### I. Program Overview

<table>
<thead>
<tr>
<th>Name of Program:</th>
<th>Miniature Air Launched Decoy (MALD™)/Miniature Air Launched Decoy Jammer (MALD-J™)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your Name/title:</td>
<td>James McClendon, Program Director, Raytheon Company; Scott Muse, Program Director, Raytheon Company</td>
</tr>
<tr>
<td>Customer:</td>
<td>U.S. Air Force</td>
</tr>
<tr>
<td>Program Category</td>
<td>A.2 Development stage/SDD contract</td>
</tr>
</tbody>
</table>
| Program Background | Overarching Need  
MALD™ is a low-cost, air-launched programmable unmanned aerial vehicle that duplicates the flight profiles and signatures of U.S. and other aircraft. Modern air campaigns have underscored the need for counter air operations to neutralize, if not destroy, relatively less expensive air defense systems that pose a threat to more costly U.S. and coalition aircraft and invaluable aircrews. MALD™ and MALD-J™ are cost-effective, expendable solutions that provide the air warrior with an electronic warfare protection capability to fill this critical gap.  
History of the Program  
Initiated in 2003, this System Development and Demonstration (SDD) program has completed developmental testing that includes F-16 and B-52 endurance and stress tests. In December 2007, the program received an Initial Operational Test and Evaluation (IOT&E) missile order. On April 2, 2008, a Production Readiness Review was successfully completed. In addition, as a measure of the customer’s confidence, the program received a manufacturing risk reduction contract in preparation for low rate initial production. Both programs have an unprecedented flight test record for their respective phases. The decoy has a 40 out of 42 flight test success record, while the jammer has a perfect 12 out of 12 successful test events. |
|                 | Program Background  
- The overarching need for this program  
- History of the program  
- Current status of the program |
|                 | AND  
B.1 Large-scale system (multi systems)  
B.2 Subsystem |
**Current Status**
MALD™ is moving into its operational test and production phase. As a follow on to MALD™, the MALD-J™ offers a low-cost, air-launched aircraft for stand-in jamming as part of the airborne electronic attack system of systems. The MALD-J™ program has completed Phase I Risk Reduction and entered into Phase II Risk Reduction. Both programs are on track to meeting required assets available milestone dates for the US Air Force.

**VALUE CREATION = 10 POINTS**

Describe how this program contributes to your corporation’s ability to deliver value to customers and shareholders.

The MALD™ Program uses technology gained in earlier development programs and through internal research and development (IRAD) funded efforts including approximately $7 million into a wideband jammer IRAD effort. The resultant technology, designs and techniques were applicable and incorporated into the MALD™ giving the customer added value through cost-saving experience. Recently, the MALD-J™ team completed Phase I Risk Reduction early, 27 percent under budget, and earned 100 percent of incentive fees. The MALD™ SDD team earned 100 percent of its 2007 award fees. Using a crawl-walk–run approach to design, testing and evaluations, the program’s best practices are now being integrated into many company pursuits including average unit procurement recurring price reduction techniques, methods for lean production, test early-test often and don’t go slow-don’t accept no. These practices are promulgating throughout the company and will not only result in strong financial contributions to boost shareholder value, but will provide low-cost mission solutions for the warfighter.

**III. ORGANIZATIONAL PROCESSES/BEST PRACTICES: (HOW DO YOU DO THINGS) = 30 POINTS**

**Strategic:**
Describe how you developed your program strategy in support of your company strategy, how you monitor progress toward achieving this strategy.

