

GAO

Fact Sheet for the Chairman,
Subcommittee on Defense, Committee on
Appropriations, House of Representatives

December 1986

PRODUCTIVITY

Selected DOD Capital Investment Projects

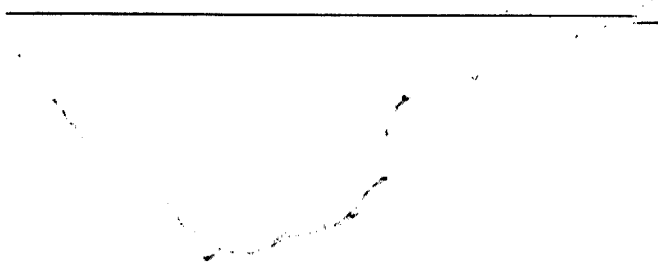


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December 23, 1986

The Honorable Bill Chappell, Jr.
Chairman, Subcommittee on Defense
Committee on Appropriations
House of Representatives

Dear Mr. Chairman:

Following the March 4, 1986, Department of Defense (DOD) manpower hearings on its Productivity Enhancing Capital Investment (PECI) Program, you requested that we provide examples of successful projects funded under the program. This letter provides an overview of the three funding strategies which make up the program. Detailed information on selected examples is found in the attached appendices.

Since 1977 DOD has actively supported the Peci program as one of a series of productivity initiatives directed at improving operating efficiencies. Through fiscal year 1986, for example, about \$990 million had been budgeted to fund over 5,500 projects. According to a March 1985 DOD program status report, investments "to date" will provide benefits exceeding \$3.6 billion, while freeing up the time of over 18,000 personnel to perform additional mission requirements. DOD reports that currently operational projects will provide a lifetime return on investment of \$15 for each \$1 invested. The fiscal year 1987 DOD budget requested \$257 million for continued funding of this program.

The Peci program consists of three separate funding strategies. The first strategy, Productivity Enhancing Incentive Funds (PEIF), finances projects costing less than \$100,000. Each military service establishes an annual "level of funding" for this strategy on the basis of past experience in financing investment opportunities and forecasts of opportunities for other productivity initiatives. This strategy allows activities to quickly capitalize on cost-saving pieces of equipment by avoiding the 2 year lead time required by the program budget cycle.

In addition to the dollar limitation, PEIF criteria require that the equipment be off-the-shelf and return the investment cost within 2 years. According to DOD, these investments tend to amortize in less than 1 year; and over the life of the investment, they have a projected undiscounted payback/savings of \$11 for every \$1 invested. Table 1 highlights service and agency participation in the strategy since its initial funding in fiscal year 1977.

Table 1

	<u>Number of projects^a</u>	<u>Investment (millions)^b</u>
Army	2,879	\$127.6
USAF	1,275	69.6
Navy	531	21.6
Other	48	2.8
	-----	-----
Totals	<u>4,733</u>	<u>\$221.6</u>

^aThrough fiscal year 1985.

^bInvestments through fiscal year 1985, plus budgeted amount for fiscal year 1986.

The second strategy, Productivity Investment Fund (PIF), provides funds which have been "fenced" or "set-aside" for costlier investment opportunities with longer investment recovery periods. Project candidates are submitted by each of the military services and DOD agencies and competitively selected and ranked by the Office of the Secretary of Defense on the basis of expected benefits. Funds for the selected projects are then added to the individual service's budget. PIF projects must cost \$100,000 or more; be projected to return costs within 4 years of becoming operational; and must receive approval, on a project-by-project basis, through the normal budgeting process. According to DOD, lifetime return on investments for approved PIF projects are projected to range from 2 to 1 for fiscal year 1981 projects to 22 to 1 for fiscal year 1985 projects. Table 2 provides projected investment costs of DOD approved projects from fiscal year 1981, when it was initiated, through the fiscal year 1986 program.

Table 2
Number of projects Investment (millions)

Army	131	\$260.8
USAF	65	205.0
Navy	99	157.0
Other	20	56.6
	-----	-----
Totals	<u>315</u>	<u>\$679.4</u>

As a third strategy DOD encourages individual services and agencies to fund other deserving productivity enhancing opportunities and to provide supplemental funding for the PEIF and PIF strategies. Funding levels and criteria for project selection are determined by the individual service/agency allowing maximum flexibility to support individual productivity projects. Table 3 notes budgeted participation in this strategy since its inception in fiscal year 1982.

