

AVIATION WEEK

Program Excellence Awards 2022

November 2, 2022

The Watergate Hotel • Washington, DC

Nomination Form

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

Nominee's Signature

Date

Nominee's Name (please print): _____

Title (please print): _____

Company (please print): _____

NOMINATION FORM

Name of Program: F-15 Radar Enterprise

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Customer Approved

o Date: 5/13/2022

o Customer Contact (name/title/organization/phone): Bridget Sherer/Combat Sensors IPT Lead/AFLCMC-WAQ/317-258-7152

Supplier Approved (if named in this nomination form)

o Date: _____

o 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 pts)

What is the vision for this program/project? What unique characteristics and properties qualify this program for consideration?

(12 pt. Times New Roman) LIMIT YOUR NARRATIVE TO THIS PAGE.

For more than 20 years the USAF F-15 customer has entrusted Boeing and its Radar Enterprise team, including our supplier partners, with the total lifecycle support for their F-15 radar and associated systems. The Boeing F-15 Radar Enterprise vision provides for the uninterrupted availability, support and sustainment of the F-15 AN/APG-63(V)1 radar; referred to as the V1, the AN/APG-63(V)3 radar referred to as the V3 and a number of additional subsystems to the United States Air Force (USAF).

Under the Radar Enterprise (RE) Performance Based Logistics (PBL) (REPBL) contract, we provide program management, supply chain management (SCM), Sustaining Engineering (SE), training, technical data, obsolescence management and security oversight. In addition, we provide product support specialists who are assigned and embedded in each F-15 squadron within the F-15 Combat Air Force to provide home station and world-wide deployment support. These highly trained subject matter experts (SMEs) support all fielded radar systems on the USAF F-15C/D/E aircraft for both operations and maintenance. As the USAF F-15 posture ensures dedicated air superiority for the United States of America, dedicated Boeing product support specialists work alongside the USAF, remain available and are emergency essential to fill active-duty mobility positions that provide total support for the radar and associated systems.



Figure 1. Boeing's F-15 Radar Enterprise PBL

This PBL ensures exceptionally high readiness rates, eliminates costly USAF spares investments and enables the USAF to deploy the F-15 whenever and wherever needed.

The F-15C/D aircraft equipped with the V1/V3 radars have flown more than 419,540 combat and training sorties totaling 640,327 flight-hours. The REPBL program is a significant contributor in ensuring the USAF continues to achieve these milestones. The support and services provided for the radar provides an F-15 subsystem that consistently exceeds its operational availability (Ao) requirements. This enables the USAF to maintain extremely high readiness rates for the radar with no significant investment in spares. Accordingly, radar system reliability overall has also remained well above its required threshold for performance. The F-15 REPBL program remains agile and is always adapting to changing environments to keep the radar operational as one of the most critical F-15C/D/E subsystems. As a testament to the program's performance, the REPBL program was submitted by the USAF for the Secretary of Defense PBL program of the year for 2015.

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.

VALUE CREATION (Value: 15 pts)

Please respond to the following prompt:

- Clearly define the value of this program/project for the corporation
- Clearly define the value of this program/project to your customer
- Clearly define the value of this program/project to members of your team
- Clearly define the contribution of this program/project to the greater good (society, security, etc.)

(12 pt. Times Roman)

Value to Boeing

The Radar Enterprise Performance Based Logistics (REPBL) contract has become the model for many other F-15 subsystem sustainment contracts. Over the last 20+ years this program has resulted in continued growth and revenue for the Boeing Company and has been the model for many other competitive Boeing campaigns. It further demonstrates the company's ability to successfully perform sustainment of both the entire aircraft platform as well as individual and unique subsystems.

