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Department of Defense OFFICE OF PREPUBLICATION AND SECURITY REVIEW

Selected Acquisition Report (SAR)



Improved Turbine Engine Program (ITEP)

FY 2024 President's Budget

Defense Acquisition Visibility Environment (DAVE)

Table of Contents

Acronyms and Abbreviations	3
Program Information	5
Responsible Office	5
Mission and Description	
Executive Summary	7
Schedule	
Performance	9
Acquisition Budget Estimate	16
Unit Cost	
Risks	19
Low Rate Initial Production	. 20
Contracts	21
Deliveries and Expenditures	24
Operating and Support Costs	25

Common Acronyms and Abbreviations \$B - Billions of Dollars \$K - Thousands of Dollars \$M - Millions of Dollars ACAT - Acquisition Category Acq O&M - Acquisition-Related Operations and Maintenance ADM - Acquisition Decision Memorandum APB - Acquisition Program Baseline **APPN** - Appropriation APUC - Average Procurement Unit Cost BA - Budget Authority/Budget Activity Blk - Block BY - Base Year CAPE - Cost Assessment and Program Evaluation CARD - Cost Analysis Requirements Description CDD - Capability Development Document CLIN - Contract Line Item Number **CPD** - Capability Production Document CY - Calendar Year DAB - Defense Acquisition Board DAE - Defense Acquisition Executive DAMIR - Defense Acquisition Management Information Retrieval DoD - Department of Defense DSN - Defense Switched Network EMD - Engineering and Manufacturing Development EVM - Earned Value Management FMS - Foreign Military Sales FOC - Full Operational Capability FRP - Full Rate Production FY - Fiscal Year FYDP - Future Years Defense Program ICE - Independent Cost Estimate Inc - Increment IOC - Initial Operational Capability JROC - Joint Requirements Oversight Council **KPP** - Key Performance Parameter LRIP - Low Rate Initial Production MDA - Milestone Decision Authority MDAP - Major Defense Acquisition Program **MILCON - Military Construction** N/A - Not Applicable O&M - Operations and Maintenance O&S - Operating and Support **ORD** - Operational Requirements Document OSD - Office of the Secretary of Defense PAUC - Program Acquisition Unit Cost PB - President's Budget

ITEP

SAR DEC 2022

PE - Program Element
PEO - Program Executive Officer
PM - Program Manager
POE - Program Office Estimate
RDT&E - Research, Development, Test, and Evaluation
SAR - Selected Acquisition Report
SCP - Service Cost Position
TBD - To Be Determined
TY - Then Year
U.S. - United States
UCR - Unit Cost Reporting
USD(A&S) - Under Secretary of Defense (Acquisition, Technology and Logistics)

Program Information

Program Name

Improved Turbine Engine Program

DoD Component

Army

Responsible Office

Program Manager

Name: Ms. Gina Bublitz

Phone: 256-313-2020

Email: regina.k.bublitz.civ@army.mil

Mission and Description

Blank IAW DMAG guidance.

Executive Summary

ITEP

Program Highlights Since Last Report

The Improved Turbine Engine Program (ITEP) is experiencing continued schedule and cost risk since the last DAES due to 1) lingering supply chain issues (workforce expertise/quality) originating with COVID-19 requiring rework and increasing costs and 2) prior congressional marks / rescissions. With on-going supply chain issues and increased delivery times for ITEP's test hardware required for Preliminary Flight Rating and qualification testing, General Electric (GE) officially reported on September 23, 2022, that they are behind their contractual schedule to complete the Engineering and Manufacturing Development (EMD) effort including engine qualification required for Milestone C (MS C). On November 19, 2022, the Army Acquisition Executive signed a revised Acquisition Decision Memorandum for ITEP establishing new objective and threshold dates for MS C and subsequent program milestones. The program, with GE, continue to pursue opportunities to improve schedule and contain cost growth. There are no significant software-related issues with this program at this time.

