

**Warner Robins Air Logistics Center, Combat Sustainment
Wing, Combat Commodity Sustainment Group
GAU-8 30mm Sustainment Roadmap**



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EXECUTIVE SUMMARY

The Air Force A-10 Thunderbolts' garnered its nickname of *the warthog* due to its crude appearance; however, its rugged versatility coupled with its current success in the Global War on Terrorism has earned it great respect. Due to the A-10's success in Operation DESERT STORM and the high cost of replacing the aircraft, its previous retirement date was extended to Year 2028. The GAU-8 30mm gun system is the A-10's most important weapons system. The aircraft cannot perform its mission without an installed gun system; therefore, its sustainment is an integral part of the Air Force close air support mission accomplishment. The gun systems consists of the 30mm Gatling gun, double-ended linkless ammunition feed, storage assembly and hydraulic drive system. The Aircraft Guns Integrated Product Team (IPT) at Warner Robins Air Logistics Center (WR-ALC), Robins Air Force Base (AFB), Georgia, is the end-item management organization responsible for the sustainment of the GAU-8 30mm gun system fleet. The gun fleet is comprised of over 370 end item gun systems valued at nearly \$91.3M. The gun systems directly support 17 operational A-10 units worldwide with a combined aircraft fleet of 370 aircraft valued at over \$4.8B.

The Aircraft Guns IPT is comprised of a committed group of professionals who are dedicated not only to the mission of the Air Force Materiel Command (AFMC) and WR-ALC, but to supporting their customers, the warfighters. Their mission is to ensure end item guns, spare parts, responsive repair capability and support equipment are available to field units worldwide. The IPT's objectives were to develop a Roadmap that would address the myriad of issues relating to the sustainment of the gun system; specifically, to ensure the availability of spare parts, re-instate an organic repair/test firing capability and provide field units with the technical requirements to support the gun system. It has taken two years of technical, engineering, item management, financial, contracting and management support to reach its current state of supply chain supportability.

The Aircraft Guns IPT's successes are solely a by-product of the innovative ideas, hard work and dedication to duty by many individuals throughout the Air Force and Department of Defense supply chain. Through their quest for supply chain operational excellence, they have learned that continuous interface with external partners is mandatory to ensure the success of their program. Due to the efforts of Headquarter Air Combat Command (HQ ACC), Defense Logistics Agency (DLA), the A-10 Aircraft Systems Program Office (SPO), Aircraft Maintenance and Regeneration Center (AMARC), Ogden Air Logistics Center (OO-ALC) Gun Shop and the 46 Operations Group Test Firing Range, they have been able to achieve their initial aircraft gun supportability objectives.

SECTION 1: GENERAL INFORMATION AND PROJECT COMPLEXITY

1.1. Name of the Submitting Organization (Corporation, Service, etc.).

WR-ALC, Combat Sustainment Wing, Combat Commodity Sustainment Group

1.2. Responding Organizational Unit (Site, Function, etc.).

WR-ALC, Combat Sustainment Wing, Combat Commodity Sustainment Group, Aircraft Guns IPT, Robins AFB, GA

OO-ALC, Hill AFB, UT

46 Operations Group, Eglin AFB, FL

1.3. Brief Mission Description of the Overall Business Objectives, Product Lines and Mission of the Organization.

1.3.1 Business Objectives

The objective of the Combat Commodity Sustainment Aircraft Guns IPT is to ensure supportability and long-term sustainment of the GAU-8 30mm gun systems to the warfighter. A coherent plan to economically and reliably extend the GAU-8 gun system through Year 2028, the expected life of the A-10 aircraft, consists of overall management responsibility including engineering, technical support, technical order responsibility and supply chain services.

1.3.2. Product Lines

The product lines are:

1. Item management for 30mm gun system, consisting of gun, ammunition storage and feed system and hydraulic drive unit
2. Stand-up of organic repair capability of gun system
3. Establishing test firing capability for overhauled guns
4. Reutilization of guns currently located at AMARC

1.3.3. Mission of the Organization



AFMC's Mission:

Air Force Materiel Command develops, acquires and sustains aerospace power needed to defend the United States and its interests--today and tomorrow. This is accomplished through management, research, acquisition, development, testing and maintenance of existing and future weapons systems and their components.

1.3.3. Mission of the Organization



WR-ALC's Mission:

The mission of WR-ALC is to sustain weapon systems and deliver ready combat capability to the warfighter through robust product support, purchasing and supply chain management and depot maintenance activities.

1.4. Award Category of Submission (Operations, Academic, Technology).

Supply Chain Operational Excellence Award

1.5. Brief Description of the Supply Chain and the Processes the Submission Spans (Plan, Source, Make, Deliver, Return, etc.).

Sustainment of the GAU-8 30mm gun system fleet is managed at WR-ALC by the Combat Sustainment Wing, Combat Commodity Sustainment Group, Aircraft Guns IPT. In the Air Force, the GAU-8 is utilized only by the A-10 airframe. Due to the earlier scheduled retirement of the aircraft, supply chain issues were not addressed during the late 1990s due to the planned phase-out of the aircraft. Once the Air Force determined the A-10 was to continue its service as the primary close air support aircraft, WR-ALC was responsible for instituting a new supply chain management function and to establish a repair and testing capability. The plan developed by the IPT was designed as a Roadmap to provide incremental asset availability to field units as the gun fleet reaches its life expectancy. The Roadmap takes into account the cost, reliability and maintainability to dictate the timeframe in which the most assets are required to support the mission accomplishments.

