ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)

February 2002

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
7 - Operational system development	**0203752A - Aircraft Engine Component Improvement Program**	**106**

COST (In Thousands)		FY 2001 Actual	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
106	A/C COMPON IMPROV PROG	5658	14889	3689	3858	3923	4094	4188	0	50599

A. Mission Description and Budget Item Justification: Aircraft Engine Component Improvement Program (CIP) develops, tests, and qualifies improvements to aircraft engine components to correct service-revealed deficiencies, improve flight safety, enhance readiness and reduce operating and support (O&S) costs. In addition, CIP provides the test vehicles for the testing and qualification efforts required as a part of the Army's Flight Safety Parts program. CIP is included in the RDTE budget vice procurement appropriations in accordance with congressional direction. This system supports the Legacy to Objective (LO) transition path of the Transformation Campaign Plan (TCP).

FY 2001 Accomplishments:

- 1510 T700 Engine: Continue the development of the 701D engine to reduce engine O&S costs and improve engine on-wing time. Complete stress analysis modeling and start life analysis modeling for the Power Turbine Module to re-analyze and update service life limits. Perform Apache Digital Electronic Unit (DECU) EMI testing to qualify internal component replacement due to obsolescence. Begin analysis of Titanium Nitride compressor coating for improved on-wing time and reduced O&S costs.
- 834 T55 Engine: Continue development of new repair procedures to reclaim high dollar hardware. Continue applying engineering effort to unanticipated flight safety problems revealed in the field and provide timely support. Complete life analysis of -714 engine and complete partial damage fraction analysis on all three T55 engine models. Complete qualification of enhanced plumbing system. Complete bearing redesign qualification testing to optimize all current mainshaft and accessory bearing designs and reduce the overall O&S costs. Design and qualify an improved Stage 2 Disk to improve life and reduce O&S costs.
- 190 T62T APU: Perform component life analysis to determine compressor and turbine wheel safe life limits.
- 178 GTCP36 APU: Conduct field evaluation of Longbow APU oil venting solution. Complete the Dual Alloy Turbine Wheel Development program to improve durability, extend service life, and reduce cost.
- 82 IN-HOUSE: In-house support for the CIP engineers.
- 1800 Design, develop and test a "universal" FADEC utilizing new technology for improved obsolescence resistance and reduced costs.
- 10 Funds provided to Redstone Technical Test Center for Digital Electronic Control Unit (DECU) 2000 support.

FY 2001 Accomplishments: (Continued)

•	1000	FDUs: Development of new technology that is adaptable to fuel delivery units (FDU) for gas turbine engines. Develop and qualify a fuel delivery unit for the RAH-66 Comanche Secondary Power Unit (SPU)
•	54	Support Contract for the FDU and FADEC.
Total	5658	

FY 2002 Planned Program

•	10365	T700 Engine: Continue the development of the 701D engine to reduce engine O&S costs and improve engine on-wing time. Complete Power Turbine Module life analysis modeling and update service life limits. Start development of the Enhanced Digital Electronic Control for the 701D engine to reduce O&S Costs and improve flight safety. Continue analysis of titanium nitride compressor coating to improve on-wing life and reduce O&S costs. Complete development of liquid or light ends air (LOLA) fuel boost pump to improve flight safety and readiness.
•	1600	T55 Engine: Continue development of new repair procedures to reclaim high dollar hardware. Continue applying engineering effort to unanticipated flight safety problems revealed in the field and provide timely support. Design and qualify an Improved Bleed System. Complete the qualification of the improved tailpipe to reduce removals and O&S costs. Begin design of an improved N2 Sensor to reduce amount of hardware and improve O&S costs.
•	410	GTCP36 APU: Determine root cause of Apache gearbox mechanical failures. Component life analysis/qualification testing. Perform Dual Alloy Turbine Wheel containment analysis.
•	200	T62T APU: Component life analysis/qualification testing Combustor.
•	64	IN HOUSE: In-house support for the CIP engineers.
•	250	RAPTR DRP/Test Cell Correlation.
•	1000	Universal Full Authority Digital Engine Control (FADEC)
•	1000	Variable Displacement Vane Pump (VDVP) and Liquid or Light End Air (LOLA) Equipped Fuel Delivery Unit
Total	14889	