Table 3
Number of projects Dollars budgeted (millions)

Army	350	\$33.6
USAF	53	31.8
Navy	37	23.3
	-----	-----
Totals	<u>440</u>	<u>\$88.7</u>

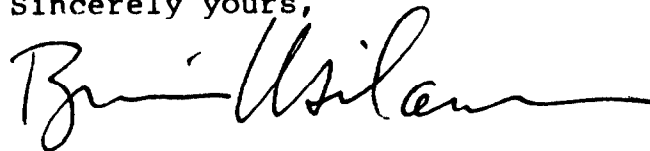
Appendix I lists and appendix II describes 25 projects we selected to highlight as successful PEI examples. The 21 PEIF projects were selected from a universe of 215 fiscal year 1984 Air Force projects and 160 fiscal year 1984 Army Training and Doctrine Command investments. Our criteria for selection included (1) high 1-year return on investment ratios, (2) well documented operational savings, and (3) available evidence to show that the project had amortized or was projected to amortize within the time frame allowed by the funding strategy. We also included case studies of three operational Air Force PIF projects and one Army PIF project which were highlighted to us by the services' productivity offices as being successful projects.

Because we used project justification data and post investment analysis reports submitted by the using activity in documenting the examples, the validity of the savings data provided in our examples is dependent on the accuracy of the reports. We did not independently verify the reported data; however, to enhance the validity and

reliability of our reported cases, we familiarized ourselves with the services' oversight and post investment reporting methodologies, verified the accuracy of selected data such as cost benefit calculations, and restricted our selection of projects to those for which program oversight and project review were evident at either the service or major command level. We conducted our work from March 30, 1986, to October 27, 1986.

As discussed with your office, we plan no further distribution of this information until 30 days from the date of the report. If you need additional assistance or have any questions regarding the contents of this document, please call me on 275-5074.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Brian Usilaner". The signature is written in black ink and is positioned above the typed name.

Brian L. Usilaner
Associate Director

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ABBREVIATIONS

DOD	Department of Defense
PECI	Productivity Enhancing Capital Investment
PEIF	Productivity Enhancing Incentive Funds
PIF	Productivity Investment Fund
CHAMPUS	Civilian Health and Medical Program of the Uniformed Services
DMES	Deployable Mobility Execution System

DOD'S PRODUCTIVITY ENHANCING CAPITAL
INVESTMENT PROGRAM PROJECTS SELECTED BY GAO

<u>Project</u>	<u>Investment cost</u>	<u>Projected 1-year savings^a</u>
Programmable micros for maintenance	\$1,750,410	\$2,845,920
Numerical control industrial plant equipment	1,607,800	1,541,500 ^b
Information resources management system	1,271,000	2,500,000
Administrative modernization system	1,070,933	770,149 ^b
Deployable mobility execution system	86,326	3,663,672
Consolidated forms design equipment	79,830	64,796
Microform retrieval system	46,978	35,722 ^b
Mechanized travel system	46,945	177,306
Light system for firing range	34,654	255,528
Office filing equipment	19,097	52,927
Meter-mix machine	17,650	81,137
Portable hoist	16,512	16,627
Fetal monitors	16,442	121,358
Automated legal research system	16,329	103,957
Communications system analyzer	13,647	24,896
Word processing center	13,614	38,598
Arthroscopy system	12,100	181,226
Engine analyzer	11,784	178,284
Microcomputers	11,206	15,982 ^b
Rotary 16mm microfilm camera	11,157	41,560
Digital biometric ruler	7,300	41,040
Multimeter	4,923	15,800
Corometrics neonatal monitoring system	4,911	22,676
Steam cleaner	3,628	24,070
Spirometer	3,435	97,264
	-----	-----
Totals	<u>\$6,178,611</u>	<u>\$12,911,995</u>

^aThese savings were projected on the basis of reported actual savings of 8 months or less.

^bActual 1-year savings.