The MALD™ program strategy stemmed from six elements:
- Deliver a low-cost, high technology readiness level (TRL) missile to the customer
- Use modularity and affordability to develop a family of weapons derived from an integrated approach with the Business Development and Advanced Programs organizations working together on strategic growth opportunities and company core capabilities
- Develop an exceptional internal team focused on delivering a product that they know can mean the difference between life and death for the warfighter
- Champion external teams, forging an environment of trust with the customer built upon results, and develop
an early partnership relationship with suppliers to ensure they understand their significant and potentially lifesaving contribution to the warfighter

- Use results oriented systems engineering that include such processes as test early-test often to identify problems early thereby eliminating pitfalls on design uncertainty and unknowns
- Use average unit procurement price and lean methods to accomplish average unit production price goals

Using these six elements as guiding principles, leadership and management are able to consistently monitor program progress and check performance toward achieving program, company and customer goals.

**Operational: Monitoring and Controlling**

How do you monitor your program's progress and make corrections to keep the program on track?

Weekly staff meetings and quarterly all-hands ensures we maintain alignment across the entire MALD™ team. Daily teleconferences between Raytheon and U.S. government program directors ensure efforts continue on track toward common goals.

Earned Value Management System (EVMS) drives success, as daily, weekly and monthly cost and schedule monitoring and tools are embedded in activities. Corresponding successful results from other company endeavors have validated the value of this approach.

**Operational: Supply Chain**

What processes, tools and relationship-building methods have you used to develop, refine and improve supply chain integration?

Key suppliers are merged into our integrated product team (IPT) structure where they participate in the management and execution of the program including EVMS. Our suppliers are our partners and are part of both our successes and challenges. Extensive production readiness reviews have been made with first-tier suppliers, and the majority of second-, third- and fourth-tier suppliers.

**Operational: Risk Management**

Describe the processes used to identify risk and avoid future/potential issues or risks.

Risk management is an integral part of our management process. A joint Raytheon and U.S. government risk board convenes monthly to communicate, identify, assess and identify mitigation efforts to risks and opportunities. Risk management is part of our EVMS process and incorporated into the Integrated Master Schedule including the appropriate mitigation tasks and activities.

**Operational: Opportunity Management**

Describe how your program team identifies opportunity and manages.

Opportunity management is part of our risk management process. For example, the MALD-J™ team planned and executed key tests as a single unit with our government counterparts, which garnered many positive reviews that have
since been passed on to the Air Combat Command, Office of the Secretary of Defense (AT&L) Joint Force Applications, Secretary of the Air Force/Acquisition and others. One government customer remarked, “Never have we had such a spirit of cooperation and seamless interaction.”

**Team Leadership:**

**Team Motivation**
Describe how you accomplish full team integration, motivation, and inspiration.

Weekly detailed staff meetings extended to the entire team. All program information, such as press releases, is disseminated to the entire team including suppliers. We extensively use the Raytheon Awards Program by recognizing high-performance MALD™ individuals and teams with monetary rewards for outstanding performance. Dinner certificates are also available to team leads to give to their team members for above-and-beyond efforts. Specific team-building efforts include:
- We are here for the Warfighter! — Displays, videos and discussions in meetings
- Regular all-hands, ice cream socials, program luncheons
- Leadership biweekly update sent to the entire team

**Team Leadership**:

**Knowledge Management**
Describe how knowledge, best practices, lessons learned are shared and used across the team to improve performance.

The acceleration of learning, sharing of knowledge and transfer of lessons learned from the MALD™ team to the MALD-J™ team was critical to MALD-J™ Phase I Risk Reduction success. Incorporating basic philosophies like test early-test often, crawl-walk-run, focus on our attention to details and meeting our commitments are just a few of the practices and principles we have used to improve individual and program performance.

**Team Leadership**:

**Leadership Development**
How do you develop team’s skills and build future leaders

Many of the people on the MALD-J™ team grew into higher levels of responsibilities through development by their IPT leads and mentors on MALD™. This trend continues as evidenced by recent internal promotions of the chief engineer, deputy chief engineer and Mechanical Design lead. People identified as having high potential have been given increased responsibility and accountability in a mentorship role to enable personal and professional growth. Both formal and informal training is available for all employees.

