NOT REMOVE THE GUIDANCE PROVIDED FOR EACH SECTION.
- Use 12 pt. Times Roman typeface throughout.

- Include graphics and photos if appropriate; do not change margins.

VALUE CREATION
Value: 15 points

Please respond to the following prompt:

- **Clearly define the value of this program/project for the corporation; quantify appropriately**

As an industry leader in EW, BAE Systems is dedicated to the Department of Defense – a dedication that does not end with designing and delivering life-saving and mission-enabling EW capabilities. Now more than ever, as our nation faces peer competitor threats and increasing tensions across the globe, it is critically important that BAE Systems maintain focus on keeping our warfighters **ready and relevant**. The F-22 program provides the opportunity for the company to continue leading the way in progressive sustainment proved through a long-term contract with LM. System support is contracted through LM's F-22 Performance Based Logistics Program, providing cost-effective support solutions to the USAF. The five-year contract, referred to as Follow-On Agile Sustainment for Raptor (FASTeR), is fixed price with defined return, spares and lay-in volume expectations. The agile approach provides cost-effective support of the subsystem, establishing the foundation for delivering the necessary support to meet the aircraft availability.

BAE Systems is a **lifetime partner** to our customers and we recognize that the majority of the funding within a weapon system's life is in the operations and maintenance phase of the program. Success and continued recognition from our customers led to the establishment of a separate organization within BAE Systems with a laser focus on EW sustainment. BAE Systems' Life Cycle Support Solutions (LCSS) product line is responsible for producing the dedicated leadership, resources, and capabilities to meet the post-production repair and sustainment of systems like the ALR-94. Ensuring that our EW systems perform when they are most needed requires a unique business model aligned to a unique customer base and demands innovative, cost-effective solutions to meet our fleet's most challenging readiness issues. This product line not only eliminates disruption on production programs, but also allows for the **optimization of the repair** processes, which can differ greatly from production.

The dedicated group of sustainment professionals not only focus on F-22 sustainment, they lead and deliver performance-based solutions for F-35 EW; F-15 EW and F-18 EW programs. This organization builds sustainment knowledge, creating a pipeline of industry professionals for product support and sustainment. LCSS is taking BAE Systems' dedication to life cycle support to new heights by pledging to be a lifetime partner to our customers and **standing by our products** when programs transition to sustainment.

- **Clearly define the value of this program/project to your customer**

BAE Systems has provided life cycle management of the ALR-94 since the inception of the program in the late 1990s. The company understands the importance of establishing a deep and multifaceted sustainment program for complex systems like the F-22 EW suite. The expert Life cycle managers at BAE Systems established many of the core pillars to long-term sustainment. The pillars include the activation of and support to USAF organic depot at Warner Robbins Air Logistics Center (WR-ALC), creation of provisioning data, retention of engineering subject-matter experts, succession planning, source data for warfighter technical manuals, reliability, maintainability, supply chain surveillance, and product modernization. LM and the USAF depend on BAE Systems to manage suppliers, repairs,

and spare parts annually. BAE Systems consistently delivers spares and repairs on time, enabling high levels of EW system availability for the Raptor.

- **Clearly define the value of this program/project to members of your team; quantify if possible**

The BAE F-22 team thrives on knowing that hard work, attention to detail, and on-time delivery is a significant contributor to the USAF Air Dominance Campaign, illustrated by the quality and on-time delivery performance for which the team is known.

The Team takes pride in supporting a small amount of aircraft and ensuring the availability of the platform for the USAF. The team embodies the company's commitment to *protect those who protect us*®. Walking through the halls of the BAE Systems Sustainment Center of Excellence (SCOE), one does not need to walk very far to find media or signage that states "*we protect those who protect us*" or "*our systems ensure the warfighter returns safely.*" The contributions BAE Systems provides the F-22 program and all of our customers is deeply rooted in the desire to serve the United States military and its allies. The company values are represented by the positive culture, results, and comradery that is developed from contributing to a just cause.

- **Clearly define the contribution of this program/project to the greater good (society, security, etc.)**

The USAF relies on the F-22 to provide stealth, speed, agility, and situational awareness combined with ability to deploy the latest air-to-air and air-to-ground weapons. BAE Systems knows customers rely on us to make the ALR-94 ready and relevant through the entire platform life cycle. Programs like the F-22 are significant contributors to the military industrial base providing the opportunity for the United States' most talented engineers to innovate, create, prototype, and deploy bleeding-edge technology. This technology not only protects the men and woman in uniform but also projects the capability and capacity of the United States military to those that attempt to threaten America and our Allies.