CASE STUDIES OF SELECTED PROJECTS FUNDED UNDER
DOD'S PRODUCTIVITY ENHANCING CAPITAL INVESTMENT PROGRAM

PROGRAMMABLE MICROS FOR MAINTENANCE

Submission date : FY80	Investment cost : \$1,750,410
Approval date : FY82	Reported 8-month savings: \$1,897,280
Operational date: 1/31/85	Months to amortize: 7
Projected 1-year savings: \$2,845,920	

In fiscal year 1980, officials of a major command proposed a project to provide logistics managers with a system for more effectively using management data in aircraft maintenance operations. The program would provide desk-top computers to 38 units to improve productivity by automating management programs and by enhancing overall unit analysis capabilities.

Officials estimated that for an investment cost of \$2 million, savings could be achieved in personnel and other resources through more rapid and complete identification of potential problem areas. For example, in 1979, a manual monitoring program used to track engine malfunctions and predict massive failures prior to engine damage had saved about \$17 million and had significantly reduced engine removals for depot overhaul. The desk-top computers, it was estimated, would increase the efficiency and material savings of the monitoring program by at least 6 percent, or approximately \$1 million per year. Savings of 12 authorized staff positions were projected to provide an additional savings of about \$208,000 annually.

The project received DOD approval for productivity enhancing capital investment funding in fiscal year 1982 and became operational in fiscal year 1985, at a cost of \$1.75 million. On October 18, 1985, officials reported a savings of about \$1.8 million in engine parts and reduction of 12 positions valued at \$126,000, as a direct result of the investment.

NUMERICAL CONTROL INDUSTRIAL PLANT EQUIPMENT

Submission date: 7/31/80	Investment cost: \$1,607,800
Approval date : FY 82	Reported savings: \$1,903,500 through
Amortization date: Approx. 12/1/85	March 1986
Operational date: 9/82-10/85	
Actual 1-year savings: \$1,541,500	

In April 1980, the Technology Repair Division of a military aircraft repair center was responsible for providing programming support for all numerically controlled machine tools at the center. The center had 12 of these machines with an additional 6 projected for installation within the next 5 years. Although there were seven programmers, additional programmers would be required to support the increased workload unless a more productive method of programming was used.

The center also had two milling machines which were over 25 years old and not anticipated to be operational past fiscal year 1982 because of increasing downtime that was affecting production output. Loss of these machines would require shifting production to conventional manual equipment at a much greater cost.

In addition, the center needed a numerically controlled sheet metal router to automate the fabrication of replacement components for selected aircraft and a numerically controlled tube bender that would increase production, reduce set-up time, and reduce scrap by 10 percent.

On the basis of the above needs and a study performed by an independent research lab highlighting the productivity-enhancing ability of these type machines, the center proposed a capital investment project comprised of the following numerically controlled equipment:

- A graphics system providing interactive design, engineering drafting, geometric digitizing, and machine program tape generation.
- Two three-axis machining centers capable of horizontal milling with a rotary table, an automatic tool changer, and a pallet shuttle for increased productivity.
- One automated sheet metal drilling and routing machine which can accomodate very large aluminum sheets.
- Two tube-bending systems capable of automatic error-free bending of aircraft and engine tubing.

Purchase of the equipment was approved under DOD's Productivity Investment Fund and put into operation between September 1982 and October 1985. As of March 31, 1986, the center had reported a savings of \$1.9 million in labor and overhead costs. Productivity had also increased as a result of the center's ability to produce more timely and error-free programming tapes from engineering drawings.

INFORMATION RESOURCES MANAGEMENT SYSTEM

Submission date : 5/28/82 Investment cost: \$1,271,000
 Approval date : FY84 Projected annual savings: \$2.5 million
 Operational date: 8/01/85 Months to amortize: 6

On the basis of a 3-year study demonstrating that a systematic application of automation reduces both professional and clerical work, officials at a major military command proposed a project to implement an information resources management system in the Comptroller's office. The proposed system would provide the Comptroller with an integrated financial management system.

It would consist of equipment sufficient to effectively generate and manage information for over 400 employees working for the Comptroller.

Officials estimated that the system, costing approximately \$1.4 million, would enable the office to do the work of 73 additional personnel with existing staff, thereby avoiding approximately \$3 million in additional personnel costs.

The project received DOD approval for funding in fiscal year 1984 and became operational at a cost of about \$1.3 million. On October 5, 1984, officials reported that the project's implementation had resulted in the elimination of 41 positions proposed for fiscal year 1986, valued at \$2.5 million annually.