The entire supply chain, including repair and required test firing, encompass many functional organizations. All of the Aircraft Guns IPT's partner organizations are directly responsible for the Roadmap's initial successes. HQ ACC is the lead Major Command for the aircraft. The A-10 SPO is responsible for direction relating to the long-term requirements of the aircraft and for management of assets stored at AMARC on Davis-Monthan AFB, Arizona. The DLA is the item management, contracting and quality control functional organization responsible for management of consumable parts utilized on the gun system. The OO-ALC Gun Shop is the organic repair functional organization and the Eglin Test Firing Range is the functional organization tasked to provide testing and reporting on weapons systems.

In Year 2002, a GAU-8 30mm Roadmap was constructed to guide the re-instatement of a supply chain for the gun systems fleet. The retirement extension of the airframe also dictated the gun fleets retirement extension due to the unique requirement in which the aircraft cannot fly without an installed gun system. The Aircraft Guns IPT worked directly with HQ ACC and the A-10 SPO to determine field requirements needed to support the planning of the Sustainment Roadmap. HQ ACC was able to dictate the field supportability requirements and the A-10 SPO was essential in dictating the airframe supportability requirements. One aspect of the draft Roadmap was to consider the use of assets stored at AMARC. As the aircraft functional manager, the A-10 SPO's support was essential to establish an interface with AMARC.

Management of non-critical items for the gun system had previously been transferred to the DLA in the mid-1990s. As with the repair capability, item management oversight has diminished due to the planned phase-out of the aircraft. At the time the Roadmap was originally planned in FY02, the consumable parts supply chain for parts installed in the

gun system required immediate attention and oversight. Item Managers and Equipment Specialists at DLA required training in order to understand the technical requirements of the parts they were tasked to manage. As the engineering and technical authority for the consumable parts managed at DLA, the Aircraft Guns IPT worked closely with the item managers and equipment specialists at DLA to determine priority for parts requirements and to provide engineering and technical guidance required to support the initiative. In order to streamline the efforts of the two organizations, a DLA liaison was assigned to WR-ALC. The DLA's items determined by the IPT to be critical or requiring direct oversight were to be reported to the DLA liaison representative for monthly tracking. Although DLA has item management authority, WR-ALC maintains technical and engineering responsibility for all parts associated with the end gun system. Management responsibilities of critical components for the gun system, including the end item gun are still maintained by WR-ALC.

At the time the draft plan was created, a balance of 50 guns in "unknown stock condition" were stored at WR-ALC and an additional 20 guns in "unknown stock condition" were stored at the OO-ALC gun shop warehouse. These guns were thought to have been turned-in as unserviceable assets by field units during the late 1990s, the original draw down period of the aircraft. The guns located at WR-ALC were shipped to OO-ALC for complete evaluation, inspection and repair. Unfortunately, the repair of 30mm guns had atrophied; therefore, spare parts, repair tooling, repair support equipment and test firing capability did not exist at that time. Those specific aspects of the supply chain management required review and action in order to reinstate the supportability of the gun fleet.

The Aircraft Guns IPT supply-chain initiative provides a cost savings return to the Air Force through the IPT's sustainment management efforts. As the 30mm gun system fleet reaches its life expectancy and the normal aircraft attrition reduces the number of aircraft the IPT is required to support, they will provide over 300 30mm gun systems and 173 major component parts over the 20-year retirement extension of the airframe. To replace these 303 assets with new guns, the cost is \$92.5 M. While their efforts to maintain the fleet will cost only \$29.7M, the Air Force will save over \$62.8M for the same number of gun systems. In the next four years, over 40 fielded gun systems will reach their maximum life and will be slated for overhaul or replacement.

Contractor Bid: 303 gun systems; **\$92.5M**

Air Force Cost: \$29.7M

130 guns @\$12,055,420 (includes packing, shipping, overhaul)

173 guns @\$17,683,887 (includes gun housing and depot overhaul)

Cost Savings: \$62.8M

The Aircraft Guns IPT planned a Roadmap that would enable the organization to provide necessary assets as required and on time. These assets will be provided to meet surge requirements and to provide long-term sustainment of the gun fleet.

1.6. Names of the Supply Chain Partner Organizations (External) Involved in the Project (Number of People Involved from Each Partner Organization and the Functional Category of Each).

HQ ACC/LGWA	4 Weapon Functional Managers
DLA-Columbus (DSCC)	3 Supply Logistics Managers
AMARC	4 Logistics Specialists
OO-ALC/MANHAG Gun Shop	10 Maintenance Technicians
46 OG/OGMTG, Eglin Test Firing Range, Eglin AFB, FL	4 Test Firing Range Technicians

1.7. Names of the Functional Organizations (Internal) Involved in the Project (Number of People Involved from Each Partner Organization and the Functional Category of Each).

WR-ALC/LM	1 Program Manager 1 Engineer 1 Equipment Specialist 1 Production Manager 1 Item Manager 1 Support Equipment Item Manager
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1.8. Point of Contact for Each Supply Chain Partner (Name, Mailing Address, Commercial Telephone, DSN and E-mail Address).

