## I. Program Overview

<table>
<thead>
<tr>
<th>Name of Program:</th>
<th>Sniper® B-1 Laptop Controlled Targeting Pod (LCTP)</th>
</tr>
</thead>
</table>
| Your Name/title: | Kenneth Fuhr, Director of Fixed-Wing Programs, Lockheed Martin (LM) Missiles and Fire Control (MFC)  
|                  | Bill Spangenberg, Sniper ATP U.S. Air Force (USAF) Program Manager, LM MFC  
|                  | Sean Quinn, Lead Systems Engineer, B-1 LCTP Program, LM MFC |
| Customer:        | Boeing Corporation and the USAF |
| Program Category | Sub-System Research & Development/System Design & Development (SDD) |

**Background.** The Sniper Advanced Targeting Pod (ATP) is a precision targeting system originally designed for fighter aircraft such as the F-15, F-16, and A-10. Combat deployed since 2005, it is the USAF’s ATP of record. The B-1 bomber carries the largest, most diverse weapon payload of any U.S. aircraft and can loiter for extended lengths of time, providing a persistent presence to the battlefield. Traditionally, the B-1’s mission was limited to weapons employment in a close-air-support role with targeting coordinates provided by an off-board source. Operation Iraqi Freedom changed the rules of engagement to require positive ID of targets prior to weapons release. As a result, Air Force Central Command (AFCENT) issued an Urgent Need Request (UNR) to install Sniper ATP on the B-1.

**The Program.** Sniper ATP provides the B-1 self-generated precision targeting coordinates for bomb delivery, identifies targets from extended ranges, and performs weapon impact assessment with a datalink to ground forces. This enables the B-1 to operate autonomously and extends its mission to include non-traditional intelligence, surveillance, and reconnaissance (NTISR). It alleviates fighter aircraft workload, reduces the kill chain, and helps prevent fratricide.

LM MFC’s Sniper ATP solution eliminated a large portion of aircraft modifications historically required for targeting pods, reducing the risk to meet UNR timelines. MFC leveraged a hybrid 1553/Ethernet solution to eliminate cockpit display integration risks. MFC utilized an on-board laptop computer as the command/control and display using previously-developed pod control software. MFC also took advantage of a mature, fielded, F-15E Sniper interface and hand controller.

The Sniper B-1 LCTP system deployed in 2008 – successfully meeting the capability and schedule requirements of the B-1 UNR.

**The Product.** Lt. Gen. Mark Shackelford, Military Deputy, Secretary of the Air Force for Acquisition recently reported to the Appropriations Subcommittee on Defense, “A perfect example of the B-1’s potential was realized by adding [Sniper] ATP to the platform’s sensor suite. In an exceptional display of acquisition effectiveness, in 2007, the Air Force and our corporate partners responded to AFCENT’s highest Urgent Operational Need requirement by energizing a fast-track development and procurement timeline. With the help of supplemental funding, by June 2008, the 34th
Bomb Squadron out of Ellsworth Air Force Base (AFB), South Dakota was able to deploy a full complement of Sniper-equipped B-1 bombers to support both Operations Enduring Freedom and Iraqi Freedom without a single break in daily combat operations. The program continues in 2009 to outfit the remaining fleet and incorporate laser-guided weapons, as well as integrate pod data directly into the avionics system to allow for direct machine-to-machine transfer of targeting data.” As stated by the Combined Force Air Component Commander, “The Sniper pod on the B-1 bomber is amazing.”

### II. Value Creation = 30 points

<table>
<thead>
<tr>
<th>Value: What is the value and competitive advantage created by this program to your: Customers Company and shareholders</th>
<th>Value – Performance.</th>
<th>Value – Platform/Market Expansion.</th>
<th>Excellence: Why should this program be awarded the Program Excellence Award?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The B-1 bomber was originally designed for low-altitude, high-speed flight against deliberate targets, said Lt. Col. Kevin Kennedy, 34th Expeditionary Bomb Squadron commander. “In today’s fight, we are most often employed in a close-air-support role from medium altitude,” he said. “In that capacity, a Sniper-equipped B-1B is an exponential increase in combat capability.”</td>
<td>Successful low-cost, rapid integration onto the B-1 establishes the Sniper B-1 LCTP program as an industry leader. The hybrid approach used on the Sniper B-1 LCTP program can be used on platforms such as C-130 and P-8 aircraft, and unmanned aerial vehicles (UAVs), directly supporting the Sniper ATP program’s platform expansion business strategy. Platform expansion in the U.S. and foreign markets provides a competitive advantage – increasing business opportunities.</td>
<td>Recognized by the customer as a huge success</td>
</tr>
</tbody>
</table>
### III. Organizational Processes/Best Practices = 30 points