History of Significant Developments Since Program Initiation						
	History of Significant Developments Since Program Initiation					
Date Significant Development Description						
Aug - 2022	Award of Black Hawk Integration Contract Phase 2					
Jun - 2022	Completed FARA Software Critical Design Review (CDR)					
Dec - 2021	Award of Apache Integration Contract Phase 2					
Dec - 2021	Completion of FARA Competitive Prototype Preliminary Design Review (PDR)					
Oct - 2021	Completion of Apache CDR					
Jun - 2021	Concluded First Engine to Test (FETT)					
Jun - 2020	Completion of ITEP CDR					
Jan - 2019	The Army Acquisition Executive signed the Acquisition Decision Memorandum on January 29, 2019, approving Milestone B, allowing entry into the Engineering and Manufacturing Development Phase.					

Schedule ITEP

Events	Milestone Baseline Objective		Baseline /Threshold	Current Estimate/Actual	Deviation
Milestone B Complete	Jan 2019	Jan 2019	Jan 2019	Jan 2019	
Critical Design Review Complete	Apr 2020	Apr 2020	Oct 2020	Jul 2020	
Developmental Test and Evaluation Complete	Aug 2025	Aug 2025	Apr 2026	Aug 2025	YES
Milestone C Complete	Aug 2025	Aug 2025	Apr 2026	Aug 2025	YES
Initial Operational Test and Evaluation Complete	Nov 2026	Nov 2026	Dec 2027	Nov 2026	YES
Full Rate Production Complete	Aug 2027	Aug 2027	May 2028	Aug 2027	YES
Initial Operational Capability Complete	Aug 2028	Aug 2028	May 2029	Aug 2028	YES

Notes

Hardware and supply chain delays continue to pace Preliminary Flight Rating testing and flight test engine deliveries. General Electric (GE) and the Aviation Turbine Engines Program Office, Improved Turbine Engine Program (ITEP) continue to identify and pursue opportunities to gain schedule.

ITEP incorporates innovative advanced manufacturing design and practices. GE has acknowledged that additive manufacturing is more challenging than originally anticipated and is driving schedule delays for additive parts.

GE continues to be behind their contractual schedule to complete the EMD effort, above and beyond the dates GE communicated in the 23 September 2022 contracts letter. ITEP is staffing a new Acquisition Program Baseline to the Milestone Decision Authority.

Deviation Explanation

The current estimates for Development Test & Evaluation, Milestone C, Initial Operational Test & Evaluation, Full Rate Production, and Initial Operational Capability indicate a schedule deviation as identified in the Q1 FY 2023 Defense Acquisition Executive Summary report. The schedule deviation is due to the prime vendor, General Electric, experiencing supply chain issues and higher than normal defect rates. The MDA has been notified, the program is approved to rebaseline, and the rebaseline is in progress.

Performance

ITEP

Performance Characteristics						
Milestone Baseline	Current Baseline O	Current Baseline Objective/Threshold		Current Estimate/Actual	Deviation	
PP) - AH-64E Worldwid	de Performance					
	An AH-64E with the installed ITE will have sufficient power available to HOGE at mission start with a takeoff gross weight of 20,260 lbs up to 6K/95degF at MCP. *Note: HOGE is at zero wind conditions and zero airspeed at 6K/95degF.	An AH-64E with the installed ITE will have sufficient power available to HOGE at mission start with a takeoff gross weight of 18,461 lbs up to 6K/95degF using no more than 95% MRP. *Note: HOGE is at zero wind conditions and zero airspeed at 6K/95degF.	TBD	Will meet threshold. An AH -64E with the installed Improved Turbine Engine (ITE) will have sufficient power available to Hover Out of Ground Effect (HOGE) at mission start with a takeoff gross weight of 18,461 Ibs up to 6K/95 using no more than 95% Maximum Rated Power. *Note: HOGE is at zero wind conditions and zero airspeed at 6K/95.		

