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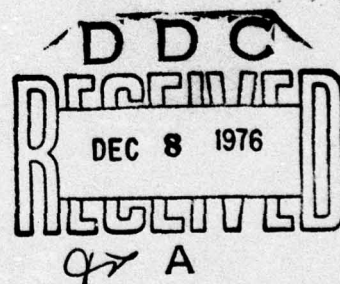
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A PROPOSED R&D MANAGEMENT MODEL

R. F. CHAILLET

H. W. MILES

DECEMBER 1976



**OFFICE OF THE COMPTROLLER
REVIEW AND ANALYSIS DIVISION, COMMAND
MANAGEMENT REVIEW AND EVALUATION BRANCH
5001 EISENHOWER AVENUE ALEXANDRIA, VIRGINIA 22333**

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) THIS REPORT DESCRIBES A PROPOSAL THAT WOULD ACCOUNT FOR THE RESOURCES USED TO PERFORM BASIC RESEARCH AND EXPLORATORY DEVELOPMENT WITHIN THE DEPARTMENT OF DEFENSE. IT DESCRIBES A MEANS BY WHICH R&D MANAGERS CAN DETERMINE THE OUTPUT BEING DERIVED FROM THE RESOURCES EXPENDED. THE PROPOSED SYSTEM COULD BE IMPLEMENTED WITH MINOR CHANGES TO EXISTING REGULATORY REPORTING REQUIREMENTS. NO NEW DOD REPORTING FORMS WOULD BE REQUIRED FOR THE PROPOSED SYSTEM.		



DEPARTMENT OF THE ARMY
HEADQUARTERS US ARMY MATERIEL DEVELOPMENT AND READINESS COMMAND
5001 EISENHOWER AVE., ALEXANDRIA, VA. 22333

30 November 1976

DRCCP-RA

MEMORANDUM FOR RECORD

SUBJECT: Command Management Review and Analysis (CAMERA) of a Proposed R&D Management Model

1. PURPOSE. On 29 April 1976, in Room 10N48, DARCOM Headquarters, Alexandria, Virginia, the Comptroller briefed the Deputy Commanding General for Materiel Development, DARCOM, on the proposed R&D management model.
2. BACKGROUND. This briefing provided the Deputy Commanding General for Materiel Development, DARCOM, a response to his request for how and by what means two recommendations made during the ECOM Laboratory CAMERA presentation could be implemented.
3. DISCUSSION. The briefing was presented in two parts; the Deputy Administrator of the Defense Documentation Center (DDC) described the existing DDC capability and data base management responsibility for DoD RDTE Program data; the Comptroller, DARCOM, Review and Analysis Division, described the proposed system and how it could be implemented within the existing capability of DDC.
4. RECOMMENDATION. One recommendation was presented. The recommendation, to implement the proposed system, was neither accepted nor rejected by the Deputy Commanding General for Materiel Development, DARCOM.

Robert D. Van Briggles
ROBERT D. VAN BRIGGLE
 Acting Chief, Review & Analysis Division
 Comptroller

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DDC	Buff Section <input type="checkbox"/>
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JUSTIFICATION.....	
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ATTENDEES

29 APRIL 1976, 1430 HOURS, ROOM 10N48

LTG G. SAMMET, JR., DCGMD

MR. N. KLEIN, ASST DEP FOR SCIENCE & TECHNOLOGY

MG L. R. SEARS, JR., COMPTROLLER

DR. R. L. HALEY, DEPUTY DIRECTOR, DEVELOPMENT & ENGINEERING

MR. HUBERT E. SAUTER, ADMINISTRATOR, DEFENSE DOCUMENTATION CENTER

MR. J. LINDWARM, OFFICE ASST DEP FOR SCIENCE & TECHNOLOGY

MR. I. BERG, CH, REV & ANAL DIVISION, COMPTROLLER

MR. R. VAN BRIGGLE, REVIEW AND ANALYSIS DIVISION, COMPTROLLER

MR. H. MILES, DEFENSE DOCUMENTATION CENTER (BRIEFER)

MR. CHAILLET, REVIEW AND ANALYSIS DIVISION, COMPTROLLER (BRIEFER)

INTRODUCTION BY

MG L. R. SEARS, JR.

A decision was deferred on two recommendations made during the ECOM Laboratory CAMERA briefing. The purpose of this briefing is to describe the manner in which these recommendations could be implemented with minimum turbulence.

While we were developing the concepts you will see here, we contacted the Defense Documentation Center to determine the impact on their system that our proposal might have. This meeting revealed that DDC was thinking along the same, though more limited, lines of developing a complete management information system that would include accountability of resources used.

The briefing today will be in two parts; first, you will hear from Mr. Herman Miles, the Deputy Administrator of the Defense Documentation Center. The Defense Documentation Center is responsible for carrying out the policy established by the Deputy Director of Defense Research and Engineering for the operation and maintenance of the DOD data bases for R&D planning, on-going work and technical reports. Mr. Miles will describe the current capabilities of DDC. Finally, you will hear from Mr. Chaillet, of my office, who will outline how the existing capability of DDC can be expanded and used to develop a more responsive management information system.

Presentation By

Herman W. Miles

The Defense Documentation Center mission is to provide scientific and technical information products, services, and supporting systems to the

RDT&E community. Our first and primary responsibility is to serve military organizations performing R&D and their contractors.

To accomplish this mission we have an annual budget of approximately 12 million dollars, approximately 460 persons engaged in acquiring, processing, announcing and making technical reports and technical information available on demand or on a recurring basis. DDC resources include two large scale and one small computer, plus an ADP software staff to design and implement support systems.

CHART 1

DDC receives policy direction from the Director of Defense Research and Engineering, specifically Dr. Allen's office and is under the operational control of the Director, DSA, General Vaughan.