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SECTION 2: IMPLEMENTATION

2.1. Why the Supply Chain Initiative was Undertaken and How it was Selected.

The supply chain initiative for the GAU-8 30mm gun system was undertaken in an effort to support the Air Force A-10 fleet because the GAU-8 30mm gun system is utilized solely by the A-10 aircraft. Due to the airframe's design, the gun system is an integral aspect of aircraft's ability to fly. Supply chain issues were not addressed during the late 1990s due to the impending retirement of the aircraft. However, during Operation DESERT STORM, the A-10 once again proved its formidable versatility and durability earning its return to service as the Air Force' premier close air support aircraft. When the A-10's retirement date was formally extended to Year 2028, WR-ALC was tasked to reinstitute a supply chain management capability and to reestablish a repair and testing capability in support of this effort.

The supply chain successes for the sustainment of the GAU-8 30mm gun system are attributable to several key organizations. The success of the Aircraft Guns IPT's Roadmap development is directly attributed to inputs and guidance received by HQ ACC and the A-10 SPO. The management and oversight of consumable parts is accomplished by DLA per congressional directive. The successful delivery of non-critical aircraft gun consumable parts will continue to be an essential aspect of their supply chain organizational success. WR-ALC maintains technical and engineering authority for items managed by DLA in addition to retaining management responsibilities for all critical component parts of the gun. Several items managed by DLA were determined by the IPT to require additional oversight. These items are reported to DLA through a liaison representative at WR-ALC for monthly tracking. The liaison's continued interface with DLA has been and still remains, another essential element of their program's success. The supply chain interface they maintain with DLA ensures parts availability, but the ultimate availability of end item guns for mission accomplishment is attributable to their supply chain partner organizations.

In addition to the management of consumable parts, the A-10 SPO has been instrumental in the Aircraft Guns IPT's efforts to obtain gun systems required to fill gaps in asset availability to field units. The A-10 SPO has worked closely with the IPT to identify aircraft guns from aircraft stored at AMARC with the lowest documented rounds count and greatest potential for serviceability. Gun systems from AMARC have been requested and shipped to the OO-ALC gun shop for evaluation and final determination for potential service. The IPT and OO-ALC gun shop have worked very closely with the Eglin Test Firing Range to institute a test firing capability. The test firing capability was essential to validate the service and functionality of the repaired gun systems prior to making them available to field units. Through the dedication of all organizations within the supply chain, the production and fielding of a quality 30mm gun system has been successful.

2.2. Duration of the Project (Pilot Project that is Being Rolled Out and Project is Ongoing).

The project is ongoing and scheduled to last until Year 2028, the current retirement date of the A-10 aircraft. At the current firing rate of guns in the field, the first 41 guns in the fleet are due to reach their life expectancy of 250,000 rounds in Year 2008. At that time, the gun systems requires an extensive depot overhaul to replace major component parts and follow-on test firing to ensure functionality. The current Roadmap projects the purchase of major component item spare parts in addition to oversight of component items procured by DLA. In order to supplement surge requirements expected to begin in Year 2008, the Aircraft Guns IPT's plan dictates the utilization of gun systems from AMARC to supplement the stock. This approach is required in order to meet the surge requirements and normal mission requirements during that time period. Currently, a pilot project to evaluate the reliability and maintainability of guns stored at AMARC is underway. In December 2004, five gun systems stored on aircraft at AMARC were selected as prime candidates for the pilot project. Their initial objectives are on target

and final long-term sustainment objectives will be based on the information gathered from their pilot project.

2.3. In Detail, the Process Used to Complete the Initiative.

The A/OA-10 Thunderbolt II was the first Air Force aircraft specially designed for close air support of ground forces. They are simple, effective and survivable twin-engine jet aircraft that can be used against all ground targets, including tanks and other armored vehicles. Since the A-10 was designed and built around the original General Electric GAU-8 30mm cannon, its performance in testing was crucial in determining how many A-10 aircraft would be built. The GAU-8 exceeded all expectations during the testing phase. Not only was it extremely accurate, but it could fire from 2,100 to 4,200 shots per minute without complications. The 30mm projectile has two times the range, three times the mass and half the time of flight of projectiles carried on other close air support comparable to the A-10. Only after designers integrated the GAU-8 into the A-10 aircraft's design was full production authority granted.

Not only is the gun system a powerful asset in its close air support mission, but due to the design of the airframe, the aircraft cannot fly without the gun system installed. Since the A-10 was built around the GAU-8 30mm gun, it is a "vital component" of the A-10 weapons system. Its reliability and sustainability are paramount to the success of its close air support mission. The GAU-8 provides a reliable, high-rate-of-fire, combat-proven weapon system for close air support. The Air Force inventory is comprised of 370 GAU-8 30mm guns, feed systems and associated parts managed by WR-ALC with an inventory which totals over \$91M and spans 17 different operating locations around the world. The gun systems directly support all 17 operational A-10 units worldwide with a combined aircraft fleet of 370 aircraft valued at over \$4.8B.