The automatic redundant digital engine control unit design will be such that engagement by a single round shall not result in loss of automatic engine control function. The unit must autonomously function to continue to provide full automatic engine control without crew interaction. Threat round characteristics are as defined in the Apache Lot 4 CPD classified annex dated April 2, 2013.(T=O) The automatic redundant digital engine control unit design will be such that engagement by a single round shall not result in loss of automatic engine control function. The unit must autonomously function to continue to provide full automatic engine control without crew interaction. Threat round characteristics are as defined in the Apache Lot 4 CPD classified annex dated April 2, 2013.(T=O) The automatic engine control unit design will be such that engagement by a single round shall not result in loss of automatic engine control function to continue to provide full automatic engine control without crew interaction. Threat round characteristics are as defined in the Apache Lot 4 CPD classified annex dated April 2, 2013.KPP) - Cybersecurity	nitredundant digitalchengine controlunit design willbe such thatengagement by asingle round shallnot result in lossof automaticengine controlfunction. Theunit mustautonomouslyfunction tocontinue toprovide fullautomatic engineecrew interaction.Threat round	
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Installation, operations and sustainment of the ITE does not increase the number of known cybersecurity vulnerabilities on the hosting platforms. The ITE shall provide means to rapidly restore functionality in the event of compromise.
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	The ITE must provide an increased fuel efficiency when compared to current 701D engine at cruise condition of no less than 25% (<= 0.352 lbs/SHP- hr) improvement in SFC as measured in an appropriate test cell facility with the engine operating at 1450 SHP and environmental conditions set at 6K/95degF.	The ITE must provide an increased fuel efficiency when compared to current 701D engine at cruise condition of no less than 13% (<= 0.409 lbs/SHP-hr) improvement in SFC as measured in an appropriate test cell facility with the engine operating at 1450 SHP and environmental conditions set at 6K/95degF.	TBD	Will meet threshold. The Improved Turbine Engine (ITE) must provide an increased fuel efficiency when compared to current 701D engine at cruise condition of no less than 13% (0.409 lb./Shaft Horsepower-hr) improvement in Specific Fuel Consumption as measured in an appropriate test cell facility with the engine operating at 1450 Shaft Horsepower and environmental conditions set at 6K/95.
(KPP) - Sustainment		·		
	Ao = 98% Am = 80%	Ao = 95% Am = 70%	TBD	Will meet threshold. Ao = 95% Am = 70%

	The statistically average production engine will have an IR signature contribution from exhaust and component radiance that is less than the 701D engine at MRP in a comparably configured platform at 6K/95degF without suppressed engine exhaust. The statistically average production engine will also have an integrated IR suppression that is pilot controlled from either off (no suppression) or on (full suppression) capability and will have no more than 2% engine power loss when fully suppressor system should default to full suppression in the event of an actuator failure for redundancy.	The production engine will have an IR signature contribution from exhaust and component radiance that will not exceed the 701D engine at MRP in a comparably configured platform at 6K/95degF without suppressed engine exhaust.	TBD	Will meet threshold. The production engine will have an Infrared (IR) signature contribution from exhaust and component radiance that will not exceed the 701D engine at Maximum Rated Power in a comparably configured platform at 6K/95 without suppressed engine exhaust.
(KPP) - Training				
	The Training Program shall train 100% of the identified Critical Training Tasks in a Live, Virtual, or Constructive environment to the identified MOS and skill level at the location identified in the System Training Plan. The system training capability shall replicate/emulate operation and	(T=O) The Training Program shall train 100% of the identified Critical Training Tasks in a Live, Virtual, or Constructive environment to the identified MOS and skill level at the location identified in the System Training Plan. The system training capability shall	TBD	Will meet objective. The Training Program shall train 100% of the identified Critical Training Tasks in a Live, Virtual, or Constructive environment to the identified Military Occupational Specialty and skill level at the location identified in the

maintenance tasks of the ITE to 80% of the physical fidelity and 100% of the functional fidelity of the ITE for critical training tasks. Maintainer proficiency shall be maintained on 100% of critical and 90% of supporting tasks within 180 days of the training event. The ITE shall facilitate operator and maintainer task proficiency and skill retention by incorporating trainability considerations in aspects of system design. The ITE shall make use of embedded job/memory aids to assist Soldiers in performing critical tasks and reducing refresher training requirements. ITE components and operator/maintainer interfaces shall provide built-in task performance feedback to enhance skill retention.