CHART 2

DDC was established after World War II and has collected over 1 million documents containing DOD generated or sponsored RDT&E. We maintain a data base containing abstracts of these reports on our computers for retrospective searches, automatic and periodic announcement and other information services. In 1974 we started collecting abstracts on technical information available from two DOD information analysis centers about information made available by these IAC's, but not stored at DDC. An extension of this existing service and system is being offered to you as a means of getting a record of all the results of R&D resourced by DARCOM. DOD directives recognize the existence of technical information in other than technical report form, but the methodology or system did not exist to facilitate collection of the information easily, rapidly and without significant increases in resources. We have the

4. ▲

capability to enter technical information in a decentralized mode from our remote on-line terminals and through DDC's internal on-line input system from hard copy.

CHART 2 - OVERLAY

DDC distributes annually over 400,000 technical reports in hard copy or microform. This distribution is upon request or automatically in accordance with a profile.

DDC operates an on-line retrieval service with terminals at 58 remote locations, of which 21 are at Army R&D labs. They perform approximately 150,000 interrogations of this data base annually. For those without terminals, DDC responds to requests through the mail for retrospective on-demand or recurring searches. The data base of IAC abstracts are available at this time only to the three IAC's who provide the input. DDC has the capability to release information in accordance with the desires of the originator.

CHART 3

At the direction of ODDR&E, DDC has established three other data bases. They are: the on-going work unit data base that was implemented in 1965 and now contains 100,000 records of which 20,000 are active and on-going.

The Program Planning Data Base containing project and task information was started in 1970. We have accumulated historical information as well as the current year submission.

The IR&D Data Base was established in a prototype mode and became operational in 1975. The current system contains new submissions of independent research performed from 32 contractors.

Note that ODDR&E has continued to use DDC for establishment of automated reporting systems that now cover the entire R&D spectrum. Some were established as a means of indicating to Congress that military R&D was being programmed, reviewed to prevent duplication of effort and that Defense R&D was pertinent, relevant and necessary.

CHART 4

The information on this chart was extracted from the final report on the Laboratory Utilization Study, initiated in April 1974 by Dr. M. R. Currie, DDR&E in response to management objectives stated by the Secretary of Defense. The Secretary had indicated concern about the quality and size of the DOD laboratories. Since about 25 percent of the DOD Research, Development, Test and Evaluation (RDT&E) Program is funded through the in-house laboratories of the military services, the efficient management and utilization of these laboratories is recognized to be of crucial importance to the DOD.

A Coordinating Board, headed by the Deputy Director (Research and Advanced Technology), ODDR&E and consisting of members from the military departments, initiated this study on 20 June 1974. The study focused on four principal issues as follows:

- (1) Does the DOD really need In-House Laboratories?
- (2) If the answer to (1) is in the affirmative, how should the services' RDT&E structures be organized and managed to get the most out of the laboratories?
- (3) What is the most appropriate division of effort between the In-House Laboratories, industry, the universities, and other performers in the various areas of the RDT&E program?
- (4) What is the proper size of the laboratory complex in view of the foregoing considerations?

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CHART 5

Data bases exist within DDC that cover the R&D spectrum from the program planning phase through documentation of completed results in the form of technical reports.

Project and task information, dollars and manpower data elements exist in both the Program Planning and On-Going Work Data Bases. If the work is on contract, the On-Going Work System should have the information along with the dollar amount of the contract.

The interrelationship of data elements should permit a gross picture of the results achieved for dollars spent, especially in the 6.1 and 6.2 program elements. However, the system does not yet have this precision.

The entire DOD RDT&E Budget, by program element and within each program element by project, is contained in this booklet*. The booklet is prepared by industry for use by industry. It costs \$15.00 and contains actual spending levels for FY 75 for R&D projects identified by the services and the budgets requested for each project for FY 76, FY 77 and FY 78. DDC has the capability to track R&D projects from the budget -- to program planning -- to work units and finally to completed results in the form of technical reports, if the information is provided by the services.

CHART 6

The booklet I have shown you indicates the Army budget for Project 61101AH53. The project title was Energetic Materials Research with funding of 3.5 million for 3 fiscal years.

* Defense RDT&E Programs and Projects FY___. DMS Inc., 100 Northfield St. Greenwich, Conn., 06830.

1st OVERLAY

THE DDC Program Planning Data Base contains the identical project with funding for five associated tasks approaching or being identical with funding in the budget.

2nd OVERLAY

The DDC Work Unit System revealed 34 work units. Thirty-three were in-house, with funds of 2.9 million in FY 75 and 2.6 million in FY 76. The funds for FY 75 almost match when you compare On-Going Work with Program Planning, but in FY 76, only 2.6 million of On-Going Work is reflected against the 3.5 projected in the Program Planning Data Base. There was one work unit being performed on contract by Princeton University.

3rd OVERLAY

A search of the DDC Technical Report Data Base using the same project number revealed only one technical report with this project number.

CHART 7

This is the DD Form 1473 that accompanied the technical report mentioned. Note item 10 is blank. This is an in-house report prepared by Picatinny Arsenal. Note that the program element and project number appear in field 8, which is reserved for contractor or grant numbers. Also note the difference in the program element and project number in the 1473 includes a prefix 1T, as opposed to the previous chart where the 1T is absent. This is an example of the difficulty in tracing project numbers identified from the budget through the Program Planning Data Base, to the Work Unit System, and finally completed results in the form of Technical Reports. On the surface, it appears that all that Army has

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received from spending \$2.9 Million is one Technical Report, and that is a report prepared by an individual at Picatinny Arsenal for the purpose of fulfilling the requirements of a degree of Doctorate of Philosophy in Physics.