Its power and accuracy are illustrated by the following statistics:

Weight: 620 Pounds (281 kg)

Total System Weight: (7 barrels/ammunition loaded) 3,882 pounds (1,761 kg)

Rate of Fire: Up to 4,200 Shots Per Minute

Ammunition Capacity: 1,174 rounds

Dispersion: 5 Milliradians Diameter (80% Circle)

Muzzle Velocity: 3,400 Feet (1,036m) Per Second

Average Recoil Force: 10,000 Pounds (44.5 kN)

Drive System: Dual Hydraulic Motors

Feed System: Double-ended, Linkless

There are currently 370 A-10 aircraft flying in the United States Air Force, Air Force Reserves and Air National Guard. The projected attrition rate for the A-10 fleet is 2.5 aircraft per year. The applicable fleet requirements are currently projected to be:

FY	Attrition Aircraft	Fleet Remaining
2004	0	370
2010	15	355
2016	15	340
2022	15	325
2028	15	310

The GAU-8 fleet is approaching its service life of 250,000 rounds per system; therefore, requiring depot overhaul. Depot overhaul consists of removing and replacing gun housing along with many critical component parts. Figure 1 shows the future requirements at the projected expenditure rate of approximately 6,200 rounds per year. At least 299 systems will need to be overhauled or replaced by Year 2028 with a maximum required production rate of 23 systems per year between Year 2013 and 2018. At the expenditure rate of 10,000 rounds per year, the entire fleet of 356 systems will need to be overhauled or replaced prior to Year 2028 with a maximum required production rate of 41 systems a year between Year 2008 and 2013. The high demand of the 30mm gun system in support of the Global War on Terrorism may prove to further increase the rounds count of the gun systems and further stress the aging systems which will mandate overhaul at a faster than projected rate. Figure 2 provides a graphic of the demand for gun systems through Year 2025.

Bottom line: There will be a need for 299 to 356 guns in the next 25 years and there are only 70 spare guns in the inventory listed in “unknown” condition. At the time this initiative was undertaken, three options prevailed:

Buy New: A qualified contractor provided a Rough Order of Magnitude (ROM) with a cost and delivery schedule for new guns (gun and barrels, not feed systems or drums). The projected cost for 303 guns (50 in the first year and 11 a year thereafter) was \$92,568,676 (3% inflation accounted for) with a 15-month lead-time for the first new gun delivery. As shown in Figure 2, this flat rate production does not meet the surge requirement expected for the 10,000 round per year expenditure rate.

Depot Overhaul: OO-ALC has the capability to completely overhaul a gun that has reached its life expectancy of 250,000 rounds. The overhaul process returns the gun to a “like new” condition. The cost of overhaul, including parts, is approximately \$90,000 per gun. The limiting factor for complete overhaul of the gun is the gun housing itself. *A perspective contractor provided a ROM cost for the housing of \$29,000 each or a projected cost of \$8,671,000 (for the 299 housings required at 6,200 rounds per year) or \$10,121,000 (for the 359 housings required at 10,000 rounds per year).

***Inflation is not accounted for in these figures.**

AMARC Systems: There are 130 gun systems installed in aircraft at AMARC that are not on the “inviolable storage list.” These guns range from new to 200,000 rounds fired, with eight guns missing documentation, therefore in an “unknown” condition. These guns can be removed from the aircraft and brought to the nearest 25,000 round inspection to ensure serviceability. The cost to remove the gun from the aircraft located at AMARC is approximately \$6,342. The Ammunition Handling System (AHS) will cost \$3,024 per unit to remove at the same time. The estimated cost for the transportation is \$3,000 for the gun and the AHS. The total cost per system is \$12,366. Work will include removal, packing and manufacturing of boxes to meet Special Packing Instructions and reseal of the aircraft. *The projected cost to remove, ship and inspect 130 guns is \$1,604,460 with the added benefit of drawing repairable ammunition handling systems and drums into the repair cycle at the same time.

The sustainment plan was finally determined to require a two-phase approach in order to maximize its effectiveness to ensure field units have available assets in a timely manner. AMARC assets would be utilized to fill the gap while gun housings were ordered from a competed contract. Due to the fact that gun housings have not been procured in over twenty years, the complexity of the first article test required for the item and the anticipated production lead-time, a significantly longer lead-time is expected for this item. During the approximate two-year wait for gun housings required to perform 250k round depot overhaul of current guns in the field, guns will be sent to depot to ensure they are field-ready to fill requirements.

The OO-ALC overhaul and Eglin Test Firing Range capabilities were instrumental aspects of the Aircraft Guns IPT Roadmap. Their depot overhaul and test firing capabilities atrophied in the late 1990s due to the expected retirement of the A-10 fleet. The depot overhaul capability at OO-ALC had to be started from the ground up and the Eglin Test Firing Range’s capabilities have been regenerated.

Working in conjunction with OO-ALC, the Aircraft Guns IPT initiated its first phase of the 30mm gun sustainment initiative in Year 2003. Approximately 50 guns warehoused at WR-ALC were sent to OO-ALC for evaluation. This stock of guns was subsequently combined with guns in unknown condition warehoused at OO-ALC for a total of approximately 70 guns. Those guns with documentation indicating they had 100 rounds fired indicating status as “new guns” were to be inspected for current configuration, lubricated and returned to supply in Condition Code A. Those guns with documentation showing “a specific rounds count” were to be inspected and brought up to the next 25,000 round inspection status, as mandated by the governing Technical Order (T.O.) and returned to supply Condition Code A. Of those original 70 guns, over 30 guns have been depot inspected, test fired and returned to stock as of this date.