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System Training Plan. The system training capability shall replicate/emulate operation and maintenance tasks of the Improved Turbine Engine (ITE) to 80% of the physical fidelity and 100% of the functional fidelity of the ITE for critical training tasks. Maintainer proficiency shall be maintained on 100% of critical and 90% of supporting tasks within 180 days of the training event. The ITE shall facilitate operator and maintainer task proficiency and skill retention by incorporating trainability considerations in aspects of system design. The ITE shall make use of embedded job/memory aids to assist Soldiers in performing critical tasks and reducing refresher training requirements. ITE components and operator/maintain er interfaces shall provide built-in task performance feedback to enhance skill retention.

(KPP) - UH-60 Worldwide Performance			
An H-60 with the installed ITE will have sufficient power available to perform a 750 fpm VROC from HOGE at mission start with a takeoff gross weight of 22,000 lbs up to 6K/95degF at MCP. *Note: HOGE is at zero wind conditions and zero airspeed at 6K/95degF.	20,632 lbs up to	TBD	Will meet threshold. An H- 60 with the installed Improved Turbine Engine (ITE) will have sufficient power available to perform a 500 feet per minute Vertical Rate of Climb (VROC) from Hover Out of Ground Effect (HOGE) at mission start with a takeoff gross weight of 20,632 lbs up to 6K/95 using no more than 95% Maximum Rated Power. *Note: HOGE is at zero wind conditions and zero airspeed at 6K/95.

Requirement Reference

Validated:

CDD approved July 24, 2017

Deviation Explanation

No deviations for this program/subprogram

Notes

None

Acquisition Budget Estimate

Total Acquisition Cost

		Milestone APB	Current Baseline		Budget Estimate PB 2024		
Category	Base Year	Objective (BY\$M)	Objective (BY\$M)	Threshold (BY\$M)	BY\$M	TY\$M	Deviation
RDT&E	2019	1,983	1,983	2,181.3	2,102	2,294.7	
Procurement	2019	10,030.5	10,030.5	11,033.6	9,894.2	15,796.4	
MILCON	2019	0	0	0			
Acq. O&M	2019	74.9	74.9	82.4	4.7	5	
Total		12,088.4	12,088.4		12,000.9	18,096.1	
PAUC	2019	1.932	1.932	2.125	1.918	2.892	
APUC	2019	1.621	1.621	1.783	1.599	2.552	

Appropriation Category Deviation Explanations

PAUC Deviation Explanation

APUC Deviation Explanation

Budget Notes

The Improved Turbine Engine Program (ITEP) has experienced the following funding turbulence since achieving Milestone B in January 2019:General Electric (GE) has been awarded requested equitable adjustments (REA) for FY 2020 (\$11M) and FY 2021 (\$4.63M) and is expected to submit additional REAs totaling \$12.7M for FYs 2022-2024. GE has requested labor rate escalation and inflation impacts. Since contract award, the Engineering Manufacturing Development contract has incurred ~\$22M in Defense Contract Management Agency approved labor rate increases. The following rescission and marks have occurred:FY 2020\$49.5M rescission FY 2021 \$8M mark FY 2022 \$15M mark. The Army returned \$32.5M in FY 2022 (\$24.5M rescission above proposed Above Threshold Reprogramming - ATR; \$8M mark) and re-phased FY 2019 RDTE ATR funding into FY 2023 (\$17.5M) & FY 2024 (\$17.5M). (Note: Though funding has since been restored, the FY 2020 \$49.5M rescission and FY21 \$8M mark caused a six (6) month delay for AH-64E and H-60 Developmental Testing (DT), moving the MS C from July 2024 to the objective of August 2025.) Acquisition O&M funding represents civilian pay for the Project Management Office from FY 2016 -FY 2019.

Total End Item Quantity

Quantity Category	Current APB Quantity	Current Estimate Quantity
Development	69	69
Procurement	6,189	6,189
O&M-Acquired		

Quantity Notes

Development Quantity includes equivalent engines. Core engines will be rebuilt multiple times during the Preliminary Flight Rating (PFR) and Qualification Testing (QT) test periods.