CHART 8

Another example of an attempt to track results achieved for resources spent on work starting as early as July 1970 is Project 6230A24, in the area of Missile Technology. The FY 75 budget showed approximately \$25 Million being spent annually through FY 77. Prior to FY 75, this effort had a different project number.

1st OVERLAY

The DDC Program Planning Data Base contains the identical project with funding for 14 associated tasks being identical to the funding portrayed by the budget.

2nd OVERLAY

A search of the DDC Work Unit System identified 109 work units, 63 were in-house. FY 75 and FY 76 funding for this on-going work does not approach the funding reflected in the Program Planning Data Base. There were 46 on-going work units being performed on contract, of the 46 contracts:

1 was let in 1972;	1 was let in 1973;	3 were let in 1974;
30 were let in 1975;	11 were let in 1976	

Again note the difference in the funding of on-going work versus what was planned. Is this difference the lack of reporting on-going work or are the figures indicative of what is happening? Is the difference being

expended but not reported? If so, what are these resources accomplishing?

3rd OVERLAY

A search of the DDC Technical Report Data Base using the same project number revealed only one technical report with this project number. The technical report is an in-house one from the U.S. Army Missile Command. Although the project number search revealed only one in-house technical report, a contract number search using contract numbers associated with the 46 contract work units, revealed 15 technical reports in our system. However, the project number for these was not reported.

CHART 9

Looking at the DD 1473 that was part of the technical report identified, we see that field 10 is filled in but has a different project number than the one I have been referring to and some additional information that is completely unknown to DDC or anybody who may be looking at this information who is not a part of the U.S. Army Missile Command.

The point of these two examples is either that the system has deficiencies in being able to identify results for dollars spent, or the work results are not being submitted to DDC, if in fact they are documented.

CHART 10

I would like to summarize now with an illustration that indicates how the visibility of DOD laboratories work can be viewed in comparison with the resources being utilized. The top figure in the funds column

10'

reflects dollars expended in FY 73 for 6.1 and 6.2 effort. The second figure represents all other 6.0 money. Since the contents of the Work Unit System is primarily 6.1 and 6.2, you can see the variation in the reporting of work units by lab with funds spent in 6.1 and 6.2 effort. BRL has the best ratio of active work units for dollars spent. Of the four examples, Redstone has the poorest reporting ratio. These are just simple numbers that may or may not be significant. However, a comprehensive reporting of work unit information is a desire of ODDR&E and the OSD Comptroller, who control the purse strings and approve your budgets. It is worth looking at as a defensive measure.

BRL and Picatinny have the best performance in documenting completed work in comparison with 6.1 and 6.2 money spent. HDL, the poorest documentation performance.

Comparing technical reports sent to DDC with active work units, indicates Redstone submitted more technical reports in 1975 than they had work unit summaries, Picatinny and BRL's technical report input compared to active work units is also good. HDL's performance was the worst of the four.

Comparing completed work in 74 with 75 shows two organizations doing more in 75 than 74. But comparing 74-75 technical report input with a 10-year average for the same labs, shows technical report input down. QUESTION: Is R&D costing more and producing less?

Mr. Chaillet of the Comptroller's Office, US Army Materiel Development and Readiness Command, will present a concept for tracking the the accomplishment of R&D from planning through to completion.

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Presentation By

Robert F. Chaillet

Mr. Miles has described the existing DDC capability for storing and retrieving R&D information. Furthermore, he has, I believe, highlighted a major deficiency in the existing system and that is the inadequacies found in the timeliness, completeness, and accuracy of reporting planned, on-going, and completed R&D work.

An abbreviated form of the ECOM Laboratory CAMERA recommendations that precipitated this study is shown here.

CHART 11

These recommendations are interrelated since both call for an accountability of the allocated R&D resources. The difference between them is the organizational elements that would be effected by their implementation. If the first recommendation is accepted it would incorporate the detail of the second and would be implemented Army-wide. Acceptance of the second recommendation would limit the scope of participation to DARCOM and provide us with a system of accountability for R&D resources. In the first case, the Army Regulation 70-9 would be modified and staffed to reflect the changes required to account for resource disposition. In the second instance, only the DARCOM Supplement to AR 70-9 would be changed to reflect the revised reporting requirement.

In either case, no new forms would be required to collect the necessary information. As you will see, the audit trail from planned to completed work can be accomplished on existing DOD Forms.

Before we begin, let us see where we stand today in Basic Research, Exploratory Development, and to a lesser extent in the Advanced Development areas.

CHART 12

The Army requirement is specified; a project or projects are established to satisfy that requirement and these in turn are divided into Tasks. Finally, the Tasks are subdivided, for local administration and execution of work, into work units. But, something is missing in this display and that missing item is --

REVEAL ON

the Results of the Work and its impact on satisfying the stated requirement. This presentation will propose one way in which this information gap may be bridged.

The handout (Appendix) contains the DOD Forms that would be used for the audit trail. Common data elements are highlighted and correspond to the highlighted portions on the next series of vugraphs.

CHART 13

The top most highlighted data element on the first page of your handout corresponds to Number 4 - Level of Summary - on this chart. This DD Form 1634 identifies a DA Project. The next line down that is highlighted corresponds to item Number 8a on this chart and, as you can see, identifies the Program Element and Project Number of this particular project. On the right side of your handout, you will find a highlighted

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area that corresponds to Item 15, Mission Objective, in the lower right portion of the chart. This data element contains the requirement for this work and is usually cited as a paragraph number from the Catalog of Approved Requirement Documents.

So far we know we are dealing with a project, what its number is, what program element it is part of, and finally the Army Requirement that this project will satisfy.

CHART 14

The second page of your handout contains another DD Form 1634. As shown on this chart, this is for a Task under the project shown previously.