***Inflation is not accounted for in these figures.**

Critical parts were identified to the depot in order to create a master parts list. This list was prepared and transferred to the depot in order to ensure critical parts were available for repair and potential overhaul of guns in unknown condition. The parts identified were as follows:

Gun Housing	205F120
Forward Rotor	205F335 OR 205F281
Bolt Assembly	132D1421
Firing Cam	205F463
Safing Cam	205F464
Rear Bearing	163B5860-1
Fwd, mid, rear Tracks	201F116, 7, 8
Aft Sleeve Bearing	163B5933
Bearing	MS17131-30
Spur Gear shaft	105D3518
Spur Gear shaft	105D3527
Lock and Unlock Cam	205F311
Spindle	105D3511
Solenoid Plunger	163B5859

In addition to the gun stock shipped to OO-ALC for evaluation and potential repair, guns from AMARC were planned to be evaluated to determine their potential usefulness to support the field during gun housing production. A team consisting of members from the A-10 SPO and the Aircraft Guns IPT visited AMARC in December 2003 to review documentation and determine which guns would provide the most benefit to the field. This determination was based on the gun system's rounds count, age of equipment and length of storage at AMARC. In December 2004, five guns were selected for initial depot evaluation. Guns were to be inducted and evaluated in the same manner as those previously coming from stock. All guns are to be inspected up the next 25,000 rounds inspection, test fired and returned to stock in "A" condition. This requirement also requires additional cost due to varying parts requirements as based on the level of inspection required. The level of inspection required is based on the number of rounds the gun had previously fired prior to being stored at AMARC. The official rounds count of the gun system is based on required documentation maintained by the prior operational unit to which the gun system was assigned. Once the gun systems are determined to meet the depot's T.O. inspection requirements, five systems will need to be shipped each quarter to meet the expected requirement rate and create a steady workflow. This rate can be adjusted, as the actual firing rate is determined.

One of the most critical and intricate parts of the gun system is the gun housing. The reliability standard for gun housings is estimated to have a life of 250,000 rounds, at which time it must be replaced. Although gun housings are a critical item for the GAU-8, the high cost and the planned retirement of the aircraft deleted any future requirements to purchase this item. The gun housing had not been purchased for many years; therefore,

the potential sources for supply were no longer current. The current cost for the replacement of a 30mm gun housing is \$12,219 and the sources of supply are minimal.

During the time guns were being shipped from the warehouse at WR-ALC, gun housings with no associated documentation were found in an isolated area of the warehouse. Due to the critical nature of the part and its dollar value, an engineering effort was initiated by the Aircraft Guns IPT to determine potential usefulness of the gun housings. The gun housings were shipped to OO-ALC for testing and the engineer at WR-ALC devised a test plan to test wear patterns on housings with a known rounds count assigned. The data was to be compared to approximate the assigned rounds count on gun housings without a validated rounds count. Once that test plan was provided to OO-ALC, ten gun housings with varied rounds count totals were selected and pulled from the gun stock at OO-ALC for this specialized testing. The test plan required several targeted measurements along the cam path to develop a wear trend. After extensive testing and data analysis, the testing data was unfortunately determined to be inconclusive as the housings were discovered to have variant hardness levels.