Value to the Customer

Boeing's REPBL solution provides the USAF with a cost effective and agile repair solution for the F-15 radar and unique related subsystems. We are able to drive cost-effectiveness by:

- minimizing spares requirements through robust field evaluation. When parts are removed from the aircraft, we go to great lengths to make sure that parts have truly failed before sending them to Original Equipment Manufacturers for repair. Specifically, we review fault data with the USAF pilots and maintainers and, as mission requirements and aircraft availability allow, we verify the failure on a second aircraft. This process ensures good parts remain in the field, keeps current stock on the shelf and minimizes requirements for spare parts which result in less costs for new parts on behalf of the USAF.
- verifying failures in the field as a way to reduce Cannot Duplicate (CND) situations at the supplier. In these instances, CNDs are typically more expensive to evaluate than failed part repairs because the part has to be subjected to multiple tests and environment stress screening in an attempt to duplicate the failure which results in extra time and labor. CND returns from the field result in unnecessary shipping costs along with artificial pressure for available spare parts.



Our cohesive team that engages with our USAF customer at all levels includes logistics specialists, product support field representatives, sustaining engineers, and our supplier partners all working together keep the F-15 fleet healthy by:

- providing reliable parts that at the subsystem level demonstrate a Mean Time Between Failure (MTBF) rate in excess of 450 hours that far exceeds the 300-hour subsystem requirement.
- properly managing and prepositioning parts at F-15 field units and to support deployment Mission Support Kits enabling rapid repairs and ensuring the weapon system is available to meet all

requirements. Our hands-on approach and engagement enable us to exceed a subsystem 90% Operational Availability requirement by achieving a realized 99.9% Operational Availability.

Our REPBL support solution is designed to adapt to support the typical dynamic operations tempo of the F-15 fleet. One of the core enablers to our approach rests with our centrally located logistics teams. They provide direct and hands-on parts management which enables an agile supply support system that allows any needed parts to flow seamlessly across the supply chain. Our team has dedicated logistics experts who review data daily and make informed decisions on parts movement to ensure mission support. When a squadron is tasked to deploy anywhere world-wide, our logistics team remains on task while working closely with our Boeing product support field reps who deploy with the customer to maintain the supply chain and operational support.



Value to the REPBL Team

The REPBL program is a lead program within the F-15 portfolio. Everyone on the team is involved with day-to-day operations to sustain the Warfighter and the aircraft subsystem. Each individual is a value-added contributor that displays and enjoys a sense of pride for being an integral part of the F-15 fleet operational mission. Many of our team members are veterans and have served in the military themselves. Joining the Boeing team and continuing to support the F-15 platform undeniably continues that sense of service and the ability to give back to the military and the country that they served.



Value to the Greater Good

The REPBL team stays true to its mission and provides 24/7 support for the USAF and the Warfighter. We provide F-15 fleet pilots with the most capable radar of any fighter platform in the Department of Defense inventory allowing them to perform any assigned mission. In addition, expert organizational level flight line guidance and support along with robust repair and management processes enables high combat capability and mission readiness. The purpose of the F-15C model aircraft is to provide air superiority to the US military and its allies. That is only achieved when they are able to see and counter potential threats. The F-15 V1 and V3 radars provide that capability thereby supporting national security objectives for the US and its allies and contributing to world peace. During peace time, the aircraft with its radar systems are used to train US and allied combat forces at home and abroad to keep them ready to dominate and maintain air superiority during a conflict.

METRICS (Value: 15 pts)

Please respond to the following prompt:

- What are your predictive metrics?
- How did you perform against these metrics?
- How do your predictive metrics drive action toward program excellence? Please provide examples.

(12 pt. Times Roman)

Metrics

Under the REPBL contract, Boeing execution provides for the support, sustainment and continuous availability of the V1 and V3 radars after they've been installed on the aircraft. This effort involves on equipment aircraft repairs, repair of fielded failed components, sustaining engineering, and management of parts obsolescence while maintaining the form, fit, function (F3I) configuration control of all line replaceable units (LRUs). Today, there are 18 F-15 aircraft operating V1 radars and 171 F-15 aircraft operating V3 radars that are mission essential for virtually every required F-15 mission. The REPBL

program has three primary performance objectives that are essential and are in place to ensure the V1 and V3 radars remain operational and available.