If this were a Single Program Element Funded report, the terminology in data element 4 would read Scientific or Technology Areas instead of Task, and in data element 8a the Task number 01 would be an alpha character.

Under any project level report, there may be any number of Tasks for which this form would be prepared.

So far, we have been able to track the planned work and its mission objective from the project level to the task level.

Turning to the third page of the handout, you will find the DD Form 1498.

CHART 15

Selected portions of the DD Form 1498 are shown on this chart to call your attention to the manner in which we can track from the planning

documents to the on-going work documents. At the top of your handout, the highlighted areas correspond to data element 10, at the top of this chart. Again we see the Program Element, Project, and the Task number as shown on the previous chart. What has been added here is the Work Unit number.

Within data element 10, you will note that the Mission Objective is printed out for those DD Form 1498's, where the preparing activity has seen fit to include it.

I call your attention to the highlighted portion on the lower top third of your handout and the corresponding clear portion of the chart labeled Contract/Grant, item 17. I will have more to say about this later.

So far we find that we have been able to track the plans expressed in the Project and Task documents to the execution of those plans at the Work Unit level. But, what happened to the work? What were the results? Were there any results? Were the results used? How? By whom? For what?

CHART 16

We come to the final page of the handout and an explanation how we might use this DD Form to answer the questions just posed. On your handout, the areas highlighted in yellow and appearing on the right of this chart, provide the track we need from planning of work through to completion.

If we use the DD Form 1473 as a single page reporting document for work accomplished, in conjunction with more extensive coverage of what is to be reported as on-going work, we can begin to see the formation of a

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management information system that would let us question the present and influence the future rather than simply review the past. Let me present a few examples of what I mean.

Since the mission objective is stated on each document from planning through completion, we could question a requirement that has been cited as the justification for generating numerous reports or presentations and is still being cited as justification because the requirement has not been satisfied. Possibly it is time to re-examine the requirement. Conversely, are we working on all requirements? Are some requirements more heavily funded than their priority would warrant? What is the relationship between the requirements being cited and the development plan of which they are supportive? Where are contracts or grants going by corporation or university, and what accomplishments have been attained from these? Finally, projects, tasks or work units that have produced few if any results over the past two or three years could be identified and questioned in greater detail during the program review process.

Addressing the last page of your handout and the chart shown here, we have now reached the point where modification to existing regulations or supplements will be required.

As I said earlier, the use of the DD Form 1473 is envisioned as a single page reporting document used to reflect the accomplishments achieved under a particular work unit. Your handout has one example of a research measure, highlighted at the bottom of the page. On the chart, we have still another measure to show the range of data that could be captured, coded, sorted, summarized and retrieved as required by management.

To accomplish this, the Defense Documentation Center has agreed to establish a computer file to achieve what has been described. DARCOM will need to modify existing regulations or supplements to establish the reporting requirement for single page usage of the DD Form 1473. Neither of these events, establishing the computer file or modifying the regulations and supplements, will require a large expenditure of resources. Their accomplishment does hold promise for a large return on a minimal investment by increasing completeness and accuracy of reports thereby providing an information base for decision making.

The next chart contains some proposed measures. This list is by no means exhaustive but rather should be considered as the starting point of a systematic means of accounting for resources used.

CHART 17

The highlighted areas on this chart correspond to the ones on your handout and the chart shown. Each of the measures shown, and any subsequent ones added, must be defined carefully for inclusion in the regulation or supplement. As an example of the type of definition that is required for each measure, I have taken the liberty of defining a Professional Journal Article, as shown on the next chart.

CHART 18

The documents cited here are available in any technical library. So there can be no mistake as to what constitutes a professional journal, the appropriate sections or descriptions of the three documents shown here cover all professional society publications. An article published in a source not listed in one of these documents would not be a professional journal article; It may be a trade journal or a newsmagazine

but not a Professional Journal Article.

The conclusions of this study are shown here.

CHART 19

The audit trail from requirement and planning through to completed work can be made available for more effective corporate management.

As indicated earlier, one thing we could do would be to look at existing requirements to find out how much we have spent to date to satisfy them, how long have we been working on them, and what have we obtained for this investment.

We could look at particular Projects, Tasks, or Work Units periodically to find out what has been accomplished over the past two or three years. During the ECOM CAMERA presentation, 14 of the 54 Work Units that had been active for five or more years had produced two or less products, that is reports, patents or presentations, and that if these work units had been terminated after three unproductive years we would have saved 2.7 million dollars.

Also, through periodic review of on-going work we can insure that there is a continuing need for the work, that progress is being made, that resources are being used for the purpose intended, and that performance can be measured objectively and uniformly among DARCOM elements.

We can implement this within DARCOM with minimum change to regulations and by using forms in existence.

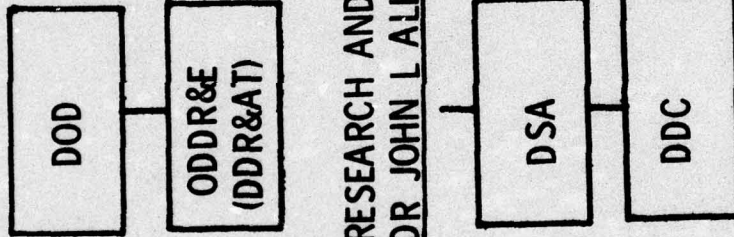
Finally, whether we like it or not, the day of accounting for resource utilization is here and DARCOM should take the lead in establishing how this system or accountability will be accomplished.

CHART 20

We believe we have demonstrated how the recommendations on this chart can be implemented, at least for DARCOM. We believe we have reached the decision point. Do we go forward with this concept of accountability and close the loop you saw earlier, or do we continue to perpetuate the information gap that currently precludes us from doing the best job of corporate management.

Thank you Gentlemen, that concludes my presentation.