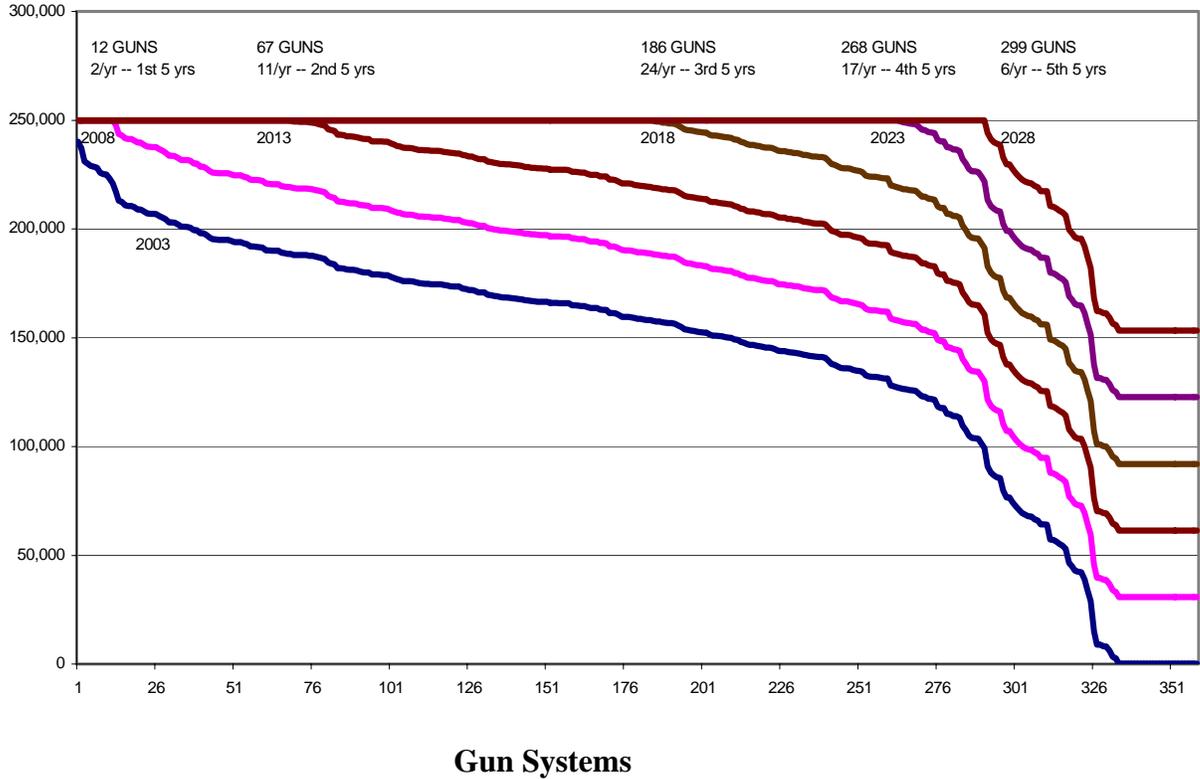
Due to the lack of success in the gun housing testing, as a proactive measure to ensure gun housings are available for the projected Year 2008 surge in requirements, an additive to the FY05 computation cycle was submitted for 30 gun housings. This requirement has been input into the D-200 system for FY05. Due to the complicated forging and complexities involved in testing and production for this item, long lead times are anticipated. Delivery of this critical part is not expected for three years. The current depot overhaul of guns from AMARC will adequately allow the contact vendor time for the first article testing and production. This will provide lead-times for contract and production of housings for complete overhaul. As shown in Figure 1, at a 6,200 rounds per year average, as many as 74 guns will need a complete 250,000 round overhaul (including replacing the gun housing) beginning approximately Year 2020. As shown in Figure 2, at a 10,000 rounds per year average, as many as 145 guns will need a complete 250,000 round overhaul (including replacing the gun housing) beginning approximately Year 2013. The effective fiscal year and actual final number of guns that will require complete overhaul depends directly on the average rounds fired per year, per system and how rapidly the A-10 fleet draws down.

After identification of the gun housing issues, the formal planning continued. The planning for this dual-pronged approach was a major undertaking and required the commitment of many individuals from the various organizations involved. While this plan will result in "used" guns being issued to fill requisitions from the field, these guns will be serviceable assets with less service life remaining than a new gun. The benefit of accepting these assets is a \$63M savings if the entire A-10 fleet remains active until Year 2028. In addition to the cost savings, the A-10 gun system fleet gains the added benefit of a well-trained long-term depot overhaul capability. If the A-10 fleet is extended again, the depot function at OO-ALC will be fully active and able to continue the 250,000 round overhauls indefinitely. The only requirement would be to adjust the parts requirements with enough lead-time to ensure timely procurement.