Unit Cost ITEP

Current	UCR Baseline and Current Est	timate (Base-Year Dollars)	
Category (\$M) Base Year:2019	Current UCR Baseline	Current Estimate	% Change
Program Acquisition Unit Cost		·	
Cost	12,088.4	12,000.9	
Quantity	6,258	6,258	
Unit Cost	1.932	1.918	-0.724%
Average Procurement Unit Cost			
Cost	10,030.5	9,894.2	
Quantity	6,189	6,189	
Unit Cost	1.621	1.599	-1.357%
Original	UCR Baseline and Current Es	timate (Base-Year Dollars)	
Category (\$M) Base Year:2019	Original UCR Baseline	Current Estimate	% Change
Program Acquisition Unit Cost	1 - 000 /		
Cost	12,088.4 6,258	12,000.9	
Quantity	·	6,258	0.50.40/
Unit Cost	1.932	1.918	-0.724%
Average Procurement Unit Cost			
Cost	10,030.5	9,894.2	
Quantity	6,189	6,189	-1.357%
Unit Cost	1.621	1.599	-1.53/%
	Cost Growth Det	tails	
Current Baseline PAUC Breach Ex	xplanation		
Comment Dessition A DUC Drosek Ex			
Current Baseline APUC Breach Ex			
Original Baseline PAUC Breach E	valenation		
Original dasenne i AUC dreach E.			
Original Baseline APUC Breach E	vnlanation		
original Dasenie III de Dreach D.			
Impacts of Schedule Changes on U	nit Cost		
Impacts of Performance Changes of	on Unit Cost		
Actions Taken or Proposed to Con	trol Future Cost Growth		

Risk and Sensitivity Analysis ITEP

Risk and Sensitivity Analysis
Current Procurement Cost (December - 2022)
Original Baseline Estimate (August - 2019)
None
Current Baseline Estimate (August - 2019)
(1) The Current Baseline Estimate is based on the 2019 Milestone B Army Cost Position. The PB FY 2021-2025 fully funds the

(1) The Current Baseline Estimate is based on the 2019 Milestone B Army Cost Position. The PB FY 2021-2025 fully funds the EMD program. (2) The Improved Turbine Engine Program Original Baseline was established by the Army Acquisition Executive on January 29, 2019. The Milestone B Army Cost Position was used to establish the APB. The most significant cost drivers in the estimate were the projected engine unit price and aircraft platform integration costs.

Schedule Risk				
Technical Risks				

Low Rate Initial Production ITEP

Item	Initial LRIP Decision	Current Total LRIP
Approval Date	01/29/2019	01/29/2019
Approved Quantity	255	255
Reference	Milestone B Acquisition Decision Memorandum	Milestone B Acquisition Decision Memorandum
Start Year	2024	2025
End Year	2026	2027

Rationale if quantity exceeds 10% of the total number of articles to be procured:

Notes

Contracts & Efforts

Contract Data			
Contract Number	W58RGZ-19-C-0003		
Effort Number	3		
Modification Number			
Award Date	02/01/2019		
Definitization Date	05/31/2019		
Order Number			
CAGE Code/CAGE Legal Name	/General Electric Aviation		
Contract Title	Engine EMD Contract		
Contract Address	Lynn, MA		
Contracting Office			
Supported Phase	Development		
Contract Strategy			
Contract Type	Cost-Plus-Incentive-Fee		
Modification Date			
Work Start Date	May 31, 2019		
Technical Data Rights			
Work Completed	62.83%		

Contracts/Effort Price, Quantity, and Performance (TY\$M)				
Initial Target Price		Current Target Price		
\$512		\$512		
Initial Ceiling Price		Current Ceiling Pric	e	
\$540		\$540		
Contractor EAC		PM EAC		
\$595		\$610.6		
Initial Quantity Current Quantity			Delivered Quantity	
46	46		1	
BAC	BCWP		ACWP	
\$555.1	\$348.8		\$378.1	

BCWS	Cost Variance	Schedule Variance
\$405.1	-\$29.3	-\$56.4

Contract Notes:

Factors Contributing to Cost Variance and Projected Effects on Program Costs

The unfavorable cumulative cost variance is due to supply chain lags for hardware, challenges in additive manufacturing and increased labor rates. Program costs remain within Acquisition Program Baseline cost thresholds.