**Lessons Learned/Best Practices**
Check category of your effort

- [X] Teaming/Leadership
- [X] Supply Chain Management
- [X] Risk Management
- [X] Opportunity Management
- [X] Configuration Control
- [X] Schedule/Planning/Forecasting
- [X] Subsystem Control
- [X] Systems integration/tradeoffs
- [ ] Other (describe)

**Lessons Learned/Best Practices:**
Explain the specific Best Practice or Lesson Learned your team

Strong teaming, simplified processes and innovative approaches enabled the MALD-J™ unprecedented box score of 12 out of 12 successful test events, earlier than scheduled finish and under cost performance.
• **Earned Value Partnership.** We have changed the game. The contractor now has one schedule — the earned value baseline. No need for a Program Manager Review. Once a month, we hold an Earned Value Day meeting with all cost account managers reporting a cost or schedule performance index less than 1.0. It is not just about the numbers but fully examines root causes, directions, solutions, resources and actions to stay the course. The government customer is fully involved with these meetings. Gone are the days of waiting for the earned value reports that rely on data that may be up to 60 days old. Now, we see data real-time and are involved in the real-time plans and real-time solutions.

• **Trust-Partnership-Results.** MALD™ has worked hard to ensure our testing is production representative. We have used actual manufacturing processes in our SDD flight test aircraft. The demonstrated results speak volumes about why we demanded after the fifth test aircraft that the fabrication of SDD test aircraft occur on the real production line. All six powered flight tests following the fifth MALD™ test flight were flawless. In addition to having manufacturing work with engineering early, this next step provided invaluable learning to ensure a smooth transition to actual production. Additionally, by putting all material in the manufacturing system, all drawings through full release, ensuring full-up Failure Reporting, Analysis and Corrective Action System (FRACAS) and highly accelerated life testing (HALT) results because we are testing real weapons. We have met with the warfighter, government contracting office and vendors to understand how we meet producibility and affordability requirements. With early testing, we found problems now instead of deferring them post production. We have also locked down the supplier base for LRIP and IOT&E. This stabilization breeds U.S. government confidence in the quality of our product.

• **Test Early-Test Often.** This process ensures a robust system verification plan, with greater than 50 verification tests in SDD.

• **Trunk Monkey Testing.** This practice uses extreme testing of subsystems and components early in the design cycle to minimize the potential for system-level failures.

• **Integrated Leads.** Making Raytheon partner business unit leads IPT leads, with direct and visible cost and schedule accountability, a more effective and integrated team is created. This was noted as a best practice by an internal
### Lessons Learned/Best Practices

**What specific plans and actions – including systems, processes or tools applied – were taken to create the best practice or to mitigate/prevent re-occurrence of the root cause issue on this program.**

The MALD™ program used a joint U.S. Air Force, U.S. Navy Joint Direct Attack Munition (JDAM) program product called a miniature telemetry set. Traditionally, sized as a fuze for bombs, this unit has accelerometers and telemetry capabilities to accurately measure jettison and launch data. Though MALD™ does not have a warhead (it is in work as a growth spiral) we were able to use this unit for better results than photogrammetric data. This minimized the jettison test program.

Reuse of baseline MALD™ assets modified for MALD-J™ led to significant cost reductions and shorten program schedule and risk for MALD-J™ Phase I Risk Reduction — a clear example of commonality.

Numerous innovative ways to test, collect and measure results were used.