As a support provider, BAE Systems responsibility to the prime integrator and to the USAF is that of a life cycle manager. In collaboration with LM and the USAF, we provide warfighter with effective, innovative, and proactive sustainment solutions to meet **cost-effective readiness**. BAE Systems provides this support to the ALR-94 system though the rigorous management of the supply chain, incorporation of system improvements, and the on-time delivery of material. The company's opportunity to provide EW systems like the ALR-94 enables it to employ more than 6,000 people in the State of New Hampshire.

BAE Systems recognizes the importance of collaborating with the government organic industrial base when it comes to depot maintenance. BAE Systems was contracted to develop and activate a United States Code (USC) Title 10 compliant organic depot at WR-ALC. Through the prime, BAE Systems continues to collaborate with USAF organic depot at Warner Robins, Georgia to maintain the Raptor EW suite of test equipment. The USAF depot provides facilities, personnel, and retail supply support to repair a subset of ALR-94 LRUs, and BAE Systems' repairs LRUs that were not activated at WR-ALC. BAE Systems is also responsible for maintaining the depot repair capability within our factory and at the WR-ALC Depot. BAE Systems provides wholesale supply support to LM, who in turn supports the USAF retail demands. This high mixture of parts combined with low density of returns requires BAE Systems to maintain a deep technical bench.

ORGANIZATIONAL BEST PRACTICES AND TEAM LEADERSHIP

Value: 35 points
Use 12 pt. Times Roman typeface

Please respond to the following prompts:

- ***15 points:*** **Describe the innovative tools and systems used by your team, how they contributed to performance and why**

Material Planning, Procurement, Visibility, and Reliability: In addition to BAE Systems' standard Enterprise Resource Planning (ERP) tool set, resources, and supplier management capabilities, the sustainment team utilizes a cadre of tools focused on parts management, asset visibility, life cycle cost, and supportability. These tools are critical to supporting EW capability and product readiness.

Effective parts management is grounded in understanding supply chain vulnerabilities. The F-22 program deals with DMSMS on a routine basis. Maintaining fielded platforms means life cycle managers will see an escalation in DMSMS events throughout the product life cycle and history has taught us that a reactive DMSMS plan will fail. DMSMS does not just affect the mission equipment; it can affect test equipment required to fault isolate and repair failed items.

BAE Systems utilizes the Advanced Component Obsolescence Management (AVCOM) tool suite to proactively manage and inform the support of the EW systems. AVCOM creates an environment where sufficient time exists to work with the customers (LM and USAF) to plan and execute contracts that result in redesign and or procurement. The AVCOM tool and surrounding processes minimize out-of-cycle redesigns, DMSMS-related production impacts, and is a force multiplier for maintaining the readiness of the ALR-94 suite. The robust and proactive DMSMS concept of operations for the F-22 ALR-94 provides more resolution options, faster, while providing additional time for LM and the USAF team to select an optimal solution to discrete DMSMS issues. The level

of attention to detail needed to maintain a long-term supply chain requires more than procurement; the team is also responsible for the receipt, inspection, stocking, storing, and issue of the material.

Management of sustainment programs requires total asset visibility of both customer-owned and company-owned assets. The F-22 team provides this core capability, maintaining real-time, accurate accountability of assets. Our integrated support solution includes parts tracking and online tools that monitor spares throughout the process from receipt through repair and return shipment. These tools interface with customer tools to enable end-to-end supply chain visibility allowing accountability of all material.

BAE Systems Life Cycle Management (LCM) process ensures technical rigor, diversity, inclusion, sound execution approaches, and is foundational to all BAE Systems' programs. The primary purpose of LCM is to help project teams understand challenges facing them so they are able to make risk-based decisions to ensure successful project delivery. Its principles can be applied to any project, with the key element of application being tailored to suit the project's unique characteristics. LCM processes **continue to contribute to continuous improvement** initiatives such as repair turnaround time reduction, predictive analytics, and supply chain forecasting.

BAE Systems also deploys a robust Failure Report Analysis and Corrective Action Summary (FRACAS) suite of tools to provide trend analysis of system failures, locations, and product wear out predictions using an enhanced system architecture that designs supportability features into the initial design of our offerings.

Parts management is an essential element of program performance and BAE Systems Supply Chain team utilizes a Material War Room to plan, measure, and manage critical suppliers. This approach utilizes tool sets and processes to elevate supply chain issues and drive timely resolution. Supply chain leadership discusses critical supplier challenges and examines measured planning versus actuals. Supplier review boards are also used as a way to align all of the functions around specific supplier issues related to the product lines.

Demand forecast tools and analytics contributes to effective resource planning within our factories and with our core suppliers. This is seen as a core element of effective program execution, allowing BAE Systems to inform suppliers of upcoming demand forecasts, manage lead times and proactively address DMSMS.