ADMINISTRATIVE MODERNIZATION SYSTEM

Submission date: FY 79	Investment Cost: \$1,070,933
Approval date: FY 81	Reported 1-year savings: \$770,149
Operational date: 8/84	Months to amortize: 17

An Adjutant General survey of a military installation revealed administrative inefficiencies within the personnel office--primarily attributable to the lack of readily available current information. Personnel records were frequently required by more than one clerk at a time, causing delays for both clerks and customers. Additional problems were caused by antiquated typewriters and novice typists. Approximately 20 percent of the typing had to be redone because of typographical errors.

Problems in the administrative operations were mainly due to continuous requirements for revising draft documents before printing. Approximately 30 percent of the typing workload was the result of re-typing documents to produce final camera-ready copies.

To solve the problems, officials proposed to fully automate all operations. The proposal included the need to acquire a central processing unit with peripheral terminals and printers that would allow immediate access to current military personnel information. Also included in the proposal were text editors, central dictation equipment, and optical character readers that would enhance the quality and response time of preparing routine and repetitive correspondence. Officials indicated that the proposal could be implemented at a cost of \$1,015,000 and, through an increase in operating efficiency, could be expected to save 64 manpower spaces and generate an annual savings of approximately \$602,000.

The proposal received DOD approval for funding under the Productivity Investment Fund and became operational at a cost of \$1,070,933. Officials reported that as a result of implementing the project, 32 unfilled and 8 filled staff positions had been eliminated--saving \$770,149 during fiscal year 1985.

DEPLOYABLE MOBILITY EXECUTION SYSTEM (DMES)

Submission date: 12/13/83 Investment cost: \$86,326
 Approval date: 12/21/83 Reported 6-month savings: \$1,831,836
 Operational date: 05/15/84 Months to amortize: 1
 Projected 1-year savings: \$3,663,672

A major service command had an immediate requirement for a deployable (portable) microcomputer to support a deployed, automated cargo and passenger load planning and manifesting system. With the increased emphasis in DOD on rapid deployment and more efficient use of airlift, an alternative load planning and manifesting system was needed.

In an attempt to find an alternative system, a prototype microcomputer system called the Deployable Mobility Execution System (DMES) was developed and tested. The system provided the following capabilities:

- Much faster load planning and cargo manifesting than was possible under the old system.
- Extensive override and modification capability to let the load planner investigate various mixes of cargo, aircraft configurations, and aircraft types.

In a comparison of manual versus DMES load planning, a manual load plan to move 16 military vehicles was replanned using DMES, resulting in 20 percent more cargo being loaded on two C-141 aircraft. On the basis of the test results, the military command proposed purchasing 13 microcomputers to operate the DMES software.

The DMES microcomputers, purchased for \$86,326, achieved the following reported results during the first 6 months of operation.

Aircraft requirement prior to <u>DMES</u>	Cost of airlift prior to <u>DMES</u>	Aircraft requirement after <u>DMES</u>	Cost of airlift after <u>DMES</u>	Aircraft utilization <u>savings</u>
1,001	\$16,059,719	883	\$14,221,778	\$1,837,941

Net savings of \$1,831,836 were reported after deducting DMES material and maintenance costs from the aircraft utilization savings amount.

CONSOLIDATED FORMS DESIGN EQUIPMENT

Submission date : 1/21/85 Investment cost : \$79,830
 Approval date : 3/18/85 Reported 6-month savings: \$31,982
 Operational date: 9/01/85 Months to amortize: 15
 Projected 1-year savings: \$64,796

Forms design functions were being performed by a headquarters unit and its subordinate units within a major service command. Using antiquated equipment, the process was costing approximately \$339,466 annually.

Command officials determined that the procurement of newer equipment, at an estimated cost of \$81,459, would greatly enhance productivity by upgrading the forms analysis and design capability and allow for the consolidation of the forms design function at one location. This consolidation would eliminate the need for three staff positions for a total savings of approximately \$65,152 per year.

The newer equipment was purchased for \$79,830. During its first 6 months of operation, two positions were eliminated, resulting in about \$32,000 in savings for the period.