<table>
<thead>
<tr>
<th><strong>Strategic:</strong> Describe how you developed your program strategy and competitive advantage in support of your company strategy, how you monitor progress toward achieving this strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Customer Need.</strong> Urgently integrate Sniper ATP on the B-1 to provide:</td>
</tr>
<tr>
<td>- Positive target identification</td>
</tr>
<tr>
<td>- Self-generated precision coordinates for strikes</td>
</tr>
<tr>
<td>- Video down link (VDL) to ground forces</td>
</tr>
<tr>
<td>- NTISR and bomb damage assessment</td>
</tr>
<tr>
<td>- B-1 Sniper ATP deployment capability by July 2008</td>
</tr>
</tbody>
</table>

**Program Strategy.** Provide a rapid, low-risk integration of Sniper ATP on the B-1. MFC fully leveraged the Sniper pod’s unique ability to communicate via Ethernet and utilized the existing aircrew B-1 laptop interface/display, significantly reducing aircraft hardware/software modifications and resulting in an accelerated, low-cost program – a competitive advantage. Progress was monitored via earned value and an Integrated Master Schedule.

**Company Strategy.** This solution aligned with meeting Warfighter needs and introduced an innovative way to expand onto additional platforms, growing the market for future sales. Progress was assessed via markets captured.

**Success Criteria.** MFC met UNR/Warfighter needs and developed a solution applicable to UAVs, B-52 and C-130 aircraft. MFC also won contracts with six new international customers on six new platforms.

<table>
<thead>
<tr>
<th><strong>Operational:</strong> Monitoring and Controlling How do you monitor your program’s progress and make corrections to keep the program on track</th>
</tr>
</thead>
</table>
| **Close-Knit Integration Collaboration.** The urgent fielding requirement necessitated tight communication between multiple Boeing divisions, government test agencies, operational bases, and program offices. Multiple weekly action item meetings kept all groups on the critical path in an expanded Integrated Product Team (IPT) environment.

**Quick Action Corrections.** Standard root cause investigation and corrective action implementation processes would not have been effective due to the shortened integration timelines. Creative and critical changes were implemented when aircraft technical delays deferred initial flight testing and threatened operational test and aircrew training flights prior to deployment. Examples of these corrections are as follows:

- A ground-based Sniper ATP aircrew simulation device was assembled at Ellsworth AFB to provide aircrew and maintainer training on Sniper pod controls and displays while waiting for Sniper-equipped aircraft. This proved to be invaluable for personnel new to the Sniper ATP and reduced the risk associated with aircraft modification package delays.

- MFC provided near real-time post flight test data analysis by employing Sniper ATP internal digital data recorders and on-site data reduction stations. This enabled expedited root cause analysis and corrective action implementation supporting the accelerated flight test schedule.

<table>
<thead>
<tr>
<th><strong>Operational:</strong> Supply Chain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Improved Supply Chain Integration.</strong> In addition to rapid B-1 Sniper pod integration demands, the program needed eight Sniper VDL pods delivered...</td>
</tr>
</tbody>
</table>
What processes, tools and relationship-building methods have you used to develop, refine and improve supply chain integration? This is one of the most imperative needs of our industry – please provide in specifics and with data that assist you in gauging the effectiveness.

ahead of schedule and installed onto B-1s in time for fielding. Sniper pods rolling off the production line were already being allocated to critical deployed fighter aircraft groups and not yet available for the B-1s. Sniper pod production was accelerated for immediate B-1 allocation.