2.3.1. Figure 1

Desired expenditure of 6,200 rounds per year per gun system

Round Fired

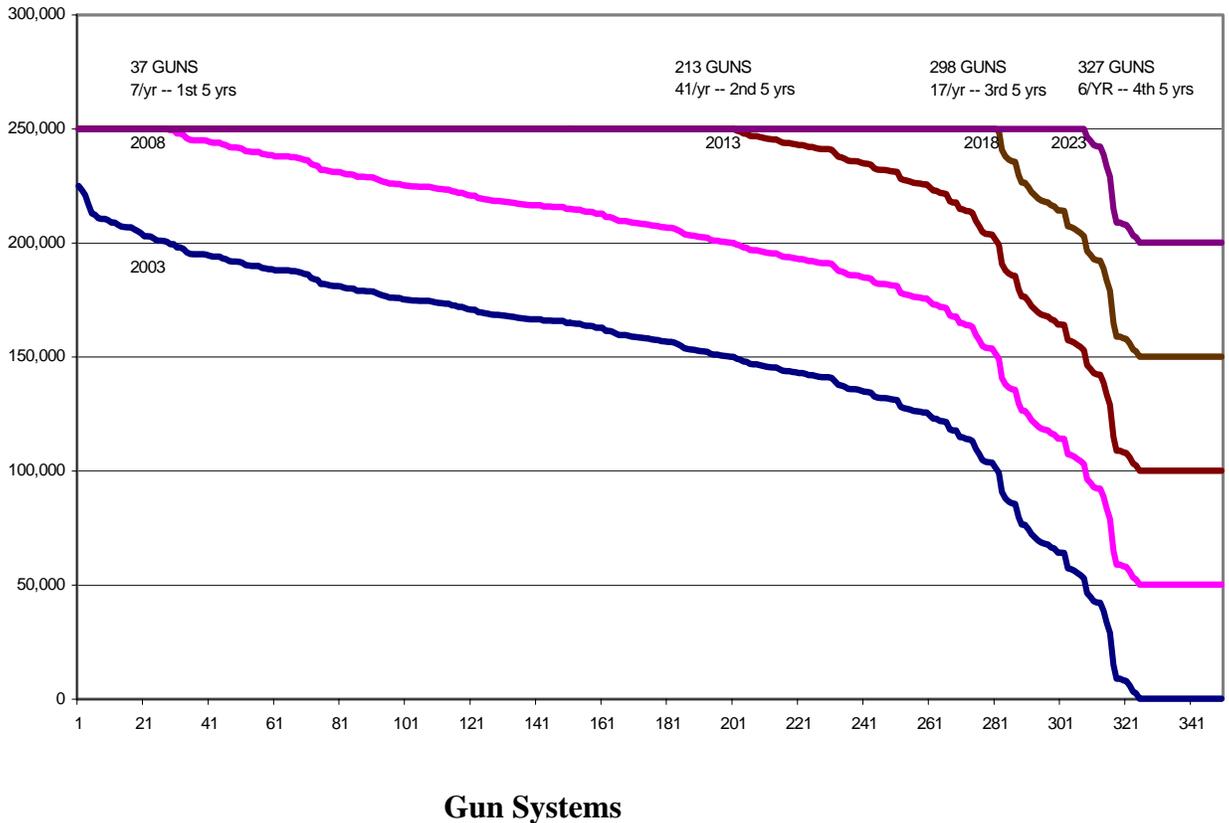


NOTE: Each line represents the status of the GAU-8 fleet in a 5-year progression beginning in Year 2003. The label at the top of the chart indicates the total number of guns reaching 250,000 rounds fired by that year and the average production per year required to meet the demand in 5-year increments.

2.3.2. Figure 2

Desired expenditure of 10,000 rounds per year per gun system

Rounds Fired



NOTE: Each line represents the status of the GAU-8 fleet in a 5-year progression beginning in Year 2003. The label at the top of the chart indicates the total number of guns reaching 250,000 rounds fired by that year and the average production per year required to meet the demand in 5-year increments.

In summary, while developing the Aircraft Guns IPT's Roadmap, they kept their focus on the warfighter and the impact on the mission requirements of the A-10 aircraft. The significance and proven capabilities are well-known to the warfighters who depend on its close air support mission. To prove the awesome respect this aircraft and the 30mm Gatlin gun have garnered, stories from the field are the best illustration. During OPERATION DESERT STORM, A-10 aircraft had a mission capable rate of 95.7 percent and flew 8,100 sorties. One of the main weapons' systems in its arsenal is its 30mm GAU-8/A which is used for close air support in attacking ground threats such as armored tanks and vehicles. Recently in Afghanistan, A-10 aircraft were used to help

rescue ambushed ground forces pinned in a canyon under heavy enemy gunfire. Once the pilot was able to identify the enemy targets, they marked their positions and opened fire with over 720 rounds of high-explosive 30mm incendiary ammunition. Another amazing success story was during the "Battle for the Palace" in Iraq where an A-10 was used to aid in saving ground troops who had encountered heavy resistance. During some intensive fire fighting, an A-10 circled in a dive to neutralize a building sheltering enemy combatants with its 30mm gun. Missions such as these continue to prove the A-10 is still the best fixed-wing aircraft for close air support in the Air Force inventory.

2.4. Significant Challenges Encountered, the Process for Resolution and the Solutions (Any Best Practices Employed or Developed).

The planning of the Aircraft Guns IPT's Roadmap required tremendous planning, continuous interface and dedication. The most significant challenges encountered stemmed from communication, funding and parts availability. As the IPT learned from this undertaking, communication is the key when working with organizations from various Major Commands and functional organizations. Planning a large initiative becomes very time consuming, especially as key player personnel turnover takes place. The practice employed to overcome this personnel turnover was to rely heavily on those with the proper experience and enlist the help of "experts" to compliment for lack of experience.

Funding challenges have also been an obstacle in attaining their objectives of providing a coherent plan to economically sustain the GAU-8 gun system. Since the Materiel Support Division funds are used for depot repair of assets, depot evaluations, and test firing, the IPT is bound by current funding levels. The IPT must continually reevaluate these funding levels and compare them against current field requirements in order to prioritize the depot's repair and test firing efforts. The resolution of this challenge is to continuously evaluate funding levels and communicate requirements to the depot in order to optimize gun availability for the warfighter.

The limiting factor for OO-ALC depot overhaul capability was a parts issue, specifically the gun housing. Due to the high cost of the part, the non-existent reportable history of the item and the limited sources of supply, the part availability was a major concern as it is a critical component part. The cost as listed in the Item Manager's D035C, Reportable Asset Management Process System, was over 20 years old. The current price was over \$11,000 higher than the previous cost, of nearly \$1,670. This cost increase led to a decrease in the requirements submission. The IPT's planned resolution to this issue will entail initiating an unfunded requirement for the item during the next computation cycle to allow the item to be procured in a subsequent computation cycle even though it will still show no reported historical usage.

2.5. Metrics Used to Measure Progress and Success.

Cost savings and gun systems availability to the warfighter are the measurements of their success. By utilizing the Aircraft Guns IPT's Roadmap, they are projected to save over

\$62M through a two-phased approach for sustainability. The IPT's goal is to deliver approximately 143 "like new" depot overhauled guns to field units within three years in order to meet surge requirements. They will be able to meet projected surge requirements through the use of used gun systems currently stored at AMARC.

2.6. Cost and Performance Benefits, Including the Project's Return on Investment and Changes in the Value of One or More of the SCOR Level 1 Metrics.