- The use of a private Sabreliner test-bed aircraft
- The use of existing U.S. Navy assets and facilities provided practical approaches to validate maturity
- Mounting and testing a MALD-J™ on a 90-foot pole to collect data was an innovative cost-effective approach

**Using accelerated scheduling techniques enabled completion three months early at 27 percent under cost for a 12 month activity during the Phase I Risk Reduction program. A measure of our success was our 100 percent award fees and accolades received from numerous government official including Program Executive Officer Judy Stokley and Assistant Secretary of the Air Force for Acquisition Sue Payton.**

### IV. ADAPTING TO COMPLEXITY: (HOW DO YOU DEAL WITH YOUR PROGRAM’S UNIQUE COMPLEXITIES) = 30 POINTS

**Identify the Program’s Market Uncertainty level using the definitions below. Then describe how you planned to deal with this uncertainty difference:**

V. **Is it a Derivative of existing product/system?**

- **New Generation** of existing product line/system applied to new market segment?
- **Breakthrough Program** (new to the...
Growth is key to Raytheon and our U.S. Air Force customer. Industry has seen time and time again that to keep a product affordable and available, variant growth must occur. By design the affordability based MALD™ program includes the potential up front modularity.

<table>
<thead>
<tr>
<th>Identify the Program’s Technological Uncertainty using the definitions below. Then describe how you are addressing this uncertainty:</th>
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<tbody>
<tr>
<td><strong>Low-tech</strong>: application of existing technology</td>
</tr>
<tr>
<td><strong>Medium Technology</strong>: mature technology adaptation to meet new requirements</td>
</tr>
<tr>
<td><strong>High-Technology</strong>: new technology applied to fully defined requirements</td>
</tr>
<tr>
<td><strong>Super High-Technology</strong>: non-existing technology that needs to be developed during the program.</td>
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MALD™, as a vehicle, uses high technology with an all-composite body
MALD™, as a decoy, uses medium technology that is proven, repeatable and affordable
MALD-J™ uses high technology as a stand-in jammer to complement emerging stand-off jammer capabilities
We mitigate uncertainties through extensive testing beyond the U.S. government expectations using our test early-test often philosophy

MALD™ and its derivatives are 200 pound, air- and surface-launched aircraft systems with a greater than 400nm capability that sit in a box for 15 years and still works.
MALD-J™ Phase II will be a two year effort to integrate the jammer package into the overall system. We will take the proven decoy and show its interoperability as a jammer using our crawl–walk–run and test early-test often philosophy.
Although this undertaking may appear simple in words, this endeavor will require extensive subsystem integration and engineering to ensure system capabilities and flexibilities.
Efforts will include:
- Capitalizing on subsystem commonality between MALD™ and MALD-J™ systems with innovative approaches to testing
- Using the same personnel and supplier base for both MALD™ and MALD-J™
- Using the same test and manufacturing infrastructure

<table>
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<tr>
<th>Identify the System Complexity using the definitions below. Then explain how you are dealing with this complexity:</th>
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<tbody>
<tr>
<td><strong>An Assembly</strong> performing a single function.</td>
</tr>
<tr>
<td><strong>A Sub-system</strong> fitting within a larger collection of systems?</td>
</tr>
<tr>
<td><strong>A System</strong> – a collection of subsystems performing multiple functions?</td>
</tr>
<tr>
<td><strong>An Array</strong> – a system of systems; a widely dispersed collection of systems serving a common mission?</td>
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<table>
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<th>Identify the Pace of your team’s effort using the definitions below. Then</th>
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<tbody>
<tr>
<td>Time Critical to meet the warfighters’ needs. Required assets available date is a must for both programs. To meet the</td>
</tr>
</tbody>
</table>
describe how you deal with the program’s pace requirements:
- **Regular timing** based on past efforts
- **Fast Competitive** – the pace is driven by desire to be first to market
- **Time Critical** – there is an absolute and near-term deadline
- **Blitz** – there is a crisis element driving immediate response

schedule, parallel test activities include B-52 separation tests at Edwards Air Force Base; captive carry avionics tests across the U.S.; F-16 flight testing at Eglin Air Force Base; and B-52 flight testing at Nevada Test and Training Range.

Intense, centrally managed, decentralized executed program, along with the identification and placement of decisive leaders in key program roles will speed efforts to meet the customer’s requirements.