MICROFORM RETRIEVAL SYSTEM

Submission date	: 8/30/84	Investment cost:	\$46,978
Approval date	: 9/17/84	Reported 1-year savings:	\$35,722
Operational date	: 1/02/85	Months to amortize:	18

A military supply squadron was responsible for providing quality control, filing, and retrieval of up to 325,000 documents annually. Squadron officials determined that manual document processing, involving many hours of tedious and meticulous work, could be accomplished more efficiently through automation. They proposed a microform retrieval system that would automatically store, retrieve, duplicate, and provide quality control and save enough hours to reduce personnel requirements by one--resulting in annual savings of \$26,937.

Using productivity funding, the squadron procured the equipment for \$46,978 and eliminated the personnel requirement as anticipated. As a result, the project should be fully amortized within 18 months of its purchase.

MECHANIZED TRAVEL SYSTEM

Submission date	: 10/28/83	Investment cost:	\$46,945
Approval date	: 3/26/84	Projected 1-year savings:	\$177,306
Operational date:	9/27/84	Months to amortize:	3

The travel office at a military installation was responsible for processing all types of travel vouchers for assigned military and civilian personnel. During the period August 1982 through July 1983, 26 military and civilian personnel in the office processed 62,407 vouchers, at a cost of \$490,902.

In order to reduce the number of personnel, officials purchased a mechanized system for processing travel vouchers for \$46,945. The system computed all types of travel vouchers more

efficiently, eliminating the need for 8 of the 26 personnel. Further, the need to audit computations was no longer required because of the system's mathematical accuracy. On March 8, 1985, officials reported that utilization of the equipment had reduced personnel requirements and would result in a first-year savings of \$177,306.

LIGHT SYSTEM FOR FIRING RANGE

Submission date: 11/17/83 Investment cost: \$34,654
 Approval date: 03/20/84 Projected 1-year savings: \$255,528
 Operational date: 12/01/84 Months to amortize: 2

During military training in nightfiring techniques, one base had used white star cluster flares to light the target areas. The training exercises, which were conducted during approximately 162 days annually, required approximately 24 flares each to provide artificial illumination. Individuals administering the firing training recommended installing an electrical lighting system with a dimming capability to eliminate the need for using flares, while still providing a realistic scenario. The elimination of flares was projected to save approximately \$107,708 annually.

Funded under the productivity enhancing incentive funds strategy, the light system became operational on December 1, 1984. After 3 months of actual operation, officials estimated that because of increased training requirements, 7,791 flares would be required annually without the new lighting system. At a cost of about \$33 per flare, the new lighting system will result in net saving of approximately \$256,000 annually.

OFFICE FILING EQUIPMENT

Submission date: 11/29/83 Investment cost: \$19,097
 Approval date: 3/27/84 Projected 1-year savings: \$52,927
 Operational date: 9/24/84 Months to amortize: 5

A base level civilian personnel office had to maintain approximately 4,410 official personnel folders in outdated, inefficient files. In accomplishing the necessary personnel administrative actions, the office estimated that approximately 272 folders were checked out and replaced on a daily basis. The collective time expended by one dedicated file clerk and by personnel specialists amounted to an annual personnel cost of \$82,381.

A productivity proposal was made for the purchase of an automated filing system, at a projected cost of \$24,806. The system would reduce the filing operations of the personnel specialists, expand the filing capacity by 22 percent, and eliminate one clerk-typist requirement. Estimates indicated that the automated filing system would save \$61,501 annually. The system was approved and became operational on September 24, 1984.

During the first 6 months of operation, the office documented savings of 3,807 hours for the personnel specialists. This manning, together with the elimination of one clerk-typist position, produced an annual projected savings of \$52,927.

METER-MIX MACHINE

Submission date : 5/17/84 Investment cost: \$17,650
 Approval date : 6/25/84 Projected 1-year savings: \$81,137
 Operational date: 11/01/84 Months to amortize: 3

A military training and audiovisual center was tasked to produce and distribute 28,000 scale models of armor vehicles. Officials determined that the then current method of mixing and pouring plastics by hand would require seven additional employees at a cost of approximately \$190,099 to produce the models. They also determined that the acquisition of a meter-mix machine at an estimated cost of \$18,000 could significantly reduce production costs. The equipment would increase production by 70 percent, reduce material waste, and produce an estimated savings of \$160,396 in the first year, even with the addition of two new employees.

Using productivity enhancing capital investment funds, the equipment was procured for \$17,650. Officials reported that the mixing machine cut production time from 35 minutes to 5 minutes per model and resulted in estimated personnel and material savings of \$81,137 in the first year.