- ***10 points:*** **Define the unique practices and process you used to develop, lead and manage people?**

BAE Systems established the SCOE with the explicit purpose of establishing a post-production environment that does not conflict with unique production processes or rely on production capacity. Life cycle management experts in the LCSS product line are free to implement repair processes to enable effective repair cycle times while building the skills necessary to perform sustainment.

The BAE Systems F-22 team also embeds supplier program managers within the team to oversee supplier quality management, which has led to increased agility when the program is faced with material changes and specification evolutions.

BAE Systems also deploys a suite of internally developed and third-party life cycle management tools that are used to predict the amount of field returns, lay-in material, and spare parts required to meet the availability requirements of the USAF. Life cycle management tools measure the impact to

life cycle cost and allow our team to perform sensitivity analyses when developing business cases and courses of action for reliability of DMSMS mitigation strategies for our customers.

The collection, cleansing, processing, and visualization of operations and maintenance data is a key enabler to digital transformation and the implementation of model-based product support. The BAE Systems team eliminated multiple, disparate data sources and integrated all F-22 maintenance data into a single data lake. This data lake feeds analytic tools and dashboards that provide a scoreboard for the F-22 team. A Data Collection, Analysis, and Corrective Action System combined with sustainment troubleshooting guides, test and evaluation documentation, and targeted knowledge transfer and succession planning has proven that BAE Systems can build and mature sound sustainment practices while maintaing a capable workforce. The targeted left-shifting of knowledge transfer between sustaining engineers and technicians and consistently updated processes reduce variation and ultimately leads to an increase in on-time delivery and reductions in cycle time.

Maintaining resilience within the supply chain requires a disciplined but flexible management approach. The F-22 supply chain team utilizes weekly stand-up meetings to review all open orders and planned orders through receipt. The team installed critical touch points for each order ensuring nothing is overlooked. Leadership utilized a tiered approach to order management: Tier 1 – daily (Buyers); Tier 2 – weekly (Business Area Managers); Tier 3 – (business area and all functional leadership); Tier 4 – meet with leadership in the Material War Room. This process guarantees the right level of review at the right time to maintain the dynamic and many times unpredictable F-22 supply chain.

- ***10 points:*** **How did you leverage skills and technologies of your suppliers?**

BAE Systems deployed its "Partner to Win" (P2W) business strategy with preferred suppliers. The P2W program is recognized internally and by BAE Systems' suppliers as a best practice. P2W utilizes strategic, long-term supplier agreements resulting from competition amongst preferred partners. This model rewards the best suppliers, ensures competition and affordability. Innovative programs like P2W are critical on a program like F-22 when it is a challenge to keep suppliers interested due to the small quantities and mature life cycle.

The supply chain team's mission is to extend Achieving Operational Excellence (AOE) and zero defects into our supply chain by raising the bar of our performance expectations, redoubling our efforts to enable excellence in supply chain performance, and rewarding supplier excellence with increased business while transitioning away from suppliers unable to meet our performance expectations.

The P2W program creates incentives for suppliers that send specification-conforming material on time and within budget. We extend our AOE culture into our supply chain as a way to share our vision with suppliers dedicated to our industrial base.

To manage past performance within the supply chain, the team utilizes global quality and delivery scorecards for participating suppliers, supplier advisory boards, and annual Supplier Awards. Rewarding good performance and deepening relationships with strategic suppliers enables supply chain stability, predictability, improved communications, deliveries and quality. P2W allows us to develop multiple strategic suppliers by commodity to drive competition.

DEALING WITH PROGRAM COMPLEXITY
(VOLATILITY, UNCERTAINTY, COMPLEXITY, AMBIGUITY, or VUCA)
Value: 25 points
Use 12 pt. Times Roman typeface

Please respond to the following prompts:

- ***10 points:*** **Describe UNIQUE areas of VUCA faced by your program and why. (Please avoid the issues surrounding Covid-19 pandemic, which was faced by all programs.)**

Complexity – Everything is tailored and custom for the F-22. The mix of components that make up the system is broad, with many suppliers building highly customized parts. The F-22 program has always been about performance, thus this program did not utilize Commercial-off-the-Shelf (COTS) components. The ALR-94 is very custom, similar to a highly customized performance vehicle; every aspect of the platform is tuned for maximum performance.

Test environment – Support of the F-22 EW system relies on a legacy test environment, creating the need to maintain and proactively address the challenges of aging test equipment and operating systems. In collaboration with LM, BAE Systems deploys a team of system and test engineers to proactively maintain the test environments, including automated test equipment and Test Program Sets (TPS). The program refreshes test capability with the development and incorporation of up to five annual TPS updates throughout the test environment. Due to limitation in available funding, the systems and test teams also work to implement continuous improvement in test to overcome these challenges.