DDC POLICY FLOW



DEPUTY DIRECTOR, RESEARCH AND ADVANCED TECHNOLOGY
DR. JOHN L. ALLEN

RDT&E INFORMATION AVAILABLE

	<u>AMOUNT (000)</u>	<u>TIME SPAN</u>	<u>ANNUAL OUTPUT (000)</u>
<u>TECHNICAL REPORTS</u>	1,200	WWII	400
<u>DATA BASES</u>			
DD 1473 - TECHNICAL REPORT ABSTRACTS	825	1953	150 On-Line 20 Batch
- IAC Abstracts	25	1974	IAC Use Only On-Line

MANAGEMENT INFORMATION AVAILABLE

	<u>AMOUNT (000)</u>	<u>TIME SPAN</u>	<u>ANNUAL OUTPUT (000)</u>
<u>DATA BASES</u>			
DD 1498 - On Going Work	100	1965	5.5
DD 1634 - Program Planning	20	1970	.5
INDEPENDENT RESEARCH - IR&D	6	1975	1.0

MILITARY R & D LABORATORY FUNDING AND MANNING

FY 73

	<u>BILLION</u>	<u>PERSONNEL (1,000)</u>	<u>Nbr of LABS</u>
DEPARTMENT OF ARMY	\$ 1.0	24.0	39
DEPARTMENT OF NAVY	1.2	32.5	27
DEPARTMENT OF AIR FORCE	<u>.6</u>	<u>8.3</u>	<u>12</u>
TOTALS	\$ 2.8	64.8	78

R&D SPECTRUM

● PROGRAM PLANNING

■ PROJECT-TASKS

- Dollars
- Manpower

● ON-GOING WORK

■ IN-HOUSE

- Dollars
- Manpower

■ CONTRACTS

- Number of Contracts
- Dollar Amount of Contracts

● RESULTS

■ TECHNICAL REPORTS

DEFENSE RDT&E PROGRAMS & PROJECTS

<u>PROJECT NUMBER</u>	<u>TITLE</u>	<u>FUNDS (Millions)</u>		
		<u>FY 75</u>	<u>FY 76</u>	<u>FY 77</u>
61102AH53	Energetic Materials Research	3.5	3.5	3.5
<u>PROGRAM PLANNING DATA BANK</u>				
61102AH53	Energetic Materials Research	2.8	3.5	3.5
	Physical Sciences Research	.1	.1	.1
	Combustion Research	.5	.6	.6
	Ignition Research	.5	.6	.6
	Pyrotechnics Research	.1	.2	.2
	Explosives Research	1.6	1.9	1.9
<u>ON GOING WORK</u>				
61102AH53	33 In-House Work Units	2.9	2.6	
	1 Contract Work Unit		.03	
<u>TECHNICAL REPORT</u>				
61102AH53	1 Technical Report			

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16. DISTRIBUTION STATEMENT (of this Report) APPROVED FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED.			
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)			
18. SUPPLEMENTARY NOTES			
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)			
BAND STRUCTURE	FLUORESCENCE	OPTICAL ABSORPTION	QUANTUM YIELDS
CHARGE TRANSFER	HMX	PHOSPHORSCENCE	REFLECTANCE SPECTRA
CIRCULAR DICHROISM	LIFETIMES	PHOTODECOMPOSITION	RDX
DOPING	LUMINESCENCE	POLYNITRAMINES	
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) OPTICAL ABSORPTION MEASUREMENTS HAVE CONFIRMED THE REPORTS OF EARLIER WORKERS THAT THE SOLID FORMS OF THE CYCLIC POLYNITRAMINES KNOWN AS RDX AND HMX HAVE A WEAK ABSORPTION BAND IN THE NEAR ULTRA-VIOLET WHICH IS NOT OBSERVED IN SPECTRA OF THE SOLVATED COMPOUNDS. FLUORESCENCE MEASUREMENTS ON SOLID SAMPLES OF THESE MATERIALS SHOW A WEAK EMISSION, THE EXCITATION SPECTRUM OF WHICH CORRESPONDS TO THIS ABSORPTION BAND.			

CHART 7

DEFENSE RDT&E PROGRAMS & PROJECTS

PROJECT NUMBER	TITLE	FUNDING (Millions)		
		FY 75	FY 76	FY 77
62303A214	Missile Technology	23.5	26.0	26.1

PROGRAM PLANNING DATA BANK

62303A214	Missile Technology 14 Tasks with related titles	23.5	26.0	26.1
-----------	--	------	------	------

ON GOING WORK

62303A214	109 Work Units	9.9		
	63 In-House		12.8	
	46 Contract		5.3	

TECHNICAL REPORT

62303A214	1 Technical Report			
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UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER TECHNICAL REPORT RE-75-27	2. JOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) A CURSORY EXAMINATION OF INFRARED AIR DEFENSE SYSTEMS IN A SURFACE-TO-SURFACE MODE, (U)		5. TYPE OF REPORT & PERIOD COVERED
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) RONALD C. PASSMORE, RAY H. FARMER, THOMAS K. LO, AND CHARLES F. HESTER		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS COMMANDER, US ARMY MISSILE COMMAND ATTN: AMSMI-RE REDSTONE ARSENAL, ALABAMA 35809		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS DA PROJECT NO. 1M362303A21401, AMCMS CODE NO. 632303.11.21401
11. CONTROLLING OFFICE NAME AND ADDRESS COMMANDER, US ARMY MISSILE COMMAND ATTN: AMSMI-RPR REDSTONE ARSENAL, ALABAMA 35809		12. REPORT DATE 15 APRIL 1975
		13. NUMBER OF PAGES 36
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) CONFIDENTIAL
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE XGDS-3, PART IV
16. DISTRIBUTION STATEMENT (of this Report)		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) INFRARED (IR) HOMING WEAPONS MAN-PORTABLE AIR DEFENSE SYSTEM CREW-SERVED AIR DEFENSE SYSTEM		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) INFRARED HOMING WEAPONS HAVE BEEN AND CONTINUE TO BE DEVELOPED FOR ARMY AIR DEFENSE APPLICATIONS. THE PERFORMANCE OF THESE WEAPONS AGAINST AIRBORNE THREATS IS WELL DOCUMENTED. IN A VERY CURDORY MANNER, THIS REPORT EXAMINES THE POSSIBILITY OF USING THESE WEAPONS AGAINST GROUND TARGETS. THE MAIN PROBLEM AREAS DISCUSSED INCLUDE CLUTTER PERFORMANCE OF THE INFRARED SENSOR, GUIDANCE CONSIDERATIONS FOR GROUND-TO-GROUND, AND GENERAL WARHEAD CONSIDERATIONS.		