FY 2003 Planned Program

- 2000 T700 Engine: Complete the development of the 701D engine to reduce engine O&S costs and improve engine on-wing time. Continue the development of the Enhanced Digital Electronic Control for the 701D engine to reduce O&S Costs and improve flight safety. Complete development of titanium nitride compressor coating to improve on-wing life and reduce O&S costs.
- 957 T55 Engine: Continue development of new repair procedures to reclaim high dollar hardware. Continue applying engineering effort to unanticipated flight safety problems revealed in the field and provide timely support. Complete design and qualification of an improved N2 Sensor to reduce amount of hardware and improve O&S costs. Design and qualify an improved EGT Measurement System to reduce O&S costs.
- 300 T-62 APU: Redesign reduction drive housing and carrier assembly to improve maintainability/reliability. Redesign wiring harness to greatly improve reliability.
- 350 GTCP36 APU: Run 200-hour Qualification Tests for numerous CIP-developed components for the Apache and Black Hawk APUs. Develop new depot repair procedures to deal with emerging failure trends.
- 82 IN HOUSE: In-house support for the CIP engineers.

Total 3689

B. Program Change Summary	FY 2001	FY 2002	FY 2003
Previous President's Budget (FY2002 PB)	5873	13017	3684
Appropriated Value	5929	15017	0
Adjustments to Appropriated Value	0	0	0
a. Congressional General Reductions	0	-128	0
b. SBIR / STTR	-173	0	0
c. Omnibus or Other Above Threshold Reductions	0	0	0
d. Below Threshold Reprogramming	-43	0	0
e. Rescissions	-55	0	0
Adjustments to Budget Years Since FY2002 PB	0	0	5
Current Budget Submit (FY 2003 PB)	5658	14889	3689

FY02: +1M for universal Full Authority Digital Engine Control
+1M for VDVP and Liquid or Light-end Air Equipped Fuel Delivery Unit

C. Other Program Funding Summary: There are no other RDTE or other Appropriation efforts.

D. Acquisition Strategy: Improved designs will be implemented via Engineering Change Proposal (ECP) and follow-on procurement or modification to a production contract to introduce the improved hardware.

E. Schedule Profile	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007
T700 - Continue Development of 701D Engine	2Q						
T700 - PT Stress Analysis Modeling	2Q						
T700 - Apache DECU EMI Testing	2Q						
T700 - Begin Analysis on TIN Coating	3Q						
T700 - Continue Development of Improved 701D Engine		2Q					
T700 - Complete PT Life Analysis		2Q					
T700 - Start Development of 701D Enhanced DECU		2Q					
T700 - Develop Stage 2 Nozzle Internal Coating		2Q					
T700 - Develop Reduced Leakage CDP Seal		2Q					
T700 - Continue Development of Improved 701C Engine			2Q				
T700 - Complete Qualification of CDP Seal			2Q				

E. Schedule Profile (continued)	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007
T55 - Complete Qualification of Hard Line Plumbing System		2Q					
T55 - Continue Development of New Repair Procedures and Providing Flight Safety Spt	4Q						
T55 - Complete Bearing Redesign Qualification Testing		2Q					
T55 - Design and Qualify Improved Stage 2 Disk		2Q					
T55 - Complete the Qualification of Improved Tailpipe to Reduce Removals & O&S Costs		4Q					
T55 - Develop Improved Bleed System Actuator		4Q					
T55 - Design and Qualify Improved N2 Sensor			4Q				
GTCP36 - Field Evaluation of Oil Leakage Solution	1Q						
GTCP36 - Complete Dual Alloy Turbine Wheel Development	2Q						
GTCP36 - Gearbox Failure Investigation			3Q				
GTCP36 - Dual Alloy Turbine Wheel Containment Analysis			2Q				
GTCP36 - Component Qualification Tests			4Q				
T62T - Complete Material Analysis for Component Lifing	4Q						
T62T - Reduction Drive Housing Design			4Q				
T62T - High Reliability Wiring Harness			3Q				
FADEC - Complete hardware design, conduct CDR	2Q						
FADEC - Initiate fabrication of development units	2Q						
FADEC - Complete preliminary software development	3Q						
FADEC - Initiate engine document support	3Q						
FADEC - Complete software development		2Q					
FADEC - Prototype software qualification testing		2Q					
FADEC - Unit durability test program		3Q					
FADEC - Support HALTS and engine testing			2Q				
FADEC - Support system level FMECA/SHA			2Q				
FDU - Finalize pressure sensor integration	2Q						
FDU - Fabricate developmental units	3Q						
FDU - Complete LOLA pump design and testing	3Q						