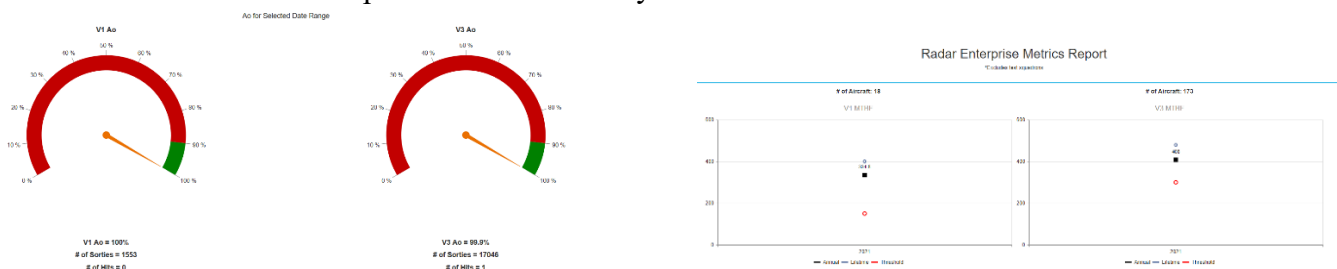
- Mean Time Between Failures (MTBF) measures the requirement for the amount of time between each failure of a radar subsystem. The V1 radar subsystem MTBF requirement is 150 hours, excluding the Mechanically Scanned Array (MSA) and is based on the lifetime flight hours. For the V3 radar subsystem, the MTBF requirement is 300 hours based on the lifetime flight hours.
- Operational Availability (Ao) expresses the percent of time the V1 and V3 radar subsystems are available each time a pilot steps to an aircraft or for an aircraft that is scheduled to fly. The F-15 radar subsystem has an Ao requirement of 90%.

The radars also have a classified wartime sortie generation support rate requirement to meet F-15 wartime sortie surge rates. The radar is not a pacing item and far exceeds the requirement.

Performance

Boeing has been supporting the F-15 radar for over 20 years and has consistently performed above all performance thresholds providing the USAF with exceptional radar availability. MTBF and Ao measures have consistently remained above program requirements over the life of the program. In particular, over this past year, the 18 F-15 aircraft with the V1 radar subsystem Ao was 100% with no sorties lost out of a total of 1,553 sorties flown. The V1 radar subsystem experienced a MTBF rate of 334.8 hours. Over the past year, the 171 F-15 aircraft with the V3 radar subsystem Ao was 99.9% with only one sortie lost related to a radar issue out of a total of 17,046 sorties flown. The V3 radar subsystem experienced a MTBF rate of 411.6 hours.

- CY2021 F-15 Radar Operational Availability and Mean Time Between Failure Metrics



Program Excellence

Boeing execution has provided for the continued availability of the V1 and V3 radars since installation on the F-15 aircraft. Under the REPBL contract, in partnership with our suppliers, we have repaired all radar and associated components field failures, managed parts obsolescence, configuration control, and maintained the form, fit and function (F3I) of all line replaceable units (LRUs). Today in the USAF F-15 fleet there are 18 aircraft operating V1 radars and 171 aircraft operating V3 radar and virtually every F-15 mission requires an operational radar in order to be execute its mission. By monitoring parts use and failure data, analyzing mission and debrief data with both pilots and maintainers, we are systematically feeding improvements back into the program. The REPBL program sets a high bar for future performance and reveals what is possible and what can be achieved on similar type programs.