PORTABLE HOIST

Submission date : 3/21/83 Investment cost : \$16,512
 Approval date : 11/25/83 Projected 1-year savings: \$16,627
 Operational date: 3/25/85 Months to amortize: 12

Officials in the Directorate of Industrial Operations at a military base concluded that the use of hand jacks and safety stands for undercarriage repair and inspection of vehicles required approximately 30 minutes per vehicle. Officials further determined that the acquisition of portable hydraulic hoists could significantly reduce time required to perform this operation and generate savings in personnel costs.

Under the productivity program, the base acquired four portable hoists at a cost of \$16,512. Subsequently, officials reported that actual use of the equipment indicated that about 1,129 hours per year would be saved, resulting in yearly savings of \$16,627.

FETAL MONITORS

Submission date : 3/27/84 Investment cost: \$16,442
 Approval date : 4/26/84 Reported 6-month savings: \$61,317
 Operational date: 10/17/84 Months to amortize: 2
 Projected 1-year savings: \$121,358

A military hospital was regularly referring high-risk maternity patients to local civilian facilities for treatment because of the questionable reliability of in-house fetal monitoring equipment. Assuming that the more complex maternity cases might have had to be referred to civilian facilities regardless of equipment availability, hospital officials estimated that 75 percent of the patients could still have been treated at the base hospital if reliable equipment had been available--saving over \$75,000 annually.

The hospital acquired two fetal monitors for \$16,442 and reported savings of over \$60,000 during the first 6 months of their operation. Officials reported that 34 patients who would have been referred to civilian facilities were treated at the hospital for an estimated savings of about \$1,700 for each nonreferral.

AUTOMATED LEGAL RESEARCH SYSTEM

Submission date : 3/16/84 Investment cost: \$16,329
 Approval date : 6/25/84 Projected 1-year savings: \$103,957
 Operational date: 12/01/84 Months to amortize: 2

A 22-attorney office of the Staff Judge Advocate was responsible for providing legal assistance, processing claims, administering procurement law, and providing legal support. The attorneys had to manually conduct their legal research at an annual cost of 6,240 hours.

To eliminate this manual research, officials proposed acquiring an automated legal research system, at a cost of \$13,888, which would provide electronic legal research services at greatly reduced costs.

Following the acquisition of the equipment with productivity funds, at a cost of \$16,329, and the actual documentation of savings for a 3-month period, officials reported a reduction of about 5,000 hours or approximately \$104,000 annually.

COMMUNICATIONS SYSTEM ANALYZER

Submission date : 12/13/83 Investment cost : \$13,647
 Approval date : 3/26/84 Projected 1-year savings: \$24,896
 Operational date: 1/01/85 Months to amortize: 7

A military industrial activity was responsible for testing and repairing communications equipment. The then current procedures required three to eight pieces of diagnostic equipment and manual calculation of the results. On the basis of historical workload data, officials determined that to repair 545 pieces of equipment annually required 3,708 hours of labor at a cost of \$61,918. An analysis indicated that the annual workload could be accomplished with 1,316 fewer hours using a system analyzer.

Under the productivity initiative, the equipment was procured at a cost of \$13,647. Officials reported that, on the basis of 3 months of data, the equipment would save \$24,859 in labor costs and \$37 in other costs annually.

WORD PROCESSING CENTER

Submission date: 08/01/84 Investment cost: \$13,614
 Approval date: 08/28/84 Reported 6-month savings: \$19,299
 Operational date: 07/15/85 Months to amortize: 5
 Projected 1-year savings: \$38,598

In August 1984, a military aircraft squadron requested that \$20,892 of productivity funds be approved for the purchase of a two station word processing system. The equipment was to be used for producing administrative material for the squadron and its aircraft maintenance units. The project was justified on the basis of improving the turnaround time of the products by 30 percent, reducing the amount of supplies by 20 percent, and improving the productivity level within the squadron by decreasing labor costs and improving work methods. The unit agreed to "pay" for the project by eliminating one staff position having an annual cost of \$39,632 and decreasing supply expenditures by \$600.

During the first 6 months of equipment use the unit reported a savings of \$19,299. The major portion of the documented savings was the deleted personnel authorization.