Factors Contributing to Schedule Variance and Projected Effects on Program Schedule

The unfavorable cumulative schedule variance is due to 1) lingering supply chain issues (workforce expertise/quality) originating with COVID-19 requiring rework and increasing costs and 2) prior congressional marks / rescissions.

External Government Activities

Activity Title		Government Entity		Supported Phase
CAGE			Work Start Date	
City			State/Province:	
Notes				

Deliveries and Expenditures ITEP

Deliveries				
Delivered to Date	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	1	1	69	1.45%
Production			6,189	0.00%
Total Program Quantity Delivered	1	1	6,258	0.02%
Expended and Appropriated (TY \$M)				
Years Appropriated to date: 10				
Total Years Appropriated Funding (Current Baseline): 43				
Percent Years Appropriated: 23.26%				
Then-Year Funding Appropriated as Percentage of Total Acquisition Estimate: 6.898%				
Then-Year Funding Expended as Percentage of Total Acquisition Estimate: 5.971%				
Total Acquisition Cost: 18,096.1				

Deliveries & Expenditures Notes:

Operating and Support Costs ITEP

O&S Cost Breakdown:

Category (BY\$ Million)	Improved Turbine Engine
Unit-Level Manpower	0.0
Unit Operations	6,622.1
Maintenance	4,515.6
Sustaining Support	0.0
Continued System Improvements	138.3
Other	0.0
Total	11,276.0

Cost Estimate Source:

Type: Component Cost Position

Approved by: ASA(FM&C), January 18, 2019

O&S Cost Notes:

Improved Turbine Engine Program (ITEP) Milestone B Army Cost Position as reviewed by the Army Cost Review Board. This is a lifecycle cost position, not just O&S.

Total Program O&S Cost Compared with Baseline					
	Current	Baseline			
	Objective (BY\$M)	Threshold (BY\$M)	Current Estimate (BY\$M)	Current Estimate (TY\$M)	Deviation
Total O&S	11,276	12,403.6	0.0	0.0	

Note:

There are no O&M costs tracked in the APB. ITEP will deliver a sub-component to other weapon systems: ITEP will produce engines for Apache and Black Hawk aircraft. As a Class IX repair part, Operating and Support Costs are not tracked at the component level.

O&S Cost Deviation Explanation

Operating and Support Costs - Disposal and Unitized Costs ITEP

Annual Unitized O&S Cost Definition and Calculation Relative to Total O&S Cost:

The Improved Turbine Engine Program (ITEP) will produce engines for Apache and Black Hawk aircraft. As a Class IX repair part, Operating and Support Costs are not tracked at the component level.

Sustainment Factors	System Name:	Antecedent System Name:
Quantity to Sustain		
Unit of Measure		
Unit Expected Service Life		

Base Year:

Annual Unitized O&S Cost by Category Base Year \$ Unit:(\$M)	System Name:	Antecedent System Name:
Unit-Level Manpower		
Unit Operations		
Maintenance		
Sustaining Support		
Continued System Improvements		
Other		
Total O&S		

Disposal/Demilitarization Cost Estimate

(Base Year \$Millions)	System Name:	Antecedent System Name:
Total Disposal		

Cost Estimate Source - Disposal		
Туре:		
Approval Authority and Date:		
Note:		
Disposal Cost Notes:		
The Improved Turbine Engine (ITE) is a Class IX repair part. Disposal costs are captured in the platform in which it is installed (H-60 and the AH-64E). There is no separate disposal cost for the engine.		
Additional O&S Estimate Assumptions:		

Sustainment Strategy:

Antecedent Estimate Assumptions:

General Electric, 701D Engine