CHART 9

R&D LABORATORY VISIBILITY

RESOURCES UTILIZED		RESULTS ACHIEVED		
FUNDS (Millions)	PERSONNEL Mil & Civ	ACTIVE WORK UNITS	COMPLETED WORK (T. R.)	
			74	75 Avg
<u>BRL</u>	27.5 30.9 <u>58.4</u>	883	152	223 292
<u>HDL</u>	24.3 42.5 <u>66.8</u>	1,587	83	61 95
<u>REDSTONE</u>	28.4 64.3 <u>92.7</u>	1,259	110	176 186
<u>PICATINNY</u>	17.5 80.0 <u>97.5</u>	2,919	162	141 251

RECOMMENDATIONS

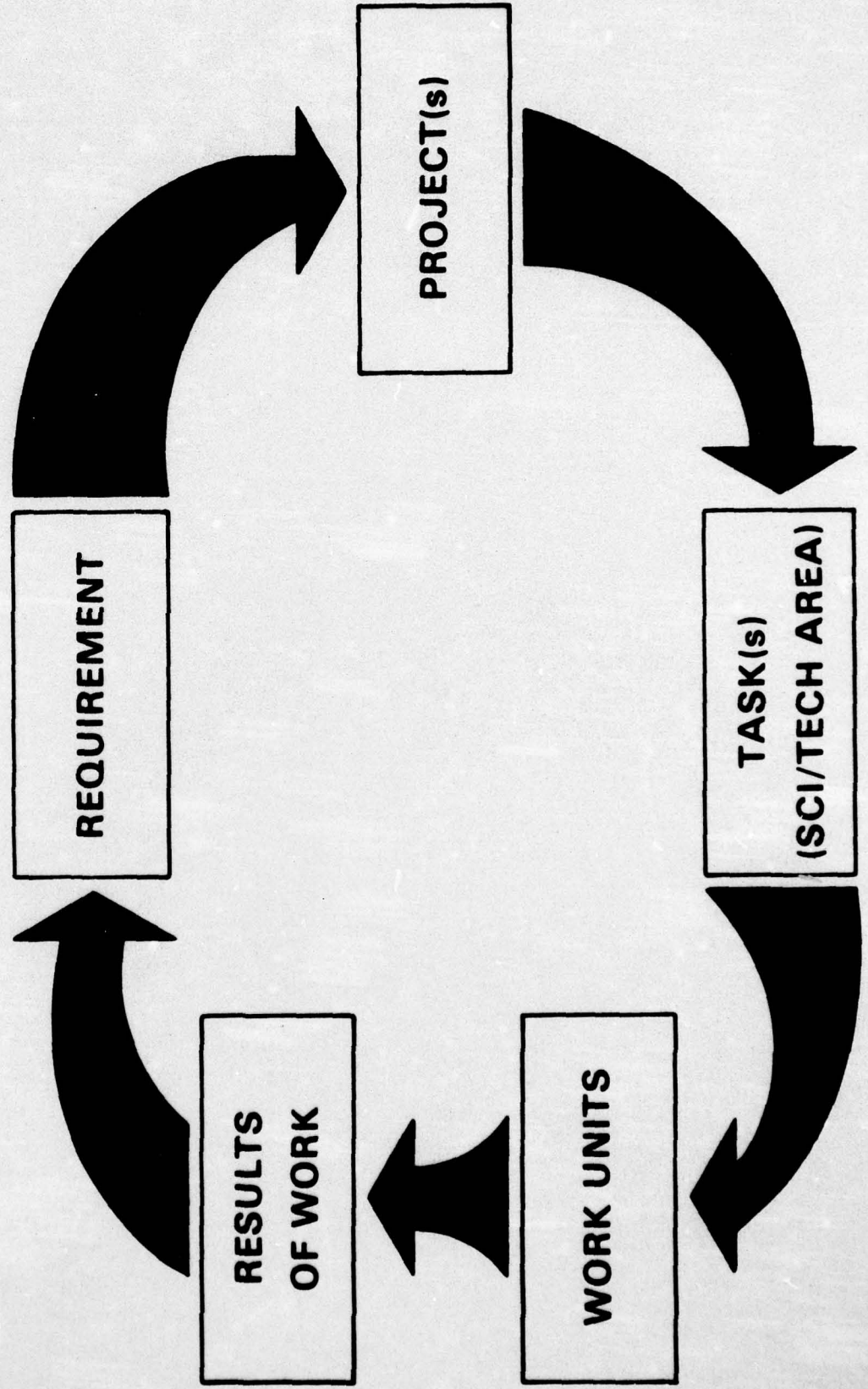
**ECOM
LAB CAMERA**

- PREPARE AND COORDINATE A CHANGE TO CHAPTER 3, AR 70-9 TO INCORPORATE REPORTING OF R&D WORK IN ALL BUDGET CATEGORIES AND SPECIFYING INCLUSION OF THE RESULTS OF THE R&D EFFORT IN TERM OF PAPERS, PRESENTATIONS, PATENT RELATED ACTIONS, APPLICATIONS TO ITEMS OR MILESTONES ACHIEVED (ACTION: AMCRD)