Critical Path. The new VDL transmitter line replaceable unit (LRU) was already in very high demand and was pacing the ability to further accelerate pod production to meet the B-1 UNR schedule. Design changes were implemented to eliminate several manual-intensive processes and provide opportunities to automate and offload the process. Pride in the product and the Nation helped inspire and refine processes at the supplier to meet the early delivery need without impacting performance. Increased face-to-face meetings and teleconferences sustained elevated performance.

Measurement. Sniper VDL pod delivery rates were ramped to eight pods per month to meet critical customer demands. Along with the scheduled ramp-up, eight additional pods were produced and allocated to the B-1 while achieving 99.7% on-time delivery and 98% quality yield. Early deliveries were realized due to high performing suppliers focused on the mission without sacrificing performance. Teaming with suppliers on lean events, hosting supplier conferences with Warfighter participation, and personal communication techniques are examples of some of the supply chain management strategies implemented to achieve exceptional supplier performance on the Sniper B-1 LCTP program.

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

Urgent Timeline. The B-1 UNR accelerated program schedule drove the selection of MFC’s low-risk, highly capable Sniper ATP solution. Weekly IPT meetings monitored risks and opportunities to ensure on-time fielding.

Guided by Low Risk. The Sniper ATP/B-1 interface possesses all the requisite traits to achieve a rapid integration and fielding. Risks and opportunities were tracked in a risk register. All team members input to the register, which was reviewed at weekly IPT and monthly risk meetings. Some of these traits are as follows:

Sniper ATP Software Architecture. MFC capitalized on a design that segregates core pod functionality (90%) and unique aircraft interface functions (10%). This design enables the team to focus on new interface changes while avoiding code changes to critical pod functionality.

Laptop/Ethernet Design. MFC reduced aircraft hardware and software requirements and risks by integrating Sniper ATP onto the existing aircrew laptop via Ethernet command and control.

Existing F-15E Interface. Rather than invent a new interface, the Sniper F-15E controller and pilot vehicle interface software were re-used to further reduce risk. The F-15E aircrew interface was a mature baseline and helped eliminate risk of new discovery and change requests during test.

Maintained Sniper VDL Fleet Commonality. The Sniper ATP/B-1 interface design only required the addition of Ethernet lines to existing spare pins and did not impact the Sniper pod’s inherent interchangeability on the F-16 Block 30, F-16 Block 40/50, A-10A+, A-10C, F-15E, and B-52 platforms.
### Operational: Opportunity Management
Describe how your program team identifies and manages opportunity.

Opportunities are worked in conjunction with our Risk and Opportunity program. The 15-month Sniper B-1 LCTP program provided several key opportunities.

**Platform Expansion.** The innovative, low-cost, low-risk, Sniper laptop-controlled solution was fielded on the B-1 and is applicable to other platforms (e.g., C-130, P-8, and UAVs) that would integrate and leverage Sniper pods.

**Crew Familiarization Device.** The accelerated program schedule provided limited familiarization flight opportunities for aircrews and generated a requirement for a crew familiarization device. MFC delivered a low-cost laptop device that filled the need and provided Sniper pod familiarization training for new aircrews. The new training device can now be applied to other platforms/market segments.

### Team Leadership: Team Motivation
Describe how you accomplish full team integration, motivation, and inspiration.

**Full Team Integration.** The shortened timeline required close knit, tight communication between Long Beach Boeing and Oklahoma City Boeing, government program offices, and test sites at Wright Patterson AFB, Langley AFB, Edwards AFB, and Ellsworth AFB, and even the Russian Federation personnel supporting the Strategic Arms Reduction Treaty (START II) B-1 inspections. Since the B-1 community was new to targeting pod integration and test activities, MFC took a leadership role and empowered the team to be flexible and drove mission success.

**Motivation and Inspiration.** Motivation and inspiration were key factors in the success of the Sniper B-1 LCTP program. While the patriotic sense of duty working on the B-1 UNR for Operation Enduring Freedom was a strong motivator, All Hands meetings to share accomplishments and objectives were also effective. Success was inspired with financial rewards and Evening of Excellence recognition awards. The LM Corporation has also institutionalized Full Spectrum Leadership to motivate teams and individuals. LM is deeply committed to diversity education and has developed an employee awareness program where all personnel are encouraged to recognize and embrace differences to create a fully engaged team.