Additionally, we have built a failure model where we use historical actual data to predict future failures. When we are required to propose sparing recommendations for future efforts we know what's needed and have information that provides for an objective data driven recommendations. This data is the basis for how we estimate what will be needed to sustain the fleet's radars for the follow-on years. Accordingly, as you would expect, a fully integrated weapon system such as the F-15 also has to remain focused on

obsolescence as these systems remain in use for decades. In these instances, we rely on our data-rich solutions to also predict needs for a life-time buy when needed for parts to resolve obsolescence issues; to validate supplier proposals; to help the USAF formulate long-term plans for fleet sustainment and for deployment support.

DEALING WITH PROGRAM COMPLEXITY (VOLATILITY, UNCERTAINTY, COMPLEXITY, AMBIGUITY, OR VUCA) (Value: 25 pts)

Please respond to the following prompts:

➤ 10 pts: Describe areas of VUCA faced by your program and why.

➤ 15 pts: Explain how your team responded to these challenges.

(12 pt. Times Roman)

Volatility

During the past several years the COVID pandemic has created significant impacts not only within Boeing but within our suppliers and the supply chain. Pandemic impacts have driven workforce availability as well physical access to locations to perform work. We continue to see impacts driven by supply chain and parts availability. Lead times for material have increased in addition to escalating costs due to lost efficiencies, raw material, and capacity. Customer Health Protection Conditions disrupted flying schedules and access to customer personnel to perform daily sustainment tasks. In many cases normal customer processes to use support equipment and debrief systems was limited or curtailed to prevent physical contact due to COVID risks. F-15 Theater Security Package and Air Tasking Order deployments continued in the COVID environment that required continued Boeing support. Changing country entry requirements depending the country or region restriction routinely changed. An international customer supported on this contract experienced funding challenges leading to incremental funding of a negotiated Firm Fixed Price contract until a stop work order was eventually issued. The USAF fielded the F-15 Fully Automated Debrief System needed to obtain aircraft sortie parametric data and to generate positive maintenance actions based on Boeing fault isolation rules. The unit level customer has been reluctant to implement and use this system impacting daily processes to obtain objective aircraft data to sustain the radar subsystems.

Uncertainty

An international customer supported on this contract had persistent funding issues driving continuous uncertainty, in many cases, month-to-month funding, to continue work or go into a stop work condition. The international customer radar support is only for returned parts. Boeing has no visibility of the customer spares, usage levels, or even failure and maintenance actions. Quarterly a Multi-role Tanker Transport shows up with a load of parts with no prior notification. Persistent threats in the Pacific Area of Responsibility due to Chinese and North Korean actions drove impacts to Boeing support capacity. Although Boeing continues to support the sustainment of the Talon HATE system that is part of the Radar Enterprise contract, the operational user has not implemented use of the system. The customer has not funded the Talon Hate system other than the labor to support the Pods and security. Although not funded, the customer has not removed the requirements from the contract putting Boeing in a position to continue to execute and support if the customer were to decide to provide funding.

Complexity

Parts within the radar subsystem range from unclassified, to collateral, and above. Data also falls within multiple security levels. Depending on mission types, failure modes, performance capabilities, and other variables hardware, software, and data must dynamically handled. The Radar Enterprise not only deals with the USAF for the domestic radar subsystem with the F-15 System Program Office at Robins AFB, Georgia, but with the USAF Foreign Military Sales for an international customer. In addition, software

updates, hardware modifications, and current APG-82 is managed on the acquisition side of the house with the System Program Office at Wright-Patterson AFB, Ohio. To manage and sustain the F-15 radar we have three separate customers on the same contract and in many cases each organization has competing priorities. Many program complexities are also driven by our suppliers. Radar system engineering and contracting for Raytheon, our largest supplier, is performed by Raytheon El Segundo in California while the actual sustainment program management and repairs is performed by Raytheon's sustainment division at Forest, Mississippi. Coordination across multiple supplier divisions supporting the same product and contract purchase order drives significant daily engagement.