- IDENTIFY BY BUDGET CATEGORY AND SOURCE (IN-HOUSE-EXTERNAL) AND REPORT:
 - RESEARCH OUTPUTS (PRODUCTS)
 - DOLLARS AND MANYEARS EXPENDED ON RESEARCH OUTPUTS
 - APPLICATION OF RESEARCH OUTPUT TO SYSTEMS OR EQUIPMENT

R&D DOCUMENTATION TODAY

(6.1, 6.2 AND 6.3A)



THE AUDIT TRAIL

RESEARCH AND DEVELOPMENT PLANNING SUMMARY

3. KIND OF SUMMARY	4. LEVEL OF SUMMARY PROJECT	5. SUMMARY SECURITY
8a. PROGRAM ELEMENT/PROJECT/TASK AREA NUMBER 6NNNNA NANNNNNNANN		8b. FORMER, ETC.
9. TITLE 10. RESPONSIBLE DOD ORGANIZATION		11. START 12. COMPLETION 13. RESOURCE ESTIMATE
14. PARTICIPATION 16. SCI/TECH AREA		15. MISSION OBJECTIVE CARDS PARA

17-19

DD FORM 1634

46-17



RESEARCH AND DEVELOPMENT PLANNING SUMMARY

3. KIND OF SUMMARY	4. LEVEL OF SUMMARY TASK	5. SUMMARY SECURITY
8a. PROGRAM ELEMENT/PROJECT/TASK AREA NUMBER 6NNNNA NANNNNN ANNN-01		8b. FORMER, ETC.
9. TITLE 10. RESPONSIBLE DOD ORGANIZATION	11. START 13. RESOURCE ESTIMATE	12. COMPLETION
14. PARTICIPATION	15. MISSION OBJECTIVE	
16. SCI/TECH AREA	CARDS PARA	

17-19

DD FORM 1634

4-6-17

THE AUDIT TRAIL

REPORT DOCUMENTATION PAGE

4. TITLE TRAINING DEVICE REQUIREMENT

7. AUTHOR(s)

9. PERFORMING ORGANIZATION

11.

14.

16.

17.

18.

19.

20. ABSTRACT:

TRAINING DEVICE REQUIREMENT 0031 -76 PREPARATION OF THE ENGINEERING REQUIREMENTS FOR A CALIBER .22 RIMFIRE ADAPTER FOR THE M16A1 RIFLE

6. PERFORMING ORG. REPORT NUMBER
MISS OBJ CARDS PARA

8. CONTRACT OR GRANT NUMBER

DA-NN-NNN-AA-NNNN

10. PROGRAM ELEMENT PROJECT, TASK
AREA AND WORK UNIT NUMBERS

6NNNNA

NANNNNNANNNN-01-001

12.

13.

15.

15a.

DD FORM 1473

4-6-17

CHART 16



R&D MEASURES

— A PROPOSAL —

<u>MEASURES</u>	<u>CODE</u>	<u>YEAR ACCOMPLISHED</u>
PROFESSIONAL JOURNAL ARTICLE	0001	75
TRADE JOURNAL ARTICLE	0005	XX
TECHNICAL REPORT, NOTE OR MEMO	0010	XX
TECHNICAL DATA PACKAGE	0015	XX
MILITARY SPECIFICATION	0020	XX
MILITARY STANDARD	0021	XX
MILITARY HANDBOOK	0022	XX
REQUIREMENT DOCUMENT (ROC)	0030	XX
TRAINING DEVICE REQUIREMENT	0031	76
PATENT (INVENTION) DISCLOSURE	0100	XX
PATENT APPLICATION	0105	XX
PATENT AWARD	0106	XX
CONFERENCE/SYMPOSIA PRESENTATION	0200	XX
TECHNICAL BRIEFING (INFORMATION)	0210	XX
TECHNICAL BRIEFING (DECISION, E.G., IPR)	0215	XX

PROFESSIONAL JOURNAL ARTICLE

• ARTICLES PUBLISHED BY ORGANIZATIONS LISTED IN ONE OF THE DOCUMENTS LISTED BELOW:

- **ENCYCLOPEDIA OF ASSOCIATIONS – SECTION ON
SCIENTIFIC, ENGINEERING AND TECHNICAL
ORGANIZATIONS**
- **DIRECTORY OF EUROPEAN ASSOCIATIONS – PART 2,
NATIONAL LEARNED, SCIENTIFIC AND TECHNICAL
SOCIETIES**
- **YEARBOOK OF INTERNATIONAL ORGANIZATIONS –
WHERE IT IS STATED IN THE SECTION ON ORGANIZATION
AIM THAT THE PURPOSE OF THE ORGANIZATION IS
RESEARCH IN MEDICAL, SCIENTIFIC OR ENGINEERING
FIELDS**

CONCLUSIONS

- AN INFORMATION GAP EXISTS
- RESOURCES USED CAN BE TRACKED TO RESULTS OBTAINED
- A VARIETY OF MANAGEMENT INFORMATION REQUIREMENTS CAN BE MET
- DOD FORMS, NOW IN EXISTENCE, CAN BE USED
- MINIMUM CHANGE TO DARCOM REPORTING REQUIREMENT
- DEFENSE DOCUMENTATION CENTER WILL PROVIDE DATA PROCESSING SUPPORT
- DARCOM WILL BE ACTING NOT REACTING