ARTHROSCOPY SYSTEM

Submission date: 9/19/84 Investment cost: \$12,100
 Approval date : 1/28/85 Reported 6-month savings: \$90,613
 Operational date: 6/10/85 Months to amortize: 1
 Projected 1-year savings: \$181,226

A military hospital was referring patients to civilian facilities for arthroscopic knee surgery procedures. During a 1-year period 18 patients were referred at a supplemental care cost of \$36,000. Additionally, the arthroscopic procedures being used by the hospital required surgically opening the knee joint, making the patient nonambulatory for the following 7 to 10 days.

Hospital officials determined that acquiring an arthroscopy system at a projected cost of \$12,738 would reduce supplemental care costs and the need to surgically open knees, allowing patients to walk within 1 to 1-1/2 days, thereby returning personnel to full duty at a faster rate.

The system was procured for \$12,100. During the first 6 months of operation, a total of 44 procedures were performed. Officials estimated that \$132,000 in supplemental care costs would have been incurred if the patients had been referred to a

civilian hospital versus estimated in-house cost of \$41,387, for a reported net savings of \$90,613 for the 6-month period.

ENGINE ANALYZER

Submission date: 04/15/82 Investment cost: \$11,784
 Approval date: 11/23/83 Reported 6-month savings: \$89,142
 Operational date: 10/01/84 Months to amortize: 1
 Projected 1-year savings: \$178,284

In November 1983, a military transportation squadron received approval for funds under the productivity initiative to purchase an engine analyzer. This equipment was to be used to diagnose vehicle malfunctions, improve engine tune-ups, cut repair costs, and increase gas mileage by 1.5 percent. The unit's justification for the item noted that in past studies of the equipment by both civilian and military users, the equipment had saved 25 percent of the normal cost of repair parts during the first year of service. On the basis of the unit's workload, the engine analyzer was expected to save \$69,335 annually in material and energy costs and \$330 in maintenance contract costs. In addition, the analyzer was projected to result in a 1.5-percent increase in fleet gas mileage in each of the first 2 years.

Once the equipment became operational, the project reportedly paid for itself in 1 month. Data reported by the using activity 6 months after the project had become operational indicated that savings of \$89,142 had already accrued, including about \$86,000 in direct savings for materials and fuel usage.

MICROCOMPUTERS

Submission date : 6/20/84 Investment cost: \$11,206
 Approval date : 6/28/84 Reported 1-year savings: \$15,982
 Operational date: 12/12/84 Months to amortize: 9

A military organization was directed to participate in functional reviews over a period of 5 years. Additionally, there was a high-priority requirement to develop wartime staffing standards, requiring new and creative approaches. Officials determined that the timetable for development of all staffing standards could not be accomplished through the use of existing manual methods.

As a solution to their mission requirements, the organization proposed the purchase of three microcomputers and associated software to allow the use of lower graded personnel to perform the work. Three microcomputers, procured at a cost of \$11,206, saved a reported \$15,982 during their first year of operation.

ROTARY 16MM MICROFILM CAMERA

Submission date : 10/26/83	Investment cost : \$11,157
Approval date : 6/26/84	Reported 6-month savings: \$20,780
Operational date: 12/11/84	Months to amortize: 4
Projected 1-year savings: \$41,560	

Officials at a military historical research center concluded that a requirement to provide the National Archives and Records Service with microfilm copies of historical material on a continuing basis could not be accomplished with their existing resources. They did determine, however, that providing these materials could be accommodated with the acquisition of a rotary microfilm camera at a projected cost of \$11,157. Officials estimated that three projects waiting to be microfilmed would require 410 days using available equipment, but only 119 days using a rotary camera--generating a personnel cost savings of approximately \$30,688.

During the first 6 months after it was acquired, the camera was used for 72 days of shooting. The same amount of shooting would have required an estimated 317 days using the old system. Officials reported personnel and material savings of \$20,780 for the 6 month reporting period.

DIGITAL BIOMETRIC RULER

Submission date : 11/09/83	Investment cost : \$7,300
Approval date : 2/24/84	Reported 6-month savings: \$20,895
Operational date: 7/18/84	Months to amortize: 2
Projected 1-year savings: \$41,040	

A military hospital was referring patients to civilian facilities to have ultrasound measurements of the eye made before cataract surgery. For example, during a 12-month period, the hospital sent 31 patients to a local medical facility, incurring supplemental care costs of \$6,400.