E. Schedule Profile (continued)	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007
FDU - Initiate qualification testing program	3Q						
FDU - Support Subsystem Power Unit (SPU) testing	3Q						
FDU - Complete qualification testing		2Q					
FDU - Accelerated mission/endurance testing		3Q					
FDU - Continued support of SPU tests		3Q					

Schedule Profile provided for Full Authority Digital Engine Contol (FADEC) and Fuel Delivery Unit (FDU) efforts is in anticipation of receiving additional funds for these efforts.

ARMY RDT&E COST ANALYSIS(R-3)

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I. Product Development	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2001 Cost	FY 2001 Award Date	FY 2002 Cost	FY 2002 Award Date	FY 2003 Cost	FY 2003 Award Date	Cost To Complete	Total Cost	Target Value of Contract
a . T-700 Engine	SS/CPFF	Lynn, MA	41988	1510	2-3Q	10365	2-3Q	2000	2-3Q	Continue	Continue	Continue
b . T-55 Engine	SS/CPFF	Phoenix, AZ	20126	834	2-3Q	1600	2-3Q	957	2-3Q	Continue	Continue	Continue
c . APU's	MIPR	Air Force, Kelly AFB, TX	13557	0		0		0		0	13557	13557
d . FADEC/FDU	MIPR	CECOM, Ft. Monmouth, NJ	916	2800	1-2Q	2000	2-3Q	0		0	5716	5716
e . DECU	MIPR	RTTC, Redstone Arsenal, AL	95	10	1-2Q	0		0		0	105	105
f . APU's	MIPR	Air Force, Hill AFB, UT	0	368	2-3Q	610	1Q	650	1Q	Continue	Continue	Continue
Subtotal:			76682	5522		14575		3607		Continue	Continue	Continue

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II. Support Cost	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2001 Cost	FY 2001 Award Date	FY 2002 Cost	FY 2002 Award Date	FY 2003 Cost	FY 2003 Award Date	Cost To Complete	Total Cost	Target Value of Contract
a . Contract Engineering	SS/CPFF	Westar, St. Louis, MO	10	0		0		0		0	10	10
b . Contract Engineering	SS/CPFF	Camber, Huntsville, AL	145	54	2-3Q	0		0		0	199	199
Subtotal:			155	54		0		0		0	209	209

III. Test and Evaluation	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2001 Cost	FY 2001 Award Date	FY 2002 Cost	FY 2002 Award Date	FY 2003 Cost	FY 2003 Award Date	Cost To Complete	Total Cost	Target Value of Contract
a . Redstone Avn Prop Test Res Facility Data Reduction Prog	MIPR	Redstone Technical Test Center, RSA, AL	0	0		250	2-3Q	0		0	250	250
Subtotal:			0	0		250		0		0	250	250

Remarks: Not Applicable

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IV. Management Services	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2001 Cost	FY 2001 Award Date	FY 2002 Cost	FY 2002 Award Date	FY 2003 Cost	FY 2003 Award Date	Cost To Complete	Total Cost	Target Value of Contract
a . In-house Engineering		ATCOM, St. Louis, MO	10342	0		0		0		0	10342	10342
b . In-house Engineering	NA	AMCOM, Redstone Arsenal, AL	229	82		64		82		Continue	Continue	Continue
Subtotal:			10571	82		64		82		Continue	Continue	Continue
Project Total Cost:			87408	5658		14889		3689		Continue	Continue	Continue