The Air Force will benefit in over \$62M Total Supply Chain Management Cost savings due to the Aircraft Guns IPT's Roadmap. Not only are they able to supply a used gun system at a greatly reduced cost of goods sold, but the total supply chain management costs are realized through utilizing existing parts supply and delivery within the supply chain. Value added productivity will be realized through continued efforts for supportability and maintainability of fielded gun systems. These efforts are sought to reduce the overall cost of ownership and to remove supportability quagmires such as obsolete parts, diminishing sources of supply and other logistics requirements within the supply chain.

2.7. Success of this Effort Supports the Organizational Objectives Described in Section 1, Item 3.

The organizational objective of the Combat Commodity Sustainment Aircraft Guns IPT is to ensure supportability and long-term sustainment of the GAU-8 30mm gun systems to the warfighter. They have developed a Roadmap which is a coherent plan to economically and reliably extend the GAU-8 gun systems through the airframe's current retirement. They have incorporated all existing assets at their disposal to ensure the A-10 aircraft will be mission-ready into Year 2028. Their success consists of incorporating overall management responsibility, engineering, technical support, technical order responsibility, production support and supply chain management services.

In the Aircraft Guns IPT's efforts to work closely with external partners, they are able to successfully support their organizational objectives through Supply Chain Operational Excellence. The IPT is able to utilize the existing supply chain functions in order to give customers the support they need to ensure the ultimate user, the warfighter, is able to confidently carry out any mission, being assured of the gun systems' reliability and supportability. The Aircraft Guns IPT's sustainment planning and the ongoing management efforts combined with proven repair capability provided by OO-ALC and timely test firing as provided by Eglin Test Firing Range allow us to confidently claim initial success of their efforts. There is much more work to be done to ensure long-term sustainment is maintainable through Year 2028, the expected life of the A-10 aircraft. However, due to the dedicated team of professionals currently involved in this effort, the warfighters are ensured a war-winning sustainment of expeditionary capabilities.

Section 3: Knowledge Transfer

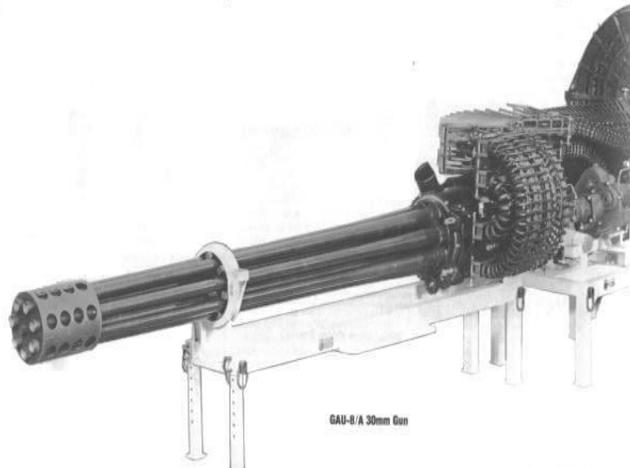
3.1. Efforts to Share Lessons Learned from this Effort with Other Internal Organizations.

The Air Force Aircraft Guns IPT is committed to sharing lessons learned with its team members and also including the entire team in the decision making process. The IPT has briefed their Roadmap strategy to both internal and external organizations to share valuable lessons learned. They have briefed their strategic use of AMARC assets to Group leadership, the A-10 SPO, OO-ALC and to the field units through Major Command sponsored weapons conferences.

3.2. How this Initiative can be Transferred to Other Organizations and Specify the Likely Candidates for Transference.

Transference of the Aircraft Guns IPT's initiative to other organizations is simple when considering the same process can be utilized when considering contractor logistics support. The same level of support and cost saving can be realized when considering the usefulness of supplying Government Furnished Equipment for repair versus the purchase of new equipment items. Their source of repair is solely organic which makes the working relationships with their supply chain partners paramount. The same level of communication is required when initiating contractor buy or repair support. The IPT owes their successes to all of the hardworking individuals at DLA who ensure consumable parts are available to the field, the repair depot maintenance activity at OO-ALC, and the testing agency at Eglin AFB. The IPT receives great support from the A-10 SPO and the supporting Major Command key decision-makers at HQ ACC. They have learned that communication and teamwork are the crucial factors in the success of the supply chain operational excellence.

Likely candidates for transference include acquisition organizations and supply chain organizations which play a role in the planning process. Sustainment organizations play a crucial role in ensuring sustainment requirements are addressed during the acquisition planning process. The ultimate sustainability of a weapons' system begins in the design phase of the acquisition process. Ensuring quality design and ownership of Technical Data will ensure government sustainment organizations do not become solely dependent on contractor support in the future and save money on long-term contractor logistics support. While purchasing Technical Data may be considered an unnecessary expense during the initial acquisition process, including these costs during sustainment planning is crucial to save money over the entire life of the system. The sustainment phase of a system's life cycle accounts for over 70 percent of its overall life cycle cost, so future supportability is a crucial aspect of any system's planning phase.



ACRONYMS:

AFB	Air Force Base
AFMC	Air Force Materiel Command
AHS	Ammunition Handling System
AMARC	Aircraft Maintenance and Regeneration Center
DLA	Defense Logistics Agency
HQ ACC	Headquarter Air Combat Command
FY	Fiscal Year
IPT	Integrated Product Team
OO-ALC	Ogden Air Logistics Center
ROM	Rough Order of Magnitude
SPO	Systems Program Office
T.O.	Technical Order
WR-ALC	Warner Robins Air Logistics Center