Far from a pedestrian program, MALD™ will require leaders to use proven lean practices and our “don’t go slow-don’t accept no” methods.

Comprehensive program activities include integrated government and contractor team that plan, communicates and executes on a daily basis. Joint teams conduct regular strategy and teaming meetings in addition to the normal program reviews, and identify roadblocks early and develop a proactive sight picture.

Raytheon has incorporated accelerated scheduling techniques in advance of contract baseline dates to drive early finish with hand selected players who can keep pace, and by hiring best of the best outside expertise to complement the program team.

**Other Complexities**
Describe other complexities faced by this program team and how you address them.

**Organizational Climate.**
In 2005, the MALD™ team was burdened with a high level of overtime. The program director identified program priorities, high risk areas and developed a plan to realign resources to critical areas to include a supplemental workforce in key risk areas. Optimizing workforce productivity and satisfaction, the program director exchanged employees who were not well suited for certain jobs and staffed positions with the right mix of skills and experience.

Following a corporate program review, Ed Franklin vice president of the Raytheon Company Evaluation Team, said, “This is a well-run program, and the team is to be congratulated for their leadership, innovation, and thoroughness in proactive identification and closure of problems.”

**VI. METRICS (HOW DO YOU MEASURE PROGRAM’S PERFORMANCE) = 30 POINTS**

**Demonstrate the customer satisfaction from your program. Include description and metrics / scores.**

Contractor Performance Assessment Review (CPAR) for MALD™ and MALD-J™ as of June 2007 was four green (satisfactory), seven purple (very good), one blue (exceptional) and one yellow (marginal).
- Program Management was rated purple — According to the review, “Outstanding program leadership yielded proactive, positive results and better product for the
- Flight Test Success — 40 out of 42 for MALD™ and 12 out of 12 for MALD-J™

During a program review, the U.S. Air Force colonel and deputy head for Air Force requirements said, “We love MALD...if I had another dog, I’d name him MALD.”

| Demonstrate program performance in terms of schedule and budget | Month Ending February 2008 EVMS scores are as follows:
|---------------------------------------------------------------|---------------------------------------------------------------|
|                                                             | • MALD™: CUM SPI 0.99, CPI 0.95
|                                                             | • MALD-J™: CUM SPI 1.02, CPI 1.28

| Provide the measure used to evaluate the program’s business success (operating margin, earned value or other indicator that can be released publicly) | Bookings/Sales/Earnings and Operating Margins have improved significantly over the past 3 years. Recent new Bookings, as reported in a recent customer approved program press release:
|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                | • $16.1 million IOT&E Missile Purchase contract
|                                                                                                                                | • $22 million MALD-J™ Risk Reduction Phase I
|                                                                                                                                | • $88 million MALD-J™ Risk Reduction Phase II
|                                                                                                                                | • Pending LRIP Decoy Production Award

| Provide the measure you use for long-term contribution to the corporation/organization? | In addition to current bookings, MALD™ offers a multitude of spiral opportunities in which could further enhance US and international partners’ capabilities resulting in financial growth to Raytheon.

| Demonstrate employee satisfaction for your team | Employee comments and feedback express a desire to work for the MALD™ program and employees assigned to other functional organizations wish to continue working for the program.
|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
|                                                | Employee morale and commitment to providing the warfighter with the best product and support possible were demonstrated during a 2007 Christmas event when $4 thousand was raised for care packages sent to soldiers deployed in Iraq and Afghanistan.
|                                                | Customer comments about how MALD™ will save lives have added to our employee pride and satisfaction.

| What is the voluntary attrition rate for program employees? | The voluntary attrition rate on MALD™ has been low. People promoted to positions of greater responsibility within Raytheon include chief engineer to product line chief engineer; program director to program director II; and lead engineer to deputy chief engineer. However, our succession planning has filled these key positions from within the program without missing a beat. Attrition has largely been because of promotions but we have retained a large part of our program staff.