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

**Fighters to Bombers.** The Sniper B-1 LCTP program is an excellent example of how knowledge management can lead to success. Start with a core team of engineers with greater than 25 years of pod fighter experience. Add talented engineers and program personnel. Form a team combining these groups to develop and integrate an innovative solution for the Sniper B-1 LCTP program. The balance of experienced engineers, combined with new talent, provided the requisite skills, motivation, and environment to share knowledge and improve team performance.

**Mentoring.** MFC has over 1,100 active mentoring partnerships, including technical and leadership partnerships. All personnel are encouraged to enter the mentoring program. MFC provides training on how to effectively use these relationships and provides a website to connect mentors with mentees.
**Team Leadership:**
Leadership Development
How do you develop team’s skills and build future leaders

**Building Future Leaders.** Part of creating high-performing teams is considering every challenge an opportunity to develop future leaders. Key to this approach is team makeup. Assigning an engineer with solid pod integration experience on F-16 and A-10 aircraft to the Sniper B-1 LCTP Lead Systems Engineering position provided the individual an excellent growth opportunity. Leading a team of both new and experienced personnel created an ideal learning environment where he excelled. Leading small teams has proven to be a valuable credential and asset many of MFC’s key managers and leaders possess. LM’s Full Spectrum Leadership model also provides a framework for building leadership competencies at every level.

**Lessons Learned:**
Describe how you collect lessons learned and how they are shared with your team and company

**MFC-Wide Lessons Learned Database.** All MFC personnel have access to the Lessons Learned database. This database compiles significant technical and non-technical information; it provides a technical, scientific, procedural, and administrative memory. The database catalogs, retains, and retrieves data of value to programs/projects, research teams, and individuals. Lessons can be any experience, example, observation, or insight that imparts beneficial new knowledge to an employee during conduct of the technical, procedural, or administrative tasks associated with the design, development, fabrication, or test of any product or service. The database is properly cataloged and stored, with current information readily available for retrieval.

Employees use the Lessons Learned database throughout a program’s life cycle to do the following:

- Avoid a repeat of past problems or mistakes
- Carry successful strategies from past projects to new projects
- Support continuous improvement in technical, cost, and schedule performance
- Achieve higher levels of customer satisfaction

**Best Practices:**
Identify one or two specific Best Practices that you applied in your program and that you believe to be unique approaches.

**Integration Tools.** The Systems Integration and Test team has an extensive set of precision tools developed and matured to test targeting pod systems over the past 25 years. Specifically, the tools enable algorithm, software, and system engineers to closely simulate a platform interface. One tool in particular enables the algorithm designers to replay previously recorded flight test data and inject algorithm changes for improvement and verification testing. This provides engineers a powerful development tool in the lab and significantly reduces flight testing and integration time.

**Software Architecture.** Modular software architecture allowed quick adaptation of a 1553B-based interface to an Ethernet-based interface, enabling the pod to operate on the B-1 without a traditional targeting pod interface.

**Target Coordinates and Tracking Solutions.** Advanced algorithms provide the Sniper pod an inertial reference frame backbone that precisely aligns to the aircraft inertial frame. This enables image tracking algorithms to produce a precise target geo-coordinate position report and a robust target tracker.
**Next Practices:**
To what extent and how can your practices be shared with other programs and become “Next Practices”?

The Sniper ATP program shares exceptional and unique practices through functional engineering and program mission area channels to provide a knowledge base for all MFC programs, the Electronic Systems business unit, and LM Corporation. Also, the Sniper ATP team is co-located with the Joint Strike Fighter Electro-Optical Targeting System team to drive best practices forward into our emerging systems.

### IV. Adapting to Complexity = 30 points

**Identify the Program’s Market Uncertainty level using the definitions below. Then describe how you deal and address this specific uncertainty:**
- *Is it a Derivative of existing product/system?*
- *Is it a New Generation of existing product line/system applied to new market segment?*
- *Is it a Breakthrough Program (new to the world product or system)?*

**Market Uncertainty – Derivative to a New Market Segment.** The Sniper B-1 LCTP program is a derivative that incorporated a new interface applied to a new market segment. The B-1 LCTP interface enables low-risk integration of the Sniper pod on new platforms that typically do not have traditional targeting pod interfaces. This opens a new market segment on platforms such as the C-130, P-8, and UAVs.