Ambiguity

USAF customer use of the fielded F-15 aircraft debrief system that provides consistent Fault Isolation codes based on parametric data rules and pilot impute continually drives ambiguity into positive maintenance and corrective actions. Product support specialists routinely must seek out pilots and analyze data that normally would be available if standard processes were used. The USAF and Boeing also receive no radar data from the international customer to quantify system use, maintenance actions, removal and replacement, cannibalization from once aircraft to another, or actual failure modes or data. Boeing and our suppliers receive no data for 99% of returned failed parts for repair. This drives ambiguity into the repair process for if the returned parts are actually bad, influenced by other aircraft systems, or are pulls driven by incorrect or improper maintenance actions. Actions and assumptions by the USAF to draw down the F-15C/D fleet drive ambiguity into repair planning and sparing levels.

Response to Challenges

Despite VUCA challenges, the Radar Enterprise program has continued to support all customer requirements. Our product support specialists embedded in each F-15 unit were available 24/7 to support the customer. In every case during the COVID pandemic as F-15 combat units were tasked to deploy OCONUS, our product support specialists accompanied the unit to provide deployed support. In several cases the F-15 USAF Air Force Engineering Technical Services (AFETS) declined to deploy USAF AFETS to support their assigned units during the pandemic. Boeing was asked by our Warfighter customer to not only fill our radar sustainment role but to fill in and perform the AFETS support role. Boeing stepped up to this request and support the Warfighter. Despite the international customer funding challenges, Boeing and our suppliers continued to support repair requirements, even when contract modifications and funding that were late to need. The REPBL team works daily with the multiple USAF customers and in many cases is the go between and arbitrator between USAF organizations for dissemination of information and to resolve competing priorities the benefits the USAF, the F-15, and the radar subsystem. We are integrated with our suppliers and understand their own internal complexities and relationships within their organizations to ensure successful contract execution and customer support. Ultimately, the USAF continues to employ and realize the benefits of F-15 radar subsystems that continue to achieve over a 99% operational availability rate and far exceeds subsystem level reliability requirements.

ORGANIZATIONAL BEST PRACTICES AND TEAM LEADERSHIP (Value: 35 pts)

Please respond to the following prompts

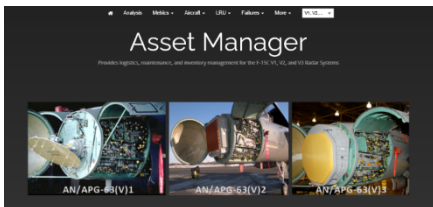
- 15 pts: Describe the innovative tools and systems used by your team
- 10 pts: Define how you developed, led and managed people
- 10 pts: How did you leverage skills and technologies of your suppliers?

(12 pt. Times Roman)

Tools and Systems

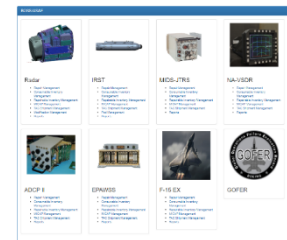
In order to consistently achieve optimal performance and system availability as required under our performance-based contract, we have developed and implemented a suite of digital tools that deliver performance data and reports, provides real-time fleet status at the aircraft subsystem level, allows for visibility of parts movements throughout the supply chain and insight to our suppliers for supplier management and parts in the repair cycle. These tools place relevant data into the hands of the team to place sustainment information into the hands of our customers and our field teams in order to optimize system readiness while honoring our commitment to subsystem reliability and operational availability. To provide data collection, storage and application development services, we require tools that present a comprehensive view of the operational support and logistics environment for select systems on the F-15.