The team works with LM on shelf stock volatility, with a focus on agility to allow for prioritization within the factory that supports LM with the necessary hardware to maintain readiness. The F-22 EW system ended production in the late 2000s, resulting in dormant product lines. To enable platform refreshes, the program has **accepted the challenge to restart complex, cold manufacturing lines**. This requires rigorous program planning, execution, effective risk and opportunity management and resource planning.

Capacity planning – Sustainment program management centers around three core elements: 1) system usage, 2) failure rates, and 3) lead times. Given the challenges associated with ambiguity in

the supply chain, the complex nature of the technology and the low-volume, high-mix nature of the system, there is a heavy reliance on long-term forecasting and anticipating supply chain needs. This introduces challenges in determining staff size, capacity planning and delivering the right part at the right time.

BAE Systems employs supportability tools to forecast and predict the support needs and throughput to meet the operational needs of the USAF. Sustainment excellence can be difficult to achieve and these predictive tools assist our factories with capacity and resource planning. The dedicated team of sustainment professionals in the SCOE constantly assess and analyze the amount of customer returns to allow the team to deploy resources effectively and optimize capacity. The focused concentration of sustainment programs in the LCSS and the SCOE allows BAE Systems to build a deep bench of multi-system subject-matter experts. The required deep technical bench allows the staff to flex from product to product.

- ***15 points:*** **Explain how your team responded to these challenges. What changes did you make, what were the results?**

To combat another facet of supply chain challenges BAE Systems developed a second source for key mechanical commodity parts after a significant break in production. These new sources were able to work with BAE Systems to meet requirements and reduce lead times when compared with previous sources. Additionally, BAE Systems actively collaborates with small businesses and suppliers to help navigate DMSMS events. Working with our suppliers, we work to minimize the time to establish substitute parts and processes that meet the system requirements and meet schedule and cost expectations of the program.

Continued investment in facilities and equipment is an aspect of the continued performance. From 2019 to 2022, BAE Systems invested more than $3 million to optimize repair processing, establishing the co-location of repair resources. This, coupled with the company's investment in ramp-to-rate for programs such as F-35 EW and F-15 EW and the decoupling of sustainment processing from production optimized factory flow. This provides the foundation for effective program execution eliminating repairs disrupting a production line, allowing LCSS to adapt production best practices into sustainment operations. Sustainment professionals do not build Legos (like production); they have to look at the Legos after they have been built and try to find the best way to disassemble and repair them. The customer directly benefits from these investments with:

- Establishment of a **state-of-the-art sustainment facility**
- Return throughput of **40 returns per month**
- High priority return processing and **delivery within 7 days**
- **Test equipment uptime > 85%**

METRICS
Value: 15 points
Use 12 pt. Times Roman typeface

Please respond to the following prompts, where predictive metrics indicate items that provide a view of how yesterday's actions and today's actions will affect the future timeline, cost or other requirement.

Provide charts/graphs that illustrate performance to these metrics:

- **What are your predictive metrics?**

  The BAE Systems strategy for the F-22 program is focused on enabling LM to achieve Supply Response Time goals for the USAF and to keep the platform ready. The F-22 Program aggregates and analyzes data streams from field returns, deployments, FRACAS and current factory space demand across the many product lines at BAE Systems. This **analysis yields the forecast for capacity planning, expected LRU and SRU returns and lay-in material to support the repair and sparing velocity needs.** Performed in two iterations, the first is a 3-year outlook and the second is a 5-year outlook, these analysis enable the business to meet the program SRT needs. The 3-year outlook is used to identify any significant changes to execution as a result of the last 5 year outlook, this process allows BAE Systems to identify facilities, material, and staffing needs.

- **How did you perform against these metrics?**

  BAE Systems has consistently achieved quality and on time delivery requirements for the F-22 program. Successful program execution is a good indicator that predictive metrics are working. The approach constantly compares actuals returns to predicted returns has allowed for the creation of algorithms that produce reliable predications.

- **How do your predictive metrics drive action toward program excellence? Please provide examples.**

  Program excellence is achieved when there are clear goals, measurable outcomes, humility in self-assessment and a scoreboard that lets the team know when they are winning or losing. The intentional deconstruction of disparate data sources enables a free flow of information that creates a common operating model that informs program execution in near real time. BAE Systems unrelenting supply chain vigilance, failure data collection, parts demand and tracking tools, factory capacity plans, and a proactive DMSMS program all contribute to program excellence. The predictive metrics have to be based on actual observed product and supply chain performance data.

  As the OEM for the ALR-94 EW System, BAE Systems is committed to maintaining system performance by providing the spares, repairs, parts management, and critical system upgrades to meet needs of the Warfighter. This is done in partnership with both Lockheed Martin and the U.S. government and the predictive metrics are essential element to share, influence and perform the performance of the F-22 EW program. This high performing team has and continues to keep the warfighter ready with EW technology to meet mission capability requirements of today.