Traditionally, the Sniper ATP has been employed solely on fighter aircraft and is fully integrated on those platforms. The MFC Sniper ATP laptop interface solution enabled capability to be fielded several years faster, saving tens of millions of dollars. The program has provided demonstrations of this interface capability to potential new customers on new platforms to reduce customer/market uncertainty and drive new business.

**Identify the Program’s Technological Uncertainty using the definitions below. Then describe how you deal and address this uncertainty:**
- *Low-tech: application of mature, well-established technology*
- *Medium Technology:*

**Medium Technology.** The Sniper B-1 LCTP program successfully integrated existing technology with the Sniper pod and B-1 aircraft. This existing technology was integrated with new applications of off-the-shelf components to meet UNR requirements.

Our imaginative workforce, commitment to continuous improvement, and world-wide experience with targeting pods enable us to deal with uncertainty and integrate systems quickly, with minimal aircraft modifications, as promised. While newer technologies may introduce uncertainty, the Sniper ATP architecture has proven to be flexible, reliable, and inexpensive to integrate on multiple platforms. Aircraft change-cycle timelines are costly and lengthy. The Sniper ATP program has demonstrated more than once how easy it is to integrate this precision targeting system with minimal aircraft changes. The ability to minimize aircraft modifications, integration cost/schedule, and logistics footprint reduces uncertainty risk.
<table>
<thead>
<tr>
<th>existing technology adopted to meet new design requirements</th>
<th><strong>High-Technology:</strong> recently developed new technology</th>
<th><strong>Super High-Technology:</strong> non-existing technology that needs to be developed during the program.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identify the level of your System Complexity</strong> using the definitions below. Then explain how you are dealing with this complexity:</td>
<td><strong>Sub-System.</strong> The B-1 LCTP is categorized as a sub-system fitting within a larger collection of systems. The Sniper pod auto-detects the B-1 as the aircraft on which it is mounted, thus eliminating any B-1-specific pod software or hardware. The pod is the “glue” that listens to the aircraft and communicates with the laptop. The laptop ties in the aircrew with command/control and display of pod video. This sub-system architecture permits the Sniper pod to be easily integrated onto any platform, providing an integrated, low-cost solution. The B-1 LCTP architecture is an extension of how the pod is tested in the engineering and production environment. The complexity of adding the Ethernet interface and the B-1 unique interface was dealt with via prototyping in the engineering lab, accelerating test events at the B-1 systems integration lab, and instrumented flight tests to facilitate performance validation analysis.</td>
<td></td>
</tr>
<tr>
<td>- <strong>Assembly</strong> performing a single function.</td>
<td><strong>Time Critical.</strong> The Sniper B-1 LCTP program became time critical when AFCENT issued a UNR in July 2006 to install the ATP on the B-1. This was CENTAF #1 UNR and resulted in an April 2007 contract requiring installation of the Sniper ATP to deploy on the B-1 by July 2008. Proper program planning, a successful demonstration program, and active communication in an IPT environment eliminated surprises and helped structure a successful program from the start.</td>
<td><strong>Flexible Communication.</strong> A dedicated core team was established to facilitate effective communication. A critical aspect of our success was the</td>
</tr>
<tr>
<td>- <strong>Sub-system</strong> fitting within a larger collection of systems?</td>
<td><strong>Regular timing</strong> based on past efforts</td>
<td><strong>Array.</strong> A “system of systems”; a widely dispersed collection of systems serving a common mission?</td>
</tr>
</tbody>
</table>
**Fast Competitive**  – the pace is driven by desire to be first to market

**Time Critical**  – there is an absolute and critical-to-success deadline

**Blitz**  – there is a crisis element driving immediate response

Flexibility of all team members, including government test facility personnel. A targeting pod sub-system was new to the B-1 community. Therefore, MFC took the lead on many discussions and leveraged its integration and pod experience from other platforms to provide lessons learned and guidance to B-1 program personnel and aircrews. All parties were treated equally and respected, creating an environment where different groups were confident and empowered to lead the charge when required. A detailed Integrated Master Schedule tracked the performance of all parties and ensured critical tasks were highlighted for additional attention.