RECOMMENDATION



- **IMPLEMENT THE CONCEPT OF TRACKING RESOURCES TO RESULTS BY:**
 - **MODIFYING THE DARCOM SUPPLEMENT TO AR 70-9 TO REFLECT NEW REQUIREMENTS TO REPORT PRODUCTS OF WORK, AND APPLICATION OF RESULTS OF WORK, ON DD FORM 1473**
 - **REQUIRING COMPLIANCE WITH THE EXISTING REPORTING REQUIREMENTS OF AR 70-9 AND ITS DARCOM SUPPLEMENT**
 - **IDENTIFYING AND CODIFYING LEGITIMATE MEASURES OF THE R&D EFFORT**
 - **INITIATING APPROPRIATE ACTION TO CHANGE AR 70-9 TO REQUIRE THAT THE CONCEPT DESCRIBED BE IMPLEMENTED ARMY-WIDE**

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APPENDIX

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RESEARCH AND DEVELOPMENT PLANNING SUMMARY		1. AGENCY ACCESSION	2. DATE OF SUMMARY	REPORT CONTROL SYMBOL DD-DR&E (AR) 925		
3. KIND OF SUMMARY	4. LEVEL OF SUMMARY PROJECT	5. SUMMARY SECURITY	6. REGRADING GROUP	7. WORK SECURITY		
8a. PROGRAM ELEMENT/PROJECT/TASK AREA NUMBER 6NNNA NANNNNNNANN		8b. FORMER PROGRAM ELEMENT/PROJECT/TASK AREA NUMBER				
9. TITLE (Precede with Security Classification Code)						
10. RESPONSIBLE DOD ORGANIZATION NAME ADDRESS RESP IND TELEPHONE NO.			11. START DATE		12. COMPLETION DATE	
			13. RESOURCES ESTIMATE	c. RDT & E FUNDS (Thousands)	d. % OF FUNDS ON CONTRACT GRANT PROGRAMS	
			CURRENT FY			
			BUDGET FY			
14. PARTICIPATION			15. MISSION OBJECTIVE CARDS Para.			
16. SCIENTIFIC TECHNICAL AREA						
17. THROUGH 19.						

1 43

RESEARCH AND DEVELOPMENT PLANNING SUMMARY		1. AGENCY ACCESSION	3. DATE OF SUMMARY	REPORT CONTROL SYMBOL DD-DR&E (AR) 925	
3. KIND OF SUMMARY	4. LEVEL OF SUMMARY TASK	5. SUMMARY SECURITY	6. REGRADING GROUP	7. WORK SECURITY	
6a. PROGRAM ELEMENT/PROJECT/TASK AREA NUMBER 6NNNNA NANNNNNNNANN-01		6b. FORMER PROGRAM ELEMENT/PROJECT/TASK AREA NUMBER			
8. TITLE (Precede with Security Classification Code)					
10. RESPONSIBLE DOD ORGANIZATION NAME ADDRESS RESP. IND. TELEPHONE NO.			11. START DATE		12. COMPLETION DATE
			13. RESOURCES ESTIMATE	14. RDT & E FUNDS (Thousands)	15. % OF FUNDS ON CONTRACT GRANT PROGRAMS
			CURRENT FY		
			BUDGET FY		
16. PARTICIPATION			15. MISSION OBJECTIVE CARDS Para.		
16. SCIENTIFIC TECHNICAL AREA					
17. THROUGH 19.					

***** Miss. Obj. CARDS Para.

11. TITLE (Precede with Security Classification Code)*

12. SCIENTIFIC AND TECHNOLOGICAL AREAS*

13. START DATE 14. ESTIMATED COMPLETION DATE 15. FUNDING AGENCY 16. PERFORMANCE METHOD
B. Contract

17. CONTRACT/GRANT DA-NN-NNN-AA-NNNN
a. DATES/EFFECTIVE: EXPIRATION:
b. NUMBER:*
c. TYPE: d. AMOUNT:
e. KIND OF AWARD: f. CUM. AMT.

18. RESOURCES ESTIMATE a. PROFESSIONAL MAN YRS b. FUNDS (in thousands)
PRECEDING
FISCAL YEAR CURRENCY

19. RESPONSIBLE DOD ORGANIZATION
NAME:* XYZ Command
ADDRESS:*
RESPONSIBLE INDIVIDUAL
NAME:
TELEPHONE:

20. PERFORMING ORGANIZATION
NAME:* PDQ Corp.
ADDRESS:* Anywhere, USA
PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)
NAME:* Public, John Q.
TELEPHONE:
SOCIAL SECURITY ACCOUNT NUMBER:

21. GENERAL USE

ASSOCIATE INVESTIGATORS
NAME: Doe, Jane M.
NAME:

22. KEYWORDS (Precede Each with Security Classification Code)

23. TECHNICAL OBJECTIVE,* 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)

* Available to contractors upon originator's approval.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. DANNNNNN	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) The Transition of Experienced Pilots to a Frequency-Separated Aircraft Attitude Display J HFS Vol 17, No 4 1975		5. TYPE OF REPORT & PERIOD COVERED
		6. PERFORMING ORG. REPORT NUMBER Miss Obj CARDS Para
7. AUTHOR(s) Public, John Q Doe, Jane M		8. CONTRACT OR GRANT NUMBER(s) DA-NN-NNN-AA-NNNN
9. PERFORMING ORGANIZATION NAME AND ADDRESS PDQ Corp Anywhere, USA		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 6NNNNA NANNNNNNANNN-01-001
11. CONTROLLING OFFICE NAME AND ADDRESS		12. REPORT DATE
		13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) XYZ Command		15. SECURITY CLASS. (of this report)
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18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Professional Journal Article -- 0001-75		

DD FORM 1473 1 JAN 73 EDITION OF 1 NOV 65 IS OBSOLETE

A-5

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