Hospital officials determined that acquiring a digital biometric ruler, at a projected cost of \$8,400, would provide the in-house measurement capability to save thousands of dollars in supplemental care costs. Potential savings were estimated to be greater in the future because of the addition of one ophthalmologist to the hospital staff. The number of yearly measurements was estimated to be in excess of 100 with this addition. Under the productivity initiative, the equipment was procured at a cost of \$7,300. During the first 6 months, a total of 63 procedures were performed at the hospital for a reported savings of \$20,895.

MULTIMETER

Submission date : 6/21/84 Investment cost : \$4,923
 Approval date : 8/7/84 Reported 6-month savings: \$7,900
 Operational date: 12/05/84 Months to amortize: 4
 Projected 1-year savings: \$15,800

A military organization had a semiannual requirement to calibrate and evaluate selected test equipment used in support of mission aircraft. In order to meet this requirement, a civilian contractor was providing the calibration and evaluation at a cost of \$3,950 per service. Officials at the installation determined that in-house personnel using a \$7,210 multimeter could perform the required services at an annual savings to the government of \$7,900.

The equipment was purchased for \$4,923 under the productivity initiative. During the period December 5, 1984, through June 5, 1985, the calibration and troubleshooting service was completed twice by assigned personnel and resulted in the projected \$7,900 savings in contractor costs.

COROMETRIC NEONATAL MONITORING SYSTEM

Submission date: 8/24/83 Investment cost: \$4,911
 Approval date: 2/23/84 Reported 6-month savings: \$11,338
 Operational date: 8/30/84 Months to amortize: 3
 Projected 1-year savings: \$22,676

A military hospital was transferring all infants needing heart rate monitoring to a civilian facility because the hospital lacked equipment that would allow continuous monitoring of heart rate, respiration, and temperature. Using historical workload data, hospital officials estimated that two infants a month, averaging 10 inpatient days, could be treated in-house if such equipment were available. Using per day neonatal intensive care costs at civilian facilities, hospital officials estimated that approximately \$27,836 in Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) funds could be saved annually for an investment of approximately \$5,000.

A neonatal monitoring system was procured at a cost of \$4,911. During the first 6 months of operation four infants used the neonatal monitor for a period of 40 bed-days. Using the neonatal intensive care costs at the surrounding health care facilities, versus in-house costs, hospital officials reported a savings of \$11,338 in CHAMPUS costs during the 6-month period.

a requirement to manually clean the vehicles and engines. Manual cleaning of an engine required 1 hour, and an entire vehicle cleaning required 3 hours. An average of 18 engines and 7 vehicles were cleaned each day. Historical data showed that approximately 8,775 hours a year were required to perform the cleaning services for a total cost of \$117,147.

In an attempt to increase productivity by reducing the hours required for vehicle cleaning, the division proposed the purchase of a steam cleaner at an approximate cost of \$8,000. Using the above vehicle cleaning averages, it was estimated that the use of such equipment would reduce the required labor hours by 50 percent.

Under the productivity initiative the steam cleaner was purchased at a cost of \$3,628. On the basis of an average of five engines, vehicles, or differentials cleaned daily and a 65-percent increase in productivity using the steam cleaner, the division reported a labor savings of 1,980 hours annually. Using the current average hourly rate of \$15.73 and discounting the cost of natural gas used by the steam cleaner (\$7,076), the division reported an annual savings of \$24,070.

SPIROMETER

Submission date:	5/22/84	Investment cost :	\$3,435
Approval date:	7/25/84	Reported 6-month savings:	\$48,632
Operational date:	11/15/84	Number months to amortize:	1
		Projected 1-year savings:	\$97,264

A military hospital was required to evaluate patients' pulmonary function (a measure of the flow and volume of air in the lungs). The hospital's capability to conduct these evaluations was limited because available equipment could only be used to perform initial screenings and only on adults. Patients requiring complete pulmonary evaluations had to be referred to civilian sources. During a 1-year period, for example, 39 patients were referred to civilian sources for testing.

During the first 6 months after the new equipment became operational, 171 patients were evaluated using the new equipment. Had the equipment not been available these patients would have been referred to private sources at an average pulmonary examination cost of about \$283 per patient. In summary, a \$3,400 investment saved DOD over \$48,000 in its first 6 months of operation.

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