**Other Complexities**

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

**START II Compliance.** Production/installation of the B-1 external hard point pod mounting kits needed to comply with the START II treaty requirements, providing a schedule challenge. This additional task had to be coordinated in sequence with aircraft update schedules and conducted by the 309th Aerospace Maintenance and Regeneration Group at Davis-Monthan AFB, AZ in close coordination with the Russian Federation.

V. Metrics = 30 points

**Customer Impact & Satisfaction.** MFC successfully met the AFCENT UNR deploying Sniper ATP on the B-1. As stated by the Combined Force Air Component Commander, “The Sniper pod on the B-1 bomber is amazing.”

**Customer Metrics.** MFC proactively engages with all its customers to promote both formal and informal communication and feedback as follows:

- **Contractor Performance Assessment Reviews (CPARs).** In the 2008 assessment of 11 categories, the Sniper B-1 LCTP program received an outstanding assessment (all green/purple/blue).

- **Key Customer Metrics – On-time Delivery Performance.** MFC exceeds Sniper ATP contract delivery requirements.

- **Sniper ATP Users Conference.** MFC hosts a Users Conference for all platform aircrews and maintainers to attend and provide a forum for product improvement.

- **Warfighter Hot Wash.** MFC eagerly attends aircrew Hot Wash events where Warfighters returning from theater provide first-hand feedback.

- **Customer Surveys.** MFC proactively submits formal survey requests to key government Sniper ATP personnel/offices.

- **Base Site Visits.** MFC field service engineers solicit informal feedback from USAF program personnel at every opportunity at test sites, operational bases, and deployed locations.

- **Prime Contractor Feedback.** MFC was part of the team recognized with the Boeing Silver Eagle Award for outstanding performance on the
| How do you measure your program’s efficiency performance in terms such as schedule and budget? | **Continuous Metrics.** MFC successfully completed the Sniper ATP B-1 LCTP program on schedule and budget. Key metrics for this development program were captured at the program level, including: cost and schedule performance index, task starts, task finishes, drawing releases, specification non-compliances, reliability, risk burn down, deliverables, and action items. Each metric has an established goal and criteria that determines a green, yellow, or red rating. The goal of each program team is to keep all metrics in the green zone. All monthly metrics rated yellow or red require a “4 Block,” return-to-green plan that establishes the issue, cause, and corrective action to return to a green status. |
| How do you measure your program’s business success (operating margin, earned value or other indicator that can be released publicly) | **Earned Value Management.** The MFC Sniper B-1 LCTP team managed their cost and schedule performance via earned value management techniques. Performance versus the cost and schedule baseline was tracked during weekly IPT meetings chaired by the program manager and attended by all critical team members. This close attention to performance by the whole team resulted in cost and schedule performance that met both customer and company objectives. |
| How do you measure and assess the long-term contribution of your program to the corporation/organization? | **Adjacent Markets.** MFC successfully fielded a low-cost, low-risk, Sniper B-1 LCTP solution on the B-1. This has opened up adjacent platform expansion markets for the Sniper ATP program. Platform expansion to aircraft such as the C-130, P-8, and Predator UAV will generate greater demand for Sniper pods and result in additional future sales. These attributes directly align with corporate strategies to grow the business and increase revenue. |
| How do you measure and assess the impact of your program on your team development and employee satisfaction? | **Employee Satisfaction.** In addition to instituting one-on-one feedback sessions between employees and immediate supervisors twice a year, MFC conducts an employee survey. This survey gauges employee satisfaction and areas of concern. Results are tabulated, distributed, and action plans developed as trends emerge. Surveying employees and taking responsive action has proven very successful in measuring employee satisfaction and is an ongoing process. Feedback from the employees on this program was very positive. They met commitments and provided an enabling capability to the Warfighter. |
| Additional Metrics: Describe any additional metrics you are using to measure your program’s progress and success | **Sniper ATP Metrics.** Two metrics critical to customer satisfaction and the program’s ability to operate every day are fully mission capability (FMC) rate and mean-time-between-maintenance events (MTBME). MFC tracks these metrics and is proud to say the Sniper ATP program is one of the industry leaders, with typical FMC rates greater than 98% and a MTBME score greater than 400 hours. |