- The F-15 Data Warehouse and our digital tools collect and process data from various Boeing, USAF, and OEM sources.
- Asset Manager is a web application which provides descriptive analytics and visibility into F-15 sortie, performance, fault, and maintenance data. It provides visibility into USAF and OEM maintenance/corrective action data for radar parts. Asset Manager provides logistics, maintenance, configuration, and inventory management for the F-15C/D V1 and V3 Radar Systems. It combines information from multiple data sources, including the USAF and Raytheon to provide a single comprehensive view. The application is available to the USAF providing real-time performance specifics and life-cycle history on radar parts. Access is also provided to Raytheon to



share detailed fault data to enhance diagnoses and repair for actual performance and faults during operation on the aircraft. Asset manager also incorporates detailed data directly from Boeing product support specialists in each unit based on analysis with the pilot, visually reviewing data from aircraft video sources, feedback from maintenance personnel and the F-15 Fully Automated Debrief System, and the review of sortie specific parametric aircraft data. It provides visibility of every radar component, each aircraft tail number, and any additional inputs documented by both Boeing and Raytheon. Asset Manager is the recognized source for USAF official radar reliability statistics. It tracks the primary performance metrics for REPBL, both MTBF and Ao.

- The Boeing Operational Support System (BOSS) application provides the ability to track LRU failures, repairs as well as spares and consumable inventories. It maintains the entire life-cycle repair history on all V1 and V3 radar and associated systems components (Air-to-Air Interrogator (AAI), electrical, Enhanced Environmental Cooling System (EECS)); archives field failure information, shipment tracking numbers, field service comments, repair details, current repair status, turnaround times, purchase order and funding details. BOSS provides on-demand generation of various metrics required by existing product support contracts as well.



The implementation of our Global Operations Failure Evaluation Report (GOFER) eliminated a labor-intensive paper process to automate the process for product support specialists to capture subsystem performance and failure data in the field with an automated interface to BOSS. Previously the information about failures coming from the field had to be manually entered into BOSS for program management and subsystem sustainment. GOFER eliminated manual inputs and made the transition of data seamless with automatic flow into BOSS and is then validated by the logistic team.

Our Suite of digital product support specialist applications ensure that our customer achieves optimal subsystem technical performance while exceeding required operational availability. Our tools are designed to address a number of pain points that exist on the flight line at the point of maintenance. These tools allow for real-time data availability providing our field specialists the ability to stay on the flight line where they are needed. These tools minimize the amount of time needed to research technical issues away from the aircraft and minimizing the time they are not directly available to the customer. To improve product and customer support our specialists needed access to technical data and drawings in one location. Our specialists also needed a reach back capability to assist with troubleshooting none standard repairs or hard broken aircraft integration issues more quickly. Reach back allows our product support specialists to interface with subject matter experts and design hardware/software engineers, essentially bringing a critical remote resource to the aircraft.

- The Military Positive Repair Information Text Analyzer identifies the most effective maintenance action for a fault which has occurred. It captures tribal maintenance knowledge stored in the system and improves maintenance efficiency.
- Sentinel is an alerting tool which prevents analysts from having to pour through mountains of records and data by hand looking for failure events. The system alerts the user in near real time of the event that is occurring and points to the location of the data that triggered the event for further analysis.
- Our Maintenance History Analysis Tool is a foundational tool we use to support multiple activities (root cause analysis, Condition Based Maintenance algorithm development, etc.). It provides the ability to store queries, capture and share peer related search terms and results, and generate other metrics relative to the execution of saved queries over time. By sharing queries across our product specialist team base, they can learn about what questions have been asked and what answers are available for common recurring issues. Think of this much like a “Maintenance FAQ tool”.

The Maintenance Health Management System tool is an analytics tool using all available data in the F-15 data warehouse containing raw vehicle flight data and field maintenance history. It provides engineering analysis and maintenance information tools which provides insight for Engineering, Leadership, and Maintainers. It improves individual aircraft and fleet performance while reducing sustainment costs.

People Leadership

At Boeing, our organizational values are the basis for how we lead and manage our teams. These values frame the environment by which our teams execute and perform in a customer-centric way. By setting expectations where we are all accountable from beginning to end, we define the behaviors for what leadership looks like. As managers and leaders, we help our teams to grow and to also be leaders, we respond to individual team members’ needs by leveraging one-on-one performance and development discussions. We challenge our team members to spur new ideas and above all we listen. We empower them to make decisions that impact their individual projects while also providing a consistent line of sight for how their work aligns and impacts the broader organization’s goals and objectives. As with many organizations, we understand that as we work to grow our employees, we must also plan for attrition as people move into new roles across the company. That said, knowledge transfer is also a part of our execution strategy. Our teaming model provides for each person to be a project lead and they also cross train to be a backup on adjacent projects. Each lead will have someone who often shadows them, participates in meetings and phone calls. When/if a primary team member is away or unavailable, his or

her backup is fully informed and steps in. By teaming people together in this way our customer can expect consistent coverage and is never left without support.

Leveraging Suppliers

The F-15 is a highly sophisticated weapon system that uses a multitude of original equipment manufacturer subsystems integrated and sustained at the platform level by Boeing. Boeing and our supplier partners have a joint responsibility to the USAF F-15 customer and we operate as one team committed to sustaining the platform to ensure its optimum performance in the field.

All of our Boeing supplier OEMs support our prime contract requirements between the USAF and Boeing. Each supplier is part of the Radar Enterprise sustainment team with responsibilities for technical performance, configuration control, engineering, and repairs. Each repaired part passes through an approved Acceptance Test Procedure using depot level testing and verticality back to the F-15 platform to ensure that repaired parts not only meet all specifications but operate out of the box without issue on the aircraft.

One example of our teaming integration is where our product support specialists may perform non-standard repairs in the field to keep parts on the aircraft preventing costly returns. Removing and replacing a radar array on an aircraft is no small task. Due to the complexity of an array a simple remove and replace action for a minor non-standard repair costs in excess of \$100,000.00 to move the part through the repair cycle. In cases such as this we work closely with our Raytheon partners to provide material and an approved engineering procedure to allow product support specialists to effect the repair at the aircraft. The result is a near real-time fix at the aircraft for a fraction of what would be a standard repair action. Together as a team we bring greater value to the program through cost avoidance measures like these as well as others. The following are our primary supplier partners and the systems and technologies they bring to the program to ensure a fully mission capable weapon system.

- Raytheon Forest (El Segundo) – is the Boeing supplier OEM for repairs of the APG-63 V1 and V3 radar components. Those components are comprised of an Analog Signal Converter, Low Voltage Power Supply, Radar Data Processor, Receiver/Exciter, Radar Set Control, Array Power Supply, and the Active Electronic Scanned Array. Raytheon also provides Boeing OEM supplier repairs for the Royal Saudi Air Force V3 radar components. They are the leading developer of the airborne radar and the key supplier for the REPBL program and share reliability responsibility for the MTBF performance requirements for both the V1 and V3 radar subsystems. Raytheon Largo (Aberdeen) is the Boeing supplier OEM for repairs of the Air-to-Air Interrogator Electronically Steered Antenna (AAI ESA) for the USAF F-15 C/D/E and for the F-15 Royal Saudi Air Force. The Boeing requirement for Raytheon Largo is for a repair turnaround time (TAT).
- Meggitt (U.K.) – is the Boeing supplier OEM for repairs of the Liquid Coolant System pump portion of the F-15 Environmental Control System (ECS). The Boeing requirement for Meggitt is a repair turnaround time.
- Triumph – is the Boeing supplier OEM for the Royal Saudi Air Force Liquid Cooling System (LCS) Pump/Reservoir. The Boeing requirement for Triumph is a repair turnaround time.
- Honeywell (Tempe, Toronto, Torrance) is the Boeing supplier OEM of multiple air and liquid F-15 Enhanced Environmental Cooling System (EECS) components. The Boeing requirement for Honeywell is a repair turnaround time. Crane (Seattle) is the Boeing supplier OEM for the F-15

Automatic Transformer Rectifier Unit (ATRU) that provides clean steady-state power for the radar. The Boeing requirement for Crane is a repair turnaround time.